SECTION ECECEC ENGINE CONTROL SYSTEM C

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CONTENTS

MRA8DE

PRECAUTIONS 9 Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TEN-SIONER" SIONER" 9 Precaution for Procedure without Cowl Top Cover9 On Board Diagnostic (OBD) System of Engine and CVT 9 General Precautions 10
PREPARATION13
PREPARATION13Special Service Tools13Commercial Service Tools13
SYSTEM DESCRIPTION15
COMPONENT PARTS15
ENGINE CONTROL SYSTEM15
ENGINE CONTROL SYSTEM : Component Parts Location

EVAP Canister Vent Control Valve24EVAP Control System Pressure Sensor25Exhaust Valve Timing Control Position Sensor25Exhaust Valve Timing Control Solenoid Valve25Fuel Injector25Fuel Level Sensor Unit, Fuel Filter and Fuel Pump
Assembly
Intake Valve Timing Control Solenoid Valve27 Intake Manifold Runner Control Valve
Knock Sensor28 Mass Air Flow Sensor (with Intake Air Tempera- ture Sensor)
Park/Neutral Position Switch
STRUCTURE AND OPERATION
SYSTEM
ENGINE CONTROL SYSTEM
MULTIPORT FUEL INJECTION SYSTEM
ELECTRIC IGNITION SYSTEM
INTAKE VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL	
INTAKE MANIFOLD RUNNER CONTROL	
INTAKE MANIFOLD TUNING SYSTEM	
ENGINE PROTECTION CONTROL AT LOW EN- GINE OIL PRESSURE	
FUEL FILLER CAP WARNING SYSTEM	
AIR CONDITIONING CUT CONTROL	
COOLING FAN CONTROL	
STARTER MOTOR DRIVE CONTROL	
EVAPORATIVE EMISSION SYSTEM	
AUTOMATIC SPEED CONTROL DEVICE (ASCD) 51 AUTOMATIC SPEED CONTROL DEVICE (AS- CD) : System Description	
CAN COMMUNICATION	-
ECO MODE CONTROL	
SPORT MODE CONTROL	
OPERATION54	4
AUTOMATIC SPEED CONTROL DEVICE (ASCD) 54 AUTOMATIC SPEED CONTROL DEVICE (AS- CD) : Switch Name and Function	
ON BOARD DIAGNOSTIC (OBD) SYSTEM 55 Diagnosis Description	5
DIAGNOSIS SYSTEM (ECM)	6
DIAGNOSIS DESCRIPTION	

DIAGNOSIS DESCRIPTION : DTC and FreezeFrame Data56DIAGNOSIS DESCRIPTION : Counter System57DIAGNOSIS DESCRIPTION : Driving Pattern60DIAGNOSIS DESCRIPTION : System Readiness61DIAGNOSIS DESCRIPTION : System Readiness61DIAGNOSIS DESCRIPTION : Permanent Diag- nostic Trouble Code (Permanent DTC)62DIAGNOSIS DESCRIPTION : Malfunction Indica- tor Lamp (MIL)63On Board Diagnosis Function63CONSULT Function66
ECU DIAGNOSIS INFORMATION76
ECM76Reference Value76Fail Safe89DTC Inspection Priority Chart92DTC Index93Test Value and Test Limit96
WIRING DIAGRAM105
ENGINE CONTROL SYSTEM105 Wiring Diagram
BASIC INSPECTION125
DIAGNOSIS AND REPAIR WORKFLOW125 Work Flow
BASIC INSPECTION130 Work Procedure
ADDITIONAL SERVICE WHEN REPLACING ECM
VIN REGISTRATION
ACCELERATOR PEDAL RELEASED POSI- TION LEARNING
THROTTLE VALVE CLOSED POSITIONLEARNING138Description138Work Procedure138
IDLE AIR VOLUME LEARNING139Description139Work Procedure139
MIXTURE RATIO SELF-LEARNING VALUE CLEAR141

Description
FUEL PRESSURE
HOW TO SET SRT CODE
SRT Set Driving Pattern
HOW TO ERASE PERMANENT DTC150 Description
Work Procedure (Group A)151 Work Procedure (Group B)153
DTC/CIRCUIT DIAGNOSIS 156
TROUBLE DIAGNOSIS - SPECIFICATION
VALUE
Description156
Component Function Check 156
Diagnosis Procedure157
POWER SUPPLY AND GROUND CIRCUIT 163
Diagnosis Procedure
U0101 CAN COMM CIRCUIT167
Description
DTC Logic
Die Logic
-
U1001 CAN COMM CIRCUIT 168
Description168
DTC Logic168
Diagnosis Procedure168
P0011 IVT CONTROL169
DTC Logic 169
Diagnosis Procedure 170
Component Inspection171
P0014 EVT CONTROL172
DTC Logic 172
Diagnosis Procedure173
Component Inspection174
P0031, P0032 A/F SENSOR 1 HEATER 175
DTC Logic 175
Diagnosis Procedure175
Component Inspection (A/F Sensor 1 Heater) 176
P0037, P0038 HO2S2 HEATER177
DTC Logic 177
Diagnosis Procedure 177
Component Inspection (HO2S Heater)
P0075 IVT CONTROL SOLENOID VALVE 179
DTC Logic
Diagnosis Procedure
Component Inspection (IVT Control Solenoid Valve)
100

P0078 EVT CONTROL SOLENOID VALVE 182	
DTC Logic	А
Diagnosis Procedure	_
Valve)183	EC
P0101, P0102, P0103 MAF SENSOR	
DTC Logic	С
Component Inspection (MAF Sensor)	
P0111 IAT SENSOR191	D
DTC Logic191 Component Function Check192	
Diagnosis Procedure	
Component Inspection192	E
P0112, P0113 IAT SENSOR 193	
DTC Logic	F
Diagnosis Procedure	
P0116 ECT SENSOR 195	G
DTC Logic	0
Component Function Check	
Diagnosis Procedure196	Н
Component Inspection196	
P0117, P0118 ECT SENSOR 197	
DTC Logic	1
Diagnosis Procedure	
	J
P0122, P0123 TP SENSOR 199 DTC Logic	
Diagnosis Procedure	
Component Inspection (TP Sensor)201	K
P0125 ECT SENSOR	
DTC Logic	L
Diagnosis Procedure202 Component Inspection	
	M
P0127 IAT SENSOR	1 V I
Diagnosis Procedure	
Component Inspection205	Ν
P0128 THERMOSTAT FUNCTION 206	
DTC Logic206	0
Diagnosis Procedure	0
P0130 A/F SENSOR 1	Р
DTC Logic209	
Component Function Check	
Diagnosis Procedure	
P0131 A/F SENSOR 1	
DTC Logic213 Diagnosis Procedure214	

P0132 A/F SENSOR 1	216
DTC Logic	216
Diagnosis Procedure	
P0137 HO2S2	219

	-
DTC Logic	219
Component Function Check	220
Diagnosis Procedure	221
Component Inspection (HO2S2)	222
,	

P0138 HO2S2 224

DTC Logic	
Component Function Check	
Diagnosis Procedure	
Component Inspection (HO2S2)	228

P0139 HO2S2	231
DTC Logic	231
Component Function Check	
Diagnosis Procedure	233
Component Inspection (HO2S2)	

P014C, P014D, P015A, P015B A/F SENSOR

1	237
DTC Logic	237
Diagnosis Procedure	239
Component Inspection (A/F Sensor 1 Heater)	
Component Inspection (MAF Sensor)	241

P0171 FUEL INJECTION SYSTEM FUNC-

TION	245
DTC Logic	245
	246

P0172 FUEL INJECTION SYSTEM FUNC-

TION	249
DTC Logic	249
Diagnosis Procedure	
P0181 FTT SENSOR	

DTC Logic	253
Component Function Check	254
Diagnosis Procedure	255
Component Inspection	

P0182, P0183 FTT SENSOR	257
DTC Logic	257
Diagnosis Procedure	
Component Inspection	

P0196 EOT SENSOR	260
DTC Logic	260
Component Function Check	262
Diagnosis Procedure	262
Component Inspection	262

P0197, P0198 EOT SENSOR	263
DTC Logic	263
Diagnosis Procedure	
Component Inspection (EOT Sensor)	264

P0222, P0223 TP SENSOR	265
DTC Logic	. 265
Diagnosis Procedure	
Component Inspection (TP Sensor)	. 267
P0300, P0301, P0302, P0303, P0304 MIS-	
	200
FIRE DTC Logic	
Diagnosis Procedure	
	. 209
P0327, P0328 KS	274
DTC Logic	. 274
Diagnosis Procedure	. 274
Component Inspection (KS)	. 275
	070
P0335 CKP SENSOR (POS)	
DTC Logic Diagnosis Procedure	
Component Inspection [CKP Sensor (POS)]	
Component inspection [CKP Sensor (POS)]	. 270
P0340 CMP SENSOR (PHASE)	279
DTC Logic	
Diagnosis Procedure	
Component Inspection [CMP Sensor (PHASE)]	. 281
P0420 THREE WAY CATALYST FUNCTION	
DTC Logic	
Component Function Check	
Diagnosis Procedure	. 284
P0441 EVAP CONTROL SYSTEM	287
DTC Logic	. 287
Component Function Check	. 288
Diagnosis Procedure	. 289
P0443 EVAP CANISTER PURGE VOLUME	
CONTROL SOLENOID VALVE	202
DTC Logic	
Dic Logic Diagnosis Procedure	
Component Inspection	
	. 295
P0444, P0445 EVAP CANISTER PURGE	
VOLUME CONTROL SOLENOID VALVE	297
DTC Logic	. 297
Diagnosis Procedure	. 297
Component Inspection (EVAP Canister Purge	
Volume Control Solenoid Valve)	. 299
P0447 EVAP CANISTER VENT CONTROL	
VALVE	300
DTC Logic	
Diagnosis Procedure	300
Component Inspection	
P0448 EVAP CANISTER VENT CONTROL	
VALVE	
DTC Logic	
Diagnosis Procedure	
Component Inspection	306



P0451 EVAP CONTROL SYSTEM PRES- SURE SENSOR	
DTC Logic	
Diagnosis Procedure	
P0452 EVAP CONTROL SYSTEM PRES-	
SURE SENSOR	
DTC Logic	. 312
Diagnosis Procedure Component Inspection	
P0453 EVAP CONTROL SYSTEM PRES- SURE SENSOR	. 315
DTC Logic	. 315
Diagnosis Procedure	
Component Inspection	. 318
P0456 EVAP CONTROL SYSTEM	. 319
DTC Logic	
Diagnosis Procedure	
Component Inspection	. 324
P0460 FUEL LEVEL SENSOR	. 325
DTC Logic	
Diagnosis Procedure	
P0461 FUEL LEVEL SENSOR	. 326
DTC Logic	
Component Function Check	
Diagnosis Procedure	. 327
P0462, P0463 FUEL LEVEL SENSOR	. 328
DTC Logic	. 328
Diagnosis Procedure	. 328
P0500 VSS	. 329
EXCEPT FOR M/T MODELS EXCEPT FOR M/T MODELS : Description	. 329
EXCEPT FOR M/T MODELS : Description	
EXCEPT FOR M/T MODELS : Diagnosis Proce- dure	
M/T MODELS	
M/T MODELS : Description	
M/T MODELS : DTC Logic M/T MODELS : Component Function Check	
M/T MODELS : Component runction check M/T MODELS : Diagnosis Procedure	
P0506 ISC SYSTEM	. 333
Description	
DTC Logic	
Diagnosis Procedure	. 333
P0507 ISC SYSTEM	. 335
Description	. 335
DTC Logic	
Diagnosis Procedure	. 335

P050A, P050B, P050E COLD START CON- TROL	А
Description	
DTC Logic	
Diagnosis Procedure	EC
P0520 EOP SENSOR	
DTC Logic	C
Diagnosis Procedure	С
P0524 ENGINE OIL PRESSURE	D
Diagnosis Procedure	
Component Inspection (EOP Sensor)	F
P0603 ECM	
DTC Logic	
Diagnosis Procedure	F
P0604 ECM	
DTC Logic	
Diagnosis Procedure	G
-	
P0605 ECM	
DTC Logic	Н
P0606 ECM	
DTC Logic	
Diagnosis Procedure	
P0607 ECM	J
DTC Logic	0
Diagnosis Procedure	
P060A ECM	Κ
DTC Logic350	
Diagnosis Procedure350	
P060B ECM	L
DTC Logic351	
Diagnosis Procedure351	
P0643 SENSOR POWER SUPPLY	M
Description	
DTC Logic352	N
Diagnosis Procedure353	IN
P0850 PNP SWITCH	
Description	0
DTC Logic	
Component Function Check355	
Diagnosis Procedure355	Ρ
P1078 EVT CONTROL POSITION SENSOR . 358	
DTC Logic358	
Diagnosis Procedure	
Component Inspection (EVT Control Position Sensor)	
309	

DTC Logic
P117A AIR FUEL RATIO
P1212 TCS COMMUNICATION LINE
P1217 ENGINE OVER TEMPERATURE368DTC Logic368Component Function Check368Diagnosis Procedure369
P1225 TP SENSOR 371 DTC Logic 371 Diagnosis Procedure 371
P1226 TP SENSOR 372 DTC Logic 372 Diagnosis Procedure 372
P1550 BATTERY CURRENT SENSOR
P1551, P1552 BATTERY CURRENT SEN- SOR
P1553 BATTERY CURRENT SENSOR379DTC Logic379Diagnosis Procedure379Component Inspection (Battery Current Sensor)380
P1554 BATTERY CURRENT SENSOR 382 DTC Logic 382 Component Function Check 382 Diagnosis Procedure 383 Component Inspection (Battery Current Sensor) 384
P1556, P1557 BATTERY TEMPERATURE SENSOR 385 DTC Logic 385 Diagnosis Procedure 385 Component Inspection 386
P1564 ASCD STEERING SWITCH387DTC Logic387Diagnosis Procedure387Component Inspection389
P1572 ASCD BRAKE SWITCH

Component Inspection (Brake Pedal Position
Switch)
Component Inspection (Stop Lamp Switch) 394
P1574 ASCD VEHICLE SPEED SENSOR 396
Description
DTC Logic
Diagnosis Procedure 396
P1650 STARTER MOTOR RELAY 2
Description
DTC Logic
P1651 STARTER MOTOR RELAY401
Description 401
DTC Logic 401
Diagnosis Procedure 401
P1652 STARTER MOTOR SYSTEM COMM403
Description 403
DTC Logic 403
Diagnosis Procedure 403
P1715 INPUT SPEED SENSOR405
Description
Description 405 DTC Logic
Diagnosis Procedure
P1800 INTAKE MANIFOLD TUNING VALVE407
DTC Logic 407
Diagnosis Procedure 407
Component Inspection (Intake Manifold Tuning Valve)
P1805 BRAKE SWITCH409
DTC Logic
Component Function Check
Diagnosis Procedure 409
Component Inspection (Stop Lamp Switch) 411
P2004 INTAKE MANIFOLD RUNNER CON-
TROL VALVE412
DTC Logic 412
Diagnosis Procedure
Component Inspection 413
P2014, P2016, P2017, P2018 INTAKE MANI- FOLD RUNNER CONTROL VALVE POSI-
TION SENSOR
DTC Logic
Diagnosis Procedure
•
P2096, P2097 A/F SENSOR 1
DTC Logic
Diagnosis Procedure 418
P2100, P2103 THROTTLE CONTROL MO- TOR RELAY422
DTC Logic
Diagnosis Procedure

P2101 ELECTRIC THROTTLE CONTROL FUNCTION	404
DTC Logic Diagnosis Procedure	
Component Inspection (Throttle Control Motor)	
P2118 THROTTLE CONTROL MOTOR	
DTC Logic	
Diagnosis Procedure Component Inspection (Throttle Control Motor)	
P2119 ELECTRIC THROTTLE CONTROL	
DTC Logic Diagnosis Procedure	
P2122, P2123 APP SENSOR	431
DTC Logic	431
Diagnosis Procedure	
Component Inspection (APP Sensor)	432
P2127, P2128 APP SENSOR	434
DTC Logic	
Diagnosis Procedure	
Component Inspection (APP Sensor)	
P2135 TP SENSOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection (TP Sensor)	
P2138 APP SENSOR	
DTC Logic	
Diagnosis Procedure Component Inspection (APP Sensor)	
SENSOR POWER SUPPLY 2 CIRCUIT	
Description	
Diagnosis Procedure	
BRAKE PEDAL POSITION SWITCH	
Component Function Check	
Diagnosis Procedure	445
Component Inspection (Brake Pedal Position Switch)	446
ASCD INDICATOR	440
Component Function Check Diagnosis Procedure	
FUEL INJECTOR	440
Component Function Check	
Diagnosis Procedure	
Component Inspection (Fuel Injector)	
FUEL PUMP	
Component Function Check	
Diagnosis Procedure	
Component Inspection (Fuel Pump)	454

IGNITION SIGNAL455	
Component Function Check	А
Component Inspection (Condenser)458 Component Inspection (Ignition Coil with Power	EC
Transistor)458	
ELECTRICAL LOAD SIGNAL	0
Description	С
Component Function Check	
-	D
COOLING FAN	
Component Function Check	
Component Inspection (Cooling Fan Motor)463	Ε
REFRIGERANT PRESSURE SENSOR	
Component Function Check464	F
Diagnosis Procedure464	
MALFUNCTION INDICATOR LAMP466	
Component Function Check466	G
Diagnosis Procedure466	
ON BOARD REFUELING VAPOR RECOV-	Н
ERY (ORVR)	11
Component Function Check	
Diagnosis Procedure	I
Component Inspection469	
SYMPTOM DIAGNOSIS 472	
ENGINE CONTROL SYSTEM	J
Symptom Table472	
NORMAL OPERATING CONDITION	K
PERIODIC MAINTENANCE478	L
IDLE SPEED	
Inspection478	M
IGNITION TIMING	IVI
Inspection479	
EVAPORATIVE EMISSION SYSTEM	Ν
Inspection	
EVAP LEAK CHECK 481	0
Inspection	0
POSITIVE CRANKCASE VENTILATION 483 Inspection	Ρ
REMOVAL AND INSTALLATION484	
ECM	
Exploded View	
Removal and Installation	

SERVICE DATA AND SPECIFICATIONS	Idle Speed 485
(SDS)	Ignition Timing 485
	Calculated Load Value 485
SERVICE DATA AND SPECIFICATIONS	Mass Air Flow Sensor 485
(SDS) 485	

А

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PRECAUTIONS

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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:

windshield.

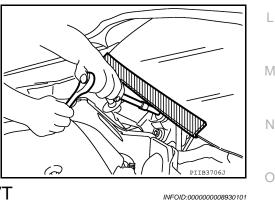
Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never 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

When performing the procedure after removing cowl top cover, cover

the lower end of windshield with urethane, etc to prevent damage to



On Board Diagnostic (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.)

PRECAUTIONS

< PRECAUTION >

- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-42, "Description"</u>.
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the 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 battery ground cable.
- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

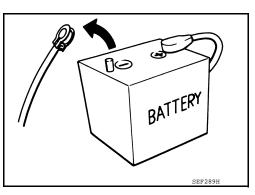
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

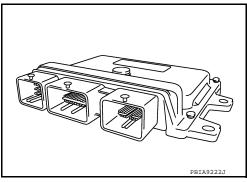
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

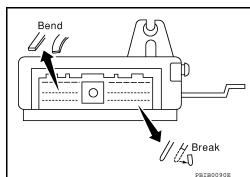
• Securely connect ECM harness connectors.

A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.

- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.







ing pin connectors into or

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PRECAUTIONS

< PRECAUTION >

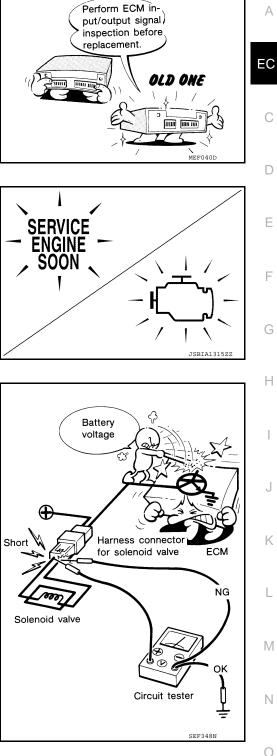
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-76, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

• 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.



EC-11

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

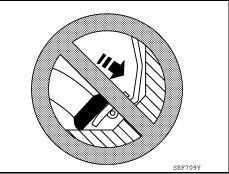


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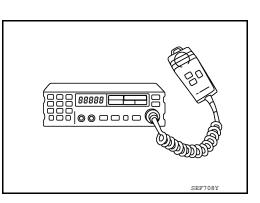
PRECAUTIONS

< PRECAUTION >

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



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
 Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave
- ratio can be kept smaller.Be sure to ground the radio to vehicle body.



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.

Fool number Kent-Moore No.) Fool name		Description
(J-44321)		Checks fuel pressure
Fuel pressure gauge kit		
	LEC642	
J-44321-6) ⁻ uel pressure adapter		Connects fuel pressure gauge to quick connector type fuel lines
	LBIA0376E	
		Measures fuel pressure
KV10120000 Fuel tube adapter		
	JSBIA04102Z	
		INFOID:00000008930104
		INFOID:000000008930104 Description
Fool name Kent-Moore No.) J-45488) Quick connector re-		
Tool name Kent-Moore No.) J-45488) Quick connector re-		Description Removes fuel tube quick connectors in engine
Tool name (Kent-Moore No.) (J-45488) Quick connector re- ease		Description Removes fuel tube quick connectors in engine

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EC

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PREPARATION

[MRA8DE]

Tool name (Kent-Moore No.)		Description
EVAP service port adapter i.e.: (J-41413-OBD)	S-NT704	Applies positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	S-NT815	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	19 mm (0.75 in) 126 in) 13 mm (1.26 in) 13 mm	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.

< PREPARATION >

[MRA8DE] < SYSTEM DESCRIPTION > SYSTEM DESCRIPTION А COMPONENT PARTS ENGINE CONTROL SYSTEM EC ENGINE CONTROL SYSTEM : Component Parts Location INFOID:000000008930105 ENGINE ROOM COMPARTMENT (4)3 (5) (2) D Õ Е 8 F Н C 6 0 C 0 0 0 °°° ° 0 Κ (6) $\overline{7}$ (8) ALBIA0980Z2 L No. Component Function IPDM E/R control the internal relays and the actuators. Μ When CAN communication with ECM is impossible, IPDM E/R performs fail-safe control. With Intelligent Key System PCS-7, "RELAY CONTROL SYSTEM : System Descrip-Ν tion" PCS-19, "Fail-safe" 1 IPDM E/R PCS-8, "POWER CONSUMPTION CONTROL SYSTEM System Description" Without Intelligent Key System PCS-35, "RELAY CONTROL SYSTEM : System Description" Ρ PCS-47, "Fail-Safe" PCS-36, "POWER CONSUMPTION CONTROL SYS-TEM : System Description" Mass air flow sensor EC-28, "Mass Air Flow Sensor (with Intake Air Temperature 2 (with intake air temperature sensor) Sensor)" Electric throttle control actuator 3

Revision: October 2012

(with built in throttle position sensor and throttle control motor)

COMPONENT PARTS

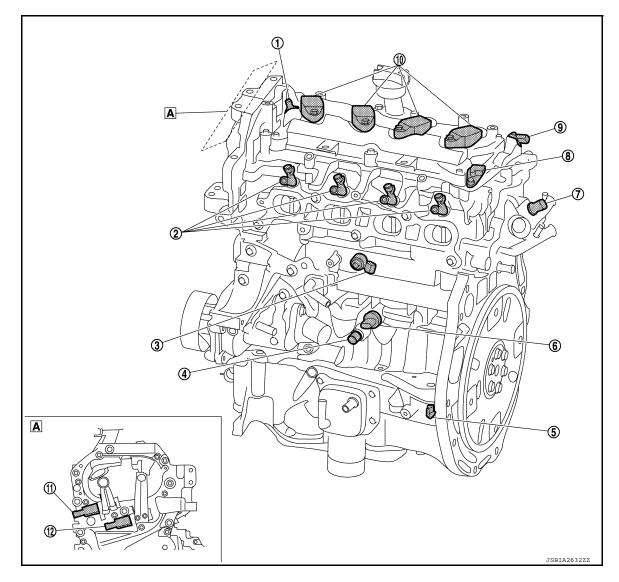
EC-22, "Electric Throttle Control Actuator"

EC-15

< SYSTEM DESCRIPTION >

No.	Component	Function
4	EVAP canister purge volume control solenoid valve	EC-24, "EVAP Canister Purge Volume Control Solenoid Valve"
5	EVAP service port	EVAP service port is prepared in order to perform evapora- tive emission system leak check.
6	Intake manifold tuning valveIntake manifold runner control valve	EC-28, "Intake Manifold Tuning Valve" EC-27, "Intake Manifold Runner Control Valve"
$\overline{\mathcal{O}}$	ECM	EC-22, "ECM"
8	Battery current sensor (with battery temperature sensor)	EC-20, "Battery Current Sensor (with Battery Temperature Sensor)"

ENGINE COMPARTMENT



A Engine front side

No.	Component	Function
1	PCV valve	The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
2	Fuel injector	EC-25, "Fuel Injector"
3	Knock sensor	EC-28, "Knock Sensor"

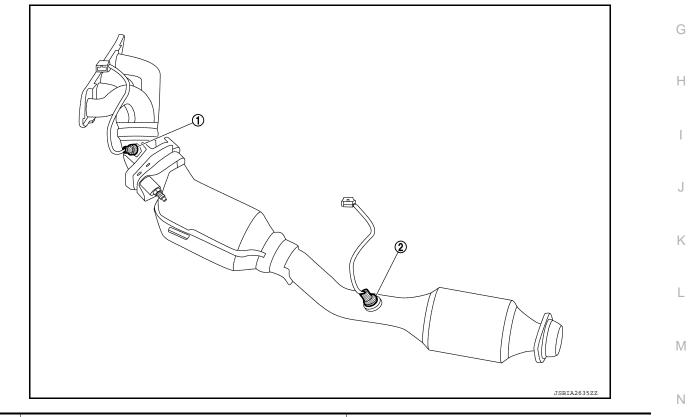
Revision: October 2012

< SYSTEM DESCRIPTION >

[MRA8DE]

No.	Component	Function	^
4	Engine oil temperature sensor	EC-24, "Engine Oil Temperature Sensor"	A
5	Crankshaft position sensor (POS)	EC-21, "Crankshaft Position Sensor (POS)"	
6	Engine oil pressure sensor	EC-23, "Engine Oil Pressure Sensor"	EC
7	Engine coolant temperature sensor	EC-23, "Engine Coolant Temperature Sensor"	0
8	Camshaft position sensor (PHASE)	EC-21, "Camshaft Position Sensor (PHASE)"	C
9	Exhaust valve timing control position sensor	EC-25. "Exhaust Valve Timing Control Position Sensor"	D
10	Ignition coil (with power transistor)	EC-27, "Ignition Coil with Power Transistor"	D
(1)	Exhaust valve timing control solenoid valve	EC-25, "Exhaust Valve Timing Control Solenoid Valve"	E
(12)	Intake valve timing control solenoid valve	EC-27, "Intake Valve Timing Control Solenoid Valve"	
EXHA	UST COMPARTMENT	·	F

EXHAUST COMPARTMENT

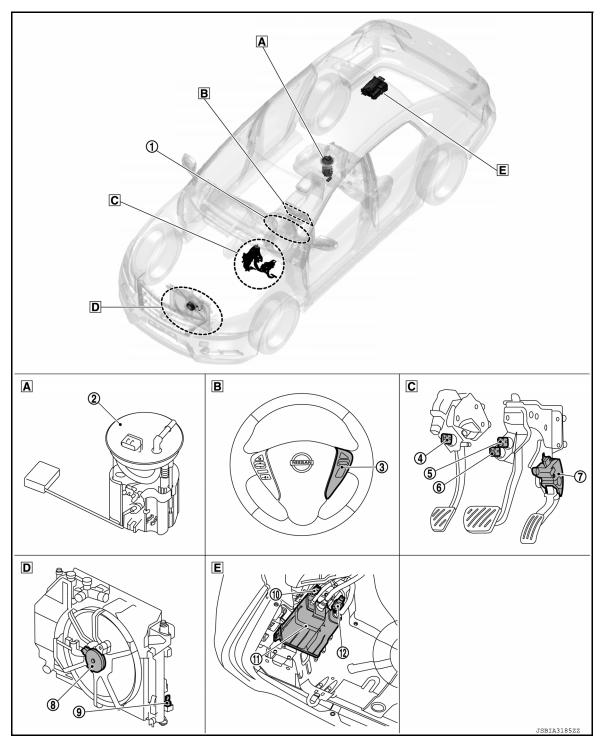


No.	Component	Function	
1	Air fuel ratio (A/F) sensor 1	EC-19, "Air Fuel Ratio (A/F) Sensor 1"	0
2	Heated oxygen sensor 2	EC-26, "Heated Oxygen Sensor 2"	

BODY COMPARTMENT

Ρ

< SYSTEM DESCRIPTION >



A Under the right side second seat

Radiator assembly

D

B On the steering wheel

Ε

- Under the left side fuel tank
- C Periphery of pedals

No.	Component	Function
1	Combination meter	MWI-6, "METER SYSTEM : Component Description"
2	Fuel level sensor unit, fuel filter and fuel pump assembly	EC-26. "Fuel Level Sensor Unit. Fuel Filter and Fuel Pump Assembly"
3	ASCD steering switch	EC-20, "ASCD Steering Switch"



< SYSTEM DESCRIPTION >

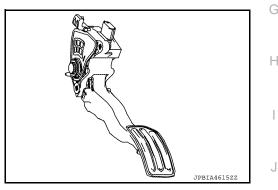
[MRA8DE	Ξ]
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No.	Component	Function	٨
4	Clutch pedal position switch	EC-21, "Clutch Pedal Position Switch"	A
5	Stop lamp switch	EC-29, "Stop Lamp Switch & Brake Pedal Position Switch"	
6	Brake pedal position switch	EC-29, "Stop Lamp Switch & Brake Pedal Position Switch"	EC
$\overline{\mathcal{O}}$	Accelerator pedal position sensor	EC-19, "Accelerator Pedal Position Sensor"	0
8	Cooling fan motor	EC-21, "Cooling Fan"	C
9	Refrigerant pressure sensor	EC-29, "Refrigerant Pressure Sensor"	
10	EVAP control system pressure sensor	EC-25, "EVAP Control System Pressure Sensor"	D
11	EVAP canister	EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the tank.	E
(12)	EVAP canister vent control valve	EC-24. "EVAP Canister Vent Control Valve"	F

Accelerator Pedal Position Sensor

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.

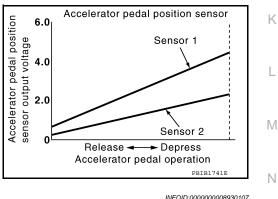


Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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.

Air Fuel Ratio (A/F) Sensor 1

DESCRIPTION



Р

< SYSTEM DESCRIPTION >

The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 760°C (1,400°F). 2 3000 E

A/F SENSOR 1 HEATER

A/F sensor 1 heater is integrated in the sensor.

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 within the specified range.

ASCD Steering Switch

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

Battery Current Sensor (with Battery Temperature Sensor)

OUTLINE

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.

Based on sensor signals, 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 CHG-8, "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.

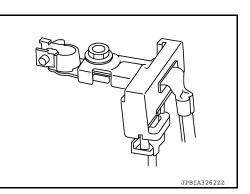
BATTERY CURRENT SENSOR

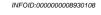
The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

EC-20

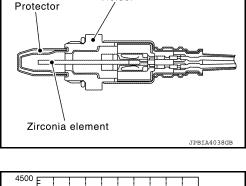
BATTERY TEMPERATURE SENSOR

Revision: October 2012





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18 20 22 Air fuel ratio

24 26 28 30 PBIB3354E

4000

3500

12 14 16

< SYSTEM DESCRIPTION >

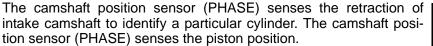
Battery temperature sensor is integrated in battery current sensor. The sensor measures temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage [*] (V)	Resistance (k Ω)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258

*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.

Camshaft Position Sensor (PHASE)



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.

Clutch Pedal Position Switch

Stop lamp switch is installed to clutch pedal bracket. The switch detects the state of the clutch pedal and transmits an ON/OFF signal to ECM.

Clutch pedal	Clutch pedal position switch
Released	OFF
Depressed	ON

Crankshaft Position Sensor (POS)

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.

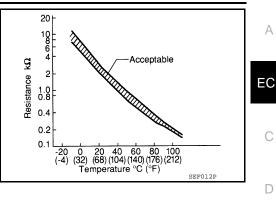
The changing gap causes the magnetic field near the sensor to change.

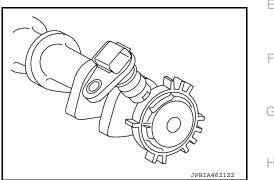
Due to the changing magnetic field, the voltage from the sensor changes.

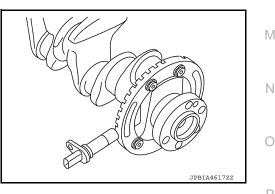
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

Cooling Fan

Cooling fan operates when the current flows in the cooling fan motor. For control details, refer to <u>EC-47, "COOLING FAN CONTROL : System Description"</u>.







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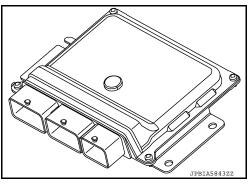
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< SYSTEM DESCRIPTION >

ECM

[MRA8DE]

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

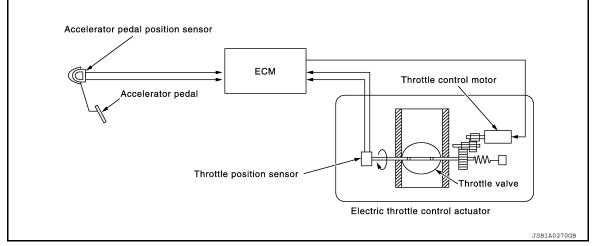


Electric Throttle Control Actuator

INFOID:000000008930115

OUTLINE

Electric throttle control actuator consists of throttle body, throttle valve, throttle control motor and throttle position sensor.



THROTTLE CONTROL MOTOR RELAY

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.

THROTTLE CONTROL MOTOR

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

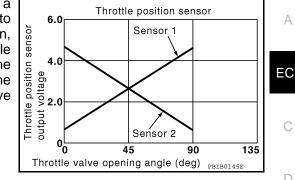
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

THROTTLE POSITION SENSOR

The throttle position sensor responds to the throttle valve movement.

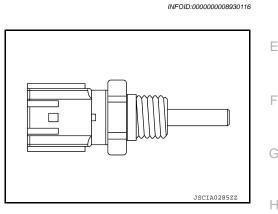
< SYSTEM DESCRIPTION >

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



Engine Coolant Temperature Sensor

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.



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Resistance 1.0 0.4 0.2 0.

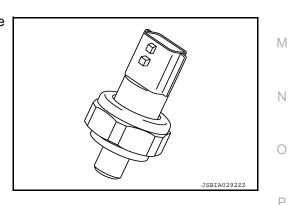
<Reference data>

Engine coolant temperature [°C (°F)]	Voltage [*] (V)	Resistance (kΩ)
-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 terminals.

Engine Oil Pressure Sensor

The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



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

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< SYSTEM DESCRIPTION >

Engine Oil Temperature Sensor

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil 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 oil 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
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals.

EVAP Canister Purge Volume Control Solenoid Valve

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



Revision: October 2012

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

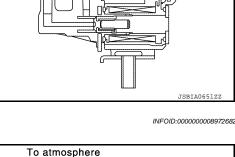
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

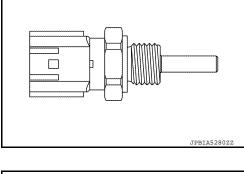
This solenoid valve is used only for diagnosis, and usually remains opened.

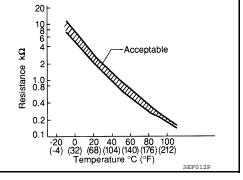
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

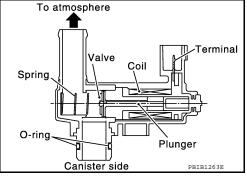
EC-24

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4.5 >

voltage

60.0

(0.61, 8.7)

tput , 1. Out 0.4

< SYSTEM DESCRIPTION >

EVAP Control System Pressure Sensor

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

Exhaust Valve Timing Control Position Sensor

Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end.

This sensor signal is used for sensing a position of the exhaust camshaft.

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.

Exhaust Valve Timing Control Solenoid Valve

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

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

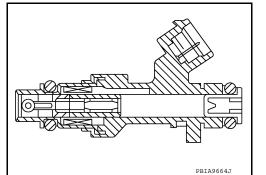
The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.

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

Fuel Injector

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.

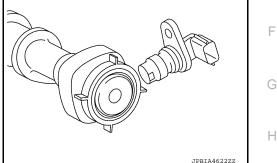


106.7 (1.088, 15.47)

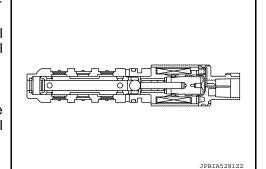
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Pressure kPa (kg/cm², psi) (Absolute pressure)



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< SYSTEM DESCRIPTION >

Fuel Level Sensor Unit, Fuel Filter and Fuel Pump Assembly

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*	Ť	Fuel pump

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

The ECM activates the fuel pump for a few seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and 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.

Heated Oxygen Sensor 2

DESCRIPTION

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

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 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.

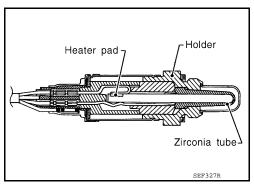
HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.

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.

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

EC-26



[MRA8DE]

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INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

Intake manifold runner control valve motor is connected to the rear end of the valve shaft. The motor opens or closes the valve by the output signal of the ECM.

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

Intake manifold runner control valve position sensor is connected to the front end of the valve shaft. The sensor consists of valiable resister. It senses the valve shaft movement and feeds the voltage signals to the ECM.

Ignition Coil with Power Transistor

< SYSTEM 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.

Intake Valve Timing Control Solenoid Valve

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

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

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

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

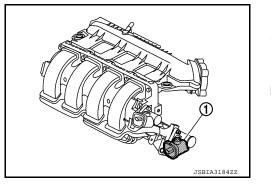
Intake Manifold Runner Control Valve

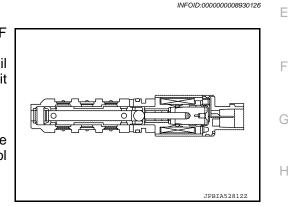
Intake manifold runner control valve() is integrated to intake manifold.

Intake manifold runner control valve is mounted each port of the intake manifold and opened/closed by the intake manifold runner control valve motor.

ECM controls the intake manifold runner control valve motor, according to signals of engine speed, water temperature, etc. and stabilizes combustion by generating a strong tunmble flow.







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< SYSTEM DESCRIPTION >

Intake Manifold Tuning Valve

Intake manifold tuning (IMT) valve ① is integrated to intake manifold. Intake manifold tuning valve consists of valve and motor. Intake manifold tuning valve is used to control the suction passage of the intake manifold tuning system.

INTAKE MANIFOLD TUNING VALVE MOTOR

Intake manifold tuning valve motor is connected to the front end of the valve shaft. The motor is operated by the ECM and it opens and closes the intake manifold tuning valve.

Knock Sensor

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.

Mass Air Flow Sensor (with Intake Air Temperature Sensor)

MASS AIR FLOW SENSOR

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 heater in sensing element to a certain amount.

The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



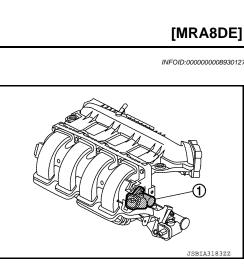
The intake air temperature sensor is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

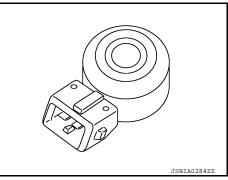
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

<Reference data>

Intake air temperature [°C (°F)]	Voltage [*] (V)
25 (77)	1.9 – 2.1
80 (176)	3.2 - 3.4

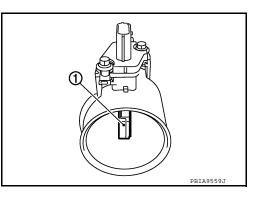
*: These data are reference values on the diagnosis tool.







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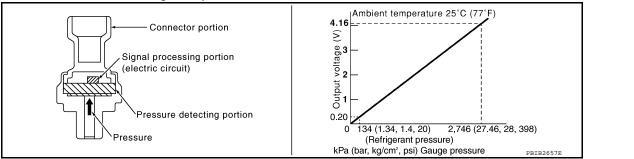
< SYSTEM DESCRIPTION >

Park/Neutral Position Switch

Park/Neutral Position Switch is installed to manual transaxle. The switch detects the neutral position and transmits a voltage signal.

Refrigerant Pressure Sensor

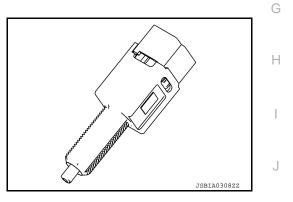
The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Stop Lamp Switch & Brake Pedal Position Switch

Stop lamp switch and brake pedal position switch are installed to brake pedal bracket.

ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).



Brake pedal	Brake pedal position switch	Stop lamp switch	
Released	ON	OFF	
Depressed	OFF	ON	L

Transmission Range Switch

Transmittion Range Switch is installed to automatic transmission and CVT transaxle. The switch detects the state of the gear position (N range and P range) and transmits a voltage signal to ECM.

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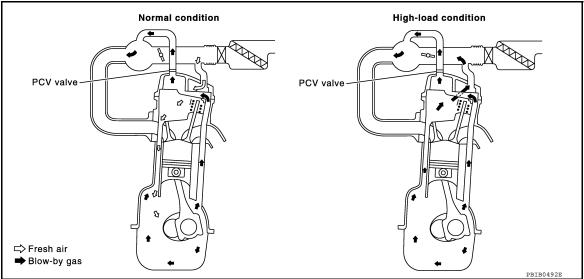
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STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:000000008930134

[MRA8DE]



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.

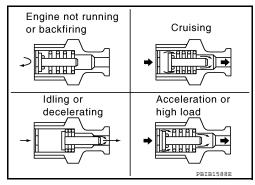
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

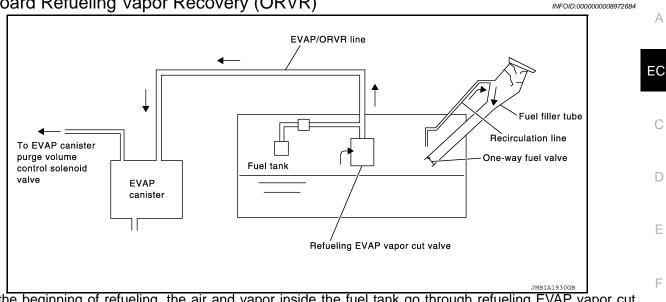
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

On Board Refueling Vapor Recovery (ORVR)



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving. Н

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-480, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

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[MRA8DE]

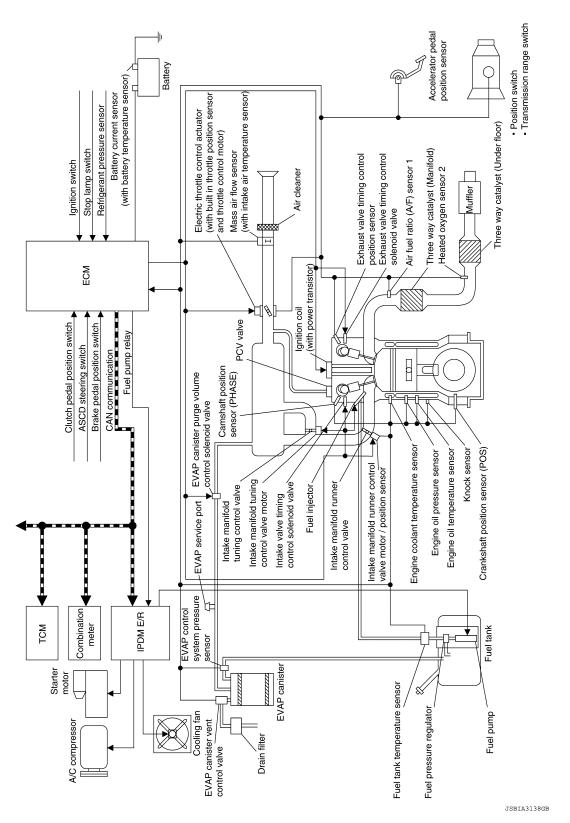
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ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

SYSTEM DIAGRAM



INFOID:000000008930135

Revision: October 2012

< SYSTEM DESCRIPTION >

- · Position switch and clutch pedal position switch are not used in models with CVT.
- ASCD steering switch and brake pedal position switch are used in models with ASCD.
- TCM and transmission range switch are not used in models with M/T.

SYSTEM DESCRIPTION

ECM controls the engine by various functions.

Function	Reference
Fuel injection control	EC-35, "MULTIPORT FUEL INJECTION SYSTEM : System De- scription"
Electric ignition control	EC-38, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-39, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-41, "EXHAUST VALVE TIMING CONTROL : System Descrip- tion"
Intake manifold runner control	EC-43, "INTAKE MANIFOLD RUNNER CONTROL : System De- scription"
Intake manifold tuning control	EC-43, "INTAKE MANIFOLD TUNING SYSTEM : System Descrip- tion"
Engine protection control (Low engine oil pressure)	EC-44, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Fuel filler cap warning system	EC-45, "FUEL FILLER CAP WARNING SYSTEM : System De- scription"
Air conditioning cut control	EC-46, "AIR CONDITIONING CUT CONTROL : System Descrip- tion"
Cooling fan control	EC-47, "COOLING FAN CONTROL : System Description"
Starter motor drive control	EC-48, "STARTER MOTOR DRIVE CONTROL : System Descrip- tion"
Evaporative emission	EC-49, "EVAPORATIVE EMISSION SYSTEM : System Descrip- tion"
Automatic speed control	EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Sys- tem Description"
ECO mode control	 <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models) <u>DMS-25, "ECO MODE CONTROL : System Description"</u> (CVT models)
SPORT mode control	 <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models) <u>DMS-60, "SPORT MODE CONTROL : System Description"</u> (CVT models)
CAN communication	EC-52, "CAN COMMUNICATION : System Description"

ENGINE CONTROL SYSTEM : Fail Safe

INFOID:000000008930136

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page	0
Malfunction	Engine speed will not rise	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.	EC-466, "Compo-	Ρ
indicator	more than 2,500 rpm due	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.	nent Function	
circuit	to the fuel cut	The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	Check"	

EC-33

DTC RELATED ITEM

Revision: October 2012



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EC

< SYSTEM DESCRIPTION >

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail sa	afe mode	Vehicle behavior
Traveling con- trol mode	Accelerator an- gle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
Device fix mode		 This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

Fail Safe Pattern

Pattern	Fail safe mode	
A	 Traveling control mode 	Accelerator angle variation control
В		Engine output control
С	Device fix mode	

Fail Safe List

×:Applicable —: Not applicable

		Vehicle behavior					
DTC No.	Detected items	Pattern			Others		
		А	В	С	Oulers		
P0011	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.		
P0075	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.		
P0014 P0078	Exhaust valve timing control	_	_	×	_		
P0101 P0102 P0103	Mass air flow sensor circuit	×	×	×	_		
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	_	_	_	The ECM controls the electric throttle control actuator in reg- ulating 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.		
P0117 P0118	Engine coolant temperature sensor	×	×	_	_		
P0171 P0172	Fuel injection system	×	_	_	_		
P0196 P0197 P0198	Engine oil temperature sensor	_	_	_	Exhaust valve timing control does not function.		

< SYSTEM DESCRIPTION >

[MRA8DE]

DTC		Vehicle behavior					
No.	Detected items	Pattern			Others		
P0300 P0301 P0302 P0303 P0304	Misfire	×	В —	с —			
2 0500	Vehicle speed sensor	×			_		
P0524	Engine oil pressure	_	_	_	 ECM illuminates oil pressure warning lamp on the combination meter. Engine speed will not rise more than 4,000rpm due to the fuel cut. Fail-safe is canceled when ignition switch OFF → ON. 		
P0603	ECM	×	×	_	_		
P0605	ECM	×	×	_	—		
P0643	Sensor power supply		_		ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P1078	Exhaust valve timing control position sensor circuit	×		×	_		
P1650 P1651	Starter relay	×	×	_			
P1805	Brake switch				ECM controls the electric throttling the throttle opening to a smatrix Therefore, acceleration will be provided in the state of the sta	all range.	
P2004	Intake manifold runner control valve		×	×			
P2100 P2103	Throttle control motor relay		_	_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P2101	Electric throttle control func- tion	_	_	_	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 control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P2119	Electric throttle control actua- tor	×	×	_	_		
P2122 P2123 P2127 P2128 P2128 P2138	Accelerator pedal position sensor		_	_	The ECM controls the electric throttle control actuator in reg- ulating 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.		

MULTIPORT FUEL INJECTION SYSTEM

MULTIPORT FUEL INJECTION SYSTEM : System Description

INFOID:000000008930137

SYSTEM DIAGRAM

< SYSTEM DESCRIPTION >

Crankshaft position sensor (POS)	Engine speed ^{*1} & Piston position	_ >	
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air	→	Fuel injection & mixture ratio control Fuel injector
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	→	
Park/neutral position (PNP) switch ^{*2}	Neutral position	ECM	
Transmission range switch ^{*3}	Gear position	→	
Battery	Battery voltage ^{*1}	→	
Knock sensor	Engine knocking condition	→	
Heated oxygen sensor 2 ^{*4}	Density of oxygen in exhaust gas	_	
ABS actuator and electric unit (control unit)	VDC/TCS operation command		
	Vehicle speed signal	-	
	Air conditioner operation signal		
A/C auto amp.			J

- *1: ECM determines the start signal status by the signals of engine speed and battery voltage.
- *2: M/T models
- *3: CVT models
- *4: This sensor is not used to control the engine system under normal conditions.

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>

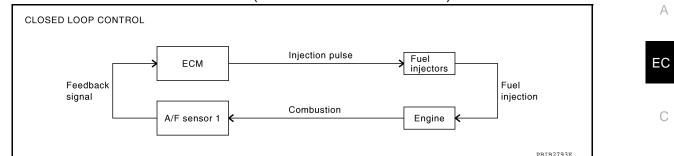
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

< SYSTEM DESCRIPTION >

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-19</u>. "Air Fuel Ratio (A/F) Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

Open Loop Control

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

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (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 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 N fuel volume if it is lean.

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

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< SYSTEM DESCRIPTION > FUEL INJECTION TIMING

 Sequential multiport fuel injection system 	 Simultaneous multiport fuel injection system
No. 1 cylinder	No. 1 cylinder
No. 2 cylinder	No. 2 cylinder
No. 3 cylinder	No. 3 cylinder
No. 4 cylinder	No. 4 cylinder
◀ 1 engine cycle →	sef337W

Two types of systems are used.

 Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System
Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals
of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.

This system is used 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.

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Description

INFOID:000000008930138

SYSTEM DIAGRAM

Crankshaft position sensor (POS)			
Camshaft position sensor (PHASE)			
Mass air flow sensor			
Engine coolant temperature sensor			
Throttle position sensor			
Accelerator pedal position sensor		→ ECM	Ignition timing control Ignition coil (with power transist
Transmission range switch*1			
Park/neutral position (PNP) switch ^{*2}			
Battery			
Knock sensor			
Combination meter	Vehicle speed signal		

*1: CVT models

*2: M/T models

INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

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Sensor	Input Signal to ECM		ECM func- tion	Actuator	А	
Crankshaft position sensor (POS)	Engine spece	Engine speed ^{*3}				
Camshaft position sensor (PHASE)	Piston posit	ion			EC	
Mass air flow sensor	Amount of inta	ike air				
Engine coolant temperature sensor	Engine coolan	t temperature				
Throttle position sensor	Throttle position	ิวท			C	
Accelerator pedal position sensor	Accelerator pe	edal position	Ignition tim-	Ignition coil (with power tran-		
Transmission range switch ^{*1}	Gear position		ing control	sistor)	D	
Park/neutral position (PNP) switch ^{*2}						
Battery	Battery voltage ^{*3}				Е	
Knock sensor	Engine knocki	ng condition				
Combination meter	CAN commu- nication	Vehicle speed signal			F	
*1: CVT models						
*2: M/T models						
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.						
SYSTEM DESCRIPTION						
Firing order: 1 - 3 - 4 - 2	_				Н	
The ignition timing is controlled			uel ratio for ever	y running condition of the	Π	
engine. The ignition timing data			d aamabaft raai			

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

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

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

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

INTAKE VALVE TIMING CONTROL : System Description	INFOID:000000008930139	M
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SYSTEM DIAGRAM

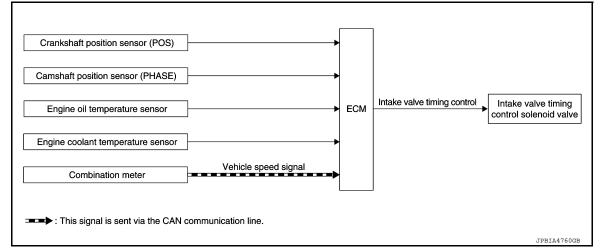
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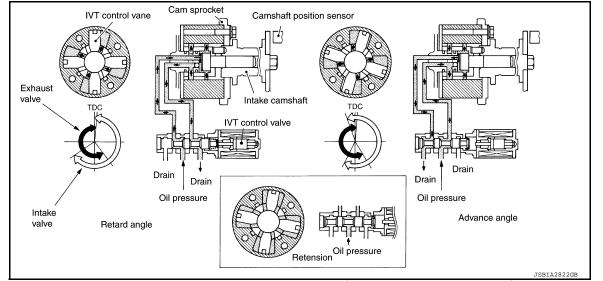
< SYSTEM DESCRIPTION >



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			Intake valve timing con- trol solenoid valve
Engine oil temperature sensor	Engine oil temperature		Intake valve tim- ing control	
Engine coolant temperature sensor	Engine coolant temperature			
Combination meter	CAN commu- nication	Vehicle speed signal		

SYSTEM DESCRIPTION



This engine is equipped with an intake valve timing controller (integral with cam sprocket) which continuously adjusts the phase of intake valve according to driving conditions, improves both low/mid range engine torque and high-speed range engine output, and brings about low emission and low fuel consumption.

The intake valve timing control system continuously controls cam phases in constant intake valve operating angle conditions and adjusts an operating oil pressure to the intake valve timing controller via the control solenoid valve.

ECM receives crankshaft position signal, camshaft position signal, engine speed signal, engine oil temperature signal, and engine coolant temperature signal. And the ECM outputs ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status.

Intake Valve Timing Controller Operation List

< SYSTEM DESCRIPTION >

Intake valve timing solenoid valve condition	Intake valve timing controller operation			
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full retard position by the reaction force of return spring, improving the starting performance of the engine.	EC		
Active (Advance angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the advance angle chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advance angle. This condition brings about the greater overlap with the exhaust valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.	C		
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.	-		
Return (Retard angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the retard chamber of the controller. And advanced angle chamger oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle.	F		

INTAKE VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the intake camshaft.

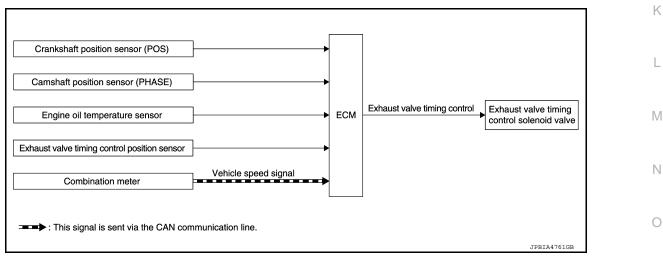
Feedback Control

The camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the intake valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Description

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Revision: October 2012

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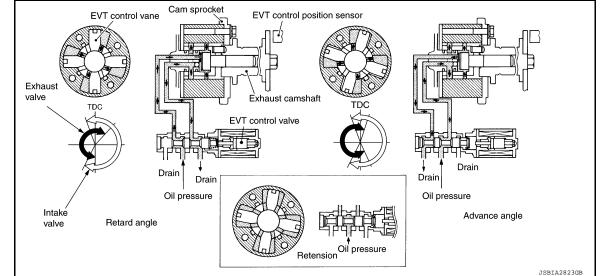
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< SYSTEM DESCRIPTION >

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			Exhaust valve timing control
Engine oil temperature sensor	Engine oil temperature		Exhaust valve	
Exhaust valve timing control position sensor	Exhaust valve timing signal		timing control	solenoid valve
Combination meter	CAN commu- nication	Vehicle speed signal		

SYSTEM DESCRIPTION



This engine is equipped with an exhaust valve timing controller (integral with cam sprocket) which continuously adjusts the phase of intake valve according to driving conditions, improves both low/mid range engine torque and high-speed range engine output, and brings about low emission and low fuel consumption.

The exhaust valve timing control system continuously controls cam phases in constant exhaust valve operating angle conditions and adjusts an operating oil pressure to the exhaust valve timing controller via the control solenoid valve.

ECM receives exhaust valve timing control position signal, crankshaft position signal, engine speed signal, engine oil temperature signal, and engine coolant temperature signal. And the ECM outputs ON/OFF pulse duty signals to the exhaust valve timing control solenoid valve depending on driving status.

Exhaust Valve Timing Controller Operation List

Exhaust valve timing solenoid valve condition	Exhaust valve timing controller operation			
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full retard position by the reaction force of return spring, improving the starting performance of the engine.			
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advance angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the exhaust valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.			
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.			
Return (Advance angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advance angle chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advance angle.			

< SYSTEM DESCRIPTION >

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

The exhaust valve control position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the intake camshaft.

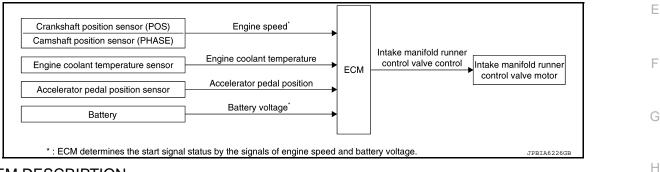
Feedback Control

The exhaust valve control position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/ closing timing according to a driving condition.

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Intake manifold runner control valve has a valve portion in the intake passage of each cylinder.

While idling and during low engine coolant temperature, the intake manifold runner control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a intake manifold runner in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve exhaust emission, and increase the stability in running conditions.

Also, except when idling and during low engine coolant temperature, this system opens the intake manifold runner control valve.

In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance.

The intake manifold runner control valve is operated by the ECM.

INTAKE MANIFOLD TUNING SYSTEM

INTAKE MANIFOLD TUNING SYSTEM : System Description

SYSTEM DIAGRAM

Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed				
Intake air temperature sensor	Intake air temperature	ECM	Intake manifold tuning valve control	Intake manifold tuning valve motor	
Battery	Battery voltage				

SYSTEM DESCRIPTION

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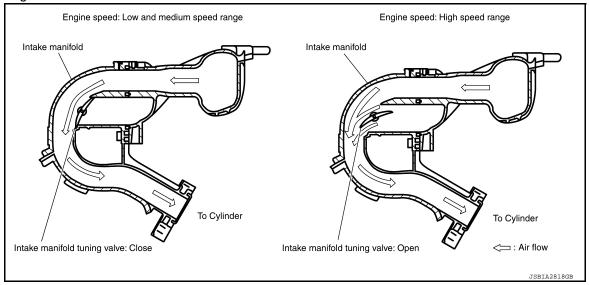
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< SYSTEM DESCRIPTION >

This system switches the length of intake air path according to the low-to-medium speed range or high speed range. Torque is increased in the low-to-medium speed range and the engine output is improved in the high speed range.



Engine speed: Low and medium speed range

Since the intake manifold tuning (IMT) valve is closed when the engine speed is less than 5,250 rpm, the length of the effective intake air path is from the mouth of intake manifold collector to the intake valve. This long path brings the inertia effect of intake air, contributing to the improvement in intake air efficiency and the generation of high torque.

Engine speed: High speed range

When engine speed is 5,250 rpm or more, ECM turns ON the intake manifold tuning valve motor to open the intake manifold tuning valve. The length of the effective intake air path at this time is from the intake manifold tuning valve to the intake valve. This short path brings the inertia effect of intake air in the high speed range, contributing to the torque improvement while the engine is running at high speeds. (The highest engine output is improved.)

Intake Manifold Tuning Valve Operating Condition

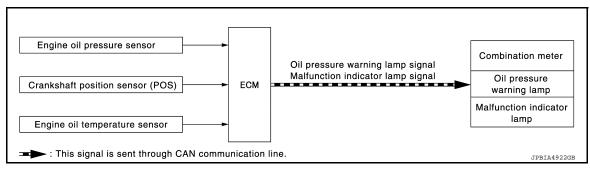
ECM opens the intake manifold tuning valve when all of the following conditions are satisfied.

- Engine speed: 5,250 rpm or more
- Engine coolant temperature: -30°C (-22°F) or more
- Battery voltage: between 11 V and 16 V

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description INFOID-000000008930142

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

			• • •	
Sensor	Input signal to ECM	ECM function	Actuator	A
Engine oil pressure sensor	Engine oil pressure	Engine protection control		
Crankshaft position sensor (POS)	Engine speed	Oil pressure warning lamp signal	Combination meter Oil pressure warning lamp 	EC
Engine oil temperature sensor	Engine oil temperature	Fuel cut control		

SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the oil pressure warning lamp a before the engine becomes damaged.
- When detecting a decrease in engine oil pressure at an engine speed less than 1,000 rpm, ECM transmits an oil pressure warning lamp signal to the combination meter. The combination meter turns ON the oil pressure warning lamp, according to the signal.

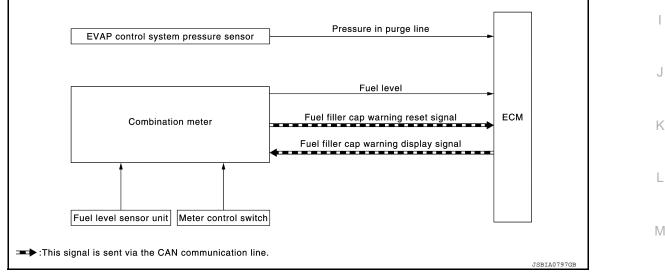
Decrease in engine oil	Engine speed	Combination meter	Fuel cut
pressure	pressure	Oil pressure warning lamp	
Detection	Less than 1,000 rpm	ON*	NO
Delection	1,000 rpm or more	ON	YES

*: When detecting a normal engine oil pressure, ECM turns OFF the oil pressure warning lamp.

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Description

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter. When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display. CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:



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< SYSTEM DESCRIPTION >

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-</u> <u>16, "Description"</u>.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:

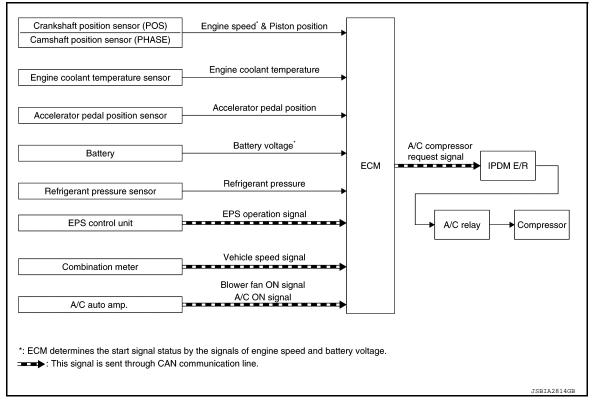
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000008930143

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

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INFOID:000000008930144

ingine speed [*]				
Piston position				
Engine coolant temperature				EC
ccelerator peo	dal position	_		
Battery voltage	*	_	IPDM E/R	С
Refrigerant pre	ssure	Air conditioner	↓ Air conditioner relav	
CAN commu- ication	EPS operation signal	- cut control	↓ Compressor	D
CAN commu- ication	Vehicle speed signal	_		
CAN commu- ication	 A/C ON signal Blower fan ON signal			E
	ccelerator per attery voltage efrigerant pre AN commu- ication AN commu- ication AN commu- ication	ccclerator pedal position attery voltage* efrigerant pressure AN commu- ication EPS operation signal AN commu- ication Vehicle speed signal AN commu- ication • A/C ON signal • Blower fan ON signal	ccclerator pedal position attery voltage* efrigerant pressure AN commu- ication EPS operation signal AN commu- ication Vehicle speed signal AN commu- ication • A/C ON signal • Blower fan ON signal	ccelerator pedal position IPDM E/R attery voltage* Air conditioner efrigerant pressure Air conditioner AN commu- EPS operation signal AN commu- Vehicle speed signal AN commu- • A/C ON signal

SYSTEM DESCRIPTION

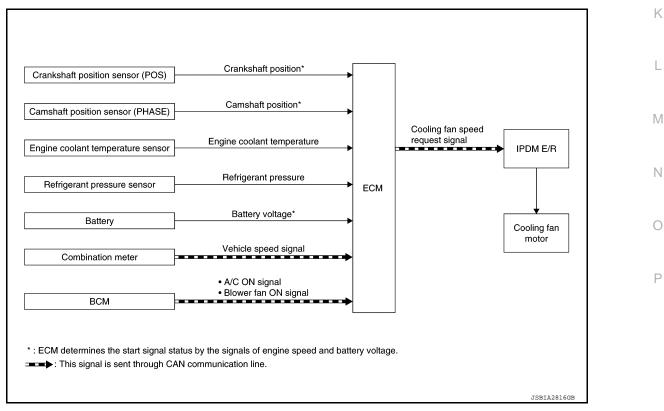
This system improves engine operation when the air conditioner is used.

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

COOLING FAN CONTROL

COOLING FAN CONTROL : System Description

SYSTEM DIAGRAM



Revision: October 2012

EC-47

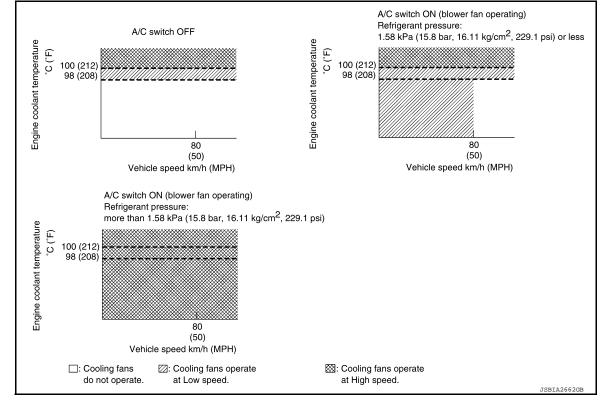
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< SYSTEM DESCRIPTION >

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].

Cooling Fan Operation



Cooling Fan Relay Operation

When IPDM E/R recieves a cooling fan speed request signal, IPDM E/R controls the cooling fan ralay 1, 2 and 3.

Cooling fan speed		Cooling fan relay	
Cooling fair speed	Cooling fan relay 1	Cooling fan relay 2	Cooling fan relay 3
OFF	OFF	OFF	OFF
LOW	ON	OFF	OFF
HIGH	ON	ON	ON

STARTER MOTOR DRIVE CONTROL

STARTER MOTOR DRIVE CONTROL : System Description

INFOID:000000008930145

SYSTEN DIAGRAM

< SYSTEM DESCRIPTION >

Crankshaft position sensor (POS)					
Camshaft position sensor (PHASE)]				
Engine coolant temperature sensor]•			BCM	
Accelerator pedal position sensor]	ECM			
Transmission range switch ^{*1}]		Starter motor	IPDM E/R	
Park/neutral position (PNP) switch ^{*2}]		drive control	(Starter relay & starter control relay)	→ Starter motor
Stop lamp switch]	•			
Combination meter	Vehicle speed signal				

*1: CVT models

*2: M/T models

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed			
Camshaft position sensor (PHASE)	Piston position			
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pe	Accelerator pedal position		• BCM
Transmission range switch (CVT)	Gear position		 Starter motor drive control 	 IPDM E/R (Starter relay & start-
Park/ Neutral position switch (M/T)	Gear position			er control relay)
Stop lamp switch	Brake pedal p	osition		
Combination meter	CAN commu- nication	Vehicle speed signal		

SYSTEM DESCRIPTION

When rapid deceleration occurs during engine runs or idle speed decreases due to heavy load conditions, ECM detects a decrease in idle speed and restarts the engine to secure reliability in handleability by transmitting a cranking request signal to IPDM E/R for activating the starter motor under the following conditions: • Selector lever: Other than P and N (CVT models)

- Shifter lever: Other than neutral position (M/T models)
- Idle switch: ON (Accelerator pedal not depressed)
- Brake switch: ON (Brake pedal depressed)
- ECM transmits a control signal to IPDM E/R via BCM by CAN communication.
- IPDM E/R detects an operating state of the starter motor relay and the starter motor control relay and transmits a feed back signal to ECM via CAN Communication. EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Description

INFOID:000000008930146

SYSTEM DIAGRAM

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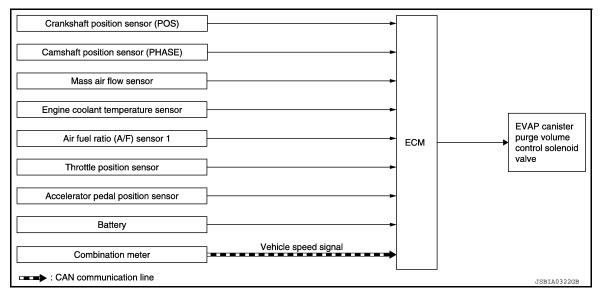
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< SYSTEM DESCRIPTION >

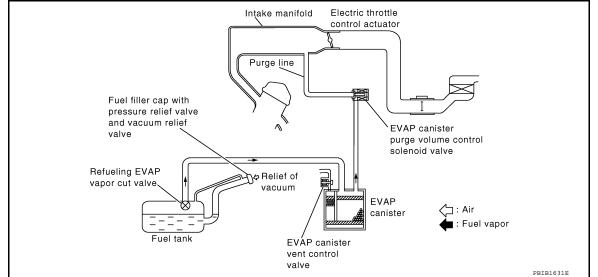


INPUT/OUTPUT SIGNAL CHART

Sensor	Input	Input signal to ECM		Actuator
Crankshaft position sensor (POS)	*			
Camshaft position sensor (PHASE)	Engine speed [*]			
Mass air flow sensor	Amount of inta	Amount of intake air		
Engine coolant temperature sensor	Engine coolant	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		EVAP canister	EVAP canister purge vol- ume control solenoid valve
Throttle position sensor	Throttle position		purge now control	
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*			
Combination meter	CAN commu- nication	Vehicle speed signal		

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

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.

< SYSTEM DESCRIPTION >

[MRA8DE] The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the

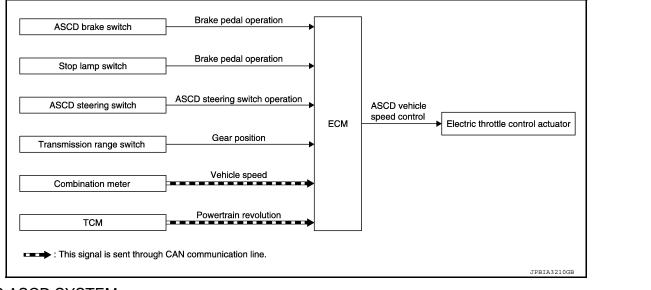
vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

SYSTEM DIAGRAM



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/ Κ h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

The ASCD operation status is indicated on the combination meter. If any malfunction occurs in ASCD system, ECM automatically deactivates the ASCD control.

NOTE:

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

SET OPERATION

Press MAIN switch. (CRUISE is indicated on the combination meter.)

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 keep the new set speed.

CANCEL OPERATION

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

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

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INFOID:000000008930147

< SYSTEM DESCRIPTION >

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

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

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

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

COAST OPERATION

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

RESUME OPERATION

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

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

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:000000008930150

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

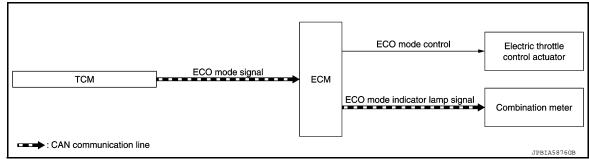
Refer to <u>LAN-30. "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart"</u>, about CAN communication for detail.

ECO MODE CONTROL

ECO MODE CONTROL : System Description

INFOID:000000008999820

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

- ECM receives an ECO mode signal from combination meter via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual. Therefore, driving characteristic is controlled (reducing energy consumption by decreasing needless acceleration and deceleration), so that driving that improved operational fuel efficiency is assisted.
- ECM receives an ECO mode signal from TCM via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual.
- ECM transmits an ECO mode indicator lamp signal to the combination meter via CAN communication. **NOTE:**

For the details of the ECO mode, refer to <u>DMS-25, "ECO MODE CONTROL : System Description"</u> (CVT models) or <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models). SPORT MODE CONTROL

тсм

- SYSTEM DESCRIPTION
- SPORT mode that keeps high engine revolution and provides direct feel and acceleration performance suitable for driving on winding road.
- ECM receives an SPORT mode signal from TCM via CAN communication and improves drivability by controlling the throttle movement.
- ECM transmits an SPORT mode indicator lamp signal to the combination meter via CAN communication. NOTE:

For the details of the SPORT mode, refer to DMS-60, "SPORT MODE CONTROL : System Description" (CVT models) or DMS-41, "SPORT MODE CONTROL : System Description" (M/T models).

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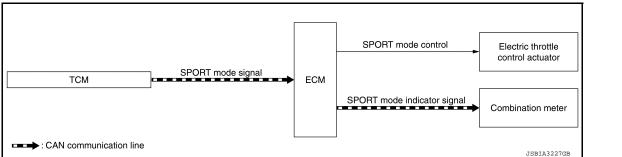
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SPORT MODE CONTROL : System Description

< SYSTEM DESCRIPTION >

SYSTEM DIAGRAM





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OPERATION

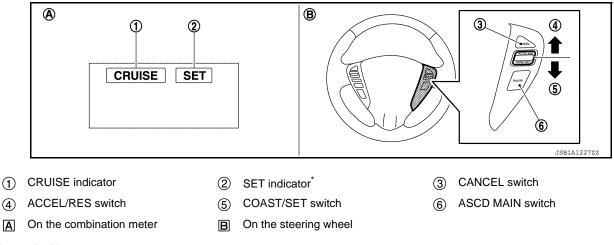
< SYSTEM DESCRIPTION >

OPERATION AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:000000008930151

SWITCHES AND INDICATORS



*: Not applicable

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
ACCEL/RES switch	Resumes the set speed.Increases speed incrementally during cruise control driving.
COAST/SET switch	Sets desired cruise speed.Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

Refer to <u>EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"</u> for ASCD operating instructions.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to <u>GI-51, "Descrip-</u><u>tion"</u>.

NOTE:

Service \$0A is not applied for regions where it is not mandated.

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< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:000000008930154

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 illuminate 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 illuminates. The MIL illuminates 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 illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

		М	IL		D	тс	1st trip	DTC
ltems	1s	t trip	2nc	l trip	1st trip	2nd trip	1st trip	2nd trip
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying	displaying	displaying	display- ing
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Re- fer to <u>EC-93, "DTC Index"</u> .)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000008930155

DTC AND 1ST TRIP DTC

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 saved 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 saved 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.

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-93, "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.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

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-125</u>, "Work Flow". Then perform DTC Confirmation 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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.



< SYSTEM DESCRIPTION >

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	
3	1st trip freeze frame	data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved 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.

DIAGNOSIS DESCRIPTION : Counter System

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 turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CON-SULT 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.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other	_
MIL (turns 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)	1
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 "MIS-FIRE <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" А

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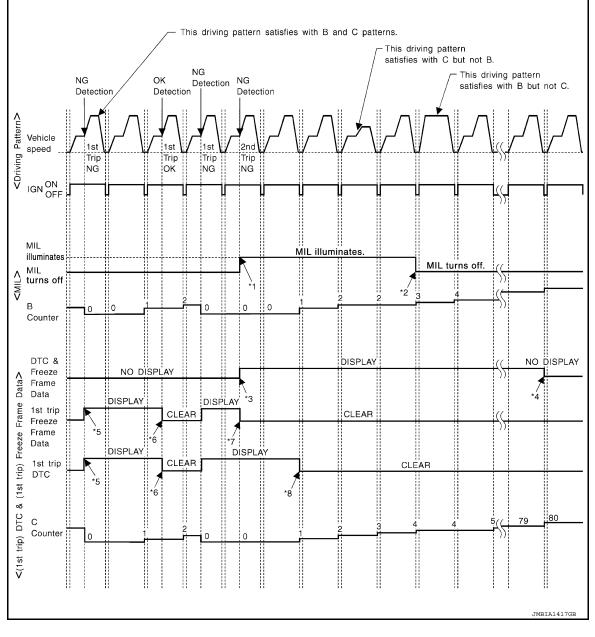
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< SYSTEM DESCRIPTION >



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

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

Driving Pattern B Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern".

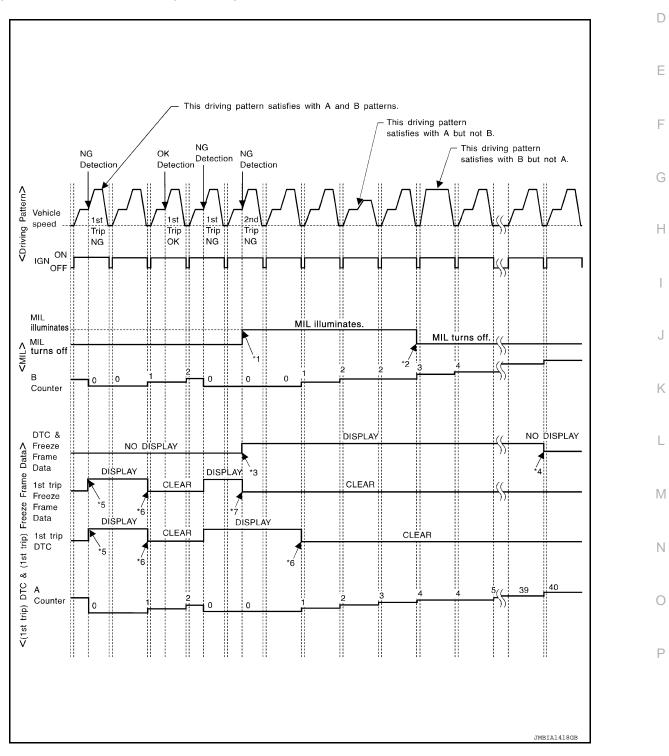
< SYSTEM DESCRIPTION >

Driving Pattern C Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern". Example: If the stored freeze frame data is as per the following: EC

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)

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



С

< SYSTEM DESCRIPTION >

- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *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.

*2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.

DIAGNOSIS SYSTEM (ECM)

- *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.
- tected in two consecutive trips, the DTC and the 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.

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

Driving Pattern A

Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B Refer to EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

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[MRA8DE]

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern Α.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 120 km/h (44 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 60 km/h (19 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern Β.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

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

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



< SYSTEM DESCRIPTION >

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

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

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

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

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

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

NOTE:

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

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

NOTE:

If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is alsoreturned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it isimportant to check SRT ("CMPLT"), DTC (No DTCs) and permanent DTC (NO permanent DTCs) before theinspection.

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.

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				Example				
Self-diagno	osis result	Diagnosis	$\begin{array}{rcl} \mbox{Ignition cycle} \\ \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} & \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} & \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} & \leftarrow \mbox{ON} \rightarrow \end{array}$					
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)		
		P0402	OK (1)	— (1)	— (1)	OK (2)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"		
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)		
		P0402	— (0)	— (0)	OK (1)	— (1)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"		
NG exists	Case 3	P0400	OK	ОК	—	—		
		P0402	—	—	—			
		P1402	NG	_	NG	NG (Consecutive NG)		
		(1st trip) DTC	1st trip DTC	-	1st trip DTC	DTC (= MIL ON)		
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"		

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

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

-: Self-diagnosis is not carried out.

When all SRT related self-diagnoses show 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 show 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 show NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". \rightarrow Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is the number one (1) for each self-diagnosis (Case 1 & 2) or the number 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.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis memory must be erased from the 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".

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

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Permanent DTC is defined in SAE J1979/ISO 15031-5 Service \$0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the in-use inspection without repairing a malfunctioning part.

When not passing the in-use inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in in-use inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

< SYSTEM DESCRIPTION >

PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).
 NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-466. "Component Function Check"</u>.

2. When the engine is started, the MIL should go off. **NOTE:**

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released po- sition learning	ECM can learn the accelerator pedal released position. Refer to EC-137. "Work Procedure".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-138, "Work Procedure".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-139, "Work Procedure".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-141, "Work Procedure".

BULB CHECK MODE

Description This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).	M
Operation Procedure	N
1. Turn ignition switch ON.	IN
 The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-466, "Diagnosis Procedure"</u>. 	0
SRT STATUS MODE	0

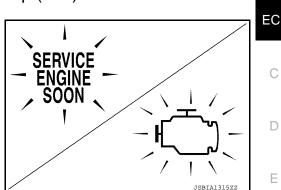
Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to <u>EC-61, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code"</u>.

Operation Procedure

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.





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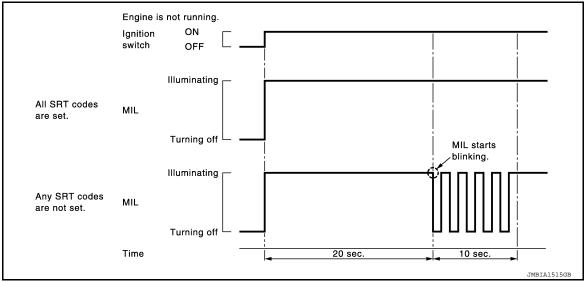
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• ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

- 1. Turn ignition switch ON.
- 2. Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to <u>EC-61</u>, "<u>DIAGNOSIS DESCRIPTION</u> : <u>System Readiness</u> <u>Test (SRT) Code</u>".
- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

NOTE:

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

4. Fully release the accelerator pedal.



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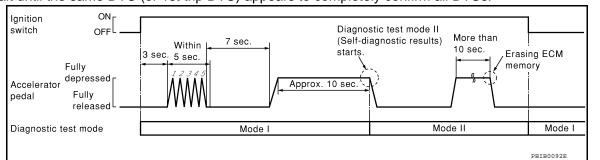
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NOTE: Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.

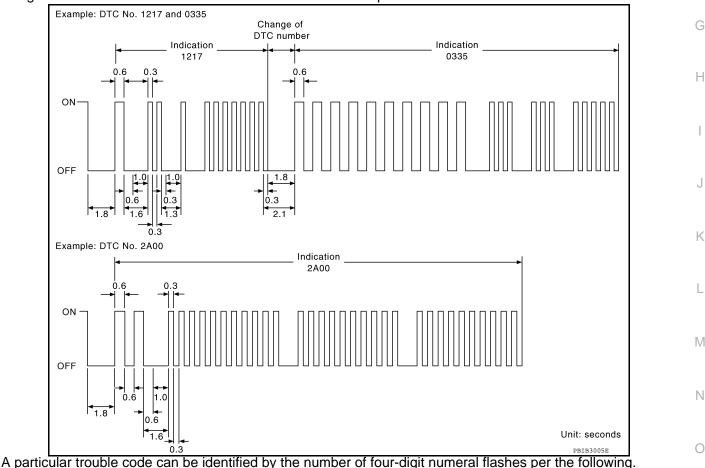
ECM has entered to "Self-diagnostic results" mode.



How to Read Self-diagnostic Results

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 "malfunction warning" mode, 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 unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



Number	0	1	2	3	4	5	6	7	8	9	А	В	С	D	E	F	
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared. A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

EC-65

< SYSTEM DESCRIPTION >

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-93</u>, "DTC Index".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

- 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.
- 4. Turn ignition switch ON.
- 5. Set ECM in "self-diagnostic results" mode.
- 6. The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- 7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

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FUNCTION

Diagnostic test mode	Function
Self Diagnostic Results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Work Support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Ecu Identification	ECM part number can be read.
DTC Work Support	The use of this mode enables quick and accurate performance of Confirmation Procedure.

*: 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

WORK SUPPORT MODE

Work Item

< SYSTEM DESCRIPTION >

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Work item	Condition	Usage	A
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	
EVAP SYSTEM CLOSE	 Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. Ignition switch ON Engine not running Ambient temperature is above 0°C (32°F). No vacuum and no high pressure in EVAP system Fuel tank temp is more than 0°C (32°F). Within 10 minutes after starting "EVAP SYSTEM CLOSE" When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", even in when using a charged battery. 	When detecting EVAP vapor leak in the EVAP system	
FUEL PRESSURE RELEASE	Crank a few times after engine stalls.	When releasing fuel pressure from fuel line	F
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed	
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM	C
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self- learning value	ŀ
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition tim- ing	I
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position	I
*: This function is not necessary in	the usual service procedure.		
SELF-DIAG RESULTS M	ODE		
Self Diagnostic Item Regarding items of DTC and	d 1st trip DTC, refer to <u>EC-93, "DTC_Index"</u> .		
 When ECM detects a 1st t When ECM has detected a If "TIME" is neither "0" nor 	p DTC ated to the malfunction are displayed in "Self-diag re- rip DTC, "1t" is displayed for "TIME". a current DTC, "0" is displayed for "TIME". "1t", the DTC occurred in the past and ECM shows the last detection of the DTC.		
How to Erase DTC and 1st Tr NOTE:	ip DTC		ſ

- 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 (see <u>EC-93, "DTC Index"</u>), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-104, "Description".
- 2. Select "ENGINE" using CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

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< SYSTEM DESCRIPTION >

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code the is displayed as PXXXX. (Refer to EC-93, "DTC Index".)
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. One of the following mode 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.
FUEL SYS-B2	
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	These items are displayed but are not applicable to this model.
INT MANI PRES [kPa]	
CONBUST CONDITION	
*. The items are the same a	s those of 1st trip fronze frame data

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

DATA MONITOR MODE

Monitored Item

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to EC-76, "Reference Value".

< SYSTEM DESCRIPTION >

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×: Applicable

		Monitor Item Selection				
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	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 run- ning, an abnormal value may be indicated. 	
MAS A/F SE-B1	V	×	×	The signal voltage of the mass air flow sen- sor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is in- dicated in "SPEC". 	
B/FUEL SCHDL	msec	×	×	"Base fuel schedule" indicates the fuel injec- tion pulse width programmed into ECM, pri- or to any learned on board correction.	When engine is running specification range is indicated in "SPEC".	
A/F ALPHA-B1	%			The mean value of the air-fuel ratio feed- back correction factor per cycle is indicated.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is in- dicated in "SPEC". This data also includes the data for the air-fuel ratio learning control. 	
COOLANT TEMP/S	°C or °F	×	×	The engine coolant temperature (deter- mined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor circuit is open or shorted, ECM enters fail-safe mode. The engine coolant tempera- ture determined by the ECM is displayed.	
A/F SEN1 (B1)	V	×	×	The A/F signal computed from the input sig- nal of the air fuel ratio (A/F) sensor 1 is dis- played.		
HO2S2 (B1)	V	×	×	The signal voltage of the heated oxygen sensor 2 is displayed.		
HO2S2 MNTR (B1)	LEAN/RICH			 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 vehi- cle speed signal sent from combination meter is displayed.		
BATTERY VOLT	V			The power supply voltage of ECM is displayed.		
ACCEL SEN 1					ACCEL SEN 2 signal is converted by ECM internal-	
ACCEL SEN 2	V			The accelerator pedal position sensor signal voltage is displayed.	ly. Thus, it differs from ECM terminal voltage signal.	
TP SEN 1-B1		×	×	The throttle position concerning of weltage in	TP SEN 2-B1 signal is con-	
TP SEN 2-B1	V	×	×	The throttle position sensor signal voltage is displayed.	verted by ECM internally. Thus, it differs from ECM terminal voltage signal.	

Revision: October 2012



< SYSTEM DESCRIPTION >

		Monitor Item	n Selection		
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
FUEL T/TMP SE	°C or °F			• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
EVAP SYS PRES	V			The signal voltage of EVAP control sys- tem 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] com- puted by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regard- less of the starter signal.
CLSD THL POS	ON/OFF	×	×	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	×	×	Indicates [ON/OFF] condition of the air con- ditioner switch as determined by the air con- ditioner signal.	
PW/ST SIGNAL	ON/OFF	×	×	Indicates [ON/OFF] condition of the power steering system (determined 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 lighting 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 heat- er 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 compensated by ECM according to the input signals.	
IGN TIMING	BTDC		×	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%			"Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIR FLOW	g/s			Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
PURG VOL C/V	%			 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM (B1)	°CA			Indicates [°CA] of intake camshaft advance angle.	
EXH/V TIM B1	°CA			Indicates [°CA] of exhaust camshaft ad- vance angle.	

< SYSTEM DESCRIPTION >

		Monitor Item	Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
INT/V SOL (B1)	%			 The control value of the intake valve tim- ing control solenoid valve (determined by ECM according to the input signals) is in- dicated. The advance angle becomes larger as the value increases. 		EC C
SWRL CONT S/ V	On/Off			 The control condition of the intake manifold runner control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 		D
VIAS S/V-1	On/Off					
AIR COND RLY	ON/OFF			The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.		F
FUEL PUMP RLY	ON/OFF			Indicates the fuel pump relay control condi- tion determined by ECM according to the in- put signals.		G
VENT CONT/V	On/Off			 The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 		H
THRTL RELAY	ON/OFF			Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.		J
COOLING FAN	Hi/Mid/Low/ Off			 Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation MID: Middle speed operation LOW: Low speed operation Off: Stop 		K
HO2S2 HTR (B1)	ON/OFF			Indicates [ON/OFF] condition of heated oxy- gen sensor 2 heater determined by ECM ac- cording to the input signals.		M
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 active. OFF: Power generation 		N
I/P PULLY SPD	rpm			Indicates the engine speed computed from the input speed sensor signal.		0
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehi- cle speed signal sent from TCM is dis- played.		Ρ
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 al- ready been performed successfully. 		

< SYSTEM DESCRIPTION >

		Monitor Item Selection				
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	
TRVL AFTER MIL	km/h or mph			Distance traveled while MIL is activated.		
ENG OIL TEMP	°C or °F			The engine oil temperature (determined by the signal voltage of the engine oil tempera- ture sensor) is displayed.		
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. 		
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehi- cle 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 RE- SUME/ACCELERATE switch signal.		
SET SW	On/Off			Indicates [ON/OFF] condition from SET/ COAST switch signal.		
BRAKE SW 1	On/Off			Indicates [ON/OFF] condition from ASCD brake switch signal.		
BRAKE SW 2	On/Off			Indicates [ON/OFF] condition from stop lamp switch signal.		
VHCL SPD CUT	Non/Cut			 Indicates the vehicle cruise condition. Non: Vehicle speed is maintained at the ASCD set speed. Cut: Vehicle speed decreased to excessively low compared with ASCD set speed, and ASCD operation is cut off. 		
LO SPEED CUT	Non/Cut			 Indicates the vehicle cruise condition. Non: Vehicle speed is maintained at the ASCD set speed. Cut: Vehicle speed decreased to excessively low, and ASCD operation is cut off. 		
AT OD MONI- TOR	On/Off			Indicates [ON/OFF] condition of A/T O/D ac- cording to the input signal from the TCM.		
AT OD CANCEL	On/Off			Indicates [ON/OFF] condition of A/T O/D cancel request signal.		
CRUISE LAMP	On/Off			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.		
SET LAMP	On/Off			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.		
ALT DUTY	%			Indicates the duty ratio of the power genera- tion command value. The ratio is calculated by ECM based on the battery current sensor signal.		
BAT CUR SEN	mV			The signal voltage of battery current sensor is displayed.		



DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

		Monitor Item	n Selection			•
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
A/F ADJ-B1	_			Indicates the correction of a factor stored in ECM. The factor is calculated from the dif- ference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculat- ed from A/F sensor 1 signal.		EC
TUMBLE POS SEN	V			 The intake manifold runner control valve position sensor signal voltage is dis- played. 		
P/N POSI SW	ON/OFF	×	×	Indicates [ON/OFF] condition from the park/ neutral position (PNP) signal.		- D
INT/A TEMP SE	°C or °F	×	×	The intake air temperature (determined by the signal voltage of the intake air tempera- ture sensor) is indicated.		E
AC PRESS SEN	V			The signal voltage from the refrigerant pres- sure sensor is displayed.		F
VTC DTY EX B1	%			 The control value of the exhaust valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 		G
EVAP LEAK DIAG	YET/CMPLT			 Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully. 		- H
EVAP DIAG READY	ON/OFF			 Indicates the ready condition of EVAP leak diagnosis. ON: EVAP leak diagnosis has been ready condition. OFF: EVAP leak diagnosis has not been ready condition. 		J
BAT TEMP SEN	V			The signal voltage of battery temperature sensor is displayed.		
THRTL STK CNT B1				_		- L
A/F SEN1 DIAG1(B1)	INCMP/CM- PLT			 Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		Μ
A/F SEN1 DIAG2 (B1)	INCMP/CM- PLT			 Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		N
A/F SEN1 DIAG3 (B1)	ABSNT/ PRSNT			 Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. 		P
HO2 S2 DIAG1 (B1)	INCMP/CM- PLT			 Indicates DTC P0139 self-diagnosis (de- layed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		-



DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item	n Selection		
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
HO2 S2 DIAG2 (B1)	INCMP/CM- PLT			Indicates DTC P0139 self-diagnosis (slow response) condition.INCMP: Self-diagnosis is incomplete.CMPLT: Self-diagnosis is complete.	
EOP SENSOR	mV			The signal voltage of EOP sensor is displayed.	
SPORT MODE SWITCH	On/Off			Displays the reception status of the sport mode switch signal received through CAN communication.	
ECO MODE SWITCH	ON/OFF	×		Displays the reception status of the ECO mode switch signal received through CAN communication.	

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injec- tion using CONSULT. 	If trouble symptom disappears, see Check item.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT. 	If trouble symptom disappears, see Check item.	 Harness and connectors Engine coolant temperature sensor Fuel injector
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. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature	e using CONSULT.	
COOLING FAN [*]	 Ignition switch: ON Select LOW or HIGH on CON- SULT screen. 	Cooling fan operates at low speed or high speed.	 Harness and connectors Cooling fan motor Cooling fan relay IPDM E/R
ALTERNATOR DUTY	 Ignition switch: ON Change duty ratio using CON- SULT. 	Battery voltage changes.	Harness and connectorsAlternatorIPDM E/R
FUEL PUMP RELAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound. 	Fuel pump relay makes the operat- ing sound.	Harness and connectorsFuel pump relay
VIAS S/V-1	 Ignition switch: ON (Engine stopped) Turn Intake Manifold Tuning (IMT) Valve "ON" and "OFF" using CONSULT and listen to operating sound. 	IMT valve motor makes an operat- ing sound.	Harness and connectorsIMT valve motor
TUMBLE CONTROL VALVE	 Ignition switch: ON Turn intake manifold runner control valve "ON" and "OFF" using CONSULT and listen to operating sound. 	Intake Manifold Runner control valve motor makes an operating sound.	 Harness and connectors Intake Manifold Runner control valve motor



DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[MRA8DE]

Test item	Condition	Judgement	Check item (Remedy)	٨
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see Check item.	Perform Idle Air Volume Learning.	EC
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N (CVT mod- els) Shifter lever: Neutral (M/T mod- els) Cut off each fuel injector signal one at a time using CONSULT. 	Engine runs rough or stops.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil 	C
VENT CONTROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve	F
INT V/T ASSIGN AN- GLE	 Engine: Return to the original trouble condition Change intake valve timing us- ing CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Intake valve timing control sole- noid valve 	G
EXH V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change exhaust valve timing us- ing CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Exhaust valve timing control sole- noid valve 	Н

*: Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC WORK SUPPORT MODE

Test mode	Test item	Corresponding DTC No.	Reference page	J
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-209</u>	
EVAPORATIVE SYS-	PURG FLOW P0441	P0441	<u>EC-287</u>	ĸ
TEM	PURG VOL CN/V P1444	P0443	<u>EC-292</u>	
	HO2S2 (B1) P1146	P0138	<u>EC-224</u>	
HO2S2	HO2S2 (B1) P1147	P0137	<u>EC-219</u>	L
	HO2S2 (B1) P0139	P0139	<u>EC-231</u>	

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ECU DIAGNOSIS INFORMATION ECM

Reference Value

INFOID:000000008930162

[MRA8DE]

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.

Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor. This occurs because the timing light shows a value calculated by ECM according to signals received from the cam shaft position sensor and other sensors related to ignition timing.

For outlines of following items, refer to EC-66, "CONSULT Function".

Monitor Item	C	Condition	Values/Status
ENG SPEED	Run engine and compare CONSL	JLT value with the tachometer indication.	Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-157, "Diagnosis Procedure"	<u>.</u>	
B/FUEL SCHDL	See EC-157, "Diagnosis Procedure"	<u>.</u>	
A/F ALPHA-B1	See EC-157, "Diagnosis Procedure"		
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	are met. - Engine: After warming up	00 rpm quickly after the following conditions en 3,500 and 4,000 rpm for 1 minute and at	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	are met. - Engine: After warming up	00 rpm quickly after the following conditions en 3,500 and 4,000 rpm for 1 minute and at	$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
ACCEL SEN 2 ^{*1}	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever: D (CVT)Shifter lever: 1st (M/T)	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	(Engine stopped)Selector lever: DShifter lever: 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank

< ECU DIAGNOSIS INFORMATION >

Monitor Item		Condition	Values/Status
START SIGNAL	• Ignition switch $ON \rightarrow START \rightarrow C$	0N (start switch is released)	$Off\toOn\toOff$
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	On
OLOD THE FUG	(Engine stopped)	Accelerator pedal: Slightly depressed	Off
	• Engine: After worming up idle the	Air conditioner switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (A/C compressor operates)	On
PW/ST SIGNAL	• Engine: After warming up, idle the	Steering wheel: Not being turned	Off
FW/ST SIGNAL	engine	Steering wheel: Being turned	On
		Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch and lighting switch: OFF	Off
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$\text{On} \rightarrow \text{Off} \rightarrow \text{On}$
	• Engine: After warming up, idle the	Heater fan switch: ON	On
HEATER FAN SW	engine	Heater fan switch: OFF	Off
		Brake pedal: Fully released	Off
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	On
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	3° - 13° BTDC
IGN TIMING	Selector lever: P or N		3 - 13 0100
	Air conditioner switch: OFFNo load	2,000 rpm	35° - 55° BTDC
	Engine: After warming up	Idle	10% - 35%
CAL/LD VALUE	 Selector lever: P or N Air conditioner switch: OFF No load 	2,500 rpm	10% - 35%
	Engine: After warming up	Idle	Approx. 2.9 g/s
MASS AIRFLOW	 Selector lever: P or N Air conditioner switch: OFF No load 	2,500 rpm	Approx. 5.5 g/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	0% - 90%
	Engine: After warming up	Idle	-5°- 5° CA
INT/V TIM(B1)	Selector lever: P or N Air conditioner switch: OFF No load	2,000 rpm	Approx. 0° - 20° CA
	Engine: After warming up	Idle	–5° - 5° CA
EXH/V TIM B1	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0° - 40° CA
	Engine: After warming up	Idle	0%-2%
INT/V SOL (B1)	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0%– 90%
	Ignition switch: ON	Accelerator pedal: Fully released	On
SWRL CONT S/V	 Ignition switch: ON Engine coolant temperature: Be- tween 0°C (32°F) and 45°C 	Accelerator pedal: Fully depressed	Off



< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	condition	Values/Status
VIAS S/V-1	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	When revving engine up to 5,250 rpm quickly and release the accelerator pedal.	$Off\toOn\toOff$
	Engine: After warming up, idle the	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	For 1 second after turning ignitionEngine running or cranking	switch: ON	On
	Except above		Off
VENT CONT/V	Ignition switch: ON		Off
THRTL RELAY	Ignition switch: ON		On
	• Engine: Afterwarming up, idle the	Engine coolant temperature is 97°C (207°F) or less	Off
	 Engine: After warming up, idle the engine Air conditioner switch: OFF 	Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Low
		Engine coolant temperature between 100°C (212°F) or more	Hi
COOLING FAN	Engine: After warming up, idle the engine	Engine coolant temperature is 97°C (207°F) or less	Low
	 Air conditioner switch: ON Refrigerant pressure is less than	Engine coolant temperature between 98°C (208°F) and 99°C (210°F) or more	Low
	1,280 kPa (12.80 bar, 13.05 kg/ cm ² , 185.6 psi)	Engine coolant temperature between 100°C (212°F) or more	Hi
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm a Engine: After warming up Keeping the engine speed betwee idle for 1 minute under no load 	fter the following conditions are met. en 3,500 and 4,000 rpm for 1 minute and at	On
	• Engine speed: Above 3,600 rpm		Off
ALT DUTY SIG	Power generation voltage variable	e control: Operating	On
ALI DUTY SIG	Power generation voltage variable	e control: Not operating	Off
I/P PULLY SPD	Vehicle speed: More than 20 km/h	n (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	• Turn drive wheels and compare CONSULT value with the speedometer indi- cation.		Almost the same speed as the speedometer indication
	Engine: running	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)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	• Engine: After warming up, idle the (More than 260 seconds after star		4 - 100%
VHCL SPEED SE	• Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	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 SW	Ignition switch: ON	MAIN switch: Released	Off

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Condition	Values/Status
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
CANCEL SW	· Ignition switch. ON	CANCEL switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
RESUME/AGO SW		RESUME/ACCELERATE switch: Re- leased	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
SET 5W		SET/COAST switch: Released	Off
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
VHCL SPD CUT	Ignition switch: ON		Non
LO SPEED CUT	Ignition switch: ON		Non
AT OD MONITOR	Ignition switch: ON		Off
AT OD CANCEL	Ignition switch: ON		Off
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$On\toOff$
SET LAMP	NOTE: The item is indicated, but not used.		
ALT DUTY	Engine speed: Idle		0 - 80%
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged^{*2} Selector lever: P or N (CVT) Shifter lever: Neutral (M/T) Air conditioner switch: OFF No load 		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: running		-0.450 - 0.330
	Ignition switch: ON	Accelerator pedal: Fully released	Less than 2.4 V
TUMBLE POS SEN	 Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) 	Accelerator pedal: Fully depressed	More than 3.5 V
P/N POSI SW	Ignition switch: ON	 Selector lever: P or N (CVT) Shifter lever: Neutral (M/T) 	On
		Selector lever: Except above	Off
NT/A TEMP SE	Ignition switch: ON		Indicates intake air tempera- ture
AC PRESS SEN	Engine speed: IdleBoth A/C switch and blower fan switch	witch: ON (Compressor operates)	1.0 - 4.0 V
	Engine: After warming up	Idle	0 - 2%
/TC DTY EX B1	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0- 90%
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
BAT TEMP SEN	 Engine: After warming up, idle the Selector lever: P or N Air conditioner switch: OFF No load 	engine	Indicates the temperature around the battery.

< ECU DIAGNOSIS INFORMATION >

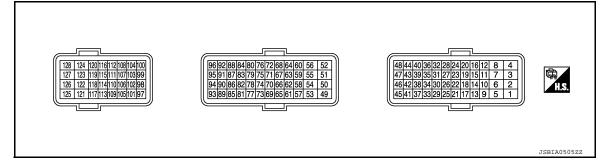
[MRA8DE]

Monitor Item	(Condition	Values/Status
THRTL STK CNT B1	NOTE: The item is indicated, but not used.	_	
A/F SEN1 DIAG1	DTC P015A and P015B self-diagno	sis is incomplete.	INCMP
(B1)	DTC P015A and P015B self-diagno	sis is complete.	CMPLT
A/F SEN1 DIAG2	DTC P014C and P014D self-diagno	sis is incomplete.	INCMP
(B1)	DTC P014C and P014D self-diagno	osis is complete.	CMPLT
A/F SEN1 DIAG3	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
(B1)	The vehicle condition is within the d P015A or P015B.	PRSNT	
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed	INCMP	
	DTC P0139 self-diagnosis (delayed	CMPLT	
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow res	INCMP	
1102 32 DIAG2 (BT)	DTC P0139 self-diagnosis (slow res	CMPLT	
	Engine: After warming up	Idle	Approx. 1,450 mV
EOP SENSOR	 Selector lever: P or N (CVT) Shifter lever: Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 2,850 mV
SPORT MODE		Press the sport mode switch	On
SWITCH	ignition switch: ON	Release the sport mode switch	Off
ECO MODE	ignition switch: ON	Press the ECO mode switch	On
SWITCH		Release the ECO mode switch	Off

*1: 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.

*2: Before measuring the voltage, confirm that the battery is fully charged. Refer to PG-4, "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.

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	EC
1 (P)	128 (B/Y)	Throttle control motor (Close)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT) Shifter lever: 1st (M/T) Accelerator pedal: Fully released 	1.8 V★ 5mSec/div	C
2 (G)	128 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	Е
3 (W)	128 (B/Y)	Throttle control motor (Open)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT) Shifter lever: 1st (M/T) Accelerator pedal: Fully depressed 	3.2 V★ 1mSec/div	F
4 (W)	8 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V	Н
5 (G)	128 (B/Y)	Intake manifold tuning valve motor (Close)	Output	 [Ignition switch ON] Engine coolant temperature: Normal operating condition Accelerator pedal: Depressed → fully released 	Battery voltage appears for about 1 second.	I
6 (R)	128 (B/Y)	Intake manifold tuning valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	J
7 (R)	128 (B/Y)	Intake manifold tuning valve motor (Open)	Output	 [Ignition switch ON] Engine coolant temperature: normal operating condition Accelerator pedal: Fully released → depressed 	Battery voltage appears for about 1 second.	K
8 (B)	_	Sensor ground (Knock sensor)	_	_	_	L
9 (BR)				 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	Battery voltage (11 - 14 V)★ 50mSec/div	M
10 (SB) 13 (O) 14 (V)	128 (B/Y)	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 2	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	10V/div JSBIA3228ZZ Battery voltage (11 - 14 V)★ 50mSec/div 50mSec/div	P

< ECU DIAGNOSIS INFORMATION >

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L			

	nal No. color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
12 (B)	_	ECM ground		_	_	
16 (B)	_	ECM ground		_	—	
17 (L)	(b) EV/AP conister purge vol		Output	 [Engine is running] Idle speed Accelerator pedal: Not depressed even slightly, after engine starting 	Battery voltage (11 - 14 V)★ 50mSec/div 50mSec/div 20V/div JMBIA0087GB	
(-)	(B/Y)	valve		 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.) 	10 V★ 50mSec/div ↓↓↓↓↓↓ ↓↓↓↓↓↓ ↓↓↓↓↓↓ ↓↓↓↓↓↓↓ 10V/div	
18 (GR)	128 (B/Y)	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.0 V	
				[Ignition switch: ON]More than 1 second after turning ignition switch ON	Battery voltage (11 - 14 V)	
21 (Y)	128 (B/Y)	Throttle control motor re- lay	Output	[Ignition switch: OFF]	Battery voltage (11 - 14 V)	
(1)	(6,1)	lay		[Ignition switch: ON]	0 - 1.0 V	
22 (W)	23 (BR)	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly 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 	0 - 1.0 V	
23 (BR)		Sensor ground (Heated oxygen sensor 2)	_	_	_	
25 (Y)	26 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.	
26 (P)	_	Sensor ground (Engine oil temperature sensor)		_	_	
27 (LG)	_	Sensor ground (Engine coolant tempera- ture sensor)		_	_	
28 (V)	27 (LG)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.	

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
30 (L)	_	Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_	
31	30	Camshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 2.0★ 10mSec/div	
(BR)	(L)	(PHASE)		[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div	
32 (GR)	_	Sensor power supply [Camshaft position sen- sor (PHASE)]		[Ignition switch: ON]	5.0 V	
33 (GR)	34 (W)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
34 (W)	_	Sensor ground (Mass air flow sensor, in- take air temperature sen- sor)		_	_	
				[Ignition switch: ON] • Engine stopped	1.27 V	
35 (G)	34 (W)	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	1.3 – 1.6 V	
(-)	(**)			[Engine is running]Warm-up conditionEngine is revving from idle to about 4,000 rpm	$1.3 - 1.6 \rightarrow 2.6$ V (Check for lin- ear voltage rise in response to engine being increased to about 4,000 rpm.)	
36 (R)	_	Sensor power supply (Mass air flow sensor, in- take air temperature sen- sor)	_	[Ignition switch: ON]	5.0 V	
37 (B)	_	Shield	—	_	_	
38 (W)	_	Sensor ground (Engine oil pressure sen- sor)		_	_	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
39	38	Engine oil pressure sen-	Input	[Engine is running]Warm-up conditionIdle speed	1.3 V★ 5mSec/div	
(G)	(W)	sor	Input	[Engine is running]Warm-up conditionEngine speed is 2,000 rpm	2.7 V★ 5mSec/div	
40 (R)	38 (W)	Sensor power supply (Engine oil pressure sen- sor)	_	[Ignition switch: ON]	5.0 V	
41 (Y)	128 (B/Y)	A/F sensor 1	Input	Engine running] • Warm-up condition • Engine speed: 2,000 rpm	2.2 V (Output voltage varies with air- fuel ratio)	
42 (W)	_	Sensor ground [Exhaust valve timing control position sensor]		_	_	
43	42	Exhaust valve timing con-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0★ 50mSec/div	
(P)	(W)	trol position sensor	Input	[Engine is running] • Engine speed is 2,500 rpm	1.0★ 50mSec/div	
44 (R)	_	Sensor power supply [Exhaust valve timing control position sensor]		[Ignition switch: ON]	5 V	
45 (BR)	128 (B/Y)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	2.2 V Output voltage varies with air fuel ratio.	
49 (G)	128 (B/Y)	Intake manifold runner control valve motor (Close)	Output	 [Ignition switch ON] Engine coolant temperature: More than 60°C (140°F) Accelerator pedal: Depressed → fully released 	Battery voltage appears for about 1 second.	



< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

Terminal No. (Wire color)		Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
50 (R)	128 (B/Y)	Intake manifold runner control valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
51 (R)	128 (B/Y)	Intake manifold runner control valve motor (Open)	Output	 [Ignition switch ON] Engine coolant temperature: More than 60°C (140°F) Accelerator pedal: Fully released → depressed 	Battery voltage appears for about 1 second.
52 (B)	_	ECM ground	_	_	_
53 (G)	128 (B/Y)	A/F sensor 1 heater	Input	 [Engine is running] Warm-up condition Idle speed (More than 260 seconds after start- ing engine) 	10 V★ 100mSec/div
54 (G)	128 (B/Y)	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	8 V★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	Battery voltage (11 - 14 V)
61 (BG)	62 (BR)	Battery temperature sen- sor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.3 V
62 (BR)	_	Sensor ground (Battery current sensor, battery temperature sen- sor)	_	_	_
63 (G)	62 (BR)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged[*] Idle speed 	2.6 - 3.5 V
64 (Y)	_	Sensor power supply (Battery current sensor)	_	[Ignition switch: ON]	5.0 V
70 (W)	_	Sensor ground [Crankshaft position sen- sor (POS)]	_	_	_

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< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
71 (R)	70 (W)	Crankshaft position sen- sor (POS)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 V★ 5mSec/div 1.0 V★ 2V/div JPBIA472822	
. ,				[Engine is running] • Engine speed: 2,000 rpm	1.0 V★ 5mSec/div	
72 (G)	_	Sensor power supply [Crankshaft position sen- sor (POS)]		[Ignition switch: ON]	5.0 V	
73 (GR)	_	Shield	_	_	_	
77	78		I brottlo position concor 7	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	Less than 4.75 V
(W)	(R)		input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V	
78 (R)	_	Sensor ground (Throttle position sensor)	—	_	_	
79	78	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V	
(G)	(R)			 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	Less than 4.75 V	
80 (B)	_	Sensor power supply (Throttle position sensor)	_	[Ignition switch: ON]	5.0 V	
81 (Y)	128 (B/Y)	Power supply for ECM (Backup)	Input	[Ignition switch: OFF]	Battery voltage (11 - 14 V)	
83	Intake manifold runner	Intake manifold runner		 [Ignition switch ON] Engine coolant temperature: Between 0°C (32°F) and 45°C (113°F) Accelerator pedal: Fully released 	Less than 2.4 V	
(LG)	83 92 control valve position sen-		Input	 [Ignition switch ON] Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) Accelerator pedal: Slightly de- pressed 	More than 3.5 V	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
84 (W)	_	Sensor power supply (Intake manifold runner control valve position sen- sor)	_	[Ignition switch: ON]	More than 4.98 V	EC
86 (R) 87 (LG)	128	Ignition signal No. 1 Ignition signal No. 2		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.1 V★ 100mSec/div	D
90 (P) 91 (SB)	(B/Y)	Ignition signal No. 3 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 0.2 V 100mSec/div 2V/div	F G
89 (GR) 92 (LG)	128 (B/Y)	ECM relay (Self shut-off) Sensor ground (Intake manifold runner control valve position sen- sor)	Output	 [Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF [Ignition switch: OFF] More than a few seconds after turning ignition switch OFF 	0 - 1.0 V Battery voltage (11 - 14 V) —	J
93 (LG)	128 (B/Y)	Intake valve timing control solenoid valve	Output	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition When revving engine up to 2,000 rpm quickly 	0 V 11 – 14 V ★ • • • • • • • • • • • • • • • • • • •	L M N
94 (G)	128 (B/Y)	Exhaust valve timing con- trol solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 V Battery voltage (11 - 14 V)	O
97 (BR)	128 (GR)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	Battery voltage (11 - 14 V)	
99 (P)	—	CAN communication line (CAN-L)	Input/ Output			

< ECU DIAGNOSIS INFORMATION >

	Terminal No. (Wire color) Description			Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
100 (L)		CAN communication line (CAN-H)	Input/ Output	_	_	
101 (G)	128 (B/Y)	Starter relay cut off signal	Input/ Output	[Ignition switch: ON] [Engine is running] • Warm-up condition • Idle speed	0 V Battery voltage (11 - 14 V)	
103 (P)	124 (Y)	Refrigerant pressure sen- sor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0 V	
104 (L)	_	Sensor power supply (Refrigerant pressure sensor)		[Ignition switch: ON]	5.0 V	
105 (V)	128 (B/Y)	Starter motor relay control signal	Output	 [Engine is running] Warm-up condition Idle speed Selector lever: D (CVT) Shift lever: 1st (M/T) Engine speed: Less than 1,500 rpm NOTE: To decrease engine speed, perform the DTC confirmation procedure B in P1650. Refer to <u>EC-398, "DTC Logic"</u>. 	0 V (While operating the starter mo- tor)	
					[Engine is running]Warm-up conditionIdle speed	Battery voltage (11 - 14 V)
109 (O)	128 (B/Y)	Ignition switch	Input	[Ignition switch: OFF] [Ignition switch: ON]	0 V Battery voltage (11 - 14 V)	
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	
110 (P)	111 (B)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V	
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V	
111 (B)		Sensor ground (ASCD steering switch)	_			
113 (G)	_	Sensor power supply (EVAP control system pressure sensor)	_	[Ignition switch: ON]	5.0 V	
114 (P)	124 (SB)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V	
115	128	Stop Jamp quitab	Innut	[Ignition switch: OFF] • Brake pedal: Fully released	0 V	
(SB)	(B/Y)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	Battery voltage (11 - 14 V)	

< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

Terminal No. (Wire color)		Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
116	128	Brake pedal position	Input	[Ignition switch: OFF] • Brake pedal: Fully released	Battery voltage (11 - 14 V)
(G)	(B/Y)	switch	mput	[Ignition switch: OFF] • Brake pedal: Slightly depressed	0 V
117 (BR)	128 (B/Y)	 PNP signal (CVT) Neutral switch (M/T) 	Input	[Ignition switch: ON] • Selector lever: P or N (CVT) • Shifter lever: Neutral (M/T)	Battery voltage (11 - 14 V)
(DR)	(6/1)			[Ignition switch: ON] • Except above	0 V
118 (O)	_	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5.0 V
119	120	Accelerator pedal posi-	loout	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 – 0.6 V
(W)	(Y)	tion sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 – 2.4 V
120 (Y)		Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_
121 (G)	128 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
122 (V)		Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5.0 V
123 (B/Y)		ECM ground	_		_
124 (V)	_	Sensor ground (EVAP control system pressure sensor, refriger- ant pressure sensor)	_	_	_
126	127	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.6 – 0.9 V
(R)	(GR)	tion sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 – 4.7 V
127 (GR)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)	_		_
128 (B/Y)		ECM ground	—	_	_

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) *: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "<u>How to Han-</u> <u>dle Battery</u>".

Fail Safe

INFOID:000000008930163

Ρ

NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks	Reference page
Malfunction	Engine speed will not rise	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.	EC-466, "Compo-
indicator	more than 2,500 rpm due	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.	nent Function
circuit	to the fuel cut	The fail safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	Check"

DTC RELATED ITEM

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail sa	fe mode	Vehicle behavior		
Traveling con- trol mode	Accelerator an- gle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. NOTE: ECM does not control the accelerator pedal releasing speed.		
Engine or control	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.		
Device fix mode		 This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens). 		

Fail Safe Pattern

Pattern	Fail safe mode			
A	Traveling control mode	Accelerator angle variation control		
В		Engine output control		
С	Device fix mode			

Fail Safe List

×:Applicable —: Not applicable

			Vehicle behavior					
DTC No.	Detected items	Pattern			Others			
		A	В	С	Oulers			
P0075	Intake valve timing control	_	_	×	ECM activates the IVT intermediate lock control solenoid valve to bring the cam sprocket into an intermediate lock condition.			
P0078	Exhaust valve timing control	—	—	×	—			
P0101 P0102 P0103	Mass air flow sensor circuit	×	×	×	_			
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	_	_	_	The ECM controls the electric throttle control actuator in reg- ulating 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.			

< ECU DIAGNOSIS INFORMATION >

		Vehicle behavior								
DTC No.	No. Detected items		Pattern		Others					
		А	В	С		915				
P0117 P0118	Engine coolant temperature sensor	×	×	_	_					
P0171 P0172	Fuel injection system	×	_	—	_					
P0197 P0198	Engine oil temperature sensor	—	_	_	Exhaust valve timing control do	es not function.				
P0300 P0301 P0302 P0303 P0304	Misfire	×	_		_					
P0500	Vehicle speed sensor	х	—	—	-	-				
P0524	Engine oil pressure	_	_	_	 ECM illuminates oil pressure warning lamp on the combinition meter. Engine speed will not rise more than 4,000rpm due to the fuel cut. Fail-safe is canceled when ignition switch OFF → ON. 					
P0603	ECM	×	×	_	_	-				
P0605	ECM	×	×	—	_	-				
P0643	Sensor power supply	_	_	_	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.					
P1078	Exhaust valve timing control position sensor circuit	×	_	×	-	-				
P1650 P1651	Starter relay	×	×	_						
P1805	Brake switch				ECM controls the electric throttl ing the throttle opening to a sma Therefore, acceleration will be p	all range.				
		_	_	_	Vehicle condition	Driving condition				
					When engine is idling	Normal				
					When accelerating	Poor acceleration				
P2100	Throttle control motor relay	_	_	_	ECM stops the electric throttle co valve is maintained at a fixed op the return spring.					
P2101	Electric throttle control func- tion	_	_	_	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 control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.					
P2119	Electric throttle control actua- tor	×	×	_	-	-				
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	_	_		The ECM controls the electric throttle control actuator in reg- ulating 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.					

DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	DTC	Detected items
	U0101, U1001	CAN communication line
	P0101, P0102, P0103	Mass air flow sensor
	P0112, P0113	Intake air temperature sensor 1
	P0117, P0118	Engine coolant temperature sensor
	P0122, P0123, P0222, P0223, P1225, P2135	Throttle position sensor
	P0197, P0198	Engine oil temperature sensor
	P0327, P0328	Knock sensor
	P0335	Crankshaft position sensor (POS)
4	P0340	Camshaft position sensor (PHASE)
1	P0500	Vehicle speed sensor
	P0520	Engine oil pressure sensor
	P0603, P0604, P0605, P0606, P0607, P060A, P060B	ECM
	P0643	Sensor power supply
	P0705	Transmission range switch
	P0850	Park/neutral position (PNP) switch
	P1550, P1551, P1552, P1553, P1554	Battery current sensor
	P1610 - P1615	NATS
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
	P0031, P0032	Air fuel ratio (A/F) sensor 1 heater
	P0037, P0038	Heated oxygen sensor 2 heater
	P0075	Intake valve timing control solenoid valve
	P0078	Exhaust valve timing control solenoid valve
	P0130, P0131, P0132, P014C, P014D	Air fuel ratio (A/F) sensor 1
	P0137, P0138, P0139	Heated oxygen sensor 2
	P0444	EVAP canister purge volume control solenoid valve
	P0710	CVT related sensors, solenoid valves and switches
2	P1078	Exhaust valve timing position sensor
	P1217	Engine over temperature (OVERHEAT)
	P1650, P1651, P1652	Starter motor relay
	P1715	CVT related sensors, solenoid valves and switches
	P1800	Intake manifold tuning valve
	P1805	Brake switch
	P2100, P2103	Throttle control motor relay
	P2101	Electric throttle control function
	P2118	Throttle control motor

INFOID:000000008930164

< ECU DIAGNOSIS INFORMATION >

Priority	DTC	Detected items	
	P0171, P0172	Fuel injection system function	А
	P0201 - P0204	Injector	
	P0234	Turbocharger system	EC
3	P0300 - P0304	Misfire	
	P0420	Three way catalyst function	
	P0524	Engine oil pressure	С
	P2119	Electric throttle control actuator	

DTC Index

INFOID:000000008930165

[MRA8DE]

 \times :Applicable —: Not applicable

DTC ^{*1}							
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
U0101	0101 ^{*5}	LOST COMM (TCM)	_	2	_	В	<u>EC-167</u>
U1001	1001 ^{*5}	CAN COMM CIRCUIT	_	1 or 2	_	_	<u>EC-168</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_		Flashing ^{*6}	_	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-169</u>
P0014	0014	EXH/V TIM CONT-B1	_	2	×	В	<u>EC-172</u>
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-175</u>
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-175</u>
P0037	0037	HO2 HTR (B1)	-	2	×	В	<u>EC-177</u>
P0038	0038	HO2 HTR (B1)	_	2	×	В	<u>EC-177</u>
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	<u>EC-179</u>
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	В	<u>EC-182</u>
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	<u>EC-185</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-185</u>
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-185</u>
P0111	0111	IAT SENSOR 1 B1	-	2	×	А	<u>EC-191</u>
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-193</u>
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-193</u>
P0116	0116	ECT SEN/CIRC	_	2	×	A	<u>EC-195</u>
P0117	0117	ECT SEN/CIRC	_	1	×	В	<u>EC-197</u>
P0118	0118	ECT SEN/CIRC	—	1	×	В	<u>EC-197</u>
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	<u>EC-199</u>
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	В	<u>EC-199</u>
P0125	0125	ECT SENSOR	—	2	×	В	<u>EC-202</u>
P0127	0127	IAT SENSOR-B1	_	2	×	В	<u>EC-204</u>
P0128	0128	THERMSTAT FNCTN	—	2	×	А	<u>EC-206</u>
P0130	0130	A/F SENSOR1 (B1)	_	2	×	А	<u>EC-209</u>
P0131	0131	A/F SENSOR1 (B1)	—	2	×	В	EC-213
P0132	0132	A/F SENSOR1 (B1)	—	2	×	В	<u>EC-216</u>
P0137	0137	HO2S2 (B1)	×	2	×	А	EC-219

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}							
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
P0138	0138	HO2S2 (B1)	×	2	×	A	<u>EC-224</u>
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-231
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	EC-237
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	EC-237
P015A	015A	A/F SENSOR1 (B1)	×	2	×	А	EC-237
P015B	015B	A/F SENSOR1 (B1)	×	2	×	А	EC-237
P0171	0171	FUEL SYS-LEAN-B1		2	×	В	<u>EC-245</u>
P0172	0172	FUEL SYS-RICH-B1		2	×	В	EC-249
P0181	0181	FTT SENSOR	_	2	×	A and B	EC-253
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-257
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-257
P0196	0196	EOT SENSOR	_	2	×	A and B	EC-260
P0197	0197	EOT SEN/CIRC	_	2	×	В	EC-263
P0198	0198	EOT SEN/CIRC	_	2	×	В	EC-263
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-265
P0223	0223	TP SEN 1/CIRC-B1		1	×	В	EC-265
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	— or ×	В	EC-268
P0301	0301	CYL 1 MISFIRE		1 or 2	— or ×	В	EC-268
P0302	0302	CYL 2 MISFIRE		1 or 2	— or ×	В	EC-268
P0303	0303	CYL 3 MISFIRE	_	1 or 2	— or ×	В	EC-268
P0304	0304	CYL 4 MISFIRE	_	1 or 2	— or ×	В	EC-268
P0327	0327	KNOCK SEN/CIRC-B1		2	_		EC-274
P0328	0328	KNOCK SEN/CIRC-B1		2	_		EC-274
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	EC-276
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	EC-279
P0420	0420	TW CATALYST SYS-B1	×	2	×	А	EC-282
P0441	0441	EVAP PURG FLOW/MON	×	2	×	А	<u>EC-287</u>
P0443	0443	PURG VOLUME CONT/V	_	2	×	А	EC-292
P0444	0444	PURG VOLUME CONT/V		2	×	В	EC-297
P0445	0445	PURG VOLUME CONT/V		2	×	В	EC-297
P0447	0447	VENT CONTROL VALVE	_	2	×	В	<u>EC-300</u>
P0448	0448	VENT CONTROL VALVE	_	2	×	В	EC-304
P0451	0451	EVAP SYS PRES SEN		2	×	А	EC-308
P0452	0452	EVAP SYS PRES SEN		2	×	В	EC-312
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-315
P0456	0456	EVAP VERY SML LEAK	×* ⁷	2	×	А	EC-319
P0460	0460	FUEL LEV SEN SLOSH		2	×	A	<u>EC-325</u>
P0461	0461	FUEL LEVEL SENSOR	_	2	×	В	<u>EC-326</u>
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	<u>EC-328</u>
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	EC-328

< ECU DIAGNOSIS INFORMATION >

DT	°C ^{*1}							٥
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	A
P0500	0500	VEHICLE SPEED SEN A* ⁸	_	2	×	В	<u>EC-329</u> (CVT models) <u>EC-330</u> (M/T models)	EC C
P0506	0506	ISC SYSTEM	_	2	×	В	EC-333	
P0507	0507	ISC SYSTEM	_	2	×	В	EC-335	
P050A	050A	COLD START CONTROL		2	×	А	<u>EC-337</u>	D
P050B ^{*9}	050B ^{*9}	COLD START CONTROL	_	2	×	А	EC-337	
P050E	050E	COLD START CONTROL	_	2	×	A	EC-337	Е
P0520	0520	EOP SENSOR/SWITCH	_	2	_	_	EC-339	
P0524	0524	ENGINE OIL PRESSURE	_	1	_		EC-342	
P0603	0603	ECM BACK UP/CIRCUIT*10	_	2	× or —	В	<u>EC-345</u>	F
P0604	0604	ECM	_	1	×	В	EC-346	
P0605	0605	ECM	_	1 or 2	× or —	В	EC-347	G
P0606	0606	CONTROL MODULE	_	1	× or —	В	<u>EC-348</u>	
P0607	0607	ECM	_	1 or 2	× or —	В	EC-349	
P060A	060A	CONTROL MODULE	_	1 or 2	×	В	EC-350	Н
P060B	060B	CONTROL MODULE		1	×	В	EC-351	
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	<u>EC-352</u>	
P0850	0850	P-N POS SW/CIRCUIT		2	×	В	<u>EC-354</u>	
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	В	<u>EC-358</u>	
P1148	1148	CLOSED LOOP-B1	_	1	×	A	<u>EC-361</u>	J
P117A	117A	AIR FUEL RATIO B1	_	2	×	A	<u>EC-362</u>	
P1212	1212	TCS/CIRC	_	2	_	—	<u>EC-367</u>	K
P1217	1217	ENG OVER TEMP	_	1	×	В	<u>EC-368</u>	
P1225	1225	CTP LEARNING-B1	_	2	_	—	<u>EC-371</u>	
P1226	1226	CTP LEARNING-B1	_	2	_		<u>EC-372</u>	L
P1550	1550	BAT CURRENT SENSOR	—	2			<u>EC-373</u>	
P1551	1551	BAT CURRENT SENSOR	_	2			<u>EC-376</u>	M
P1552	1552	BAT CURRENT SENSOR	—	2	_		<u>EC-376</u>	
P1553	1553	BAT CURRENT SENSOR	—	2	_		<u>EC-379</u>	
P1554	1554	BAT CURRENT SENSOR	—	2	_		<u>EC-382</u>	Ν
P1556	1556	BAT TMP SEN/CIRC	—	2	—		<u>EC-385</u>	
P1557	1557	BAT TMP SEN/CIRC	—	2	—		<u>EC-385</u>	0
P1564	1564	ASCD SW	-	1	—	—	<u>EC-387</u>	0
P1572	1572	ASCD BRAKE SW	_	1	_		<u>EC-390</u>	
P1574	1574	ASCD VHL SPD SEN	-	1	—	—	<u>EC-396</u>	Ρ
P1610	1610	LOCK MODE	_	2	_	_	SEC-66 (With intelligent key system), <u>SEC-</u> <u>180</u> (Without in- telligent key system)	
P1611	1611	ID DISCORD, IMMU-ECM		2	—	—	<u>SEC-67</u>	

< ECU DIAGNOSIS INFORMATION >

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DTC ^{*1}							
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
P1612	1612	CHAIN OF ECM-IMMU	—	2	_	_	<u>SEC-68</u>
P1650	1650	STR MTR RELAY 2	—	2	\times or —	В	<u>EC-398</u>
P1651	1651	STR MTR RELAY	—	2	×	В	<u>EC-401</u>
P1652	1652	STR MTR SYS COMM	—	1	×	В	<u>EC-403</u>
P1715	1715	IN PULY SPEED	_	2	_	_	<u>EC-405</u>
P1800	1800	VIAS S/V-1	—	2	_	_	<u>EC-407</u>
P1805	1805	BRAKE SW/CIRCUIT	—	2	_	_	<u>EC-409</u>
P2004	2004	TUMBLE CONT/V	_	2	×	В	<u>EC-412</u>
P2014	2014	IN/MANIFOLD RUNNER POS SEN B1	_	2	×	В	<u>EC-415</u>
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-415</u>
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-415</u>
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1	_	2	×	В	<u>EC-415</u>
P2096	2096	POST CAT FUEL TRIM SYS B1	_	2	×	А	<u>EC-418</u>
P2097	2097	POST CAT FUEL TRIM SYS B1	—	2	×	A	<u>EC-418</u>
P2100	2100	ETC MOT PWR-B1	—	1	×	В	<u>EC-422</u>
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	В	<u>EC-424</u>
P2103	2103	ETC MOT PWR	_	1	×	В	<u>EC-422</u>
P2118	2118	ETC MOT-B1	—	1	×	В	<u>EC-427</u>
P2119	2119	ETC ACTR-B1	—	1	×	В	<u>EC-429</u>
P2122	2122	APP SEN 1/CIRC	_	1	×	В	<u>EC-431</u>
P2123	2123	APP SEN 1/CIRC	—	1	×	В	<u>EC-431</u>
P2127	2127	APP SEN 2/CIRC	—	1	×	В	<u>EC-434</u>
P2128	2128	APP SEN 2/CIRC	—	1	×	В	<u>EC-434</u>
P2135	2135	TP SENSOR-B1	—	1	×	В	<u>EC-437</u>
P2138	2138	APP SENSOR		1	×	В	<u>EC-440</u>

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: Refer to EC-150, "Description".

*5: The trouble diagnosis for this DTC needs CONSULT.

*6: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to EC-63, "On Board Diagnosis Function".

*7: SRT code will not be set if the self-diagnostic result is NG.

*8: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*9: For CALIFORNIA

*10: This self-diagnosis is not for ECM power supply circuit, even though "ECM BACK UP/CIRCUIT" is displayed on CONSULT screen.

Test Value and Test Limit

INFOID:000000008930166

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

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.



< ECU DIAGNOSIS INFORMATION >

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. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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< ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		li	e and Test mit display)	
Item	MID		DTC	TID	Unitand Scaling ID	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
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2096	89H	84H	The amount of shift in air fuel ratio
			P2097	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
HO2S			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diag- nosis
			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 >

L.	OBD-	. Self-diagnostic test item	570	li	ie and Test mit display)		
Item	MID		DTC	TID	Unitand Scaling ID	Description	
			P0151	83H	0BH	Minimum sensor output voltage for test cycle	
			P0151	84H	0BH	Maximum sensor output voltage for test cycle	
			P0150	85H	0BH	Minimum sensor output voltage for test cycle	
			P0150	86H	0BH	Maximum sensor output voltage for test cycle	
			P0153	87H	04H	Response rate: Response ratio (lean to rich)	
			P0153	88H	04H	Response rate: Response ratio (rich to lean)	
			P2098	89H	84H	The amount of shift in air fuel ratio	
			P2099	8AH	84H	The amount of shift in air fuel ratio	
			P0150	8BH	0BH	Difference in sensor output voltage	
	05H	Air fuel ratio (A/F) sensor 1	P0153	8CH	83H	Response gain at the limited frequency	
		(Bank 2)	P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1	
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1	
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1	
HO2S				P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1	
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1	
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	
			P0158	07H	0CH	Minimum sensor output voltage for test cycle	
		Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle	
	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	
			P0159	82H	11H	Rear O2 sensor delay response diag- nosis	
			P0163	07H	0CH	Minimum sensor output voltage for test cycle	
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	



< ECU DIAGNOSIS INFORMATION >

ltem	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unitand Scaling ID	Description
	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust in- dex value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST		Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
	22H		P0430	82H	01H	Switching time lag engine exhaust in- dex value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
EGR SYSTEM			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
			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

< ECU DIAGNOSIS INFORMATION >

	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)			А
Item				TID	Unit and Scaling ID	Description	EC
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)	С
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)	0
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)	D
	35H	VVT Monitor (Bank1)	P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)	Е
	5511		P100A	84H	10H	VEL slow response diagnosis	
			P1090	85H	10H	VEL servo system diagnosis	
VVT			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	F
			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)	G
SYSTEM	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)	Н
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)	
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)	I
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)	J
			P100B	84H	10H	VEL slow response diagnosis	
			P1093	85H	10H	VEL servo system diagnosis	K
			P0021	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)	L
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down	Μ
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)	Ν
	ЗСН	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)	
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring	0
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring	Р
	3DH	Purge flow system	P0441	83H	осн	Difference in pressure sensor output voltage before and after vent control valve close	

< ECU DIAGNOSIS INFORMATION >

	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		
ltem				TID	Unitand Scaling ID	Description
	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
	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR			P2448	83H	01H	Secondary air injection system high airflow
			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
			P2444	86H	01H	Secondary air injection system pump stuck on
		H Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
FUEL	81H		P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM	82H	2H Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

< ECU DIAGNOSIS INFORMATION >

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	OBD- MID	Self-diagnostic test item		Test value and Test limit		Description	А
ltem			DTC	(GST display)			
				TID	Unitand Scaling ID		EC
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder	С
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder	
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder	D
	A1H		P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder	E
		Multiple cylinder misfires	P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder	
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder	F
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder	0
MISFIRE			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder	G
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders	Н
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder	-
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder	
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder	J
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder	-
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder	K
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder	L
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder	-
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder	Μ
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder	N
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder	-
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders	0

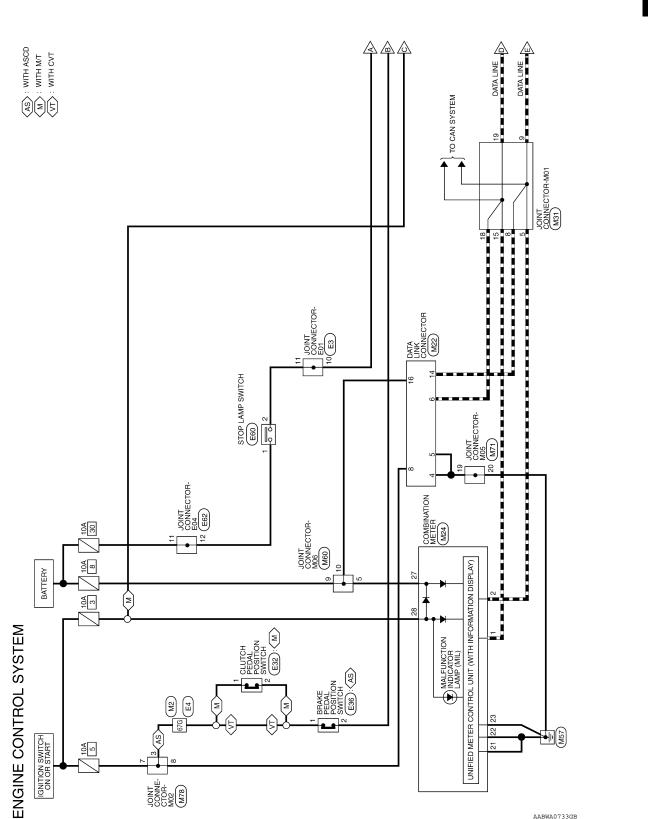
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< ECU DIAGNOSIS INFORMATION >

ltem		Self-diagnostic test item	DTC	Test value and Test limit		Description
	OBD-			(GST display)		
	MID			TID	Unitand Scaling ID	Description
	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
MISFIRE			P0304	0CH	24H	Misfire counts for last/current driving cycles
MISTIRE	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

< WIRING DIAGRAM > WIRING DIAGRAM ENGINE CONTROL SYSTEM

Wiring Diagram



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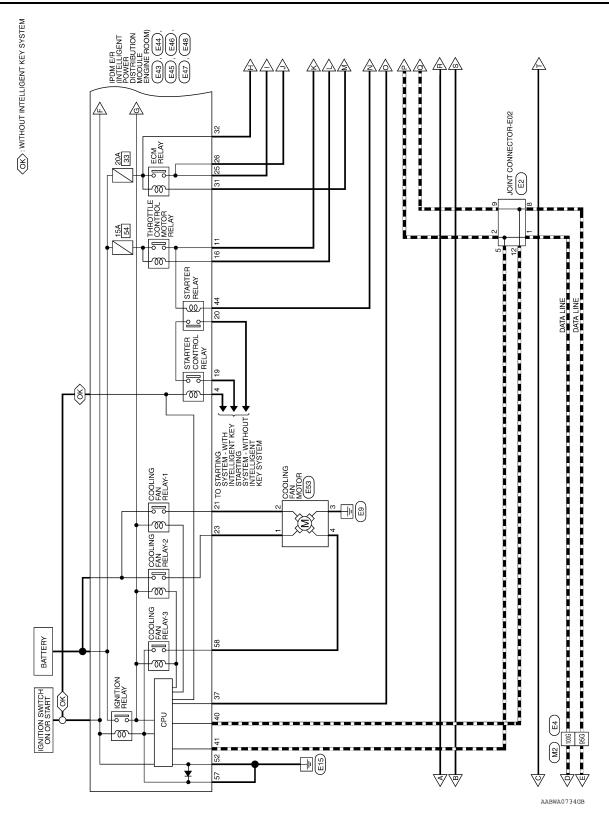
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ENGINE CONTROL SYSTEM

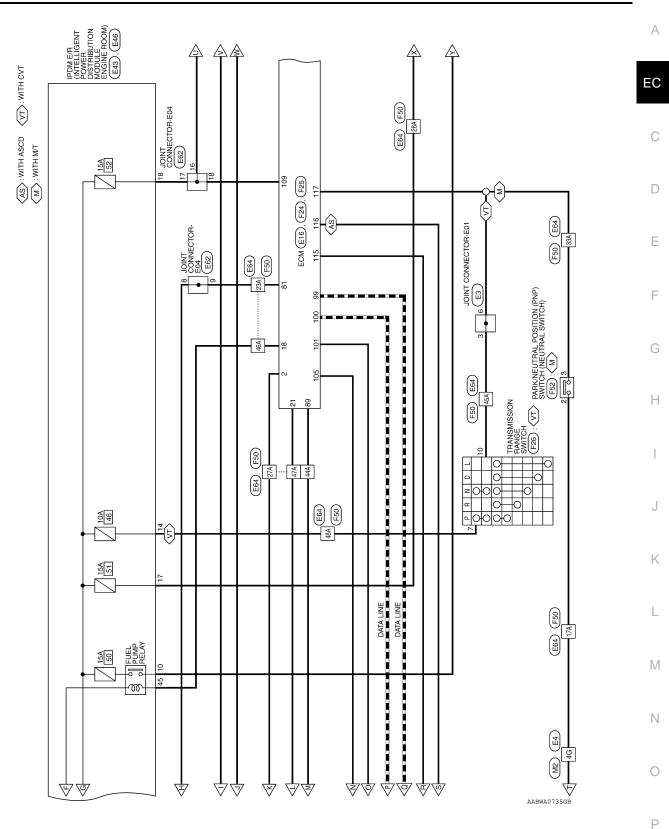
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ENGINE CONTROL SYSTEM

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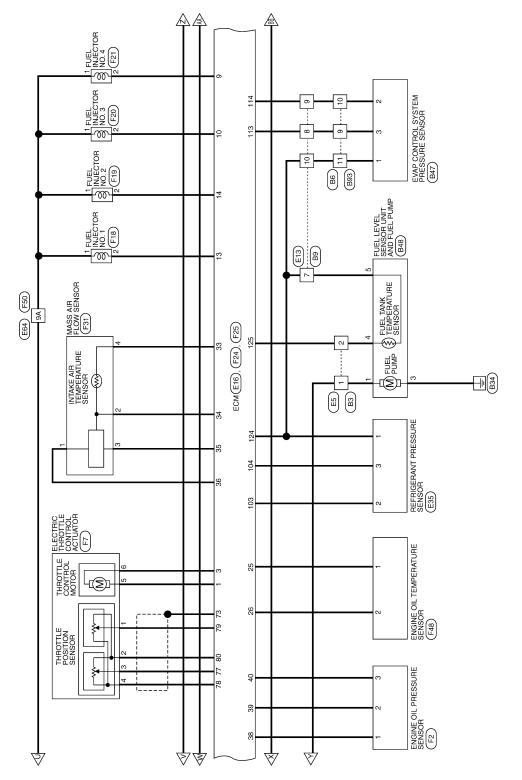


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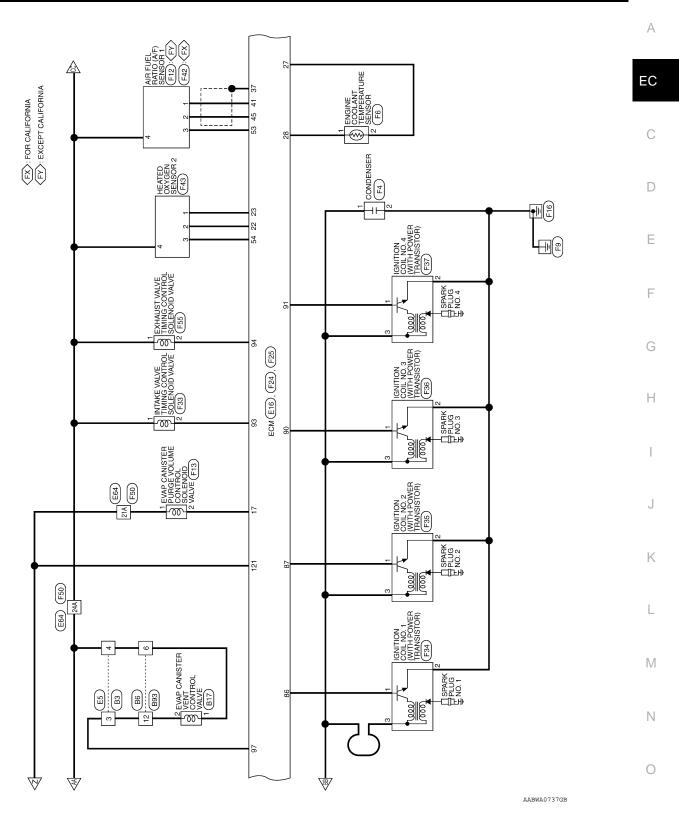
ENGINE CONTROL SYSTEM

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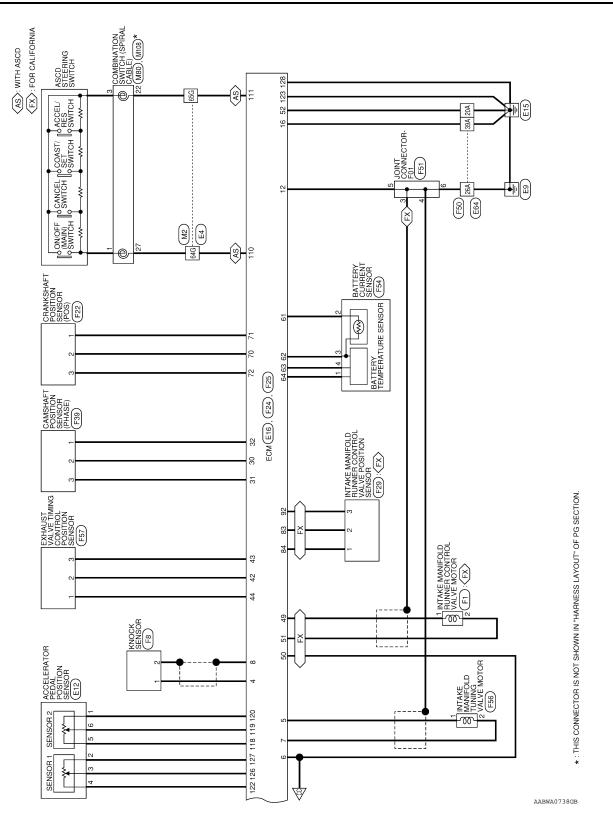


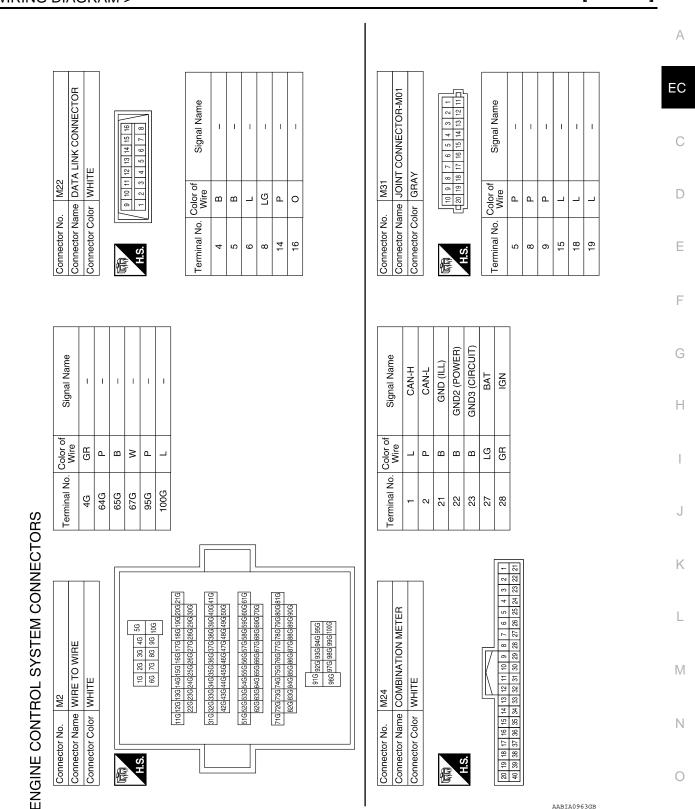
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< WIRING DIAGRAM >

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Signal Name

Color of Wire

Terminal No.

Signal Name

Color of Wire

Terminal No.

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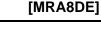
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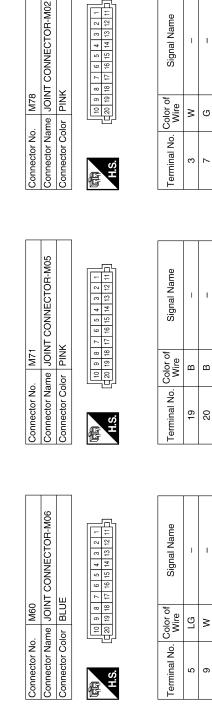
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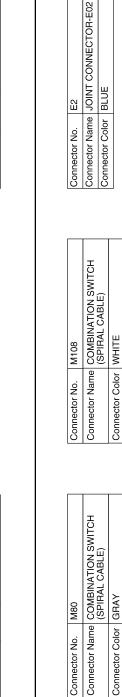
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ABLE)		
(SPIRAL CABLE)	RAY	25 24 31 32 27 21 22 33
	Connector Color GRAY	H.S.

Signal Name	I	I	
Color of Wire	ш	٩	
Terminal No.	22	27	

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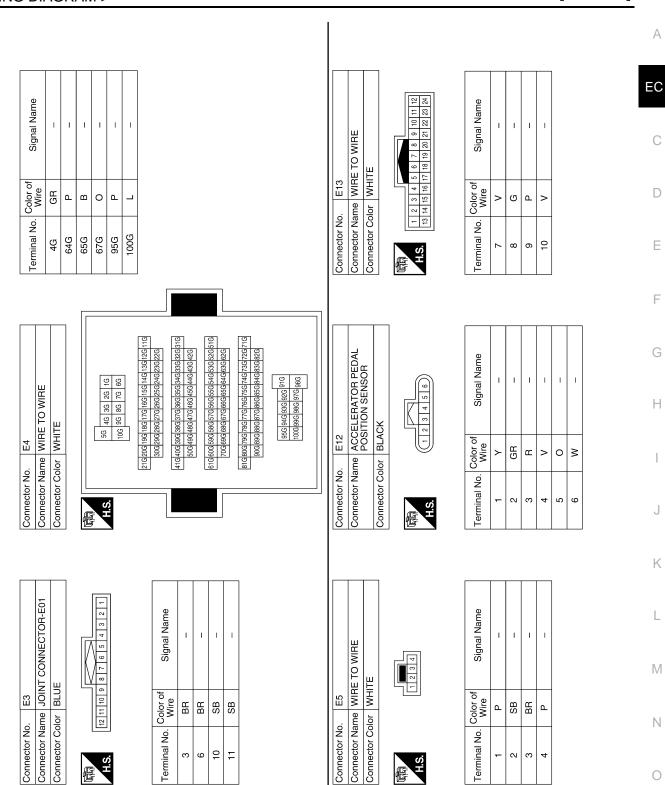
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< WIRING DIAGRAM >

[MRA8DE]

Terminal No.	Color of Wire	Signal Name
101	SB	STARTER RELAY CUT OFF SIGNAL
102	I	I
103	Ъ	REFRIGERANT PRESSURE SENSOR
104	Г	SENSOR POWER SUPPLY
105	^	STARTER MOTOR RELAY CONTROL SIGNAL
106	Ι	I
107	I	I
108	T	I
109	0	IGNITION SWITCH
110	٩	ASCD STEERING SWITCH
111	В	SENSOR GROUND
112	-	I
113	U	SENSOR POWER SUPPLY
114	Ч	EVAP CONTROL SYSTEM PRESSURE SENSOR

ACCELERATOR PEDAL POSITION SENSOR 2

SENSOR POWER SUPPLY

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PNP SIGNAL

ВВ

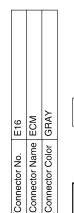
117 118 119 120

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SENSOR GROUND

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POWER SUPPLY FOR ECM





Signal Name	EVAP CANISTER VENT CONTROL VALVE	I	CAN COMMUNICATION LINE (CAN-L)	CAN COMMUNICATION LINE (CAN-H)	
Color of Wire	BR	I	Р	L	
Terminal No. Color of Wire	67	98	66	100	

ENGINE CONTROL SYSTEM

ACCELERATOR PEDAL POSITION SENSOR 1

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126 127 128

SENSOR GROUND

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ECM GROUND

SENSOR GROUND

ECM GROUND

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123

122

121

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124 125

FUEL TANK TEMPERATURE SENSOR

SB

SENSOR POWER SUPPLY

< WIRING DIAGRAM >

STOP LAMP SWITCH BRAKE PEDAL POSITION SWITCH

SB

115 116

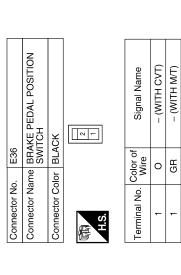
Signal Name

Color of Wire

Ferminal No.

EC-11

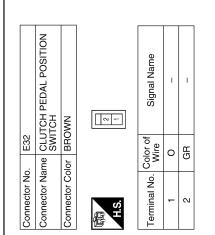
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Connector Name REFIGERANT PRESSURE SENSOR	CK		Signal Name	I	-	Ι
me REF PRE	lor BL⊿		Color of Wire	>	٩	_
Connector Na	Connector Color BLACK	际 H.S.	Terminal No. Color of Wire	-	2	e

E35

Connector No.



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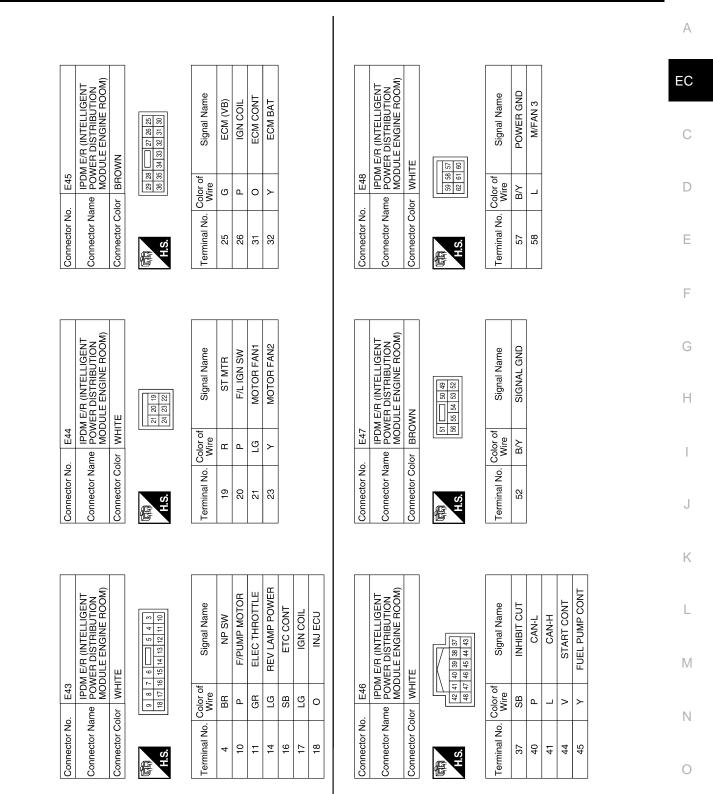
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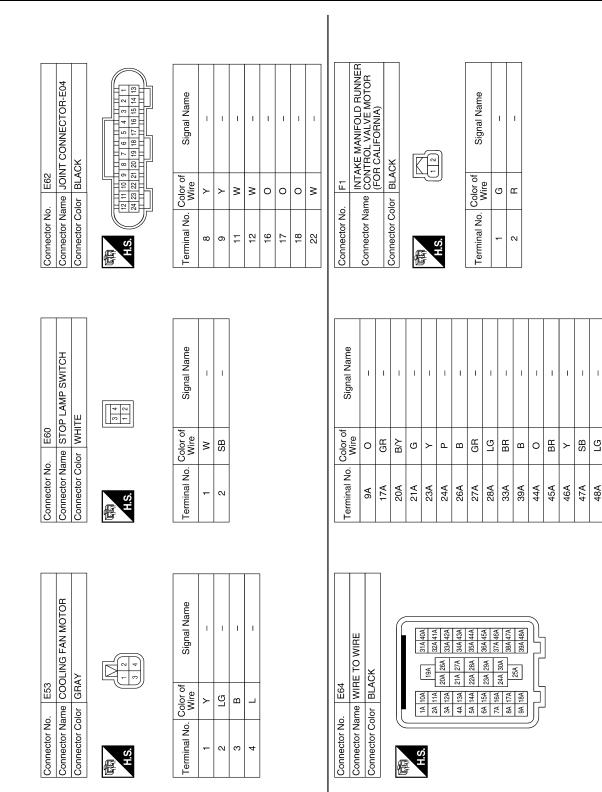
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ENGINE CONTROL SYSTEM

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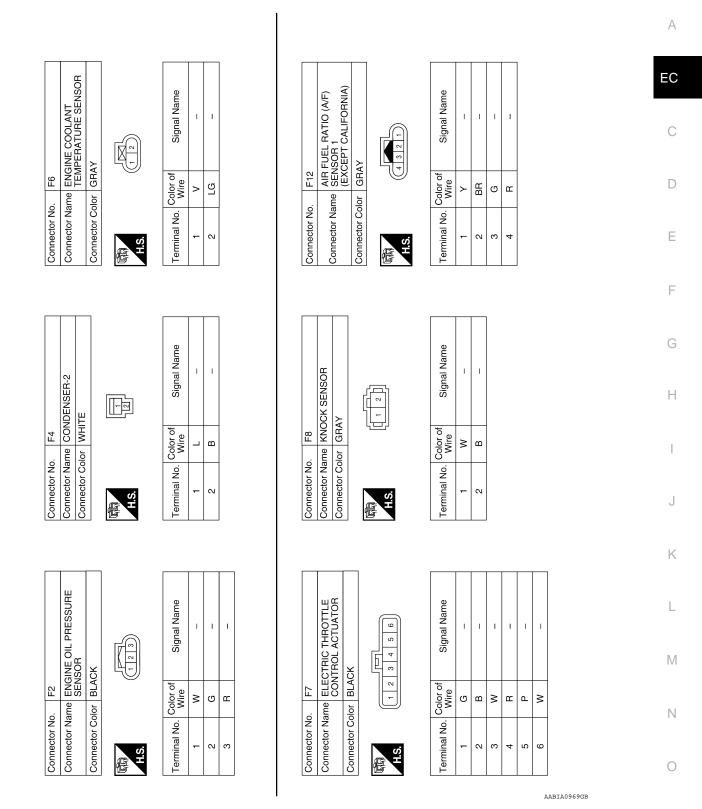
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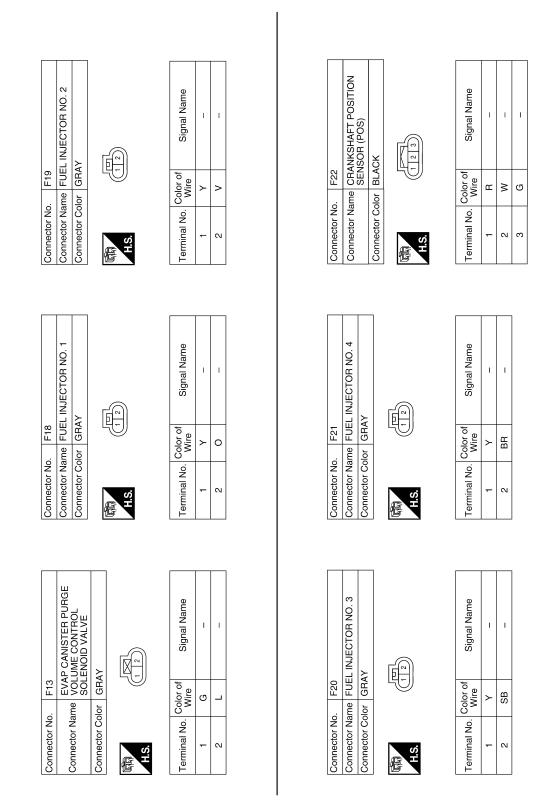
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Signal Name
I
ECM GROUND
L INJECTOR NO.1
L INJECTOR NO.2
I
ECM GROUND
VAP CANISTER URGE VOLUME VTROL SOLENOID VALVF

< WIRING DIAGRAM >

												1
Color of Wire	I	в	0	>	I	в	L	GR	I	I	Y	M
Terminal No.	11	12	13	14	15	16	17	18	19	20	21	22
				16 12 8 4	11 7	14 10 6 2 13 0 5 1	»	al Name		R (CLOSE)	LE CONTROL	UPPLY LE CONTROL

Terminal No. Color of Wire

-

N

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Connector Color BLACK Connector Name ECM Connector No. | F24

ENGINE CONTROL SYSTEM

Signal Name	SENSOR GROUND	CAMSHAFT POSITION SENSOR (PHASE)	SENSOR POWER SUPPLY	INTAKE AIR TEMPERATURE SENSOR	SENSOR GROUND	MASS AIR FLOW SENSOR	SENSOR POWER SUPPLY	SHIELD	SENSOR GROUND	ENGINE OIL PRESSURE SENSOR	SENSOR POWER SUPPLY	A/F SENSOR 1	SENSOR GROUND	EXHAUST VALVE TIMING CONTROL POSITION SENSOR	SENSOR POWER SUPPLY	A/F SENSOR 1	I	Ι	I
Color of Wire	-	BR	GR	GR	×	σ	œ	в	×	IJ	œ	≻	×	٩	œ	ВВ	I	I	ı
Terminal No.	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

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	-		12	В	ECM GROUND
			13	0	FUEL INJECTOR NO.1
	48 44 40 36 32	32 28 24 20 16 12 8 4	14	>	FUEL INJECTOR NO.2
4	7 43 39 35	27 23 19 15 11 7	15	ı	I
4 3	6 42 38 34 5 41 37 33	46 42 38 34 30 26 22 18 14 10 6 2 45 41 37 33 30 55 31 17 13 0 5 1	16	ш	ECM GROUND
ツ		-	17	<u>ب</u>	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
No.	Color of	Signal Name	18	GR	FUEL PUMP RELAY
			19	I	I
	۵.	MOTOR (CLOSE)	20	I	I
	σ	THROTTLE CONTROL MOTOR POWER	21	≻	THROTTLE CONTROL MOTOR RELAY
	M	SUPPLY THROTTLE CONTROL	22	8	HEATED OXYGEN SENSOR 2
	>	MOTOR (OPEN)	23	ВВ	SENSOR GROUND
	≥	KNOCK SENSOR	24	I	I
	U	INTAKE MANIFOLD TUNING VALVE MOTOR (CLOSE)	25	>	ENGINE OIL TEMPERATURE
	α	INTAKE MANIFOLD TUNING VALVE	26	٩	SENSOR GROUND
	-	MOTOR POWER SUPPLY	27	Ľ	SENSOR GROUND
	۳	INTAKE MANIFOLD TUNING VALVE MOTOR (OPEN)	28	>	ENGINE COOLANT TEMPERATURE SENSOR
	ш	SENSOR GROUND	29	ı	I
	BR	FUEL INJECTOR NO.4			
	SB	FUEL INJECTOR NO.3			

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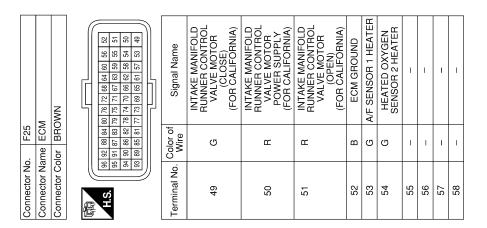
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< WIRING DIAGRAM >

Color of Signal Name	SENSOR POWER SUPPLY	POWER SUPPLY FOR ECM (BACKUP)	1	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR (FOR CALIFORNIA)	SENSOR POWER SUPPLY	I	IGNITION SIGNAL NO.1	IGNITION SIGNAL NO.2	I	ECM RELAY (SELF SHUT-OFF)	IGNITION SIGNAL NO.3	IGNITION SIGNAL NO.4	SENSOR GROUND	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE	I	
Terminal No.	80	81	82	83	84	85	86	87	88	89	06	16	92	93	94	95	00

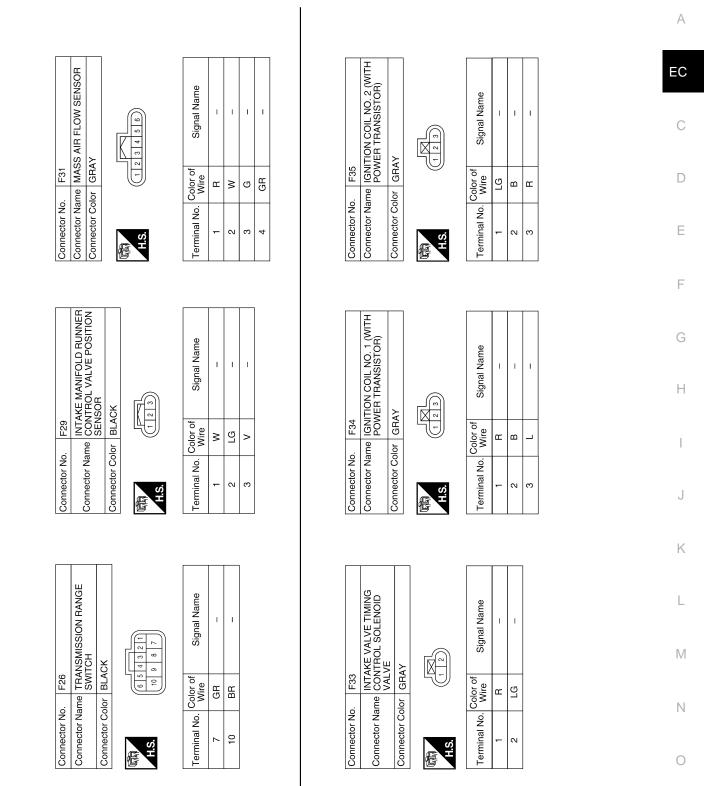
Signal Name	1	1	BATTERY TEMPERATURE SENSOR	SENSOR GROUND	BATTERY CURRENT SENSOR	SENSOR POWER SUPPLY	I	I	1	I	I	SENSOR GROUND	CRANKSHAFT POSITION SENSOR (POS)	SENSOR POWER SUPPLY	SHIELD	I	I	I	THROTTLE POSITION SENSOR 2	SENSOR GROUND	THROTTLE POSITION SENSOR 1
Color of Wire	ı	I	0	BR	U	¥	I	I	I	I	I	Ν	В	G	GR	Ι	I	I	Ν	н	თ
Terminal No.	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	92	77	78	62



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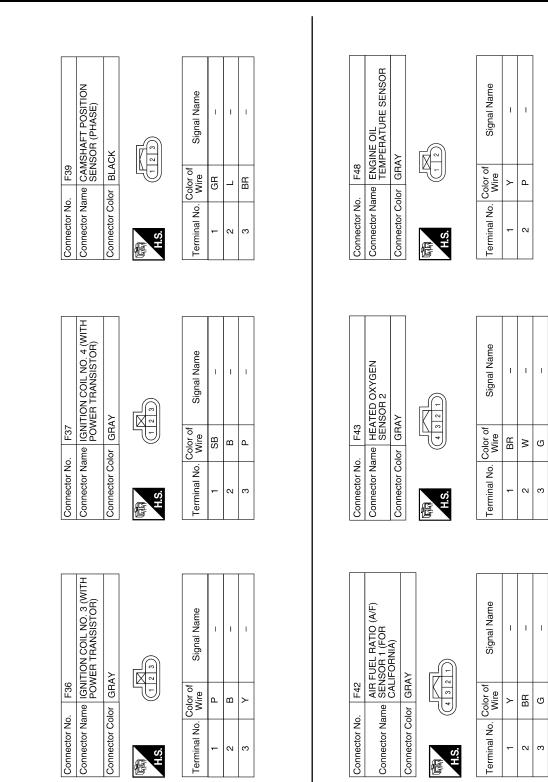
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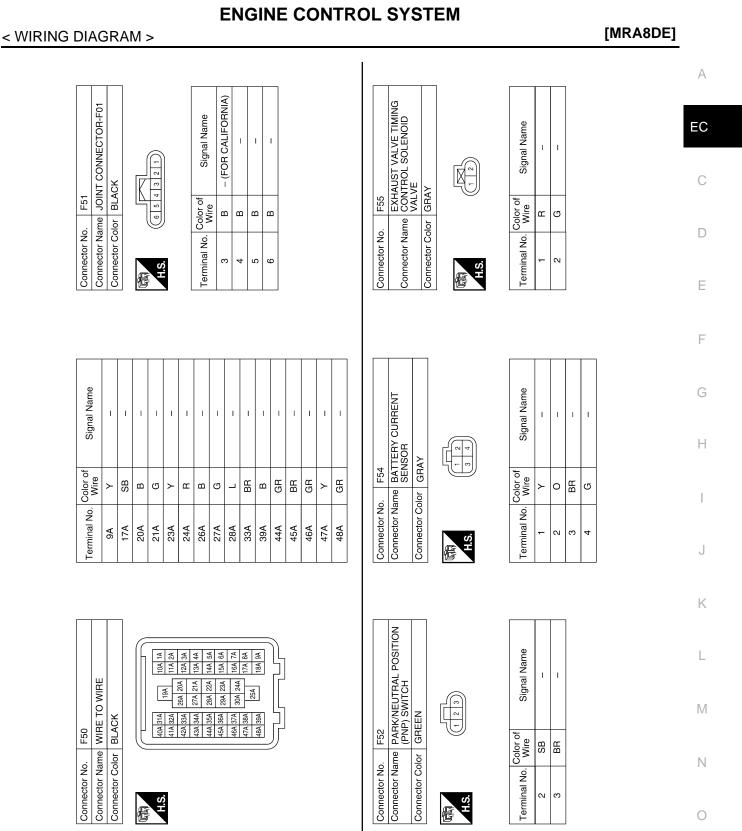
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Revision: October 2012



< WIRING DIAGRAM >

Connector No. B3 Connector Name WIRE TO WIRE

Connector Color WHITE

e EXHAUST VALVE TIMING CONTROL POSITION SENSOR BLACK

Connector Name Connector Color

Connector Name INTAKE MANIFOLD TUNING VALVE MOTOR

F56

Connector No.

BLACK

Connector Color

F57

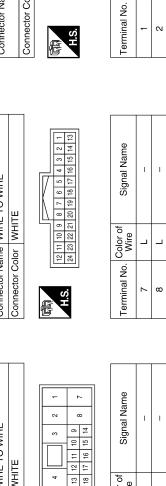
Connector No.

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	Signal Name	I	I	1	I			Connector Name EVAP CANISTER VENT CONTROL VALVE	cK	
	Color of Wire	9	٩	_	œ		. B17	me EVA CON	lor BLA	
	Terminal No.	٢	2	e	4		Connector No.	Connector Na	Connector Color BLACK	围 H.S.
	[1	1				7	
	Signal Name	I	I	I				e to wire Te		22 11 10 9 8 7 6 5 4 3 2 1 24 23 22 21 20 19 18 17 16 15 14 13
IJ	Color of Wire	œ	×	٩			B9	me WIRE		24 23 22 21
H.S.	Terminal No.	-	2	n			Connector No.	Connector Name WIRE TO WIRE Connector Color WHITE		대动 H.S.
]					7	
	Signal Name	I	I					E TO WIRE TE		3 2 1 12 11 10 9 8 7 17 16 15 14 8 7
	Color of Wire	σ	œ				. B6	ame WIR		5 4 19 13 18
H.S.	Terminal No.	-	0				Connector No.	Connector Name WIRE TO WIRE Connector Color WHITE		H.S.



Signal Name T T

Color of Wire

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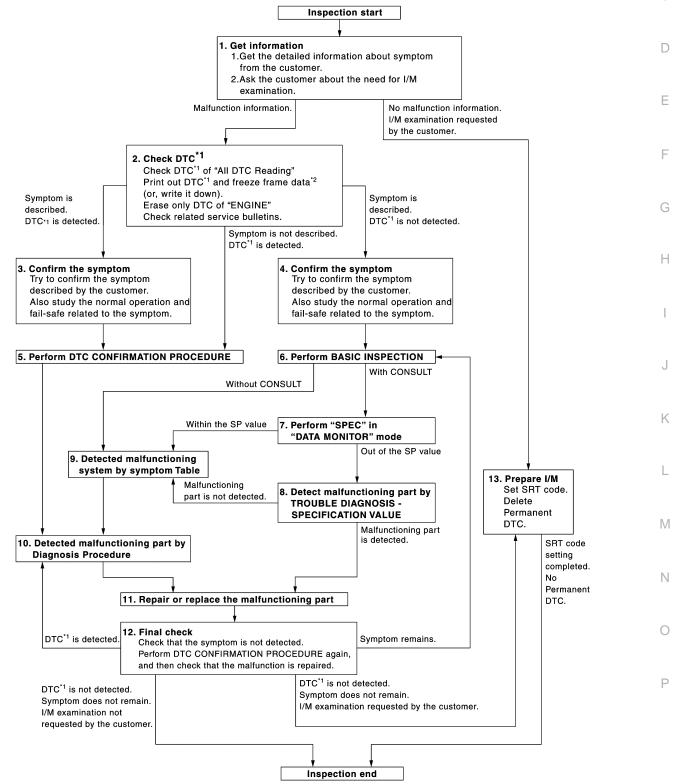
					
Signal Name	I	I	I	I	I
Color of Wire	œ	L	Р	۲	Г
Terminal No. Color of Wire	9	6	10	11	12

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BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow





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EC

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

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-128</u>, "<u>Diagnostic Work</u> <u>Sheet</u>".)

>> GO TO 2.

2. СНЕСК DTC

- 1. Check DTC.
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out using CONSULT or GST.)
- Erase DTC.

(E) With CONSULT: "How to Erase DTC and 1st Trip DTC" in <u>EC-66, "CONSULT Function"</u>.

Without CONSULT: "How to Erase Self-diagnostic Results" in EC-63, "On Board Diagnosis Function".

- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-472, "Symptom Table"</u>.)
- 3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-477, "Description"</u> and <u>EC-89, "Fail 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-477</u>, "<u>Description</u>" and <u>EC-89</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-92, "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?

DIAGNOSIS AND REPAIR WORKFLOW

DIAGNOSIS AND REPAIR WORKFLOW	
< BASIC INSPECTION > [MRA8DE]	
YES >> GO TO 10. NO >> Check according to EC-93, "DTC Index".	0
NO >> Check according to <u>EC-93, "DTC Index"</u> . 6.PERFORM BASIC INSPECTION	A
Perform <u>EC-130, "Work Procedure"</u> .	
Do vou have CONSULT?	EC
YES >> GO TO 7.	
NO >> GO TO 9.	С
. PERFORM SPEC IN DATA MONITOR MODE	
Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CON- SULT in "SPEC" of "DATA MONITOR" mode. Refer to <u>EC-156, "Component Function Check"</u> .	D
Is the measurement value within the SP value?	
YES >> GO TO 9.	Е
NO >> GO TO 8.	
8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE	F
Detect malfunctioning part according to <u>EC-157, "Diagnosis Procedure"</u> .	
<u>Is malfunctioning part detected?</u> YES >> GO TO 11.	
NO $>>$ GO TO 9.	G
9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE	
Detect malfunctioning system according to <u>EC-472, "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.	Н
>> GO TO 10.	I
10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE	
Inspect according to Diagnosis Procedure of the system.	I
NOTE:	0
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-</u>	L.
<u>46. "Circuit Inspection"</u> .	K
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-	L
SULT. Refer to <u>EC-76, "Reference Value"</u> .	
11. REPAIR OR REPLACE THE MALFUNCTIONING PART	M
1. Repair or replace the malfunctioning part.	
 Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replace- ment. 	NI
3. Check DTC. If DTC is displayed, erase it. Refer to the following.	Ν
With CONSULT: "How to Erase DTC and 1st Trip DTC" in <u>EC-66, "CONSULT Function"</u> .	
Without CONSULT: "How to Erase Self-diagnostic Results" in <u>EC-63. "On Board Diagnosis Function"</u> .	0
>> GO TO 12.	
12.FINAL CHECK	Ρ
When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function	
Check again, and then check that the malfunction have been completely repaired.	
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected	

when symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

< BASIC INSPECTION >

[MRA8DE]

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- YES-2 >> Symptom remains: GO TO 6.
- NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in <u>EC-66</u>, "<u>CONSULT Function</u>", Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in <u>EC-63</u>, "<u>On Board Diagnosis Function</u>"). If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to <u>EC-145</u>, "<u>SRT Set Driving Pattern</u>".
- NO-2 >> I/M examination, requested from the customer: GO TO 13.

13.PREPARE FOR I/M EXAMINATION

- 1. Set SRT codes. Refer to <u>EC-144, "Description"</u>.
- 2. Erase permanent DTCs. Refer to EC-150, "Description".

>> INSPECTION END

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 a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

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

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

Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

WHAT.....Vehicle & engine modelWHEN.....Date, FrequenciesWHERERoad conditionsHOW.....Operating conditions,
Weather conditions,
Symptoms

Revision: October 2012

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

WORKSHEET SAMPLE

Customer na	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 	y screwed on.
	☐ Startability	Impossible to start	nrottle position d by throttle position
Symptoms	Idling	□ No fast idle □ Unstable □ H □ Others [High idle 🔲 Low idle
- j p . - -	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [Lack of power ire]
	Engine stall	At the time of start While idling While accelerating While dece	lerating
Incident occu	irrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night [☐ In the daytime
Frequency		All the time Under certain cond	ditions
Weather con	ditions	Not affected	
	Weather	🗌 Fine 🗌 Raining 🗌 Snowing	Others []
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🗌 Humid [°] F
		Cold During warm-up	After warm-up
Engine condi	tions	Engine speed 0 2,000	
Road condition	ons	🗌 In town 🗌 In suburbs 🗌 Hig	hway 🛛 Off road (up/down)
Driving condi	tions	Not affected At starting While idling While accelerating While decelerating While turning	•
		Vehicle speed 1 20	 30 40 50 60 MPH
Malfunction in	ndicator lamp	☐ Turned on ☐ Not turned on	

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BASIC INSPECTION

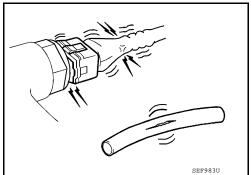
Work Procedure

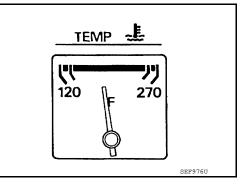
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[MRA8DE]

1.INSPECTION START

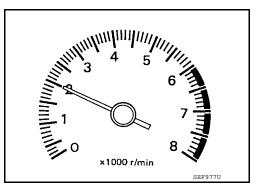
- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses 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.
- 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 or GST.

<u>15 any l</u>	
YES	>> GO TO 2.
NO	>> GO TO 3.



2.REPAIR OR REPLACE

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

>> GO TO 3.

3.CHECK TARGET IDLE SPEED

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

BASIC INSPECTION

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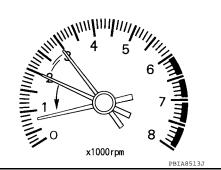
EC

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- 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-478, "Inspection"</u>.
 For specification, refer to <u>EC-485, "Idle Speed"</u>.

Is the inspection result normal?

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



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4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
 Stop engine. Perform EC-137, "Work Procedure".
2. Perform <u>EC-137, "Work Procedure"</u> .
>> GO TO 5.
5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Perform <u>EC-138, "Work Procedure"</u> .
>> GO TO 6.
6.PERFORM IDLE AIR VOLUME LEARNING
Perform EC-139, "Work Procedure".
Is Idle Air Volume Learning carried out successfully?
YES >> GO TO 7. NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.
7. CHECK TARGET IDLE SPEED AGAIN
1. Start engine and warm it up to normal operating temperature.
 Check idle speed. For procedure, refer to <u>EC-478</u>, "Inspection".
For specification, refer to <u>EC-485, "Idle Speed"</u> .
Is the inspection result normal?
YES >> GO TO 10. NO >> GO TO 8.
8. DETECT MALFUNCTIONING PART
 Check the Following. Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-279, "DTC Logic"</u>.
 Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-276, "DTC Logic"</u>.
Is the inspection result normal?
YES >> GO TO 9. NO >> Repair or replace. Then GO TO 4
9. CHECK ECM FUNCTION
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-64.</u> <u>"ECM : Work Procedure"</u> .
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

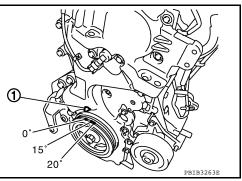
BASIC INSPECTION

< BASIC INSPECTION >

- Check ignition timing with a timing light. For procedure, refer to <u>EC-479</u>, "Inspection" For specification, refer to <u>EC-485</u>, "Ignition Timing".
 - 1 : Timing indicator

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> GO TO 11.



[MRA8DE]

11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform EC-137, "Work Procedure".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-138, "Work Procedure".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-139, "Work Procedure".

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 TARGET IDLE SPEED AGAIN
- 1. Start engine and warm it up to normal operating temperature.
- Check idle speed.
 For procedure, refer to <u>EC-478, "Inspection"</u>.
 For specification, refer to <u>EC-485, "Idle Speed"</u>.

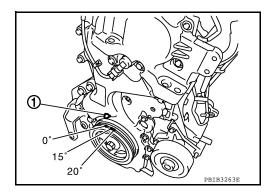
Is the inspection result normal?

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-479, "Inspection"</u>. For specification, refer to <u>EC-485, "Ignition Timing"</u>.
 - 1 : Timing indicator

Is the inspection result normal?

- YES >> INSPECTION END.
- NO >> GO TO 16.



16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-58, "Inspection".

Is the inspection result normal?

YES >> GO TO 17.

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

BASIC INSPECTION

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17. DETECT MALFUNCTIONING PART	А
 Check the following. Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-279, "DTC Logic"</u>. Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-276, "DTC Logic"</u>. 	EC
Is the inspection result normal?	EC
YES >> GO TO 18. NO >> Repair or replace. Then GO TO 4	С
18. CHECK ECM FUNCTION	
 Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.) 	D
 Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-176.</u> <u>"ECM : Work Procedure"</u>. 	
>> GO TO 4.	Е
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< BASIC INSPECTION >

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

When replacing ECM, perform additional service.

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. To perform the operation, always follow the work instructions. Refer to <u>EC-134</u>, "Work Procedure".

Work Procedure

1.CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not. **NOTE:**

- Part number of blank ECM is 23703 xxxxx.
- Check the part number when ordering ECM or with delivered package label.

Is the ECM a blank ECM?

YES >> GO TO 2.

NO >> GO TO 4.

2.SAVE ECM PART NUMBER

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual".

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 3.

>> GO TO 3.

3. PERFORM ECM PROGRAMMING

After replacing ECM, perform the ECM programming. Refer to "CONSULT Operation Manual". **NOTE:**

- During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 5.

4.REPLACE ECM

Replace ECM. Refer to EC-484, "Removal and Installation".

>> GO TO 5.

5. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to <u>SEC-64, "ECM : Work Procedure"</u> (With Intelligent Key System) or <u>SEC-176, "ECM : Work Proce-dure"</u> (Without Intelligent Key System).

>> GO TO 6.

6.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-137, "Work Procedure".

>> GO TO 7.

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING



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ADDITIONAL SERVICE WHEN DEDLACING ECM

ADDITIONAL SERVICE WHEN REPLACING ECIN		
< BASIC INSPECTION >	[MRA8DE]	
Refer to EC-138. "Work Procedure".		
		А
>> GO TO 8.	ſ	
8. PERFORM IDLE AIR VOLUME LEARNING		EC
Refer to EC-139, "Work Procedure".		
>> END		С
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VIN REGISTRATION

< BASIC INSPECTION >

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).

Work Procedure

INFOID:000000008972694

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-27, "Identification Number".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

(I) With CONSULT

- 1. Turn ignition switch ON and engine stopped.
- 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Follow the instruction of CONSULT display.

>> END

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ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the EC 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.

Work Procedure

1	.START	
1.	Make sure that accelerator pedal is fully released.	 D

- 1 Turn ignition switch ON and wait at least 2 seconds. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 2 seconds. 4.
- Turn ignition switch OFF and wait at least 10 seconds. 5.

>> END

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THROTTLE VALVE CLOSED POSITION LEARNING

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THROTTLE VALVE CLOSED POSITION LEARNING

Description

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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 the harness connector of the electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside is cleaned.

Work Procedure

INFOID:000000008930176

1.START

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Follow the instructions on the CONSULT display.
- 4. Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

Without CONSULT

1. Start the engine. **NOTE:**

Engine coolant temperature is 25°C (77°F) or less before engine starts.

2. Warm up the engine. **NOTE:**

Raise engine coolant temperature until it reaches 65°C (149°F) or more.

3. Turn ignition switch OFF and wait at least 10 seconds. Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

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.
- .

Work Procedure	
1.preconditioning	D
Make sure that all of the following conditions are satisfied.	
Learning will be cancelled if any of the following conditions are missed for even a moment.	
 Battery voltage: More than 11.6 V (At idle) 	Е
 Engine coolant temperature: 70 - 100°C (158 - 212°F) 	
• Selector lever: P or N (CVT), Neutral (M/T)	
Electric load switch: OFF (Air and difference)	F
(Air conditioner, headlamp, rear window defogger)	1
On vehicles equipped with daytime running light systems, set lighting switch to the 1st position to light only small lamps.	
 Steering wheel: Neutral (Straight-ahead position) 	
 Vehicle speed: Stopped 	G
• Transmission: Warmed-up	
- CVT models	
• With CONSULT: Drive vehicle until "ATF TENP SEN" in "DATA MONITOR" mode of "CVT" system indicates	Н
less than 0.9 V.	
 Without CONSULT: Drive vehicle for 10 minutes. 	
- M/T models	
Drive vehicle for 10 minutes.	
Do you have CONSULT?	
YES >> GO TO 2.	J
NO >> GO TO 3.	
2.IDLE AIR VOLUME LEARNING	
	Κ
With CONSULT	
1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-137, "Work Procedure"</u> .	
2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-138, "Work Procedure"</u> .	L
3. Start engine and warm it up to normal operating temperature.	
 Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode of "ENGINE". Touch "START" and wait 20 seconds. 	
Is "CMPLT" displayed on CONSULT screen?	M
YES >> GO TO 4.	
NO >> GO TO 5.	
3.IDLE AIR VOLUME LEARNING	Ν
NOTE:	0
 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-137, "Work Procedure"</u> .	Р
2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-138, "Work Procedure"</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	

- Repeat the following procedure quickly five times within 5 seconds. 6. Fully depress the accelerator pedal. _
- Fully release the accelerator pedal. -

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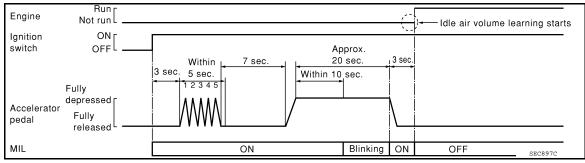
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IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approximately 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.
- 10. Wait 20 seconds.



>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to <u>EC-485</u>, "Idle Speed" and <u>EC-485</u>, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.DETECT MALFUNCTIONING PART

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-156, "Description"</u>.

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

• Engine stalls.

• Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

< BASIC INSPECTION >

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

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

Work Procedure

1.START

	With CONSULT	
1.	Start engine and warm it up to normal operating temperature.	D
2.		
3.	Clear mixture ratio self-learning value by touching "CLEAR".	_
জ্ঞা\ 1.	With GST Start engine and warm it up to normal operating temperature.	E
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.	F
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.	G
	>> END	
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< BASIC INSPECTION >

FUEL PRESSURE

Work Procedure

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.

Without CONSULT

- 1. Remove fuel pump fuse located in IPDM E/R.
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.

>> END

FUEL PRESSURE CHECK

CAUTION:

- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- 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 sealability 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.

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because this models do not have fuel return system.

1.FUEL PRESSURE CHECK

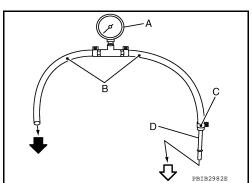
- 1. Release fuel pressure to zero.
- Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV1011840] (D), then connect fuel pressure gauge (A).
 - : To quick connector
 - : To fuel tube
 - C : Clamp

CAUTION:

- Use suitable fuel hose for fuel pressure check (genuine NISSAN 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.

CAUTION:

Do not twist or kink fuel hose because it is plastic hose.



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FUEL PRESSURE

< BASIC INSPECTION >

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4. Connect fuel hose for fuel pressure check ① to fuel tube ③ with clamp ② as shown in the figure.

5: No. 2 spool

CAUTION:

- 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 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.

Tightening 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb) torque:

- Install hose clamp to the position within 1 2 mm (0.04 0.08 in).
- 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

After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm high pressure fuel pump does not come off.

- 6. Turn ignition switch ON and check for fuel leakage.
- 7. Start engine and check for fuel leakage.
- 8. Read the indication of fuel pressure gauge.

CAUTION:

- 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 (3.5 bar, 3.57 kg/cm², 51 psi)

Is the inspection result normal?

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

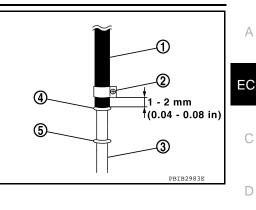
2.CHECK FUEL HOSES

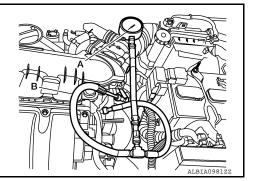
Check the following.

- Fuel hoses for clogging
- Fuel filter for clogging
- Fuel pump
- Fuel pressure regulator for clogging

Is the inspection result normal?

- YES >> Replace fuel pressure regulator.
- NO >> Repair or replace error-detected parts.





HOW TO SET SRT CODE

< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000008930182

[MRA8DE]

OUTLINE

In order to set all SRTs, the self-diagnoses as in the "SRT ITEM" table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

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

SRT item ^{*1} (CONSULT indication)	Performance Pri- ority ^{*2}	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0456
HO2S	1	Air fuel ratio (A/F) sensor 1	P0130
		Air fuel ratio (A/F) sensor 1	P014C, P014D
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	2	Intake value timing control function	P0011

*1: Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

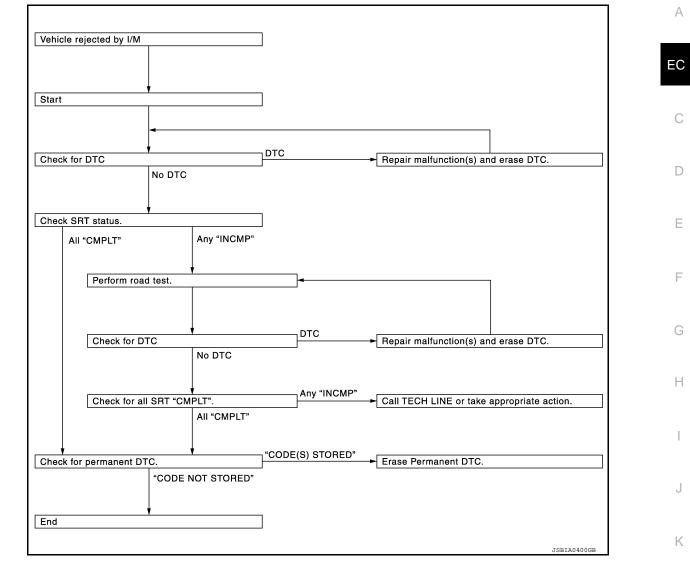
*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

SRT SERVICE PROCEDURE

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

< BASIC INSPECTION >

[MRA8DE]



SRT Set Driving Pattern

CAUTION:

INFOID:000000008930183

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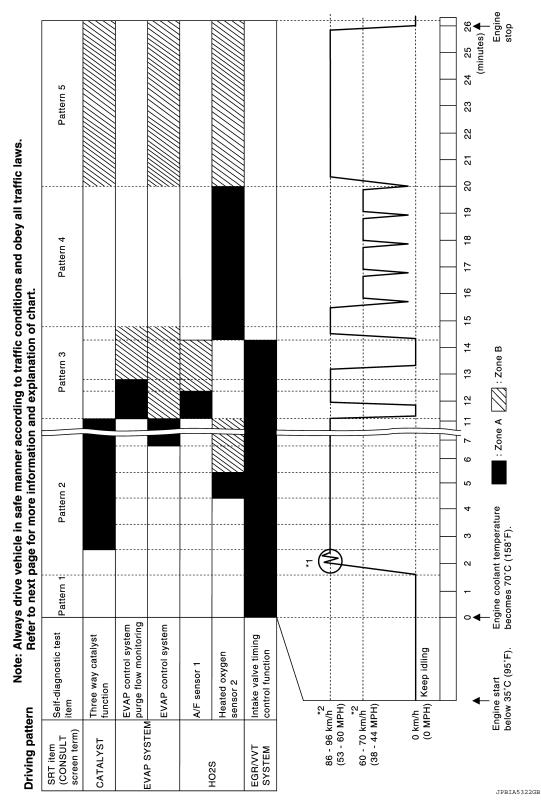
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< BASIC INSPECTION >

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



NOTE:

*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.

• The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

< BASIC INSPECTION >	[MRA8DE]
Zone A refers to the range where the time, required for the diagnosis under normal conditions*	, is the short-
est. Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not con	Anpleted within
zone A. *: Normal conditions refer to the following:	
Sea level	EC
• Flat road	
 Ambient air temperature: 20 - 30°C (68 - 86°F) Diagnosis is performed as quickly as possible under normal conditions. 	С
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86 sis may also be performed.	3°F)], diagno-
 "EGR/VVT SYSTEM" written in the figure is not applicable to the vehicle. 	D
Work Procedure	INFOID:000000008930184
1.снеск отс	E
Check DTC.	
Is any DTC detected?	F
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-93, "DTC Index"</u> . NO >> GO TO 2.	1
2.CHECK SRT STATUS	G
With CONSULT	
Select "SRT STATUS" in "DTC & SRT CONFIRMATION" using CONSULT.	
Perform "SRT status" mode with <u>EC-63, "On Board Diagnosis Function"</u> .	Н
@With GST	
Select Service \$01 with GST.	
<u>Is SRT code(s) set?</u> YES >> END	
NO-1 >> (1) With CONSULT: GO TO 3.	J
NO-2 >> Without CONSULT: GO TO 4.	
3.DTC CONFIRMATION PROCEDURE	
 Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" using CONSULT. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-144</u>. "<u>Description</u>". 	according to
3. Check DTC.	L
Is any DTC detected?	
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-93, "DTC Index"</u> . NO >> GO TO 9.	IV
4.PERFORM ROAD TEST	IV
Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-144. "Description".	
 Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-145, "S</u> ing Pattern". 	SRT Set Driv- N
In order to set all SRTs, the SRT set driving pattern must be performed at least once.	
>> GO TO 5.	0
5.PATTERN 1	Ρ
1. Check the vehicle condition;	P
- Engine coolant temperature is -10 to 35° C (14 to 95° F).	
 Fuel tank temperature is more than 0°C (32°F). Start the engine. 	
3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)	

NOTE:

ECM terminal voltage is follows;

< BASIC INSPECTION >

- -10 to 35°C (14 to 95°F): 3.0 4.3 V
- 70°(158°F): Less than 1.4 V

>> GO TO 6.

6.PATTERN 2

- 1. Drive the vehicle. And 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.
- 2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

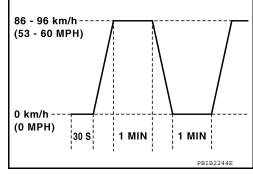
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7.PATTERN 3

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

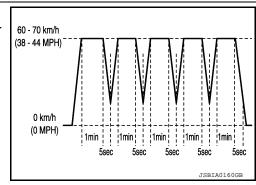
>> GO TO 8.



8. PATTERN 4

- Operate vehicle following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.

>> GO TO 9.



9. PATTERN 5

• The accelerator pedal must be held very steady during steady-state driving.

• If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.CHECK SRT STATUS

With CONSULT
 Select "SRT STATUS" in "DTC & SRT CONFIRMATION" using CONSULT.
 WITHOUT CONSULT
 Perform "SRT status" mode with <u>EC-63. "On Board Diagnosis Function"</u>.
 With GST
 Select Service \$01 with GST.
 <u>Is SRT(s) set?</u>
 YES >> END

Revision: October 2012

< BASIC INSPECTION >

NO >> Perform this procedure again.



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Revision: October 2012

< BASIC INSPECTION >

HOW TO ERASE PERMANENT DTC

Description

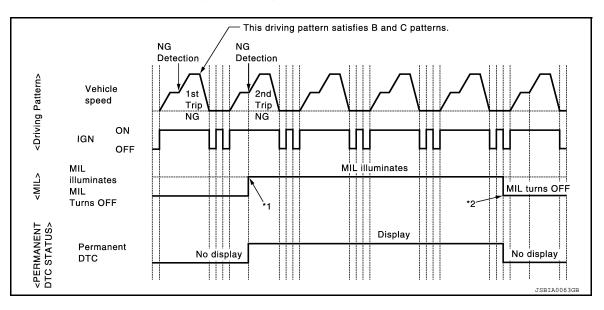
INFOID:000000008972695

[MRA8DE]

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate. *2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table. **NOTE:**

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

Crows*	Perform "DTC CONFIRMATION PROCE-	Driving	Reference	
Group	Group DURE" for applicable DTCs.		D	Itelefence
A	×	—	—	<u>EC-151</u>
В	_	×	×	<u>EC-153</u>

*: For group, refer to <u>EC-93, "DTC Index"</u>.

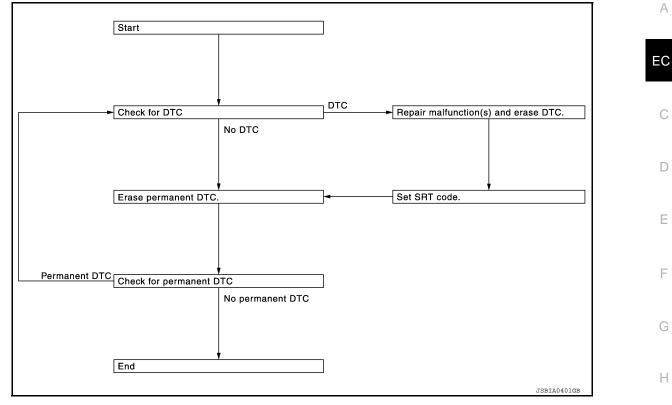
PERMANENT DTC ITEM

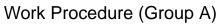
For permanent DTC items, MIL turns ON. Refer to EC-93, "DTC Index".

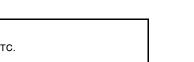
< BASIC INSPECTION >

[MRA8DE]

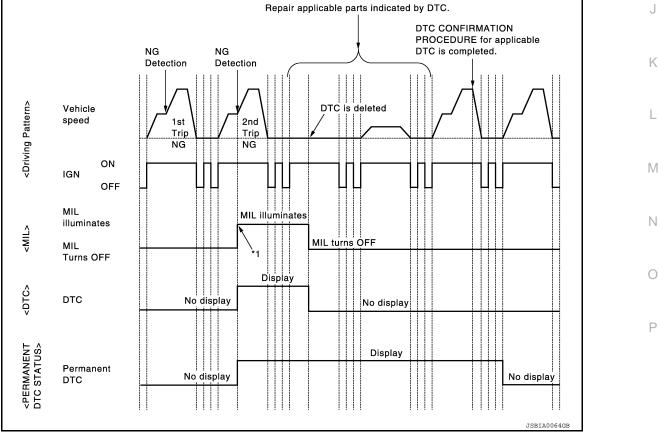
PERMANENT DTC SERVICE PROCEDURE







INFOID:000000008972696



Revision: October 2012

< BASIC INSPECTION >

*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1. СНЕСК DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-63, "On Board Diagnosis Function"</u>, <u>EC-66,</u> <u>"CONSULT Function"</u>.

NO >> GO TO 2.

2. CHECK PERMANENT DTC

With CONSULT

- 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.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

- 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.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3. PERFORM DTC CONFIRMATION PROCEDURE

Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-93. "DTC Index".

>> GO TO 4.

4.CHECK PERMANENT DTC

(B) With CONSULT

- 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.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

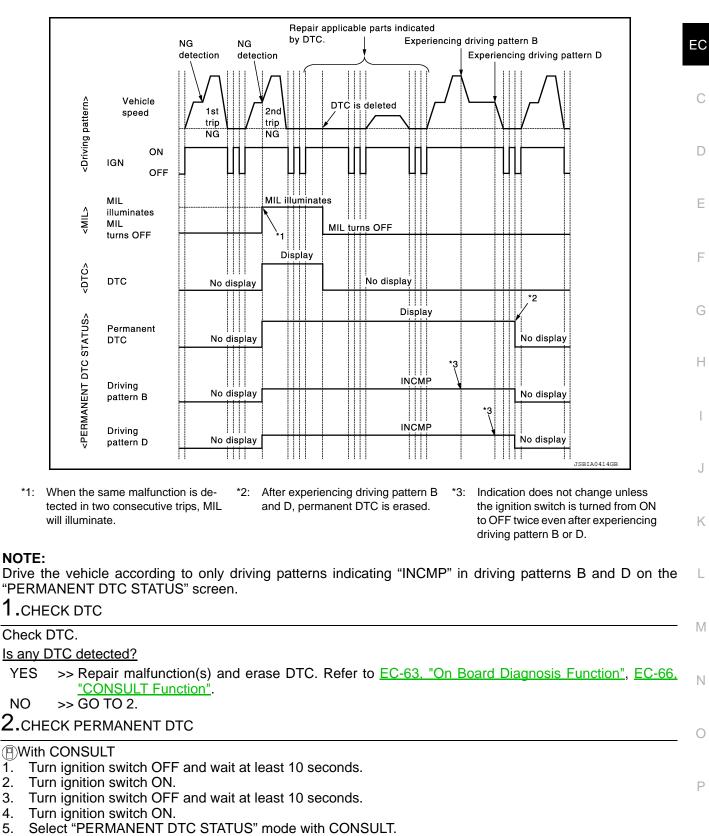
- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

< BASIC INSPECTION >

Work Procedure (Group B)



А



ⓐ With GST

1.

2.

3.

4.

5.

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

< BASIC INSPECTION >

- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3.DRIVE DRIVING PATTERN B

CAUTION:

- Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.

With CONSULT

- T. Start engine and warm it up to normal operating temperature.
- Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to <u>EC-66, "CONSULT Function", EC-60, "DIAGNOSIS DESCRIPTION : Driving Pattern"</u>.

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Drive the vehicle according to driving pattern B. Refer to <u>EC-60, "DIAGNOSIS DESCRIPTION : Driving</u> <u>Pattern"</u>.

>> GO TO 4.

4.CHECK PERMANENT DTC

() With CONSULT

- 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.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

- 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.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5. NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:

• Always drive at a safe speed.

• Never erase self-diagnosis results.

• If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.

Drive the vehicle according to driving pattern D. Refer to <u>EC-60, "DIAGNOSIS DESCRIPTION : Driving Pat-</u>tern".

>> GO TO 6.

6.CHECK PERMANENT DTC

With CONSULT

- 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.
- 4. Turn ignition switch ON.

< BASIC INSPECTION >	[MRA8DE]	
 Select "PERMANENT DTC STATUS" mode with CONSULT. With GST Turn ignition switch OFF and wait at least 10 seconds. 		А
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select Service \$0A with GST. 		EC
<u>Is any permanent DTC detected?</u> YES >> GO TO 1. NO >> END		С
		D
		Е
		F
		G
		Η
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		J
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		Μ
		Ν
		0

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< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000008930185

INFOID:000000008930186

[MRA8DE]

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONI-TOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board 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

NOTE:

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

- 1. Perform <u>EC-130, "Work Procedure"</u>.
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Proceed to EC-157, "Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS >

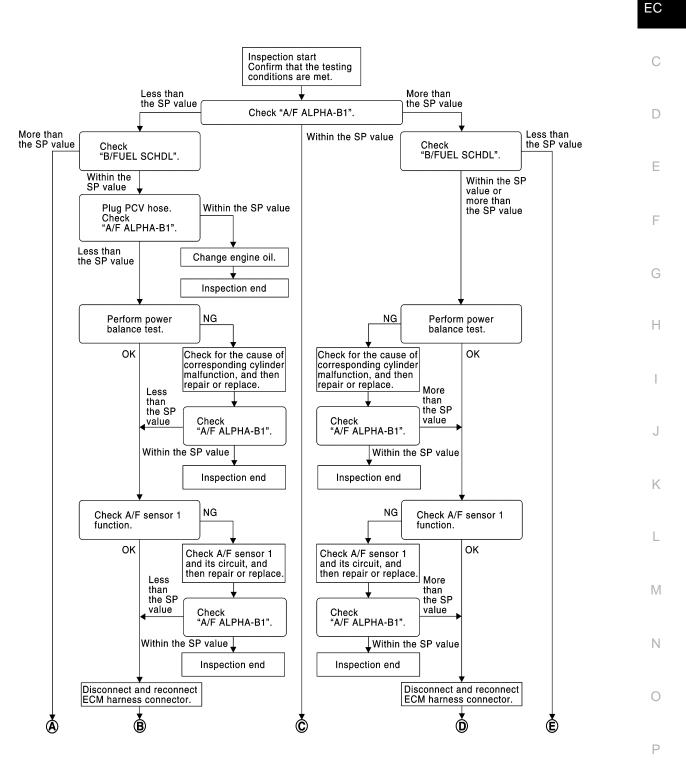
Diagnosis Procedure

[MRA8DE]

INFOID:000000008930187

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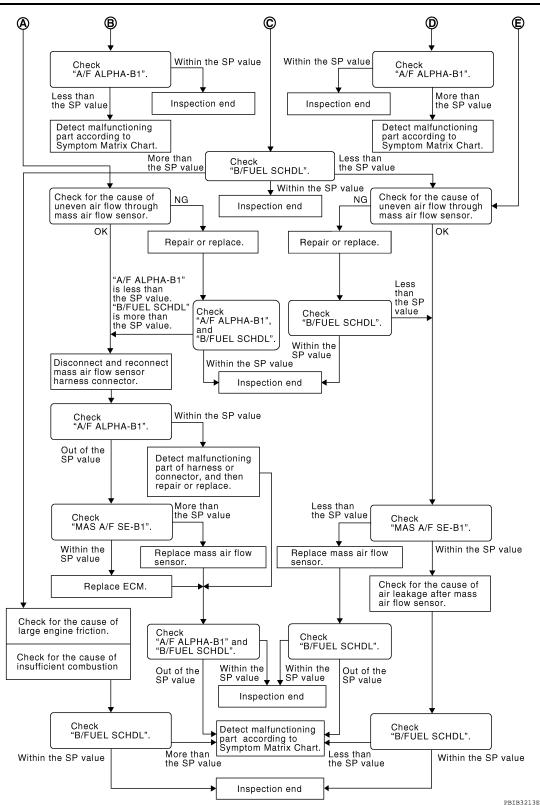
OVERALL SEQUENCE



JSBIA1063GB

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

()With CONSULT

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-156, "Component Function Check".
- 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 >	[MRA8DE]
NOTE: Check "A/F ALPHA-B1" for approximately 1 minute because it may fluctuate. It is NG if the out of the SP value even a little.	indication is
Is the measurement value within the SP value?YES>> GO TO 14.NO-1>> Less than the SP value: GO TO 2.NO-2>> More than the SP value: GO TO 3.	EC
2.CHECK "B/FUEL SCHDL"	C
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication SP value.	ו is within the
<u>Is the measurement value within the SP value?</u> YES >> GO TO 4.	Ľ
NO >> More than the SP value: GO TO 16. 3.CHECK "B/FUEL SCHDL"	E
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication	n is within the
SP value. <u>Is the measurement value within the SP value?</u> YES >> GO TO 6.	F
NO-1 >> More than the SP value: GO TO 6. NO-2 >> Less than the SP value: GO TO 22.	G
4.CHECK "A/F ALPHA-B1"	H
 Stop the engine. Disconnect PCV hose, and then plug it. Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indica the SP value. 	
<u>Is the measurement value within the SP value?</u> YES >> GO TO 5. NO >> GO TO 6.	J
5. CHANGE ENGINE OIL	
 Stop the engine. Change engine oil. NOTE: This symptom may occur when a large amount of gasoline is mixed with engine oil becau conditions (such as when engine oil temperature does not rise enough since a journey di short during winter). The symptom will not be detected after changing engine oil or changing dition. 	stance is too
>> INSPECTION END	
6.PERFORM POWER BALANCE TEST	Ν
 Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. 	
Is the inspection result normal?	C
YES >> GO TO 9. NO >> GO TO 7.	
7. DETECT MALFUNCTIONING PART	F
 Check the following. Ignition coil and its circuit (Refer to <u>EC-455, "Component Function Check"</u>.) Fuel injector and its circuit (Refer to <u>EC-449, "Component Function Check"</u>.) Intake air leakage Low compression pressure (Refer to <u>EM-23, "Inspection"</u>.) 	
Is the inspection result normal?	

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Replace fuel injector and then GO TO 8.
- NO >> Repair or replace malfunctioning part and then GO TO 8.

8.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 >> GO TO 9.

9.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, refer to <u>EC-209, "DTC Logic"</u>.
- For DTC P0131, refer to EC-213, "DTC Logic".
- For DTC P0132, refer to <u>EC-216, "DTC Logic"</u>.
- For DTC P014C and P014D, refer to <u>EC-237, "DTC Logic"</u>.
- For DTC P2096 and P2097, refer to <u>EC-418, "DTC Logic"</u>.

Is any DTC detected?

YES >> GO TO 10.

NO >> GO TO 12.

10.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 11.

11.CHECK "A/F ALPHA-B1"

- 1. 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 >> INSPECTION END

NO >> GO TO 12.

12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 13.

13.CHECK "A/F ALPHA-B1"

- 1. Start engine.
- 2. 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-472, "Symptom Table"</u>.
- **14.**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 15.
- NO-2 >> Less than the SP value: GO TO 22.

[MRA8DE]

15. DETECT MALFUNCTIONING PART	Λ
1. Check for the cause of large engine friction. Refer to the following.	A
 Engine oil level is too high Engine oil viscosity 	EC
 Belt tension of power steering, alternator, A/C compressor, etc. is excessive Noise from engine 	EC
- Noise from transmission, etc.	
 Check for the cause of insufficient combustion. Refer to the following. Valve clearance malfunction 	С
- Intake valve timing control function malfunction	
- Camshaft sprocket installation malfunction, etc.	D
>> Repair or replace malfunctioning part, and then GO TO 27.	
16.CHECK INTAKE SYSTEM	Е
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 	F
 Uneven dirt of air cleaner element Improper specification of intake air system 	
Is the inspection result normal?	G
YES >> GO TO 21. NO >> Repair or replace malfunctioning part, and then GO TO 17.	
NO >> Repair or replace malfunctioning part, and then GO TO 17. 17.CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"	Н
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.	1
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END	1
YES >> INSPECTION END NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 18.	
18. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR	J
1. Stop the engine.	17
 Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again. 	Κ
>> GO TO 19. 19. CHECK "A/F ALPHA-B1"	L
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within 	M
the SP value.	
<u>Is the measurement value within the SP value?</u> YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-185</u> , "DTC	Ν
Logic". Then GO TO 26.	
NO >> GO TO 20. 20.CHECK "MAS A/F SE-B1"	0
Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the	
SP value.	Ρ
<u>Is the measurement value within the SP value?</u> YES >> GO TO 21.	
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26.	
21.REPLACE ECM	
 Replace ECM. Perform <u>EC-134, "Work Procedure"</u>. 	

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

>> GO TO 26.

22.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 24.
- NO >> Repair or replace malfunctioning part, and then GO TO 23.

23. 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 >> Less than the SP value: GO TO 24.

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

Select "MAS A/F SE-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 25.
- NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.

25.CHECK INTAKE SYSTEM

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 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
- Malfunctioning seal of intake air system, etc.

>> GO TO 27.

26.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-472, "Symptom Table"</u>.

27.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-472, "Symptom Table"</u>.

< DTC/CIRCUIT DIAGNOSIS > POWER SUPPLY AND GROUND CIRCUIT

[MRA8DE]

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Diagnosis	FIUCEUU	•		INFOID:00000008930	
	USE				Е
Check that th	he following	fuse is not f	using.		
Locatior	<u>ו</u>	Fuse No.	Capacity	_	(
		#33	20A	—	
IPDM E/	R	#52	15A		
s the fuse fu	using?			_	
NO >>	Replace the GO TO 2. GROUND CO		epairing the appl	cable circuit.	
	ition switch		•		
			d E15. Refer to	GI-46. "Circuit Inspection".	
YES >> NO >>	<u>ttion result n</u> GO TO 3. Repair or re _l ECM GROUI	place groun	d connection.		
	ect ECM ha ne continuity			nector and ground.	
2. Check th	ne continuity			nector and ground.	
2. Check th	ne continuity +		CM harness con	nector and ground.	
2. Check th	ne continuity			nector and ground.	
2. Check th 	ne continuity + CM		CM harness con	nector and ground.	
2. Check th	ne continuity + CM Terminal		CM harness con	nector and ground.	
2. Check th 	ne continuity + CM Terminal 12		CM harness con	nector and ground.	
Connector F24 F25	ne continuity + CM Terminal 12 16	r between E€	CM harness con	nector and ground.	
Check th EC Connector F24	ne continuity + CM Terminal 12 16 52	r between E€	CM harness con	nector and ground.	_
2. Check th EC Connector F24 F25 E16 s the inspec	te continuity + CM Terminal 12 16 52 123 123 128 tion result n	Ground	CM harness con	nector and ground.	_
2. Check th EC Connector F24 F25 E16 S the inspector YES >>	tion result n	Ground	CM harness con Continuity Existed	nector and ground.	_
2. Check th EC Connector F24 F25 E16 S the inspect YES >> NO >>	te continuity + CM Terminal 12 16 52 123 128 ction result n GO TO 4. Repair or re	Ground	CM harness con Continuity Existed	nector and ground.	_
Connector F24 F25 E16 YES >> NO >> CHECK E	te continuity + CM Terminal 12 16 52 123 128 tion result n GO TO 4. Repair or rep ECM POWE	Ground Ormal? R SUPPLY (CM harness con Continuity Existed	nector and ground.	
2. Check th EC Connector F24 F25 E16 S the inspect YES >> NO >> LCHECK E CHECK E CRECONN C. Turn ign	tion switch of the continuity	Ground Ground ormal? place error-c R SUPPLY (ness conne ON.	CM harness con Continuity Existed		
2. Check th EC Connector F24 F25 E16 S the inspect YES >> NO >> LCHECK E CHECK E CRECONN C. Turn ign	tion switch of the continuity	Ground Ground ormal? place error-c R SUPPLY (ness conne ON.	CM harness con Continuity Existed detected parts. (MAIN)-1 ctor.		
2. Check the ECC Connector F24 F25 E16 S the inspect YES >> NO >> A.CHECK E CHECK E Reconne Check the ECC CHECK E	te continuity Terminal 12 16 52 123 128 tion result n GO TO 4. Repair or rep CM POWEL ect ECM har ition switch on he voltage be	Ground Ground ormal? place error-c R SUPPLY (ness conne ON.	CM harness con Continuity Existed detected parts. (MAIN)-1 ctor.		_
2. Check th EC Connector F24 F25 E16 S the inspect YES >> NO >> LCHECK E CHECK E CRECONN C. Turn ign	te continuity Terminal 12 16 52 123 128 tion result n GO TO 4. Repair or re ECM POWEL ect ECM har ition switch one voltage boom ECM +	Ground Ground ormal? place error-c R SUPPLY (ness conne ON.	CM harness con Continuity Existed detected parts. (MAIN)-1 ctor. // harness conne		_

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHECK ECM POWER SUPPLY (MAIN)-2

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

< DTC/CIRCUIT DIAGNOSIS >

2. Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector	+	-	Condition	Voltage (Approx.)	
Connector	Terr	ninal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
E16	121	128	After turning ignition switch OFF, battery voltage will ex- ist for a few seconds	Drop to 0 V	

Is the inspection result normal?

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

6. CHECK ECM POWER SUPPLY (MAIN) CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connectors.

3. Disconnect IPDM E/R harness connector.

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

+				
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		
E16	121	E45	25	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

7. CHECK ECM RELAY CONTROL SIGNAL

Check the voltage between ECM harness connector terminals as per the following.

+ E(CM		Condition	Voltage (Approx.)	
Connector	Terminal	Connector	Terminal	-	(Applox.)	
				Ignition switch ON	0 V	
F25	89	E16	128	Turn ignition switch OFF and wait at least 10 sec- onds.	Battery voltage	

Is the inspection result normal?

YES >> Check Intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 8.

 $\textbf{8.} \mathsf{CHECK} \texttt{ECM} \texttt{RELAY} \texttt{CONTROL} \texttt{SIGNAL} \texttt{CIRCUIT}$

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.

+				
EC	CM	IPDN	IPDM E/R	
Connector	Terminal	Connector Terminal		
F25	89	E45	31	Existed

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



< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-58, "Removal and Installation"</u> (with intelligent key), <u>PCS-58, A</u> <u>"Removal and Installation"</u> (without intelligent key).

NO >> Repair or replace error-detected parts.

9.CHECK IGNITION SWITCH SIGNAL

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

-						
	ECM				Maltana	
	Connector	+	_	Condition	Voltage (Approx.)	
_	Terminal					
	E16	109	109 128	100 128	Ignition switch OFF	0 V
	L10	109 120		Ignition switch ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. CHECK IGNITION SWITCH SIGNAL CIRCUIT

- 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.

+		_		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	109	E43	18	Existed

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

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.
- 11.CHECK ECM POWER SUPPLY (BACK-UP)

Check the voltage between ECM harness connector terminals.

	ŀ	-	-	
	E	СМ		Voltage (Approx.)
Connector	Terminal	Connector	Terminal	
F25	81	E16	128	Battery voltage
s the inspec	tion result n	ormal?		
YES >> (Check Interr	nittent Incide	nt. Refer to	GI-43, "Intermit
NO >> (GO TO 12.			

12.CHECK ECM POWER SUPPLY (BACK-UP) CIRCUIT

- 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.

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+		_		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F25	81	E45	32	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

< DTC/CIRCUIT DIAGNOSIS >

U0101 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

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause		
U0101	LOST COMM (TCM) (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		
DTC CONFIRMATION PROCEDURE 1. PERFORM DTC CONFIRMATION PROCEDURE					
 Turn ignition switch ON and wait at least 3 seconds. Check DTC. Is DTC detected? 					
YES >> Proceed to <u>EC-167, "Diagnosis Procedure"</u> . NO >> INSPECTION END					

Diagnosis Procedure

Perform the trouble diagnosis for CAN communication system. Refer to LAN-16, "Trouble Diagnosis Flow Chart".

Revision: October 2012

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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:000000008930193

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1001	CAN COMM CIRCUIT (CAN communication cir- cuit)	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 >> Proceed to <u>EC-168, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

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Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-16. "Trouble Diagnosis Flow</u> <u>Chart"</u>.

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P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS > P0011 IVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-179, "DTC Logic".

		<i>,</i> ,	0
DTC No.	CONSULT screen terms (Trouble diagnosis conter	L) L(' dotocting condition	Possible cause
P0011	INT/V TIM CONT-B1 ("A" Camshaft position - tir ing over-advanced or syste performance bank 1)		 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
	NFIRMATION PROCI	EDURE	
1. Turn i 2. Turn i 3. Turn i TESTING	gnition switch ON. gnition switch OFF and CONDITION:	wait at least 10 seconds. wait at least 10 seconds. g procedure, confirm that batter	y voltage is between 11 V and 16 V at
-	-> GO TO 2. DRM DTC CONFIRMAT	ION PROCEDURE-1	
 Start e Mainta 	gnition switch ON and s angine and warm it up t	select "DATA MONITOR" mode of "I o normal operating temperature. ons for at least 6 consecutive secor	ENGINE" using CONSULT.
ENG SPEE	ED 1,200 - 2,00	0 man 00	
COOLANT		60°C (140°F)	-
Selector lev	ver P or N posi	tion	-
	< 1st trip DTC.	ning and let engine idle for 10 secor	nds.
Follow the	procedure "With CON DTC detected?	SULT" above.	
NO >	 Proceed to <u>EC-170.</u> GO TO 3. 	-	
		ION PROCEDURE-2	
(B)With CC	ONSULT		

With CONSULT
 Maintain the following conditions for at least 20 consecutive seconds.

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P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMP/ S	More than 60°C (140°F)
Selector lever	D 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" above. <u>Is 1st trip DTC detected?</u>

YES >> Proceed to <u>EC-170, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

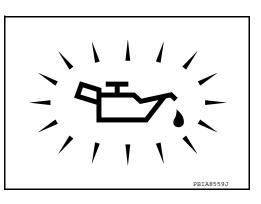
Diagnosis Procedure

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 >> Check the engine oil level. Refer to <u>LU-7</u>, "Inspection".
- NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to <u>EC-171, "Component Inspection"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 3.

NO >> Replace intake valve timing control solenoid valve. Refer to <u>EM-48</u>, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-278, "Component Inspection [CKP Sensor (POS)]"</u>. Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-33, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to <u>EC-281, "Component Inspection [CMP Sensor</u> (PHASE)]".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace camshaft position sensor (PHASE). Refer to <u>EM-60, "Exploded View"</u>.

5.CHECK CAMSHAFT (INT)

Check the following.

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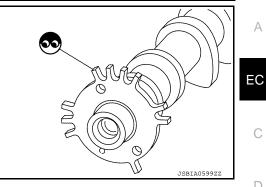
P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

- · Accumulation of debris to the signal plate of camshaft 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. Refer to EM-60, "Removal and Installation"



\sim

6. CHECK TIMING CHAIN INSTALLATION						
Check service records for any recent repairs that may cause timing chain misaligned.						
Are there any service records that may cause timing chain misaligned?				Е		
 YES >> Check timing chain installation. Refer to <u>EM-49, "Removal and Installation"</u>. NO >> GO TO 7. 						
7.CHECK LUBRI	7. CHECK LUBRICATION CIRCUIT					
Refer to LU-7, "Ins	pection", "INSPEC	TION AFTER INSTALLATION"				
Is the inspection re	esult normal?			G		
	intermittent incide lubrication line.	ent. Refer to <u>GI-43, "Intermittent</u>	Incident".	9		
Component Ins	spection		INF0/D:00000008967745	Н		
	E VALVE TIMING	CONTROL SOLENOID VALVE-	1			
1. Turn ignition s	witch OFF.					
		ontrol solenoid valve harness co				
3. Check resistar		e valve liming control solehold v	valve terminals as per the following.	I		
Intake valve timing o	Intake valve timing control solenoid valve					
+	_	Resistance				
	Terminal					
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]				
1	a i	$\Omega \propto$		1		
2	Ground	(Continuity should not exist)				
Is the inspection re	esult normal?					
YES >> GO TO				M		
· ·		ing control solenoid valve. Refe				
Z .CHECK INTAK	E VALVE TIMING	CONTROL SOLENOID VALVE-	-2	N		
		rol solenoid valve. Refer to EM		N		
		e valve timing control solenoic n interrupt it. Make sure that the				
	s as shown in the f			С		
CAUTION:						
		ously for 5 seconds or more ge to the coil in intake valve		P		
timing contro	ol solenoid valve.			Γ		
NOTE:		Intoles walks the second				
	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. Refer to EM-48, "Exploded View".

[MRA8DE]

P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P0014 EVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to <u>EC-182, "DTC Logic"</u>.
- If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to <u>EC-358</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0014	EXH/V TIM CONT-B1 ("B" Camshaft position - tim- ing over-advanced or system performance bank 1)	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Exhaust valve timing control position sensor Exhaust valve control solenoid valve Accumulation of debris to the signal pickup portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for exhaust valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLANT TEMP/S	More than 60°C (140°F)
Selector lever	P or N position
 4. Let engine idle f 5. Check 1st trip D With GST Follow the procedure Is 1st trip DTC detect 	TC. e "With CONSULT" above.

```
YES >> Proceed to EC-173. "Diagnosis Procedure"
```

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

(B) With CONSULT

P0014 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)	
COOLANT TEMP/S	More than 70°C (158°F)	EC
Selector lever	D position	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	С
CAUTION: Always drive a 3. Check 1st trip D With GST	TC.	D
•	e "With CONSULT" above.	E
Is 1st trip DTC detectYES>> ProceedNO>> INSPEC	to <u>EC-173, "Diagnosis Procedure"</u>	F
Diagnosis Proce	edure INFOID:00000008967747	
1.CHECK OIL PRE	SSURE WARNING LAMP	G
nated.	sure warning lamp and confirm it is not illumi-	Н
	ng lamp illuminated? he engine oil level. Refer to LU-7, "Inspection". 2.	I
		J
2.CHECK EXHAUS	DBIA8559J ST VALVE TIMING CONTROL SOLENOID VALVE	K
Is the inspection res		L
^	3. e exhaust valve timing control solenoid valve. Refer to <u>EM-48, "Exploded View"</u> . SHAFT POSITION SENSOR (POS)	M
Is the inspection res YES >> GO TO		Ν
4.CHECK EXHAUS	ST VALVE TIMING CONTROL POSITION SENSOR	0
Check the exhaust v sor (PHASE)]".	valve timing control position sensor. Refer to EC-281, "Component Inspection [CMP Sen-	
Is the inspection res YES >> GO TO NO >> Replace		Ρ
5.check camsh	• •	
		•

Check the following.

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P0014 EVT CONTROL

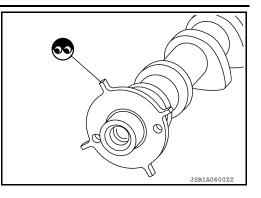
< DTC/CIRCUIT DIAGNOSIS >

- Accumulation of debris to the signal plate of camshaft 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. Refer to <u>EM-60, "Removal</u> and Installation".



6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to <u>EM-49</u>, "Removal and Installation".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to <u>LU-7, "Inspection"</u>.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Clean lubrication line.

Component Inspection

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1

- 1. Turn ignition switch OFF.
- 2. Disconnect exhaust valve timing control solenoid valve harness connector.
- 3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing	control solenoid valve	
+ –		Resistance
Terr	minal	
1	2	7.0 - 7.8 Ω [at 20°C (68°F)]
1	Ground	$\Omega \propto$
2	Glound	(Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove exhaust valve timing control solenoid valve. Refer to EM-48. "Exploded View".

2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check 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 exhaust valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".





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[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

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[MRA8DE]

EC

DTC DETECTION LOGIC

DTC No.	CONSULT screen (Trouble diagnosi tent)	le diagnosis con- DTC detecting condition Possible cause		Possible cause
P0031	A/F SEN 1 HTR (B (HO2S heater cont cuit low bank 1 ser	trol cir-	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 (A/F sensor 1 heater circuit is o shorted.)• Harness or connectors (A/F sensor 1 heater circuit is o shorted.)• A/F sensor 1 heater	
P0032	A/F SEN 1 HTR (B1) (HO2S heater control cir- cuit high bank 1 sensor 1) A/F SEN 1 HTR (B1) (HO2S heater control cir- cuit high bank 1 sensor 1) A/F SEN 1 HTR (B1) (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.) A/F sensor 1 heater (A/F sensor 1 heater circuit is short- ed.) A/F sensor 1 heater			
DTC CO	NFIRMATION F	PROCE	DURE	
1.PREC	ONDITIONING			
2. Turn 3. Turn TESTING	ignition switch OI ignition switch OI CONDITION:	N. FF and w	vait at least 10 seconds. vait at least 10 seconds.	ge is more than between 11 V at
	enorming the to	Jiowing	procedure, comminitial battery voltag	
idle.	-	Jiening	procedure, commination battery voltag	
idle.	>> GO TO 2.	-		
idle.	-> GO TO 2. DRM DTC CONF	FIRMATIC	DN PROCEDURE t least 10 seconds.	
idle. 2.PERF0 1. Start 2. Chec	>> GO TO 2. DRM DTC CONF engine and let it i k 1st trip DTC.	FIRMATIC	ON PROCEDURE	
idle. 2.PERF0 1. Start 2. Chec Is 1st trip	>> GO TO 2. DRM DTC CONF engine and let it i k 1st trip DTC. DTC detected?	FIRMATIC idle for a	DN PROCEDURE t least 10 seconds.	
idle. 2.PERF(1. Start 2. Chec Is 1st trip YES >	>> GO TO 2. DRM DTC CONF engine and let it i k 1st trip DTC. DTC detected?	FIRMATIC idle for a	ON PROCEDURE	
idle. 2.PERF0 1. Start 2. Chec Is 1st trip YES NO 2	> GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. DTC detected? > Proceed to EC	FIRMATIC idle for a <u>C-175, "D</u> END	DN PROCEDURE t least 10 seconds.	INFOID:00000008930196
idle. 2.PERF(1. Start 2. Chec Is 1st trip YES NO Diagnos	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC</u> > INSPECTION sis Procedure 	FIRMATIC idle for a <u>C-175, "D</u> END	DN PROCEDURE t least 10 seconds. tiagnosis Procedure".	
idle. 2.PERFO 1. Start 2. Chec Is 1st trip YES NO Diagnos 1.CHEC	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC</u> > INSPECTION sis Procedure K AIR FUEL RAT 	FIRMATIC idle for a <u>C-175, "D</u> END END	ON PROCEDURE t least 10 seconds. <u>liagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT	
idle. 2.PERFC 1. Start 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco 2. Turn	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to EC > INSPECTION sis Procedure K AIR FUEL RAT onnect air fuel rationality 	FIRMATIC idle for a <u>C-175, "D</u> END END FIO (A/F) io (A/F) s N.	ON PROCEDURE t least 10 seconds. <u>Viagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT sensor 1 harness connector.	INFOID:00000008930196
idle. 2.PERFC 1. Start 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco 2. Turn	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to EC > INSPECTION sis Procedure K AIR FUEL RAT onnect air fuel rationality 	FIRMATIC idle for a <u>C-175, "D</u> END END FIO (A/F) io (A/F) s N.	ON PROCEDURE t least 10 seconds. <u>liagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT	INFOID:00000008930196
idle. 2.PERFC 1. Start 2. Chec Is 1st trip YES NO Diagnos 1.CHEC 1. Disco 2. Turn	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to EC > INSPECTION sis Procedure K AIR FUEL RAT onnect air fuel rationality 	FIRMATIC idle for a <u>C-175, "D</u> END END FIO (A/F) io (A/F) s N.	ON PROCEDURE t least 10 seconds. <u>Viagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT sensor 1 harness connector.	INFOID:00000008930196
idle. 2.PERFO 1. Start 2. Chec Is 1st trip YES NO 2 Diagnos 1.CHEC 1. Disco 2. Turn 3. Chec	 > GO TO 2. ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to EC > INSPECTION Sis Procedure K AIR FUEL RAT onnect air fuel rationality in the voltage between the second seco	FIRMATIC idle for a <u>C-175, "D</u> END END FIO (A/F) io (A/F) s N.	ON PROCEDURE t least 10 seconds. <u>Viagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT sensor 1 harness connector.	INFOID:00000008930196
idle. 2.PERFO 1. Start 2. Chec Is 1st trip YES NO 2 Diagnos 1.CHEC 1. Disco 2. Turn 3. Chec	 > GO TO 2. > GO TO 2. > ORM DTC CONF engine and let it is k 1st trip DTC. <u>DTC detected?</u> > Proceed to EC > INSPECTION sis Procedure K AIR FUEL RAT onnect air fuel rationality in the voltage between 	FIRMATIC idle for a <u>C-175, "D</u> END END FIO (A/F) io (A/F) s N.	ON PROCEDURE t least 10 seconds. <u>Viagnosis Procedure"</u> . SENSOR 1 POWER SUPPLY CIRCUIT sensor 1 harness connector. = sensor 1 harness connector and ground	INFOID:00000008930196

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2.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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	3	F25	53	Existed

*1: Except California

*2: For California

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-176. "Component Inspection (A/F Sensor 1 Heater)".

Is the inspection result normal?

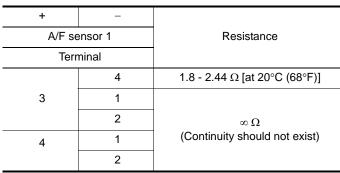
- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-30. "Exploded View".

Component Inspection (A/F Sensor 1 Heater)

INFOID:000000008930197

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.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace air fuel ratio (A/F) sensor 1. Refer to <u>EM-30, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038 HO2S2 HEATER

DTC Logic

А

EC

INFOID:000000008930198

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause			
P0037	HO2 HTR (B1) (HO2S heater control cir- cuit low bank 1 sensor 2) HO2 HTR (B1) (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.) Heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.) Heated oxygen sensor 2 heater.)					
P0038	HO2 HTR (B1) The current amperage in the heated oxygen sensor 2 bester circuit is out of the normal range (Heated oxygen sensor 2 bester circuit					
	NFIRMATION PROCI	EDURE				
3. Turn i FESTING Before pe	CONDITION: erforming the followin	wait at least 10 seconds. g procedure, confirm that battery voltage	e is more than 11 V at idle.			
`	> GO TO 2.					
_						
 Start of Turn i Start of Let er 	gnition switch ON and s engine and warm it up t gnition switch OFF and engine and keep the en ngine idle for 1 minute. k 1st trip DTC.	select "DATA MONITOR" mode of "ENGINE o normal operating temperature. wait at least 10 seconds. gine speed between 3,500 and 4,000 rpm fo	-			
	e procedure "With CON	SULT" above.				
YES >	DTC detected? >> Proceed to EC-177, >> INSPECTION END	"Diagnosis Procedure".				
Diagnos	sis Procedure		INFOID:00000008930199			
1. CHEC	K HO2S2 POWER SUF	PLY CIRCUIT				
2. Disco		ensor 2 (HO2S2) harness connector.				
	gnition switch ON. k the voltage between h	O2S2 harness connector and ground.				
	+					

-	÷		
HO	2S2	_	Voltage
Connector	Connector Terminal		
F43	4	Ground	Battery voltage

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT

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

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

+			_	
HO2S2		ECM		Continuity
Connector Terminal		Connector	Terminal	
F43	3	F25	54	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to EC-178, "Component Inspection (HO2S Heater)".

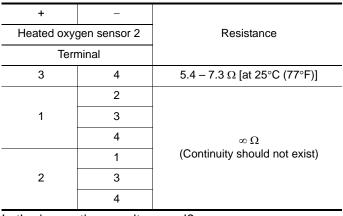
Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>.

Component Inspection (HO2S Heater)

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.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace heated oxygen sensor 2. Refer to <u>EX-5</u>, "Exploded View".

INFOID:000000008930200

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

А

EC

INFOID:000000008930201

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scree (Trouble diagno		DTC detecting condition	Possible cause
P0075	tent) INT/V TIM V/CIR (Intake valve con noid circuit bank	trol sole- th	n improper voltage is sent to the ECM rough intake valve timing control solenoid lve.	 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve
OTC CO	NFIRMATION	PROCED	URE	
1.PREC	ONDITIONING			
before co 1. Turn 2. Turn	nducting the ne ignition switch (ignition switch (ext test. OFF and wa ON.	as been previously conducted, alv ait at least 10 seconds. ait at least 10 seconds.	ways perform the following procedure
~	>> GO TO 2. ORM DTC CON	IFIRMATIC	N PROCEDURE	
2. Chec <u>Is 1st trip</u> YES >	engine and let k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>E</u> >> INSPECTIO	<u>-</u> EC-179, "Di	seconds. agnosis Procedure".	
Diagnos	sis Procedu	re		INFOID:00000008930202
1.снес	K INTAKE VAL	VE TIMING	CONTROL SOLENOID VALVE PC	OWER SUPPLY
1. Turn 2. Disco 3. Turn	ignition switch (onnect intake va ignition switch (OFF. alve timing (ON.	(IVT) control solenoid valve harnes	s connector.
4. Chec	k the voltage be	etween inta	ke valve timing control solenoid val	lve harness connector and ground.
IVT contr Connecto	+ ol solenoid valve or Terminal	_	Voltage	
F33	1	Ground	Battery voltage	
YES NO 2.CHEC 1. Turn 2. Disco	ignition switch (onnect IPDM E/	VE TIMING OFF. R harness	CONTROL SOLENOID VALVE PC connector. VT control solenoid valve harness	

P0075 IVT CONTROL SOLENOID VALVE

		+		+	
-	IVT control solenoid valve		IPDM E/R		Continuity
-	Connector Terminal		Connector	Terminal	
-	F33	1	E45	26	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

$\mathbf{3.}$ CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

- 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	Connector Terminal		Terminal	
F33	2	F25	93	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to <u>EC-180, "Component Inspection (IVT Control</u> <u>Solenoid Valve)"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-48, "Exploded View".

Component Inspection (IVT Control Solenoid Valve)

INFOID:000000008930203

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-1

- 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.

	timing control id valve	Desistance	
+ –		Resistance	
Terr	ninal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]	
1	Ground	$\Omega \propto$	
2	Giouna	(Continuity should not exist)	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to <u>EM-48</u>, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-2

1. Remove intake valve timing control solenoid valve. Refer to EM-48, "Exploded View".

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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 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:

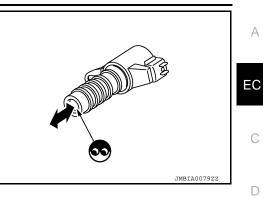
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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. Refer to <u>EM-48</u>, "<u>Exploded View</u>".



P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000008930204

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve control solenoid cir- cuit bank 1)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	 Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) Exhaust valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:000000008930205

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

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

	+		
EVT control s	solenoid valve	_	Voltage
Connector	Connector Terminal		
F55	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.check exhaust valve timing control solenoid valve power supply circuit

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between EVT control solenoid valve harness connector and IPDM E/R harness connector.

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+	+			
EVT control	solenoid valve	IPDM	E/R	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F55	1	E45	26	Existed	
. Also che	eck harness	for short to g	ound.		
	ction result n	•			
YES >>	Perform the	trouble diagn	osis for pov	ver supply circu	t.
_	•	place error-de			
3. CHECK	EXHAUST V	ALVE TIMINO	G CONTRO	L SOLENOID V	ALVE GROUND CIRCUIT
2. Disconr		rness connec		olenoid valve h	rness connector and ECM harness connec-
	+	+			
EVT control solenoid valve ECM			M	Continuity	
Connector	Terminal	Connector	Terminal		
F55	2	F25	94	Existed	
4. Also che	eck harness	for short to g	ound and to	o power.	
<u>s the inspec</u>	<u>ction result n</u>	ormal?		-	
	GO TO 4.				
	•	place error-de	•		
4.CHECK	EXHAUST V	ALVE TIMINO	G CONTRO	L SOLENOID V	ALVE
		timing contro	ol solenoid v	valve. Refer to	C-180, "Component Inspection (IVT Control
<u>Solenoid Va</u>		10			
•	<u>ction result n</u>				
			it. Refer to		
N() >>	Replace exr	aust valve tir	nina control		ent Incident". Refer to EM-49, "Removal and Installation".
				solenoid valve	Refer to EM-49, "Removal and Installation".
					Refer to EM-49, "Removal and Installation".
Compone	ent Inspec	tion (EVT	Control S	solenoid valve	Refer to EM-49, "Removal and Installation". INFOID:00000008930206 e) INFOID:00000008930206
Compone 1.снески	ent Inspec	tion (EVT (Control S	solenoid valve. olenoid Valv	Refer to EM-49, "Removal and Installation". INFOID:00000008930206 e) INFOID:00000008930206
Compone 1.CHECK I 1. Turn igr 2. Disconr	EXHAUST V Nition switch on Nect exhaust	tion (EVT) ALVE TIMINC OFF. valve timing (Control S CONTRO	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr	EXHAUST V Nition switch on Nect exhaust	tion (EVT) ALVE TIMINC OFF. valve timing (Control S CONTRO	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID CONSISSION
Compone CHECK I Turn igr Disconr Check r	EXHAUST V EXHAUST V nition switch nect exhaust resistance be	tion (EVT) ALVE TIMINC OFF. valve timing (Control S CONTRO	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve	EXHAUST V Nition switch on Nect exhaust	tion (EVT) ALVE TIMINC OFF. valve timing (Control S CONTRO	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve	EXHAUST V EXHAUST V nition switch nect exhaust resistance be timing control	tion (EVT) ALVE TIMINC OFF. valve timing of tween exhau	Control S CONTRO	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno +	EXHAUST V EXHAUST V nition switch nect exhaust resistance be timing control	tion (EVT) ALVE TIMINC OFF. valve timing of tween exhau	Control S CONTRO control sole st valve tim	solenoid valve olenoid Valv L SOLENOID V noid valve harn	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno +	EXHAUST V EXHAUST V nition switch nect exhaust resistance be timing control nid valve	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau	Control S CONTRO control sole st valve tim	solenoid valve. olenoid Valv L SOLENOID V noid valve harn ing control sole	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr	EXHAUST V EXHAUST V nition switch of nect exhaust resistance be timing control id valve	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau	Control S CONTRO control sole st valve tim	solenoid valve. olenoid Valv L SOLENOID V noid valve harn ing control sole	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr 1	EXHAUST V EXHAUST V nition switch of nect exhaust resistance be timing control id valve	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau Re 7.0 - 7.8 Ω	Control S CONTRO control sole st valve tim	solenoid valve	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr 1 1 2	ent Inspect	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau Re 7.0 - 7.8 Ω (Continuity	Control S CONTRO CONTRO Control sole st valve tim esistance $\frac{1}{2} [at 20^{\circ}C (68^{\circ})]$ $\infty \Omega$	solenoid valve	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr 1 1 2 s the inspec	ent Inspect EXHAUST V nition switch of nect exhaust resistance be e timing control id valve 	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau Re 7.0 - 7.8 Ω (Continuity	Control S CONTRO CONTRO Control sole st valve tim esistance $\frac{1}{2} [at 20^{\circ}C (68^{\circ})]$ $\infty \Omega$	solenoid valve	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1.CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr 1 1 2 Is the inspec YES >>	ent Inspect EXHAUST V hition switch of hect exhaust esistance be etiming control id valve 	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau Re 7.0 - 7.8 Ω (Continuity ormal?	Control S CONTRO Control sole st valve tim esistance $[at 20^{\circ}C (68^{\circ})]$ $\infty \Omega$ should not ex	solenoid valve. olenoid Valv L SOLENOID V noid valve harning control sole	Refer to <u>EM-49, "Removal and Installation"</u> . e) INFOID:00000008930206 ALVE-1 ess connector.
Compone 1. CHECK I 1. Turn igr 2. Disconr 3. Check r Exhaust valve soleno + Terr 1 1 2 Is the inspec YES >> NO >>	ent Inspect EXHAUST V hition switch of hect exhaust esistance be timing control id valve 	tion (EVT (ALVE TIMINO OFF. valve timing (tween exhau Re 7.0 - 7.8 Ω (Continuity ormal?	Control S CONTRO CONTRO Control sole st valve tim esistance $[at 20^{\circ}C (68^{\circ})]$ $\infty \Omega$ should not ex ning control	solenoid valve. olenoid Valv L SOLENOID V noid valve harning control sole	Refer to EM-49, "Removal and Installation". e) INFOLD-000000000000000000000000000000000000

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

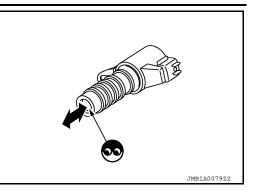
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-49, "Removal and Installation".



< DTC/CIRCUIT DIAGNOSIS >

P0101, P0102, P0103 MAF SENSOR

DTC Logic

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INFOID:000000008930207

[MRA8DE]

EC

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	C
P0101	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit range/performance)	An excessively high voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor Sensor power supply 2 circuit 	
P0102	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit low input)	An excessively low voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor Sensor power supply 2 circuit 	E
P0103	MAF SEN/CIRCUIT-B1 (Mass or volume air flow "A" circuit high input)	An excessively high voltage from the mass air flow sensor is sent to ECM.	 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor Sensor power supply 2 circuit 	(-
	NFIRMATION PROCE	DURE		⊢
If DTC C before co	inducting the next test.	has been previously conducted, alwa	ays perform the following procedure	I
2. Turn 3. Turn	ignition switch ON. ignition switch OFF and	wait at least 10 seconds.		
P0102 : P0101 c	<u>FC is detected?</u> >> GO TO 2. or P0103>>GO TO 3. ORM DTC CONFIRMAT	ION PROCEDURE FOR DTC P0102		ŀ
	engine and wait at least k DTC.	5 seconds.		L
Is DTC de YES : NO :	<u>etected?</u> >> Proceed to <u>EC-186, "</u> >> INSPECTION END	-		N
	ignition switch ON and w	ION PROCEDURE FOR DTC P0101 A	AND P0103-1	Ν
2. Chec	k DTC.			
	<u>etected?</u> >> Proceed to <u>EC-186. "</u> >> GO TO 4.	Diagnosis Procedure".		C
4		ION PROCEDURE FOR DTC P0101 A	ND P0103-2	F
4 01 1		F 1		

1. Start engine and wait at least 5 seconds.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-186, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2. P0101 and 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 or replace error-detected parts.

3.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.

- 2. Disconnect MAF sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between MAF sensor harness connector and ground.

	+		
MAF	sensor	_	Voltage (Approx.)
Connector	Connector Terminal		
F31	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 7.

CHECK MAF SENSOR GROUND CIRCUIT

- 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	
F31	2	F24	34	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

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

+		-			
	MAF sensor		ECM		Continuity
	Connector	Terminal	Connector	Terminal	
	F31	3	F24	35	Existed

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

INFOID:000000008930208

P0101 P0102 P0103 MAE SENSOR

		P010	1, P0102	, P0103 MAF		
< DTC/CIRCU	IT DIAGN	NOSIS >			[MRA8DE]	
Is the inspectio		ormal?				
	DTO 6.	place error-d	latacted part	6		А
6.CHECK MA	•	•	letected part	5	_	
			407.10	(1) (1) (1)	E	EC
Is the inspectio			<u>187, "Comp</u>	onent Inspection (N	<u>IAF Sensor)"</u> .	
			nt Refer to	GI-43, "Intermittent	Incident"	
					or). Refer to <u>EM-25, "Exploded View"</u> .	С
7. СНЕСК МА	F SENSC		CIRCUIT			
1. Turn ignitic						D
2. Disconnect	t ECM ha	rness conne				
3. Check the	continuity	between M	AF sensor ha	arness connector a	nd ECM harness connector.	_
						Е
+			-			
MAF sen	sor Terminal		CM	Continuity		F
F31	1	Connector F24	Terminal 36	Existed		
_	-			nort to ground.		
4. Also check		•	ower and sr	ion to ground.		G
) TO 8.					
		place error-d	letected part	S.		Н
8.CHECK SEI	NSOR PC	WER SUPF	LY 2 CIRCL	ЛТ		
Check sensor	ower sur	polv 2 circuit.	Refer to EC	-443, "Diagnosis F	Procedure".	
Is inspection re				· · · · · · · · · · · · · · · · · · ·		I
				ver supply circuit.		
NO >> Re	pair or re	place error-d	letected part	S.		J
Component	Inspec	tion (MAF	Sensor)		INFOID:00000008930209	
						12
1. CHECK MA		LOW SENS	JR-1			Κ
 Turn ignitic Reconnect 		SS connecto	rs disconnec	ted.		L
3. Start engin	e and wa	rm it up to no	ormal operat	ing temperature.		
		and select "I -B1" and che		TOR" mode of "EN		5.4
						Μ
Monitor item		Conditio	n	Value		
	Ignition sv	witch ON (Engir	ne stopped.)	Approx. 1.3 V		Ν
	Idle (Engi ating temp	ne is warmed-u perature.)	p to normal ope	er- 1.3 - 1.6 V		
MAS A/F SE-B1		n (Engine is war temperature.)	med-up to norn	nal 1.8 - 2.2 V		0
		out 4,000 rpm		1.3 - 1.6 V to Ap- prox. 2.5 V*		Ρ
*: Check for li	inear voltag	e rise in respon	se to engine be	eing increased to about	4,000 rpm.	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. Without CONSULT

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.

P0101, P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
1 24	55	54	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 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
- Intake valve deposits
- 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-2

()With CONSULT

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

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Without CONSULT

- 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.

P0101, P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ECM			<u>_</u> _	
Connector	+	_	Condition	Voltage	_
Connector	Terr	ninal			
			gnition switch ON (Engine topped.)	Approx. 1.3 V	
F24	35		dle (Engine is warmed-up to normal perating temperature.)	1.3 - 1.6 V	
		2	2,500 rpm (Engine is warmed-up to ormal operating temperature.)	1.8 - 2.2 V	
			dle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*	
			eing increased to about 4,000 rpm.		
•	n result normal	_			
	SPECTION END TO 4.	J			
	SS AIR FLOW S				
With CONSL	JLT n switch OFF.				
		sensor harness co	onnector and reconnect it aga	iin.	
3. Start engin	e and warm it u	p to normal opera	iting temperature.		
4. Connect C	ONSULT and se	elect "DATA MON	ITOR" mode of "ENGINE".		
5. Select "MA	S A/F SE-B1" a	ind check indication	on.		
Monitoritor		Condition	Value		
Monitor item		Condition	Value		
		N (Engine stopped.)	Approx. 1.3 V		
	Idle (Engine is wa ating temperature	armed-up to normal op e.)	1.3 - 1.6 V		
MAS A/F SE-B1	2,500 rpm (Enginor) operating temperating	e is warmed-up to nor ature.)	mal 1.8 - 2.2 V		
	Idle to about 4,00	0 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*		
_	•	response to engine b	eing increased to about 4,000 rpm.		
Without CON					
	n switch OFF.	onsor hornoos or	productor and reconnect it are	in	
			onnector and reconnect it aga ting temperature.	un.	
4. Check the	voltage betweel	n ECM harness c	onnector and ground.		
	ECM				
Contractor	+	_	Condition	Voltage	
Connector	Terr	minal			
			gnition switch ON (Engine topped.)	Approx. 1.3 V	
			dle (Engine is warmed-up to normal perating temperature.)	1.3 - 1.6 V	

Is the inspection result normal?

35

34

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

F24

operating temperature.)

Idle to about 4,000 rpm

2,500 rpm (Engine is warmed-up to

normal operating temperature.)

1.8 - 2.2 V

1.3 - 1.6 V to Ap-

prox. 2.5 V*

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
- NO >> Clean or replace mass air flow sensor. Refer to EM-25, "Exploded View".

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0111 IAT SENSOR

DTC Logic

А

EC

INFOID:000000008967749

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 (Intake air temperature sensor 1 circuit range/performance bank 1)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor
DTC COI	NFIRMATION PROCEDUR	E	
1. INSPE	CTION START		
YES >	ssary to erase permanent DTC >> GO TO 3. >> GO TO 2.		
NOTE:		fer to <u>EC-192, "Component Function (</u>	
	omponent function check to c FC might not be confirmed.	heck the overall function of the IAT se	nsor circuit. During this check, a
	bection result normal?		
	> INSPECTION END > Proceed to <u>EC-192, "Diagn</u>	osis Procedure".	
3.PREC	ONDITIONING		
	ONFIRMATION PROCEDURE re conducting the next test.	has been previously conducted, alwa	ays perform the following proce-
1. Turn i	ignition switch OFF and wait a	at least 10 seconds.	
3. Turn i	ignition switch ON. ignition switch OFF and wait a	at least 10 seconds.	
	CONDITION: performing the following pr	ocedure, do not add fuel.	
Before	performing the following pro	ocedure, check that fuel level is bet ocedure, confirm that battery voltag	
			,
	>> GO TO 4.		
	ORM DTC CONFIRMATION F	YRUGEDURE	
NOTE			
2. Turn i	the vehicle in an environment ignition switch OFF and leave TION:	of ambient air temperature between – the vehicle for 12 hours.	10°C (14°F) and 35°C (95°F).
Neve	r turn ignition switch ON du	ring this procedure.	
	whicle must be cooled with the		
	engine and let it idle for 5 min TION:	utes or more.	

.

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Proceed to EC-192, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT.
- 5. Check that "INT/A TEMP SEN" indicates as per following condition.

Monitor item	Condition		Value (Approx.)
INT/A TEMP SEN	Temperature [°C (°F)]	25 (77)	1.9 - 2.1 (V)

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Proceed to EC-192, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

Check intake air temperature sensor. Refer to EC-192, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25, "Exploded</u> <u>View"</u>.

Component Inspection

INFOID:000000008967752

INFOID:000000008967751

1.CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT.
- 5. Check that the indicated value of "INT/A TEMP SEN" is almost the same as intake air temperature.
- Is the inspection result normal?
- YES >> INSPECTION END
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-25, "Exploded <u>View</u>".

INFOID:000000008967750

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0112, P0113 IAT SENSOR

DTC Logic

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EC

INFOID:000000008930210

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scree (Trouble diagnos tent)		DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT (Intake air tempera sensor 1 circuit low	ature A	n excessively low voltage from the intake a emperature sensor is sent to ECM.	Harness or connectors
P0113	IAT SEN/CIRCUIT (Intake air tempera sensor 1 circuit hig 1)	ature A	n excessively high voltage from the intake a emperature sensor is sent to ECM.	 (Intake air temperature sensor circuit is open or shorted.) air Intake air temperature sensor
	IFIRMATION F	PROCED	URE	
pefore con 1. Turn ig 2. Turn ig 3. Turn ig	ducting the nex gnition switch O gnition switch O gnition switch O	t test. FF and wa N.	ait at least 10 seconds. ait at least 10 seconds.	ways perform the following procedure
•	> GO TO 2. PRM DTC CONF	FIRMATIO	N PROCEDURE	
2. Check <u>s 1st trip I</u> YES >	1st trip DTC. DTC detected?	<u>C-193, "Dia</u>	t at least 5 seconds. agnosis Procedure".	
-	is Procedure			INFOID:00000008930211
1. CHECK	INTAKE AIR T	EMPERAT	TURE SENSOR POWER SUPPLY	,
2. Discor 3. Turn ig	gnition switch O	low senso N.	r (with intake air temperature sens s air flow sensor harness connect	
	+		Voltage	
MA Connector	F sensor Terminal	-	(Approx.)	
F31	4	Ground	5.0 V	
YES >	ection result nor > GO TO 3. > GO TO 2.	rmal?		
2. CHECK			URE SENSOR POWER SUPPLY	CIRCUIT

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

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

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
MAF	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F24	33	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT

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

	+		_	
MAF	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F31	2	F24	34	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Check the intake air temperature sensor. Refer to EC-194, "Component Inspection (IAT Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25, "Exploded</u> <u>View"</u>.

Component Inspection (IAT Sensor)

INFOID:000000008930212

1.CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.

3. Turn ignition switch ON.

- 4. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "INT/A TEMP SEN".
- 5. Check that the indicated value of "INT/A TEMP SEN" is almost the same as intake air temperature.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25, "Exploded</u> <u>View"</u>.

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0116 ECT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit range/perfor- mance)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor
DTC CO	NFIRMATION PROCEDU	JRE	
1.INSPE	CTION START		
	ssary to erase permanent D	<u>TC?</u>	
	>> GO TO 3. >> GO TO 2.		
^	ORM COMPONENT FUNC	TION CHECK	
		Refer to EC-196, "Component Function	n Check".
NOTE:	-		
	component function check to TC might not be confirmed.	check the overall function of the ECT	sensor circuit. During this check, a
•	pection result normal?		
	>> INSPECTION END		
~	> Proceed to <u>EC-196, "Dia</u>	<u>gnosis Procedure"</u> .	
3. PREC	ONDITIONING		
		RE has been previously conducted, al	ways perform the following proce-
dure betc 1. Turn	ore conducting the next test. ignition switch OFF and wa	it at least 10 seconds.	
2. Turn	ignition switch ON.		
	ignition switch OFF and wa GONDITION:	it at least 10 seconds.	
		procedure, do not add fuel.	
• Before	performing the following	procedure, check that fuel level is b	
 Before 	performing the following	procedure, confirm that battery volt	age is 11 v or more at idle.
:	>> GO TO 4.		
	ORM DTC CONFIRMATION	N PROCEDURE	
1. Move	e the vehicle to a cool place		
NOT		nt of ombient circles and the bat	
	ignition switch OFF and lea	nt of ambient air temperature between ve the vehicle for 12 hours.	$1 - 10^{\circ}$ C (14°F) and 35°C (95°F).
CAU	TION:		
Neve NOT	er turn ignition switch ON	during this procedure.	
	vehicle must be cooled with	the food open.	
3. Start	engine and let it idle for 5 m		
	TION:	t de este establis es	

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

INFOID:000000008967753

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EC

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Proceed to EC-196, "Diagnosis Procedure".
- NO >> INSPECTION END

Component Function Check

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- 3. Remove ECT sensor. Refer to CO-23. "Exploded View".
- 4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

ECT s	sensor			
+	-	Conditio	n	Resistance (k Ω)
Terr	ninal			
			20 (68)	2.37 – 2.63
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		(-)]	90 (194)	0.236 - 0.260

JMBIA0080ZZ

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

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

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-196. "Component Inspection".

Is the inspection result normal?

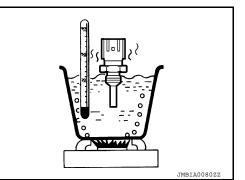
- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace ECT sensor. Refer to <u>CO-23, "Exploded View"</u>.

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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

ECT :	sensor			
+	_	Conditi	on	Resistance (kΩ)
Terr	minal			, , , , , , , , , , , , , , , , , , ,
			20 (68)	2.37 - 2.63
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

INFOID:000000008967755

INFOID:000000008967756

INFOID:000000008967754

P0117, P0118 ECT SENSOR

DTC detecting condition

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0117, P0118 ECT SENSOR

CONSULT screen terms

(Trouble diagnosis content)

DTC Logic

DTC No.

А

EC

INFOID:000000008930213

Possible cause

[MRA8DE]

	(Trouble diagnos			
P0117	ECT SEN/CIRC (Engine coolant ture sensor 1 cir	tempera-	An excessively low voltage from the engine coolant temperature sensor is sent to ECM.	Harness or connectors (Engine coolant temperature sensor cir-
P0118	ECT SEN/CIRC (Engine coolant ture sensor 1 cir		An excessively high voltage from the engine coolant temperature sensor is sent to ECM.	cuit is open or shorted.)Engine coolant temperature sensor
DTC CON	IFIRMATION	PROCED	DURE	
1.PRECC	NDITIONING			
before con 1. Turn ig 2. Turn ig	ducting the ne gnition switch (gnition switch (ext test. OFF and w ON.	as been previously conducted, alwa ait at least 10 seconds. ait at least 10 seconds.	ays perform the following procedure
~	> GO TO 2.		ON PROCEDURE	
1. Turn ig 2. Check		ON and wa	it at least 5 seconds.	
Is DTC det				
			iagnosis Procedure".	
Diagnos	is Procedu	re		INFOID:00000008930214
1. CHECK	ENGINE CO	OLANT TE	MPERATURE SENSOR POWER SL	IPPLY
1. Turn iç	gnition switch (OFF.		
			perature (ECT) sensor harness conn	ector.
	nition switch (the voltage be		T sensor harness connector and grou	und.
	5			
	+		Voltage	
EC	T sensor	-	(Approx.)	
Connector		<u> </u>		
F6	1	Ground	5.0 V	
YES >:	<u>ection result n</u> > GO TO 3. > GO TO 2.	ormai?		
2.снеск		OLANT TE	MPERATURE SENSOR POWER SL	IPPLY CIRCUIT
1. Turn iç	gnition switch (OFF.		
2. Discor	nnect ECM hai	rness conn	ector.	

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

Revision: October 2012



С

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
ECT	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F6	1	F24	28	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

${f 3.}$ CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

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

	+		_	
ECT	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F6	2	F24	27	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to <u>EC-198. "Component Inspection (ECT Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43</u>, "Intermittent Incident".

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

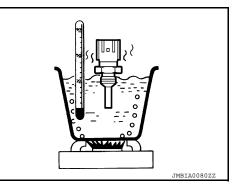
Component Inspection (ECT Sensor)

INFOID:000000008930215

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.

ECT :	sensor			
+	-	Condition		Resistance
Terr	ninal			
			20 (68)	2.37 - 2.63 kΩ
1	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. Refer to CO-23, "Exploded View".

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0122, P0123 TP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit low)	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	TP SEN 2/CIRC-B1 (Throttle/Pedal position sensor/switch "A" circuit high)	An excessively high voltage from the TP sensor 2 is sent to ECM.	Electric throttle control actuator (TP sensor 2)
OTC CON	FIRMATION PROCE	EDURE	
1.PRECO	NDITIONING		
		has been previously conducted, alwa	ys perform the following procedure
	ducting the next test. nition switch OFF and	wait at least 10 seconds.	
	nition switch ON.		
2. Turn ig			
2. Turn ig 3. Turn ig	nition switch OFF and CONDITION:	wait at least 10 seconds.	
2. Turn ig 3. Turn ig TESTING C	CONDITION:	wait at least 10 seconds. g procedure, confirm that battery vol	tage is more than 8 V at idle.
 Turn ig 3. Turn ig TESTING C Before per 	CONDITION:		tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per	CONDITION: forming the followin	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per >> 2.PERFOF 1. Start er	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per >> 2.PERFOF 1. Start er 2. Check	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC.	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per >> 2.PERFOF 1. Start er 2. Check Is 1st trip D	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>DTC detected?</u>	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per >> 2.PERFOF 1. Start er 2. Check Is 1st trip D YES >>	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>DTC detected?</u>	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per 2.PERFOF 1. Start er 2. Check Is 1st trip D YES >> NO >>	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>DTC detected?</u> Proceed to <u>EC-199,</u> NSPECTION END	g procedure, confirm that battery vol	tage is more than 8 V at idle.
2. Turn ig 3. Turn ig TESTING C Before per 2.PERFOF 1. Start er 2. Check Is 1st trip D YES >> NO >> Diagnosis	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-199,</u> NSPECTION END s Procedure	g procedure, confirm that battery vol TION PROCEDURE 1 second. "Diagnosis Procedure".	
2. Turn ig 3. Turn ig TESTING C Before per 2. PERFOF 1. Start er 2. Check Is 1st trip D YES >> NO >> Diagnosis 1. CHECK	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-199,</u> NSPECTION END s Procedure THROTTLE POSITIC	g procedure, confirm that battery vol	
2. Turn ig 3. Turn ig TESTING C Before per 2. PERFOF 1. Start er 2. Check Is 1st trip D YES >> NO >> Diagnosis 1. CHECK 1. Turn ig	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-199.</u> NSPECTION END s Procedure THROTTLE POSITIC nition switch OFF.	g procedure, confirm that battery vol TION PROCEDURE 1 second. "Diagnosis Procedure".	
2. Turn ig 3. Turn ig TESTING C Before per 2. PERFOF 1. Start er 2. Check <u>Is 1st trip D</u> YES >> Diagnosis 1. CHECK 1. Turn ig 2. Discont 3. Turn ig	CONDITION: forming the followin GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>TC detected?</u> Proceed to <u>EC-199.</u> NSPECTION END S Procedure THROTTLE POSITIC nition switch OFF. nect electric throttle continue switch ON.	g procedure, confirm that battery vol TION PROCEDURE 1 second. Diagnosis Procedure".	INFOID:00000008930217

Electric thrott	+ le control actu-		Voltage (Approx.)
	tor	-	
Connector Terminal			
F7	2	Ground	5.0 V
		10	

Is the inspection result normal?

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

Revision: October 2012

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P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

- 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 actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F25	80	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT

- 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 actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F25	78	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

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

+			_	
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F25	77	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-201. "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (TP Sensor)

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-138, "Work Procedure".
- 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 terminals as per the following conditions.

	ECM					
Connec-	+	_	Condition		Voltage	
tor	Terminal					
	77				Fully released	Less than 4.75 V
F25			Accelerator	Fully depressed	More than 0.36 V	
1.20	79	70	pedal	Fully released	More than 0.36 V	
	79			Fully depressed	Less than 4.75 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

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[MRA8DE]

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0125 ECT SENSOR

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-195, "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-197, "DTC Logic"</u>.

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

()With CONSULT

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

With GST

Follow the procedure "With CONSULT" above.

Is it above 5°C (41°F)?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

()With CONSULT

T. Start engine and run it for 65 minutes at idle speed.

2. Check 1st tip DTC.

If "COOLANT TEMP/S" indication increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-202, "Diagnosis Procedure".
- NO >> INSPECTION END

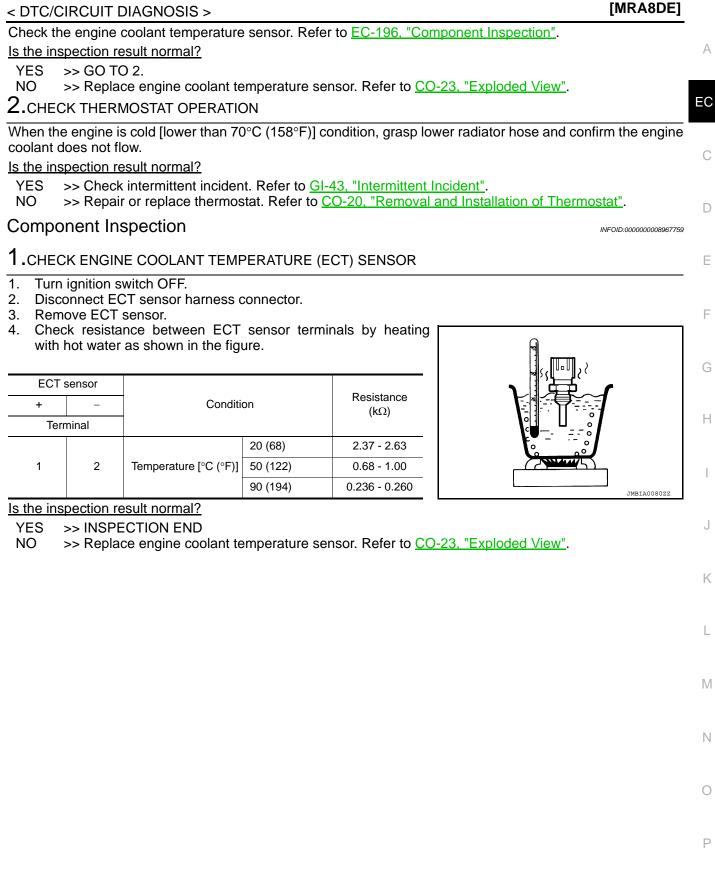
Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

INFOID:00000008967758

INFOID:000000008967757

P0125 ECT SENSOR



< DTC/CIRCUIT DIAGNOSIS >

P0127 IAT SENSOR

DTC Logic

INFOID:000000008967760

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0127	IAT SENSOR-B1 (Intake air temperature too high)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	 Harness or connectors (Intake air temperature sensor circuit is open or shorted) Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

()With CONSULT

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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).
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT
- 4. Start engine.
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-204, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008967761

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Check the intake air temperature sensor. Refer to EC-205, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25, "Exploded</u> <u>View"</u>.



P0127 IAT SENSOR

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > **Component Inspection** INFOID:000000008967762 А 1.CHECK INTAKE AIR TEMPERATURE SENSOR 1. Turn ignition switch OFF. EC 2. Disconnect mass air flow sensor harness connector and reconnect it again. 3. Turn ignition switch ON. Select "DATA MONITOR" mode with CONSULT. 4. 5. Check that the indicated value of "INT/A TEMP SEN" is almost the same as intake air temperature. С Is the inspection result normal? YES >> INSPECTION END NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-25, "Exploded D View". Е F Н

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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 P0300, P0301, P0302, P0303 or P0304. Refer to <u>EC-268, "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 being stuck open.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN [Coolant thermostat (coolant temperature below thermostat regulating temperature)]	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	 Thermostat Leakage from sealing portion of thermostat Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE **NOTE**:

Never refuel before and during the following procedure.

1.PRECONDITIONING-1

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

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

>> GO TO 2.

2. PRECONDITIONING-2

With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	–10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.

4. Check the following conditions:

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-1

()With CONSULT

- 1. Start engine.
- 2. Drive the vehicle until the following condition is satisfied. CAUTION:

Always drive vehicle at safe speed.

STEP 1

INFOID:000000008967763

< DTC/CIRCUIT DIAGNOSIS >		[MRA8DE]	
Drive the vehicle under the cond and "FUEL T/TMP SE" becom		difference between "COOLANT TEMP/S"	A
COOLANT TEMP/S	66°C (151°F) or less	-	
FUEL T/TMP SE	Less than the value calculated by sub- tracting 26°C (47°F) from "COOLANT TEMP/S".*		EC
*: Example		_	С
COOLANT TEMP/S	FUEL T/TMP SE	_	
70°C (158°F)	44°C (111°F) or less	—	D
65°C (149°F)	39°C (102°F) or less		EMP/S" A
60°C (140°F)	34°C (93°F) or less		
 STEP 2 Drive the vehicle at 50 km/h (32 I T/TMP SE" maintained at 26°C NOTE: Keep the accelerator pedal as st 	C (47°F) or more.	between "COOLANT TEMP/S" and "FUEL	
 STEP 3 Drive the vehicle at 50 km/h (32 NOTE: Keep the accelerator pedal as st 	MPH) or more until "COOLANT	TEMP/S" increases by 6°C (11°F).	G
Is the condition satisfied? YES >> GO TO 4. NO >> GO TO 1.			Η
4. PERFORM DTC CONFIRMATION	ON PROCEDURE-2		1
With CONSULT Drive the vehicle until the follo	wing condition is satisfied.		
COOLANT TEMP/S	67°C (153°F) or more	_	0
CAUTION: Always drive vehicle at safe 2. Check 1st trip DTC. Is 1st trip DTC detected?	speed.		K
YES >> Proceed to <u>EC-207, "E</u> NO >> INSPECTION END	<u>Diagnosis Procedure"</u> .		L
Diagnosis Procedure		INFOID:00000008967764	M
			1 V I

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to <u>EC-207, "Component Inspection"</u>.

<u>Is the inspection result normal?</u> YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

2.CHECK THERMOSTAT

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat.

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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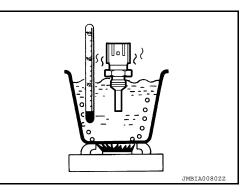
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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

- 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.

0	olant tem- e sensor	Condition			
+	-			Resistance (kΩ)	
Terr	ninal				
			20 (68)	2.37 - 2.63	
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00	
		(-)]	90 (194)	0.236 - 0.260	



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0130 A/F SENSOR 1

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.	CONSULT screen terms (Trouble diagnosis content)		DTC detecting condition	Possible cause	
P0130	A/F SENSOR1 (B1) 0130 (O2 sensor circuit bank 1		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 (A/F sensor 1 circuit is open or shorted.) 	
	sensor 1)	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	
4	IFIRMATION PROCE	DUF	RE		
1. PRECO	NDITIONING				
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING	ducting the next test. gnition switch OFF and s gnition switch ON. gnition switch OFF and s CONDITION:	wait wait			
>:	> GO TO 2.				
2.PERFO	RM DTC CONFIRMATI	ON I	PROCEDURE FOR MALFUNCTION A		
2. Let it ic		nori	mal operating temperature.		
	DTC detected?				
	> Proceed to <u>EC-210, "I</u>				
	With CONSULT)>>GO Without CONSULT)>>G				
<u> </u>	AIR FUEL RATIO (A/F				
1. Select			IONITOR" mode of "ENGINE" using COI	NSULT.	
	ndication fluctuates arou	und 2	2.2 V?		
YES >> NO >>	> GO TO 4. > Proceed to <u>EC-210, "I</u>	Diadu	nosis Procedure"		
4			PROCEDURE FOR MALFUNCTION B-1		
1. Select SULT.	"A/F SEN1 (B1) P1276		A/F SEN1" in "DTC WORK SUPPORT" n	node of "ENGINE" using CON-	
	"START". the following conditions	are	met, "TESTING" will be displayed on the	CONSULT screen.	
ENG SPEE	D 1,000	- 3,20	0 rpm		

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 (6MT)

INFOID:000000008930219

EC

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< DTC/CIRCUIT DIAGNOSIS > 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 screen? YES >> GO TO 5. NO >> 1. Check A/F sensor 1 function again. 2. GO TO 3. 5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-2 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>>1.Retry DTC CONFIRMATION PROCEDURE. 2. GO TO 4. **O.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-3 Touch "SELF-DIAG RESULT" Which is displayed on CONSULT screen? YES >> INSPECTION END NO >> Proceed to EC-210, "Diagnosis Procedure". **I.**PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B Perform Component Function Check, Refer to EC-210, "Component Function Check". NOTE: Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal? YES >> INSPECTION END

>> Proceed to EC-210, "Diagnosis Procedure". NO

Component Function Check

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1.PERFORM COMPONENT FUNCTION CHECK

With GST

- Start engine and warm it up to normal operating temperature. 1.
- Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position. 2.
- Shift the selector lever to the D position (CVT) or 5th position (M/T), then release the accelerator pedal 3. fully until the vehicle speed decreases to 50 km/h (31 MPH). **CAUTION:**

Always drive vehicle at a safe speed. NOTE:

Never apply brake during releasing the accelerator pedal.

- Repeat steps 2 to 3 for five times. 4.
- 5. Stop the vehicle and turn ignition switch OFF.
- Wait at least 10 seconds and restart engine. 6.
- 7. Repeat steps 2 to 3 for five times.
- 8. Stop the vehicle.
- 9. Check 1st trip DTC.

Is 1st trip DTC detected?

- >> Proceed to EC-210, "Diagnosis Procedure". YES
- NO >> INSPECTION END

Diagnosis Procedure

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

Turn ignition switch OFF. 1.

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P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

-	+					EC	
A/F se	ensor 1	_	Voltage				
Connector	Terminal						
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltag	je		С	
	ept California California	ì				D	
s the inspec	ction result n	ormal?					
	GO TO 3.					E	
•	GO TO 2.						
L.CHECK A	AIR FUEL R	ATIO (A/F) S	SENSOR 1 P	OWER SUPPL	Y CIRCUIT		
	ition switch					F	
		R harness c		arness connec	tor and IPDM E/R harness connector.		
. Oncorra		betweentry				G	
	+		_				
A/F se	ensor 1	IPDI	M E/R	Continuity			
Connector	Terminal	Connector	Terminal			Н	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed		I	
*1: Exce	ept California	à					
*2: For (Żalifornia						
		for short to g	ground.			J	
	tion result n		. ,				
			nosis for pow letected parts	ver supply circu	iit.	K	
~	•	•	IGNAL CIRC			Γ	
	ition switch	OFF. rness conne	ctor			L	
				arness connec	tor and ECM harness connector.		
	,						
-	+		_			M	
A/F sensor 1		ECM		Continuity			
Connector	Terminal	Connector	Terminal			Ν	
F12 ^{*1}	1		41			1.4	
F42 ^{*2}	2	F24	45	Existed			
*1: Exce	ept California	3				0	
*2: For (Ċalifornia						
		y between A	/F sensor 1	harness conne	ector and ground, or ECM harness connecto)r	
and arou	und					D	

arness connec

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and ground.

P0130 A/F SENSOR 1

	+		
A/F se	ensor 1	-	Continuity
Connector	Terminal		
F12 ^{*1}	F12 ^{*1} 1		Not existed
F42 ^{*2}	2	Ground	NOT EXISTEN

*1: Except California

*2: For California

	+		
EC	CM	_	Continuity
Connector Terminal			
F24	41	Ground	Not existed
1 24	45	Ground	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".
- NO >> Repair or replace error-detected parts.

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

P0131 A/F SENSOR 1

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.	CONSULT sc (Trouble diagno		DTC detecting condition	Possible cause		
P0131	A/F SENSOR1 (O2 sensor circ age bank 1 sen	uit low volt-	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1 		
DTC CON	FIRMATION	PROCED	DURE			
1.PRECO	NDITIONING					
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING	ducting the ne inition switch (inition switch (inition switch (CONDITION:	ext test. OFF and w ON. OFF and w	as been previously conducted, always ait at least 10 seconds. ait at least 10 seconds. procedure, confirm that battery voltage			
•	> GO TO 2. A/F SENSOF		DN			
 Select Check With GS Follow the 	ngine and war "A/F SEN1 (B "A/F SEN1 (B T procedure "W	31)" in "DAT 31)" indicati ith CONSU	JLT" above.	CONSULT.		
	ation constant	• • • •	<u>u v?</u> iagnosis Procedure".			
	> GO TO 3.	<u></u>	aginosis Flocedule.			
3.PERFO	RM DTC CON	NFIRMATIC	ON PROCEDURE			
	nition switch (and accelerate		it least 10 seconds and then restart engin more than 40 km/h (25 MPH) within 20 s			
Alway	s drive vehic		e speed. Is for about 20 consecutive seconds.			
ENG SPEE	D	1,000 - 3,20	0 rpm			
VHCL SPEE	VHCL SPEED SE More than 40 km/h (25 mph)					

NOTE:

B/FUEL SCHDL

Selector lever

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

1.5 - 9.0 msec

Suitable position

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

Check 1st trip DTC. 4. With GST

Ρ

INFOID:000000008930222

А

EC

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-214</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930223

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

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between A/F sensor 1 harness connector and ground.

	+		
A/F se	ensor 1	-	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage

*1: Except California

*2: For California

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

	+		_	
A/F se	ensor 1	IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed

*1: Except California

- *2: For California
- 4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR 1 INPUT 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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	Existed

*1: Except California

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

*2: For California

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

	+					
A/F sensor 1		_	Continuity			
Connector	Terminal					
F12 ^{*1}	1	Ground	Not existed			
F42 ^{*2}	2	Ground	NOT EXISTED			
	ept California California	1				
	+					
		_	Continuity			
Connector	Terminal					
F24	41 45	Ground	Not existed			
5. Also che	-	for short to p	ower			
Is the inspec		•	ower.			
	GO TO 4.	<u>orman.</u>				
		place error-d	etected parts.			
4.CHECK I	NTERMITTE	ENT INCIDE	T			
Check intern	nittent incide	ent. Refer to	GI-43, "Intermit			
Is the inspec	ction result n	ormal?				
NO >>	Repair or re	r or replace error-detected parts.				

Μ

0

< DTC/CIRCUIT DIAGNOSIS >

P0132 A/F SENSOR 1

DTC Logic

INFOID:000000008930224

[MRA8DE]

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0132	A/F SENSOR1 (B1) (O2 sensor circuit high volt- age bank 1 sensor 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	 Harness or connectors (A/F sensor 1 circuit is open or short- ed.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

(B) With CONSULT

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

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

YES >> Proceed to EC-217, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

()With CONSULT

- 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
D/I OLL SCIIDL	1.5 - 5.0 11360
Selector lever	Suitable position
Selector level	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

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Follow the procedure "With CONSULT" above.	
Is 1st trip DTC is detected?	A
YES >> Proceed to EC-217. "Diagnosis Procedure".	
NO >> INSPECTION END	
Diagnosis Procedure	INFOID:00000008930225
1.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY	C
 Turn ignition switch OFF. Disconnect A/F sensor 1 harness connector. 	
3. Turn ignition switch ON.	
4. Check the voltage between A/F sensor 1 harness connector and ground.	D
+	E
A/F sensor 1 – Voltage	
Connector Terminal	_
F12 ^{*1} 4 Ground Battery voltage	F
F42 ^{*2}	
*1: Except California *2: For California	G
Is the inspection result normal?	
YES >> GO TO 3.	
NO >> GO TO 2.	H
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT	
1. Turn ignition switch OFF.	
2. Disconnect IPDM E/R harness connector.	
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R h	
+ -	J
A/F sensor 1 IPDM E/R Continuity	
Connector Terminal Connector Terminal	К
F12 ^{*1}	
F42 ^{*2} 4 E45 26 Existed	
*1: Except California	L
*2: For California	
4. Also check harness for short to ground.	IV
Is the inspection result normal?	
YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts.	
3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT	N
 Turn ignition switch OFF. Disconnect ECM harness connector. 	0
3. Check the continuity between A/F sensor 1 harness connector and ECM harnes	ss connector.
+ -	P
A/F sensor 1 ECM Continuity	

*1: Except California

< DTC/CIRCUIT DIAGNOSIS >

*2: For California

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

	+		
A/F se	ensor 1	– Con	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Ground	NOT EXISTED

*1: Except California

*2: For California

	+		
E	СМ	_	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
1 24	45	Ground	NOT EXISTED

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".
- NO >> Repair or replace error-detected parts.

< DTC/CIRCUIT DIAGNOSIS >

P0137 HO2S2

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.

			JSBIA0545GB	E
				F
DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	G
P0137	HO2S2 (B1) (O2 sensor circuit low voltage bank 1 sensor 2)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	 Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector 	Н

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT? YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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:

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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. Make sure that "COOLANT TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches 70°C (158°F). 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

EC-219

2013 Sentra NAM

NG

OK

· Intake air leaks

1V

٥v

0.73V

А

EC

D

Κ

L

Μ

Ν

Ρ

< DTC/CIRCUIT DIAGNOSIS >

9. Follow the instruction of CONSULT. NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to EC-221, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-220, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-221, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-1

Without CONSULT

- 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 as per the following condition.

ECM					
Connector	Connector + -		Condition	Voltage	
Connector	Terminal				
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-2

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

ECM					
Connector +		_	Condition	Voltage	
Connector	Terminal				
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-3

INFOID:000000008930227

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

	0			0 1	U U
	ECM				
Connector	+	-	-	Condition	Voltage
Connector		Terminal			
F24	22	2	1	asting from 80 km/h (50 MPH) in D sition (CVT), 5th gear position (6MT)	The voltage should be above 0.72 V at least once during this procedure.
s the inspect					
	NSPECTIO	N END <u>EC-221, "Dia</u>	anosis Pro	ocedure"	
Diagnosis			9	<u></u> .	
4					INFOID:00000008930228
I.CLEAR TH	HE MIXTUR	RE RATIO SE	LF-LEAR	NING VALUE	
		tio self-learni ast 10 minute		Refer to <u>EC-141, "Work Proce</u> peed	dure".
•				t to start engine?	
YES >> F	Perform trou			P0171. Refer to <u>EC-245, "DT</u>	<u>C Logic"</u> .
-	GO TO 2.				
2.снеск н			ЛТ		
	tion switch		or 2 (HO29	S2) harness connector.	
3. Disconne	ect ECM ha	rness conne	ctor.	,	
4. Check th	e continuity	between HC	D2S2 harn	ess connector and ECM harne	ess connector.
+			_		
HO2		EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
F43	1	F24	23	Existed	
5. Also che	ck harness	for short to p	ower.		
Is the inspect		ormal?			
	GO TO 3. Repair or re	place error-d	etected pa	urts.	
3.снеск н	•	•			
				ess connector and ECM harne	ess connector.
	,				
+		-	_		
HO2		EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
F43	2	F24	22	Existed	
Check th ground.	ne continuit	y between H	IO2S2 har	ness connector and ground,	or ECM harness connector and
ground.					
+					
HO2	S2	1 _	Continu	ity	

HO	2S2	_	Continuity
Connector	Terminal		
F43	2	Ground	Not existed

	+		
E	СМ	_	Continuity
Connector	Terminal		
F24	22	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-222, "Component Inspection (HO2S2)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

Component Inspection (HO2S2)

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

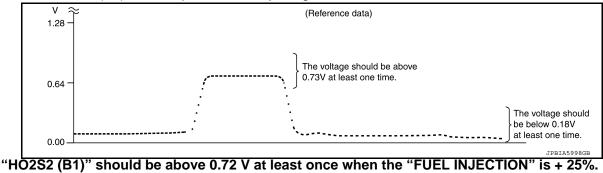
YES >> GO TO 2. NO >> GO TO 3.

3 > 3 = 10 = 3

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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. Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be below 0.12 V at least once when the "FUEL INJECTION" is - 25%.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

3.CHECK HEATED OXYGEN SENSOR 2-1

Without CONSULT

- 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 as per the following condition.

Revision: October 2012

2013 Sentra NAM

INFOID:000000008930229

< DTC/CIRCUIT DIAGNOSIS >

	ECM					
Connector	Connector + – Terminal		+ – Condition Volta		ge	
Connector						
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.		
s the inspec	tion result n	ormal?				
	INSPECTIO	N END				
	GO TO 4.					
	IEATED OX					
Check the vo	oltage betwe	en ECM ha	arness connector and ground	as per the following condition.		
	F014					
	ECM		O are little i			
Connector	+	-	Condition	Voltage		
	Ierr	ninal				
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.		
s the inspec	tion result n	ormal?				
		N END				
_	GO TO 5.					
	IEATED OX					
Check the vo	oltage betwe	en ECM ha	arness connector and ground	as per the following condition.		
	ECM					
	+	_	Condition	Voltage		
Connector		ninal		tonago		
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.		
<u>s the in</u> spec	tion result n	<u>ormal?</u>				
	<u>tion result n</u> INSPECTIO					

Revision: October 2012

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< DTC/CIRCUIT DIAGNOSIS >

P0138 HO2S2

DTC Logic

INFOID:000000008930230

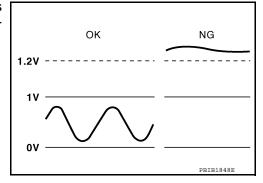
[MRA8DE]

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.

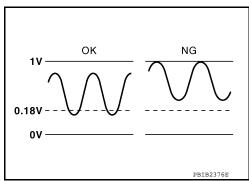
MALFUNCTION A

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.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition		Possible cause
1100000 (54)	A)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	
P0138	HO2S2 (B1) (O2 sensor circuit high voltage bank 1 sensor 2)	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A	А
 Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. 	A
 Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. Let engine idle for 2 minutes. Check 1st trip DTC. 	EC
<u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-226, "Diagnosis Procedure"</u> .	С
NO-1 (I) With CONSULT)>>GO TO 3. NO-2 (I) Without CONSULT)>>GO TO 5.	D
3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	D
 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 of "ENGINE" using CONSULT. 2. Start engine and warm it up to normal operating temperature. 	E
 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. Let engine idle for 1 minute. 	F
 Make sure that "COOLANT TEMP/S" indication is more than 70°C (158°F). If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches 70°C (158°F). Open engine hood. 	G
 Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT. Follow the instruction of CONSULT. NOTE: 	Н
It will take at most 10 minutes until "COMPLETED" is displayed. 10. Touch "SELF-DIAG RESULT".	
Which is displayed on CONSULT OK >> INSPECTION END NG >> Proceed to EC-226, "Diagnosis Procedure".	I
CAN NOT BE DIAGNOSED>>GO TO 4.	J
4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN	
 Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle). Perform DTC confirmation procedure again. 	K
>> GO TO 3.	L
5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B	
Perform component function check. Refer to <u>EC-225, "Component Function Check"</u> . NOTE: Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this	M
check, a 1st trip DTC might not be confirmed. <u>Is the inspection result normal?</u>	N
YES >> INSPECTION END NO >> Proceed to <u>EC-226, "Diagnosis Procedure"</u> .	IN
Component Function Check	0
1. PERFORM COMPONENT FUNCTION CHECK-1	
 Without CONSULT Start engine and warm it up to normal operating temperature. 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. 	٢

- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground as per the following condition.

< DTC/CIRCUIT DIAGNOSIS >

ECM				
Connector	+	_	Condition	Voltage
Connector	Terminal			
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	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 2.

2. PERFORM COMPONENT FUNCTION CHECK-2

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

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal			
F24	22	23	Keeping engine speed at idle for 10 minutes	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 3.

3.PERFORM COMPONENT FUNCTION CHECK-3

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

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal			
F24	-24 22 23		Coasting from 80 km/h (50 MPH) in D position (CVT), 5th gear position (6MT)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-226, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000008930232

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-224, "DTC Logic".

Which malfunction is detected?

- A >> GO TO 2.
- B >> GO TO 6.

2.CHECK HO2S2 CONNECTOR FOR WATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 GROUND CIRCUIT

1. Disconnect ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

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

+		-		
HO	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		-		
HO	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

	+		
HO	2S2	_	Continuity
Connector	Terminal		
F43	2	Ground	Not existed

	+		
E	СМ	_	Continuity
Connector	Terminal		
F24	22	Ground	Not existed

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-228, "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident". NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

$\mathbf{6}$.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure". 1.

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 EC-249, "DTC Logic".

NO >> GO TO 7.

1.CHECK HO2S2 GROUND CIRCUIT

Turn ignition switch OFF. 1.

Disconnect heated oxygen sensor 2 harness connector. 2. 3.

Disconnect ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

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

+				
HO	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	1	F24	23	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		—		
HO	2S2	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

	+		
HO	2S2	-	Continuity
Connector	Terminal		
F43	2	Ground	Not existed

	+		
E	CM	_	Continuity
Connector	Terminal		
F24	22	Ground	Not existed

3. 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 HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-228, "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace heated oxygen sensor 2. Refer to <u>EX-5</u>, "Exploded View".

Component Inspection (HO2S2)

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

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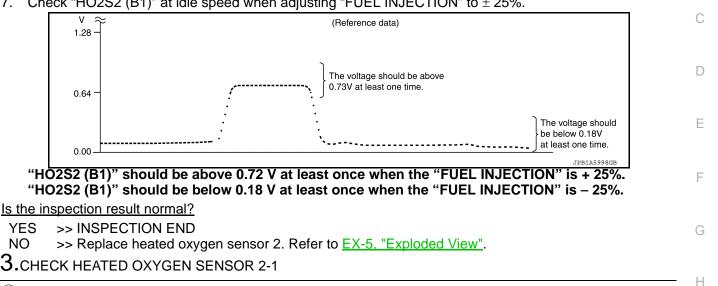
2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

INFOID:000000008930233

< DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT. 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.
- EC Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 6. (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 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.
- Check the voltage between ECM harness connector and ground as per the following condition. 5.

Connector	+	_			
Connector			Condition	Voltage	
	Termina				
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 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 2-2

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

ECM					
Connector	+	-	Condition Voltage		Р
Connector		minal			
F24	22	23	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	- -



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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-3

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

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terminal			
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 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 >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0139 HO2S2

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 1 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 various driving conditions such as fuel cut.

	witching response of the sensor's ring various driving conditions such	0V	\int	\bigvee	· _	SI	F302U
T screen terms diagnosis con-	DTC detecting condition			Pos	sible ca	use	

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	DTC No.	(Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	G
-	P0139	HO2S2 (B1) (O2 sensor circuit slow response bank 1 sensor 2)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel system Intake air system 	Н

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

CONSULT

Do you have CONSULT?

Do you have CONSULT?

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

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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:

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

>> GO TO 3.

3. Perform dTC confirmation procedure

With CONSULT

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Make sure that "COOLANT TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches to 70°C (158°F).
- 9. Open engine hood.

Revision: October 2012



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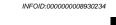
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< DTC/CIRCUIT DIAGNOSIS >

10. Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

11. Start engine and follow the instruction of CONSULT display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

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

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM SELF-DIAGNOSIS

With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" detected?

YES >> Proceed to EC-233, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-232, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-233, "Diagnosis Procedure".

Component Function Check

INFOID:000000008930235

1.PERFORM COMPONENT FUNCTION CHECK-1

Without CONSULT

- 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 as per the following condition.

ECM				
Connector	+	_	Condition	Voltage
	Terminal			
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.96 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-2

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

< DTC/CIRCUIT DIAGNOSIS >

ECM А Condition Voltage + Connector Terminal EC The voltage should be above 0.96 V at Keeping engine speed at idle for 10 F24 22 23 least once during this procedure. minutes Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 3. 3.PERFORM COMPONENT FUNCTION CHECK-3 Check the voltage between ECM harness connector and ground as per the following condition. ECM + _ Condition Voltage Connector Terminal F Coasting from 80 km/h (50 MPH) in D The voltage should be above 0.96 V at F24 22 23 position (CVT), 5th gear position (6MT) least once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-233, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000008930236 Н **1.**CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE 1. Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure". Run engine for at least 10 minutes at idle speed. 2. Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine? >> • Perform trouble diagnosis for DTC P0171. Refer to EC-245, "DTC Logic". YES Perform trouble diagnosis for DTC P0172. Refer to EC-249, "DTC Logic". NO >> GO TO 2. 2.CHECK HO2S2 GROUND CIRCUIT Κ 1. Turn ignition switch OFF. Disconnect heated oxygen sensor 2 harness connector. 2. Disconnect ECM harness connector. 3. Check the continuity between HO2S2 harness connector and ECM harness connector. 4 M + _ HO2S2 ECM Continuity Connector Terminal Connector Terminal Ν F43 1 F24 23 Existed 5. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace error-detected parts. 3.CHECK HO2S2 INPUT SIGNAL CIRCUIT 1. Check the continuity between HO2S2 harness connector and ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

	+	_		
Н	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	
F43	2	F24	22	Existed

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

	+		
HO	2S2	-	Continuity
Connector	Terminal		
F43	2	Ground	Not existed

	+		
E	CM	-	Continuity
Connector	Connector Terminal		
F24	22	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-234, "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

Component Inspection (HO2S2)

INFOID:000000008930237

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

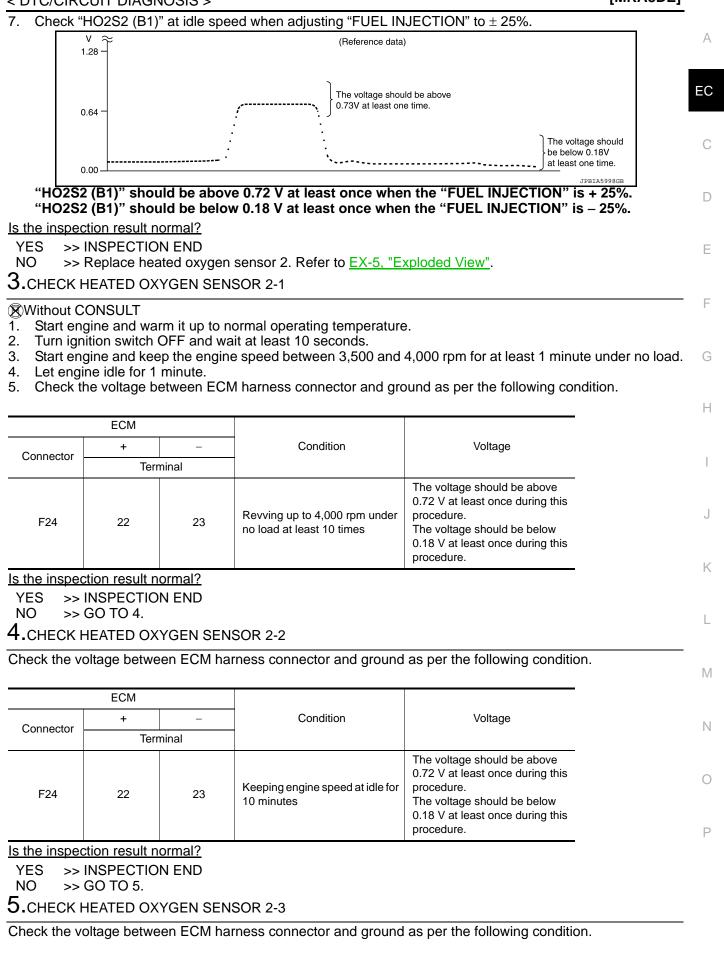
2. CHECK HEATED OXYGEN SENSOR 2

()With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode of "ENGINE" using CONSULT, and select "HO2S2 (B1)" as the monitor item with CONSULT.

< DTC/CIRCUIT DIAGNOSIS >





< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terr	ninal		
F24	22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	The voltage should be above 0.72 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 >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P014C, P014D, P015A, P015B A/F SENSOR 1

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)		 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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 11 V at idle. Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 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. 4.
- 5. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. Ν
- 6. Let engine idle for 1 minute.
- Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds. 7.
- 8. Fully release accelerator pedal and then let engine idle for about 1 minute.
- On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "A/F SEN1 DIAG3 (B1)".
- 10. Check that the data monitor indicates "PRSNT". NOTE:

If "PRSNT" changed to "ABSNT", refer to EC-210, "Component Function Check".

Is "PRSNT" displayed on CONSULT screen?

YES >> GO TO 4

NO	>> GO	TO 3.
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3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

Perform DTC confirmation procedure-1 again.

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< DTC/CIRCUIT DIAGNOSIS >

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Is "PRSNT" displayed on CONSULT screen?

- YES >> GO TO 4.
- NO >> Proceed to EC-210, "Component Function Check".

4.PERFORM DTC CONFIRMATION PROCEDURE-3

With CONSULT

- 1. Wait for about 20 seconds at idle.
- 2. On CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "A/F SEN1 DIAG2 (B1)".
- 3. Check that the data monitor indicates "CMPLT".

NOTE: If "CMPLT" changed to "INCMP", refer to <u>EC-210, "Component Function Check"</u>.

Is "CMPLT" displayed on CONSULT screen?

- YES >> GO TO 5.
- NO >> Refer to EC-210, "Component Function Check".

5.PERFORM SELF-DIAGNOSIS

With CONSULT

Check the "SELF-DIAG RESULT".

Is any DTC detected?

YES >> Proceed to EC-239, "Diagnosis Procedure".

NO >> INSPECTION END

6.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

- 1. 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 8. NO >> GO TO 7.

7. 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.

8.PERFORM DTC CONFIRMATION PROCEDURE

- 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.
- 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 7. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-239, "Diagnosis Procedure".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

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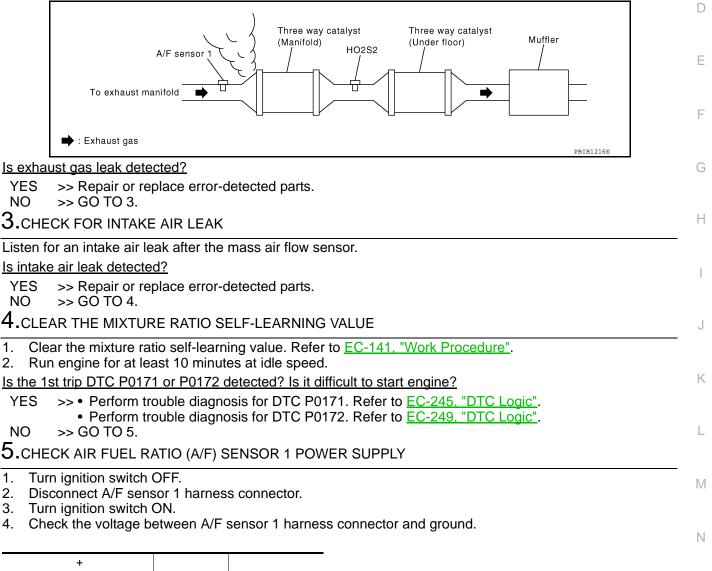
1.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-30, "Exploded View".

>> GO TO 2.

2. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst 1.



	+		
A/F se	ensor 1	_	Voltage
Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	Ground	Battery voltage

*1: Except California

*2: For California

2.

1.

2.

3.

4.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 11. Ρ

< DTC/CIRCUIT DIAGNOSIS >

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6.CHECK A/F SENSOR 1 INPUT 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	СМ	Continuity
-	Connector	Terminal	Connector	Terminal	
	F12 ^{*1}	1	F24	41	Existed
_	F42 ^{*2}	2	124	45	Existed

*1: Except California

*2: For California

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

	+		
A/F se	ensor 1	_	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Gibunu	NOT EXISTED

*1: Except California

*2: For California

	+		
E	CM	_	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
1 24	45	Gibunu	NOT EXISTED

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

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

Check the air fuel ratio (A/F) sensor 1 heater. Refer to <u>EC-241, "Component Inspection (A/F Sensor 1 Heater)"</u>.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

8.CHECK MASS AIR FLOW SENSOR

Check the mass air flow sensor. Refer to EC-241, "Component Inspection (MAF Sensor)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor. Refer to <u>EM-25, "Exploded View"</u>.

9.CHECK PCV VALVE

Check the PCV valve. Refer to EC-483, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

		P014C, P	014D, P0 ⁻	15A, P	015	5B A/F	SENSC)R 1	[MRA8DE]	
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		Parts Locat		Refer	10	<u>LO-10.</u>			<u>L OTOTEM .</u>	А
10. CHECK	K INTERMIT	TENT INCID	ENT							
Check interr	mittent incide	ent. Refer to	GI-43, "Inter	mittent Ir	ncide	<u>ent"</u> .				EC
	ction result n									20
		fuel ratio (A/ place error-d			<u>EM</u>	<u>-30, "Exp</u>	oloded Viev	<u>w"</u> .		
	•	RATIO (A/F)			. ຣບ	PPLY C	RCUIT			С
-	nition switch			-		_				
2. Disconr	nect IPDM E/	'R harness c				o otor on				D
3. Check t	ne continuity	between A/	F Sensor I n	amess c	;onn	ector an		R harness cor	mector.	
	+	-	_							Ε
A/F se	ensor 1	IPDN	/I E/R	Contii	nuity					
Connector	Terminal	Connector	Terminal]						F
F12 ^{*1} F42 ^{*2}	4	E45	26	Exis	ted					I
*1: Exce	ept California	à								G
	California	for short to g	round							
	ction result n		jiouna.							Н
YES >>	Perform the	trouble diag			ly ci	rcuit.				
NO >>	Repair or re	place error-d	letected part	s.						
Compone	ent Inspec	tion (A/F S	Sensor 1 I	Heater)				INFOID:00000008930240	
1.снески	AIR FUEL R	ATIO (A/F) S	ENSOR 1							
	nition switch									J
		sor 1 harnes: etween A/F s			ner	the follow	wina			
o. Onoon				initiale de	por		inig.			Κ
+	-									
A/F se	ensor 1	R	esistance							L
Terr	minal									
2	4	1.8 - 2.44	Ω [at 20°C (68°	°F)]						в. Л
3	1									Μ
4	1	(Continuit	$\infty \Omega$ y should not ex	kist)						
4	2	-	-	-						Ν
Is the inspec	ction result n	ormal?								
	INSPECTIO									0
	-	fuel ratio (A/	•	Refer to	<u>EM</u>	<u>-30. "Exp</u>	bloded Viev	<u>w"</u> .		
Compone	ent Inspec	tion (MAF	Sensor)						INFOID:000000008930241	Ρ
1. CHECK I	MASS AIR F	LOW SENS	OR-1							1
MALINE CON										

- With CONSULT1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- Connect CONSULT and select "DATA MONITOR" mode of "ENGINE". 4.

< DTC/CIRCUIT DIAGNOSIS >

5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Without CONSULT

- 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			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
Γ24	35	34	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about $\overline{4,000}$ 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
- Intake valve deposits
- 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-2

With CONSULT

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

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

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

Without CONSULT

- 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			
Connector	+	—	Condition	Voltage
Connector	Terr	ninal		
			Ignition switch ON (Engine stopped.)	Approx. 1.3 V
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
Γ24	33	34	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 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
IES	>> INSPECTION END

NO	>> GO TO 4.
	~~ 00 10 4.

4.CHECK MASS AIR FLOW SENSOR-3

With CONSULT

- 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 and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	Value
	Ignition switch ON (Engine stopped.)	Approx. 1.3 V
	Idle (Engine is warmed-up to normal oper- ating temperature.)	1.3 - 1.6 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
	Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm. (R)Without CONSULT

- 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.

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< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terr	ninal		
		Ignition switch ON (Engine stopped.)	Approx. 1.3 V	
F24	35	34	Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6 V
1 24	35	30 34	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.8 - 2.2 V
			Idle to about 4,000 rpm	1.3 - 1.6 V to Ap- prox. 2.5 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. Refer to <u>EM-25, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator	D
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector	-

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	F
P0171	FUEL SYS-LEAN-B1 (System too lean bank 1)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure".

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 >> Proceed to EC-246, "Diagnosis Procedure".
- NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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

2. Check 1st trip DTC.

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< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Proceed to EC-246, "Diagnosis Procedure".
- NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

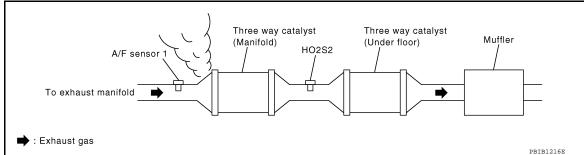
Is 1st trip DTC detected?

YES >> Proceed to <u>EC-246, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.

2.CHECK FOR INTAKE AIR LEAK

2.

1. Listen for an intake air leak after the mass air flow sensor.

2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

	+		_	
A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	LAISIEU

*1: Except California



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< DTC/CIRCUIT DIAGNOSIS >

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*2: For California

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

-	F			
A/F sensor 1		_	Continuity	
Connector	Terminal			
F12 ^{*1} F42 ^{*2}	1	Ground	Not existed	
	pt California California	l		
	F			
EC	CM	-	Continuity	
Connector	Terminal			
F24	41 45	Ground	Not existed	
6. Also che	ck harness	for short to p	ower.	
	tion result ne	•		
-	GO TO 4.		_	
4			etected parts.	
4.CHECK F	UEL PRES	SURE		
Check fuel p	ressure. Ref	fer to <u>EC-14</u> 2	2, "Work Proce	<u>lure"</u> .
ls the inspec		ormal?		
	GO TO 6.			
5. DETECT	GO TO 5.		DT	
			logging. Refer	to <u>EM-40, "Exploded View"</u> .
•	tion result no			nbly". Refer to <u>FL-6, "Exploded View"</u> .
			etected parts.	bly . Relef to <u>FL-8, Exploded view</u> .
<u>^</u>		LOW SENS	•	
With CON				
 Install al 	I removed pa			
				' mode of "ENGINE" using CONSULT.
 For spec With GST 	cincation, ref	ei to <u>EC-485</u>	5, "Mass Air Flo	<u>w Sensor</u> .
	I removed pa	arts.		
2. Check m	hass air flow	sensor signa	al in Service \$0	
•			5, "Mass Air Flo	w Sensor".
		e within the	specification?	
NO >> (sted terminals of <u>5, "DTC Logic"</u>	or loose connections in the mass air flow sensor circuit or
7.снеск ғ	UNCTION O	OF FUEL IN.	JECTOR	
With CON				

With CONSULT

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

< DTC/CIRCUIT DIAGNOSIS >

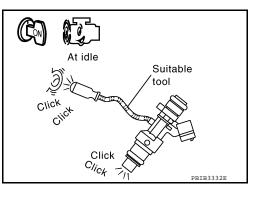
Without CONSULT

- 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-449, "Component Function Check"</u>.



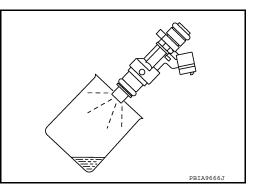
8. CHECK FUEL INJECTOR

- 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.
- Remove fuel tube assembly. Refer to <u>EM-40, "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 >> Check intermittent incident. Refer to <u>GI-43</u>, "Intermittent <u>Incident"</u>.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-40, "Removal and Installation".



Revision: October 2012

< DTC/CIRCUIT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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	D
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector	-

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	F
P0172	FUEL SYS-RICH-B1 (System too rich bank 1)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	 A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure".

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 >> Proceed to <u>EC-250, "Diagnosis Procedure"</u>. NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-250. "Diagnosis Procedure"</u>.

NO >> GO TO 5.

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< DTC/CIRCUIT DIAGNOSIS >

5.PERFORM DTC CONFIRMATION PROCEDURE-3

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

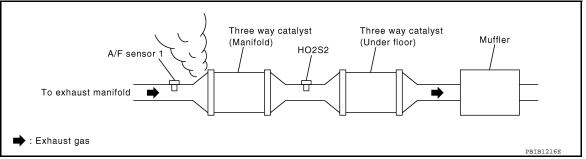
Is 1st trip DTC detected?

YES >> Proceed to <u>EC-250, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Intake air leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

 $\mathbf{3.}$ 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 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	Existed

*1: Except California

*2: For California

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



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< DTC/CIRCUIT DIAGNOSIS >

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	+			
A/F se	ensor 1	_	Continuity	
Connector	Terminal			
F12 ^{*1} F42 ^{*2}	1 2	Ground	Not existed	
	ept California California	à		
	+			
EC	СМ	_	Continuity	
Connector	Terminal			
F24	41 45	Ground	Not existed	
6. Also che	eck harness	for short to p	ower.	
Is the inspec		•		
	•	•	letected parts.	
			2, "Work Proce	dure"
Is the inspec			2, WORTTOCE	uie.
	GO TO 6.	<u>onnar.</u>		
	GO TO 5.			
5. DETECT	MALFUNC	TIONING PA	RT	
Check fuel h	noses and fu	el tubes for d	logging. Refer	to EM-40, "Exploded View".
Is the inspec	ction result n	ormal?		
				nbly". Refer to <u>FL-6. "Exploded View"</u> .
^	•	-	letected parts.	
6. CHECK N	MASS AIR F	LOW SENS	JR	
With CON	ISULT			
	ll removed p MASS AIR F		ATA MONITOR	' mode of "ENGINE" using CONSULT.
3. For spec	cification, ref		5, "Mass Air Flo	
With GST				
	ll removed p nass air flow		al in Service \$0	1 with GST
			5, "Mass Air Flo	
Is the measu	urement valu	ue within the	specification?	
NO >>				or loose connections in the mass air flow sensor circuit or
7. CHECK F	•		<u>5, "DTC Logic"</u> IECTOR	
_				
With CON 1. Start eng	gine.			
				T mode of "ENGINE" using CONSULT. ary engine speed drop.
5. mare 50				ary origino spood drop.

Without CONSULT 1. Let engine idle.

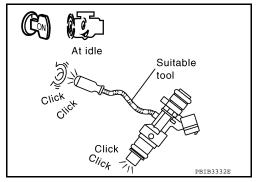
< DTC/CIRCUIT DIAGNOSIS >

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-449</u>, "Component Function Check".



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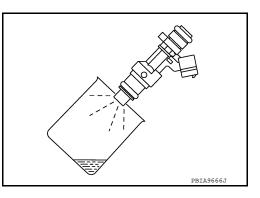
8. CHECK FUEL INJECTOR

- 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.
- Remove fuel tube assembly. Refer to <u>EM-40, "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 >> Check intermittent incident. Refer to <u>GI-43</u>, "Intermittent <u>Incident"</u>.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-40, "Removal and Installation".



P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detecting condition	Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	 Harness or connectors (FTT sensor circuit is open or shorted) FTT sensor Combination meter
P0181	FTT SENSOR (Fuel temperature sensor "A" circuit range/performance)	B)	The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temper- ature sensors when the engine is start- ed with its cold state.	 Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor
DTC CO	NFIRMATION PROCEDU	JRE		
1.INSPE	CTION START			
YES >	<u>ssary to erase permanent D</u> >> GO TO 7. >> GO TO 2. ONDITIONING	<u> </u>		
dure befo 1. Turn 2. Turn 3. Turn	re conducting the next test. ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa	it at l		ways perform the following proce
•	>> GO TO 3. ORM DTC CONFIRMATION		OCEDURE FOR MALFUNCTION	Δ-1
	ignition switch ON and wait			
	k 1st trip DTC. DTC detected?			
YES	>> Proceed to EC-255, "Dia	ignos	is Procedure".	
	>> GO TO 4. K ENGINE COOLANT TEM			
(P)With C			ATORE	
1. Selec	xt "COOLANT TEMP/S" in " k "COOLANT TEMP/S" val		MONITOR" of "ENGINE" using C	CONSULT.
	e procedure "With CONSUL	.T" ab	oove.	
	NT TEMP/S" less than 60°C	<u>(140</u>	<u>°F)?</u>	
-	>> INSPECTION END >> GO TO 5.			
5.PERF	ORM DTC CONFIRMATION		OCEDURE FOR MALFUNCTION	A-2
With C	ONSULT		DCEDURE FOR MALFUNCTION	A-2

1. Cool engine down until "COOLANT TEMP/S" is less than 60°C (140°F).

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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. Wait at least 10 seconds.

3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-255, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to <u>EC-254. "Component Function Check"</u>. **NOTE:**

Use the component function check to check the overall function of the FTT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-255</u>, "Diagnosis Procedure".

7.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure 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, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE B

1. Move the vehicle to a cool place. **NOTE:**

Cool the vehicle in an environment of ambient air temperature between $-10^{\circ}C$ (14°F) and 35°C (95°F). 2. Turn ignition switch OFF and leave the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during this procedure. NOTE:

The vehicle must be cooled with the food open.

3. Start engine and let it idle for 5 minutes or more. CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-255, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

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1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

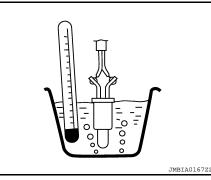
- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Remove fuel level sensor unit. Refer to <u>FL-6, "Removal and Installation"</u>.

P0181 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.

	sensor unit el pump	0			
+	_	Condi	tion	Resistance (kΩ)	
Terr	ninal				
4	5	Temperature [°C	20 (68)	2.3 – 2.7	
4	5	(°F)]	50 (122)	0.79 - 0.90	



Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43</u>, "Intermittent Incident".

NO >> Proceed to EC-255, "Diagnosis Procedure".

Diagnosis Procedure

	Mil 012.00000000000000000000000000000000000
1.INSPECTION START	
Confirm the detected malfunction (A or B). Refer to EC-253, "DTC Logic".	F
Which malfunction is detected?	
A >> GO TO 2. B >> GO TO 6.	G
2. CHECK DTC WITH COMBINATION METER	
Check DTC with combination meter. Refer to <u>MWI-17</u> , "CONSULT Function (METER/M&A)".	Н
Is the inspection result normal?	
YES >> GO TO 3. NO >> Proceed to <u>MWI-59, "Diagnosis Procedure"</u> .	I
3. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER	
 Turn ignition switch OFF. Disconnect fuel level sensor unit and fuel pump harness connector. 	J
3. Turn ignition switch ON.	
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and gro	ound.
- · · · · ·	K
+	
Fuel level sensor unit and fuel pump – Voltage	1
(Approx.)	L

Is the inspection result normal?

YES >> GO TO 5.

Connector

B48

NO >> GO TO 4.

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

Ground

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

Terminal

4

3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

5 V

	+		-	
	Fuel level sensor unit and fuel pump		ECM	
Connector Terminal		Connector	Terminal	
B48	4	E16	125	Existed

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

[MRA8DE]

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< DTC/CIRCUIT DIAGNOSIS >

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

5. CHECK FTT SENSOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM 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		ECM		Continuity
Connector Terminal		Connector	Terminal	
B48	5	E16	124	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace error-detected parts.

6.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-256. "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-6, "Removal and Installation"</u>.

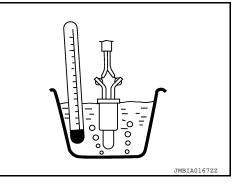
Component Inspection

INFOID:000000008967769

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation".
- 4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

	sensor unit el pump	Condition		Resistance (kΩ)
+	_			
Terr	ninal			
4	5	Temperature	20 (68)	2.3 – 2.7
4	5	[°C (°F)]	50 (122)	0.79 - 0.90



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-6, "Removal and Installation"</u>.

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0182, P0183 FTT SENSOR

DTC Logic

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INFOID:000000008967770

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen t (Trouble diagnosis co		DTC detecting condition		Possible cause
P0182	FTT SEN/CIRCUIT (Fuel temperature se "A" circuit low)	ensor An excess sent to EC	ively low voltage from the se M.	Tameee	or connectors T sensor circuit is open or
P0183	FTT SEN/CIRCUIT (Fuel temperature se "A" circuit high)	ensor An excess sent to EC	ively high voltage from the se M.	nsor is • Fuel tan	, k temperature sensor ation meter
DTC CONF	IRMATION PRO	OCEDURE			
1.PRECON	IDITIONING				
before condu 1. Turn ign 2. Turn ign	firmation Proced ucting the next te ition switch OFF ition switch ON. ition switch OFF	st. and wait at leas	t 10 seconds.	always perform	the following procedure
>> (GO TO 2.				
2.PERFOR	M DTC CONFIRI	MATION PROCI	EDURE		
	ition switch ON a st trip DTC.	ind wait at least	5 seconds.		
YES >> I	<u>C detected?</u> Proceed to <u>EC-28</u> INSPECTION EN		Procedure".		
Diagnosis	Procedure				INFOID:00000008967771
1. снеск с	DTC WITH COME	BINATION METE	ER		
	/I-17, "CONSULT				
	tion result norma	<u>ll?</u>			
-	GO TO 2. Proceed to <u>MWI-</u>	59. "Diagnosis I	Procedure".		
~			T) SENSOR POWER S	SUPPLY	
1. Turn ign 2. Disconn	ition switch OFF. ect fuel level sen		pump harness connec		
	ition switch ON. ne voltage betwee	en fuel level sen	sor unit and fuel pump	narness connect	tor and ground.
	+				
	nsor unit and fuel	_	Voltage (Approx.)		
Connector	Terminal				

Is the inspection result normal?

4

Ground

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

B48

5 V



P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

${\bf 3.}$ CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

+		-	_	
Fuel level ser fuel p		ECM		Continuity
Connector Terminal		Connector	Terminal	
B48	4	E16	125	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR GROUND CIRCUIT

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

+		-	_	
Fuel level sen fuel p		ECM		Continuity
Connector Terminal		Connector	Terminal	
B48	5	E16	124	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-258, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".

Component Inspection

INFOID:000000008967772

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.

2. Disconnect fuel level sensor unit and fuel pump harness connector.

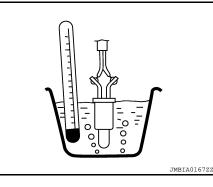
Remove fuel level sensor unit. Refer to <u>FL-6, "Removal and Installation"</u>.

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.

	sensor unit el pump	Condition		Resistance (kΩ)	
+	-				
Terminal					
4	5	Temperature	20 (68)	2.3 – 2.7	
4	5	[°C (°F)]	50 (122)	0.79 – 0.90	



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-6, "Removal and Installation"</u>.



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[MRA8DE]

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-263, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor.	 Harness or connectors (EOT sensor circuit is open or short- ed) EOT sensor
P0196	EOT SENSOR (Engine oil temperature sensor range/performance)	B)	The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is high- er/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure 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 11 V or more at idle.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-1

- 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. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for 5 minutes and 10 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-262, "Diagnosis Procedure".
- NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-2

() With CONSULT

- i. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Check that "COOLANT TEMP/S" indicates above 80°C (176°F).
- If it is above 80°C (176°F), go to the following steps.

EC-260

INFOID:000000008967773

P0196 EOT SENSOR

< DTC/(CIRCUIT DIAGNOSIS >	<u>SENGON</u>	[MRA8DE]
	is below 80°C (176°F), warm engine up until "C	OOLANT TEMP/S" indicates more	than 80°C (176°F).
3. Turr	n perform the following steps. n ignition switch OFF and soak the vehicle in a c n ignition switch ON.	cool place.	A
NO	TE:		EC
	not turn ignition switch OFF until step 8. ect "DATA MONITOR" mode of "ENGINE" using	CONSULT	EC
	eck the following.		
			С
COOLAN	NT TEMP/S	Below 40°C (104°F)	
INT/A TE		Below 40°C (104°F)	D
	ce between "COOLANT TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)	
lf th Iowi NO T			ien perform the fol- $_{ extsf{E}}$
• If 7. Star	o not turn ignition switch OFF. it is supposed to need a long period of time, 't engine and let it idle for 5 minutes. eck 1st trip DTC.	do not deplete the battery.	F
፼With (Follow tl	GST he procedure "With CONSULT" above.		G
<u>ls 1st tri</u> YES NO	<u>p DTC detected?</u> >> Proceed to <u>EC-262, "Diagnosis Procedure"</u> >> GO TO 5.		Н
_	FORM COMPONENT FUNCTION CHECK (FO	R MALFUNCTION B)	
	component function check. Refer to EC-262, "C		
1st trip [component function check to check the overall to DTC might not be confirmed. spection result normal?	unction of the EOT sensor circuit. E	Juring this check, a ປ
YES NO	>> INSPECTION END >> Proceed to EC-262, "Diagnosis Procedure"		K
b. PRE	CONDITIONING		
dure bef	CONFIRMATION PROCEDURE has been previ fore conducting the next test. n ignition switch OFF and wait at least 10 secon		ne following proce- \lfloor
	n ignition switch ON. n ignition switch OFF and wait at least 10 secon	de	M
	G CONDITION:	us.	
 Before 	e performing the following procedure, do no e performing the following procedure, check e performing the following procedure, confir	that fuel level is between 1/4 and	
_	>> GO TO 7.		0
7.PERI	FORM DTC CONFIRMATION PROCEDURE B		
	/e the vehicle to a cool place.		P
2. Turr	IE: If the vehicle in an environment of ambient air ten in ignition switch OFF and leave the vehicle for 1 UTION:		and 35°C (95°F).
Nev NO	ver turn ignition switch ON during this proce	dure.	

3. Start engine and let it idle for 5 minutes or more.

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

CAUTION:

Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Proceed to EC-262, "Diagnosis Procedure". YES

NO >> INSPECTION END

Component Function Check

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOT sensor harness connector.
- Remove EOT sensor. Refer to EM-94, "Exploded View". 3.
- 4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

EOT	sensor			
+	_	Condi	tion	Resistance (k Ω)
Terr	ninal			
		T (100	20 (68)	2.37 – 2.63
1	2	Temperature [°C (°F)]	50 (122)	0.68 – 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Proceed to EC-262, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-262, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- >> Replace EOT sensor. Refer to EM-94, "Exploded View". NO

Component Inspection

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

0	temperature nsor			
+	_	Condit	lion	Resistance ($k\Omega$)
Terr	ninal			
		-	20 (68)	2.37 - 2.63
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

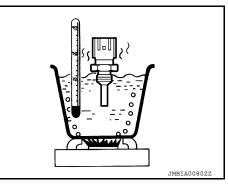
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Is the inspection result normal?

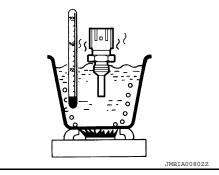
YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-94, "Exploded View".





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INFOID:00000008967775

INFOID-00000008967776

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0197, P0198 EOT SENSOR

DTC Logic

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INFOID:000000008930246

[MRA8DE]

DTC No.	CONSULT scre (Trouble diagnos		DTC detecting condition	Possible cause
P0197	EOT SEN/CIRC (Engine oil tempe sensor circuit low	erature	n excessively low voltage from the engine il temperature sensor is sent to ECM.	Harness or connectors (EOT sensor circuit is open or shorted.)
P0198	EOT SEN/CIRC (Engine oil tempe sensor circuit hig		n excessively high voltage from the engine il temperature sensor is sent to ECM.	Engine oil temperature sensor
	NFIRMATION	PROCEDI	JRE	
	ONDITIONING	ocedure has	s been previously conducted, alw	ays perform the following procedure
before cor	nducting the ne	xt test.	it at least 10 seconds.	, , , , , , , , , , , , , , , , , , ,
2. Turn i	gnition switch C	ON.	it at least 10 seconds.	
	giniori emieri e			
-	> GO TO 2.		N PROCEDURE	
	engine and wait			
2. Check	k 1st trip DTC.			
	DTC detected? > Proceed to E		agnosis Procedure".	
NO >	> INSPECTION	N END		
Diagnos	sis Procedur	е		INFOID:00000008930247
4	✓ ENGINE OIL	TEMPERA	TURE SENSOR POWER SUPPLY	
1.CHEC				
1. Turn i	gnition switch C	DFF.	re (EOT) sensor barness connecto	r
1. Turn i 2. Disco 3. Turn i	nnect engine oi gnition switch C	OFF. il temperatu DN.	re (EOT) sensor harness connector	
1. Turn i 2. Disco 3. Turn i	nnect engine oi gnition switch C	OFF. il temperatu DN.	re (EOT) sensor harness connector	
1. Turn i 2. Disco 3. Turn i 4. Checł	nnect engine oi ignition switch C k the voltage be	OFF. il temperatu DN.	sensor harness connector and gro	
1. Turn i 2. Disco 3. Turn i 4. Checl EC	nnect engine of ignition switch C k the voltage be + DT sensor	OFF. il temperatu DN.		
1. Turn i 2. Disco 3. Turn i 4. Checł EC	nnect engine of ignition switch C k the voltage be + DT sensor	OFF. il temperatu DN.	Sensor harness connector and gro Voltage (Approx.)	
1. Turn i 2. Disco 3. Turn i 4. Check EC Connecto F48	nnect engine of Ignition switch C k the voltage be + DT sensor or Terminal 1	DFF. il temperatu DN. etween EOT – Ground	sensor harness connector and gro	
1. Turn i 2. Disco 3. Turn i 4. Check EC Connecto F48 Is the insp YES >	rinnect engine of gnition switch C k the voltage be + DT sensor or Terminal pection result no >> GO TO 3.	DFF. il temperatu DN. etween EOT – Ground	Sensor harness connector and gro Voltage (Approx.)	
1. Turn i 2. Disco 3. Turn i 4. Check EC Connecto F48 Is the insp YES > NO >	innect engine of ignition switch C k the voltage be + OT sensor or Terminal 1 bection result no >> GO TO 3. >> GO TO 2.	DFF. il temperatu DN. etween EOT – Ground <u>prmal?</u>	Sensor harness connector and gro Voltage (Approx.)	bund.

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

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
EOT	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F48	1	F24	25	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3.CHECK EOT SENSOR GROUND CIRCUIT

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

	+		_	
EOT	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	,
F48	2	F24	26	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-264. "Component Inspection (EOT Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace engine oil temperature sensor. Refer to EM-94, "Exploded View".

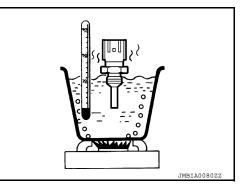
Component Inspection (EOT Sensor)

INFOID:000000008930248

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

0	l tempera- sensor			
+	_	Condition		Resistance
Terr	ninal			
			20 (68)	2.37 - 2.63 kΩ
1	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 oil temperature sensor. Refer to <u>EM-94, "Exploded View"</u>.

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0222, P0223 TP SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit low)	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	TP SEN 1/CIRC-B1 (Throttle/Pedal position sensor/switch "B" circuit high)	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)
DTC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
pefore cond	ducting the next test.	has been previously conducted, alwa	ays perform the following procedure
3. Turn ig FESTING (CONDITION:	l wait at least 10 seconds. g procedure, confirm that battery vol	tage is more than 8 V at idle.
•	-		0
~	> GO TO 2. RM DTC CONFIRMAT	TION PROCEDURE	
. Start ei	ngine and let it idle for		
	1st trip DTC. DTC detected?		
YES >>		"Diagnosis Procedure".	
Diagnosi	s Procedure		INFOID:00000008930250
1.снеск	THROTTLE POSITIC	N SENSOR 1 POWER SUPPLY	
2. Discon	nition switch OFF. nect electric throttle co nition switch ON.	ontrol actuator harness connector.	
A 01 1	AL 1A 1 A		

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

-	+		
	e control actu- tor	_	Voltage (Approx.)
Connector	Terminal		
F7	2	Ground	5.0 V

Is the inspection result normal?

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

Revision: October 2012

INFOID:000000008930249

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P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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

	+		_	
	le control actu- tor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F25	80	Existed

4. Also check harness for short to power.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT

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

	+	-	_	
	e control actu- tor	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F25	78	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

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

	+		_	
	e control actu- tor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F25	79	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-267. "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (TP Sensor)

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-138, "Work Procedure".
- 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 terminals as per the following conditions.

	ECM				
Connec-	+	_	Co	ondition	Voltage
tor	Terr	minal			
	77			Fully released	Less than 4.75 V
F25		78	Accelerator	Fully depressed	More than 0.36 V
r20	79	/0	pedal	Fully released	More than 0.36 V
	19			Fully depressed	Less than 4.75 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

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[MRA8DE]

INFOID:000000008930251

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< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000008930252

[MRA8DE]

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE (Random/Multiple cylinder misfire de- tected)	Multiple cylinder misfire.	Improper spark plugInsufficient compression
P0301	CYL 1 MISFIRE (Cylinder 1 misfire detected)	No. 1 cylinder misfires.	 Incorrect fuel pressure Fuel Injector circuit is open or shorted Fuel injector
P0302	CYL 2 MISFIRE (Cylinder 2 misfire detected)	No. 2 cylinder misfires.	Intake air leakIgnition signal circuit is open or shorted
P0303	CYL 3 MISFIRE (Cylinder 3 misfire detected)	No. 3 cylinder misfires.	Lack of fuel Signal plate A/F sensor 1
P0304	CYL 4 MISFIRE (Cylinder 4 misfire detected)	No. 4 cylinder misfires.	Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

- 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?

 Start engine and drive time. Refer to the table Hold the accelerator The similar conditions ditions should be satisfied 	pedal as steady as possible. to (1st trip) Freeze Frame Data means the vehicle operation that the following con-	
CAUTION: Always drive vehicle driving.	in safe manner according to traffic conditions and obey all traffic laws when	
Engine speed	Engine speed in the freeze frame data \pm 400 rpm	E
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)	
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).	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 var	es according to the engine speed in the freeze frame data.	(
Engine speed	Time	
Around 1,000 rpm	Approximately 10 minutes	ŀ
Around 2,000 rpm	Approximately 5 minutes	
More than 3,000 rpm	Approximately 3.5 minutes	
3. Check 1st trip DTC.		
<u>s 1st trip DTC detected?</u> YES >> Proceed to <u>EC</u> NO >> INSPECTION	- <u>269, "Diagnosis Procedure"</u> . END	,
Diagnosis Procedure	INFOID:00000008930253	,
1. CHECK FOR INTAKE A	IR LEAK AND PCV HOSE	
1. Start engine and run it	at idle speed.	
 Listen for the sound of Check PCV hose conn 		
s intake air leak detected?		_
YES >> Discover air lea	ak location and repair.	Γ
NO >> GO TO 2.		
2.CHECK FOR EXHAUS	T SYSTEM CLOGGING	1
	neck exhaust tube, three way catalyst and muffler for dents.	
s the inspection result nor		(
YES-1 (With CONSULT YES 2 (Without CONSULT		
YES-2 (Without CONSI NO >> Repair or repla		
3. PERFORM POWER BA		F
With CONSULT		
1. Start engine.		

2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.

3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.

P0300, P0301, P0302, P0303, P0304 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 3.

YES

NO

[MRA8DE]

Turn ignition switch OEE and wait at least 10 seconds 1

>> Proceed to EC-269, "Diagnosis Procedure".

EC-269

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 4.

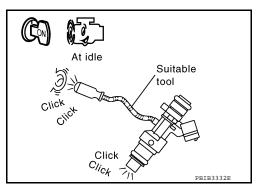
4.CHECK FUNCTION OF FUEL INJECTOR

- 1. Start engine and let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-449, "Diagnosis Procedure".



5. CHECK FUNCTION OF IGNITION COIL-1

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 to release fuel pressure, or fuel pressure applies again during the following procedure.

- 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:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 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?

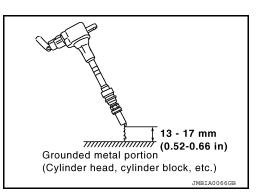
YES >> GO TO 9. NO >> GO TO 6.

O.CHECK FUNCTION OF IGNITION COIL-2

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.



< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

[MRA8DE]

А

YES >> GO TO 7. >> Check ignition coil, power transistor and their circuits. Refer to EC-455, "Diagnosis Procedure". NO 7. CHECK SPARK PLUG EC Check the initial spark plug for fouling, etc. Refer to EM-45, "Removal and Installation". Is the inspection result normal? YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-118, "Spark Plug". NO >> 1. Repair or clean spark plug. D 2. GO TO 8. Ε SEF156 8.CHECK FUNCTION OF IGNITION COIL-3 1. Reconnect the initial spark plugs. Refer to EM-45, "Removal and Installation". Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and 2. the grounded portion. Spark should be generated. Is the inspection result normal? Н YES >> INSPECTION END NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to EM-118, "Spark Plug". 9.CHECK COMPRESSION PRESSURE Check compression pressure. Refer to EM-23, "Inspection". Is the inspection result normal? YES >> GO TO 10. NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. Refer to EM-112. "Description". Κ **10.**CHECK FUEL PRESSURE 1. Install all removed parts. 2. Release fuel pressure to zero. Refer to EC-142, "Work Procedure". L 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-142, "Work Procedure". Is the inspection result normal? YES >> GO TO 12. M NO >> GO TO 11. 11. DETECT MALFUNCTIONING PART Ν Check fuel hoses and fuel tubes for clogging. Is the inspection result normal? YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-6, "Exploded View". NO >> Repair or replace error-detected parts. 12. CHECK IGNITION TIMING Check ignition timing. Refer to EC-479, "Inspection". Is the inspection result normal? YES >> GO TO 13. >> Perform "BASIC INSPECTION". Refer to EC-130, "Work Procedure". NO 13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.

< DTC/CIRCUIT DIAGNOSIS >

3. Disconnect ECM harness connector.

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

	+		_	
A/F se	sensor 1 ECM Co		ECM	
Connector	Terminal	Connector	Connector Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	124	45	Existed

*1: Except California

*2: For California

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

	+		
A/F sensor 1		-	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Cround	NOT EXISTED

*1: Except California

*2: For California

	+			
E	СМ	-	Continuity	
Connector	Terminal			
F24	41	Ground	Not existed	
1 24	45	Ground	NOT EXISTED	

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace error-detected parts.

14.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-176, "Component Inspection (A/F Sensor 1 Heater)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace A/F sensor 1. Refer to EM-30, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

()With CONSULT

Check "MASS AIRFLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Specification

: <u>EC-485, "Mass Air Flow</u> <u>Sensor"</u>

With GST Check mass air flow sensor signal in Service \$01 with GST.

Specification

: <u>EC-485, "Mass Air Flow</u> <u>Sensor"</u>

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-185, "DTC Logic"</u>.

EC-272

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
16.CHECK SYMPTOM TABLE	A
Check items on the rough idle symptom in <u>EC-472</u> , "Symptom Table".	
<u>Is the inspection result normal?</u> YES >> GO TO 17.	EC
NO >> Repair or replace error-detected parts.	
17.ERASE THE 1ST TRIP DTC	C
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to $\underline{\text{EC-55.}}$ tion".	
>> GO TO 18.	D
18. CHECK INTERMITTENT INCIDENT	-
Perform <u>GI-43, "Intermittent Incident"</u> .	E
	-
>> INSPECTION END	F
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< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328 KS

DTC Logic

INFOID:000000008930254

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0327	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit low bank 1)	An excessively low voltage from the knock sensor is sent to ECM.	Harness or connectors (Knock sensor circuit is open or short-
P0328	KNOCK SEN/CIRC-B1 (Knock sensor 1 circuit high bank 1)	An excessively high voltage from the knock sensor is sent to ECM.	ed.) • Knock sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-274, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

CHECK KNOCK SENSOR GROUND CIRCUIT

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

	+		_	
Knock	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F8	2	F24	8	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT

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

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

	+	-	_					
Knoo	k sensor	EC	CM	Continuity				
Connector	Termi	nal Connector	Terminal					
F8	1	F24	4	Existed				
. Also cl	neck harr	ness for short to g	round and to p	ower.				
-		ult normal?						
	> GO TO > Renair (3. open circuit or sh	ort to around o	r short to now	r in harness	s or conner	tors	
	-	SENSOR						
		r. Refer to EC-27	5. "Component	Inspection (S)".			
		sult normal?						
		ntermittent incide						
	•	e knock sensor. R	tefer to <u>EM-94</u> ,	"Exploded V	<u>.</u> .			
compon	ent Ins	pection (KS)					INFOID:0	000000008930256
.CHECK	KNOCK	SENSOR						
. Turn iç	nition sw	ritch OFF.						
. Discor	nect kno	ck sensor harnes						
		ce between knock		als as per the	following.			
NOTE	:	to use an ohmn			-) MΩ.		
NOTE It is ne	ecessary				-) ΜΩ.		
NOTE It is ne	ecessary	to use an ohmn	neter which ca		-) ΜΩ.		
NOTE It is ne Knock se	ecessary		neter which ca	an measure i	-) ΜΩ.		
NOTE It is ne	ensor 	to use an ohmn	neter which ca	an measure i Resistance	-) ΜΩ.		
NOTE It is ne Knock se + Termir 1 AUTION:	ecessary ensor als 	to use an ohmn Condit Temperature °C (°F)	ion 20 (68)	Resistance (Approx.) 532 - 588 k	ore than 10 			
NOTE It is ne Knock se + Termin 1 AUTION: o not use	ensor als 2 ensor als 2	to use an ohmn Condit Temperature °C (°F) ock sensors that	ion 20 (68)	Resistance (Approx.) 532 - 588 k	ore than 10 		e only new	ones.
Knock se Knock se + Termir 1 SAUTION: bo not use s the inspe	ecessary ensor als 2 e any kn ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal?	ion 20 (68)	Resistance (Approx.) 532 - 588 k	ore than 10 		e only new	ones.
NOTE It is ne Knock se + Termir 1 AUTION: o not use the inspe YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) ock sensors that	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
NOTE It is ne Knock se + Termir 1 AUTION: o not use the inspe YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
NOTE It is ne Knock se + Termir 1 AUTION: o not use the inspe YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.
Knock set + Termin 1 CO not use the inspective YES >>	ecessary ensor als 2 e any know ection res	to use an ohmn Condit Temperature °C (°F) Ock sensors that sult normal? CTION END	ion 20 (68) t have been de	Resistance (Approx.) 532 - 588 kc	ore than 10 vsically dam		e only new	ones.

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

P0335 CKP SENSOR (POS)

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-352. "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT (Crankshaft position sensor "A" circuit)	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning. 	 Harness or connectors [Crankshaft position sensor (POS) cir- cuit is open or shorted.] Crankshaft position sensor (POS) Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

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

>> GO TO 2.

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 >> Proceed to EC-276, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930258

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY

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 sen	sor (POS)	_	Voltage (Approx.)
Connector	Terminal		())
F22	3	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:00000008930257

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

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

+				
CKP sen	sor (POS)	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	3	F25	72	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3.CHECK CKP SENSOR (POS) GROUND CIRCUIT

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

	+				
	CKP sen	sor (POS)	ECM		Continuity
_	Connector	Terminal	Connector	Terminal	
	F22	2	F25	70	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT

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

+			_	
CKP sen	sor (POS)	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F22	1	F25	71	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

 $\mathbf{5.}$ CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-278, "Component Inspection [CKP Sensor (POS)]"</u>. Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-33</u>, "Exploded View".

6.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-33, "Exploded View".

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P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace the signal plate. Refer to <u>EM-90</u>, "<u>Exploded View</u>" (M/T) or <u>EM-92</u>, "<u>Exploded View</u>" (CVT).

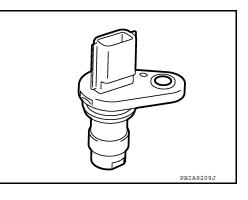
Component Inspection [CKP Sensor (POS)]

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-1

- 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). Refer to <u>EM-</u> <u>33. "Exploded View"</u>.



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-2

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

	aft position r (POS)	Condition		Resistance
+	_			
Terminal	(Polarity)			
1	2			
I	3	Temperature °C (°F) 25 (7		Except 0 or $\infty\Omega$
2	3			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS). Refer to EM-33, "Exploded View".

INFOID:000000008930259

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

DTC Logic

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EC

INFOID:000000008930260

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 (Camshaft position sen- sor "A" circuit bank 1)	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (Camshaft position sensor circuit is open or shorted) Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 2 circuit
	NFIRMATION PROC	EDURE	
.PRECO	ONDITIONING		
	onfirmation Procedure inducting the next test.	has been previously conducted, alwa	ays perform the following procedure
. Turn i		l wait at least 10 seconds.	
3. Turn i	gnition switch OFF and	l wait at least 10 seconds.	
	CONDITION: erforming the following	g procedure, confirm that battery vo	Itage is more than 10.5 V with igni-
ion swite			-
>	> GO TO 2.		
2.PERFC	ORM DTC CONFIRMA	TION PROCEDURE-1	
	engine and let it idle for		
	(1st trip DTC.	k engine for at least 2 seconds.	
•	DTC detected?		
	Proceed to <u>EC-279</u> , > GO TO 3.	"Diagnosis Procedure".	
. PERFC	ORM DTC CONFIRMA	TION PROCEDURE-2	
		more than 800 rpm for at least 5 second	ds.
	< 1st trip DTC. DTC detected?		
YES >	> Proceed to EC-279,	"Diagnosis Procedure".	
	> INSPECTION END		
Jiagnos	is Procedure		INFOID:00000008930261
.CHEC	K STARTING SYSTEM		
-	on switch to START po		
	engine turn over? Does -> GO TO 2.	s the starter motor operate?	
		m. Refer to <u>STR-20, "Work Flow (With G</u> <u>NI)"</u> .	R8-1200 NI)" or <u>STR-23, "Work Flow</u>

 $^{2. {\}sf CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY}$

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.

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

	+			
CMP sense	or (PHASE)	_	Voltage (Approx.)	
Connector	Terminal		() I I -)	
F39	1	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

+				
CMP sense	or (PHASE)	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F39	2	F24	30	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

+		-		
CMP sense	or (PHASE)	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F39	3	F24	31	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-281, "Component Inspection [CMP Sensor (PHASE)]".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-60, "Removal and Installation".

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

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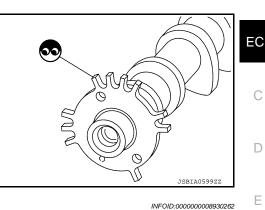
7.CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent</u> <u>Incident"</u>.
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-60, "Removal and Installation"</u>.



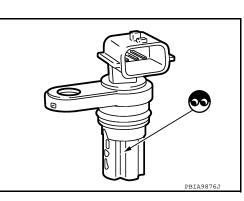
Component Inspection [CMP Sensor (PHASE)]

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace camshaft position sensor (PHASE). Refer to EM-60. "Removal and Installation".



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

	ft position PHASE)	Condition		Resistance
+	_	Condition	Condition	
Terminals (Polarity)				
1	2		25 (77)	
I	3	Temperature °C (°F)		Except 0 or ∞ Ω
2	3			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to EM-60, "Removal and Installation".

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< 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 air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold bank 1)	 Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.

Will CONSULT be used?

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

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 8. Check that "COOLANT TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLANT TEMP/S" indication reaches to 70°C (158°F).
- 9. Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode of "ENGINE" using CON-SULT.

EC-282

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H02S2

(rear)

SEF484YE

TWC (Manifold

three way catalyst)

ECM

A/F

1

sensor 1

: Exhaust gas

		P0420 I	HREE WAY CATA	LISTFUNCTION	
DTC/CIRC		NOSIS >			[MRA8DE]
		,000 to 3,00	00 rpm and hold it for 3 c	onsecutive minutes then releas	e the accelerator
	ompletely. he indication	of "CATAL	YST".		
/hich is dis	<u>played on C</u>	ONSULT so	creen?		
CMPLT>>					
NCMP >>			N PROCEDURE-2		
			IN PROCEDURE-2		
Rev eng	econds at id jine up to 2,0 approximat	000 to 3,000		"INCMP" of "CATALYST" chang	es to "CMPLT" (It
	lication char	nge to "CMF	P <u>LT"?</u>		
	GO TO 5. GO TO 4.				
-			N PROCEDURE AGAIN		
			less than 70°C (158°F).		
			edure again.		
		-			
	GO TO 2.				
.PERFOR			N PROCEDURE-3		
neck 1st tr	•				
	C detected				
	INSPECTIO		agnosis Procedure".		
-			CTION CHECK		
erform con	nponent fund	ction check.	Refer to EC-283, "Comp	onent Function Check".	
IOTE:					ifald) During this
	trip DTC mi			of the three way catalyst (man	irola). During this
-	tion result n	•			
YES >>	INSPECTIO	N END			
			agnosis Procedure".		
ompone	nt Functio	on Check	,		INFOID:000000008930264
.PERFOR		NENT FUNC	CTION CHECK		
Without C					
. Start en	gine and wa		he normal operating temp	perature.	
			ait at least 10 seconds.	00 and 4,000 rpm for at least 1	minute under no
load.	engine and	veeh nie ei	igine speed between 3,3	oo anu 4,000 ipin ioi al least i	
Let engi	ne idle for 1	minute.			
	ngine hood. he voltage b	etween ECI	M harness connector term	ninals as per the following condi	ition.
2		200			
	ECM				
Connector	+	-	Condition	Voltage (V)	
Connector	Terr	minal			
F24	22	23	Keeping engine speed at 2500 rpm constant under no	The voltage fluctuation cy- cle takes more than 5 sec- onds.	
			load	• 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3$	

Is the inspection result normal?



• 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3$

→ 0.6 - 1.0

load

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END NO >> Proceed to <u>EC-284, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1.CHECK EXHAUST SYSTEM

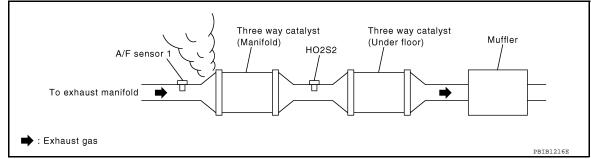
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.

NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace error-detected parts.
- NO >> GO TO 4.

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items.

- Ignition timing (Refer to <u>EC-479, "Inspection"</u>.)
- Idle speed (Refer to <u>EC-478, "Inspection"</u>.)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform "BASIC INSPECTION". Refer to EC-130, "Work Procedure".

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-449. "Component Function Check".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-449</u>, "Diagnosis Procedure".

 $\mathbf{6}$. CHECK FUNCTION OF IGNITION COIL-1

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 to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.



INFOID:000000008930265

< DTC/CIRCUIT DIAGNOSIS >

- 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:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 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 >> GO TO 10. NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-2

- 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?

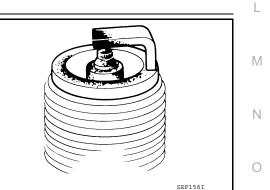
YES >> GO TO 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-455</u>, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to <u>EM-13, "Inspec-</u> tion". Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118</u>, "Spark Plug".
- NO >> 1. Repair or clean spark plug. Refer to <u>EM-45.</u> <u>"Removal and Installation"</u>.
 - 2. GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-3

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

13 - 17 mm

(0.52-0.66 in)

JMBIA0066G

(Cylinder head, cylinder block, etc.)

Grounded metal portion

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark Plug"</u>.

10.CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Remove fuel injector assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 3. Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ÓN.

Does fuel drip from fuel injector?

- YES >> GO TO 11.
- NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to <u>EM-40, "Removal and Installa-</u> tion".

11.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the trouble fixed?

- YES >> INSPECTION END
- NO >> Replace three way catalyst assembly. Refer to EX-5, "Exploded View".

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P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

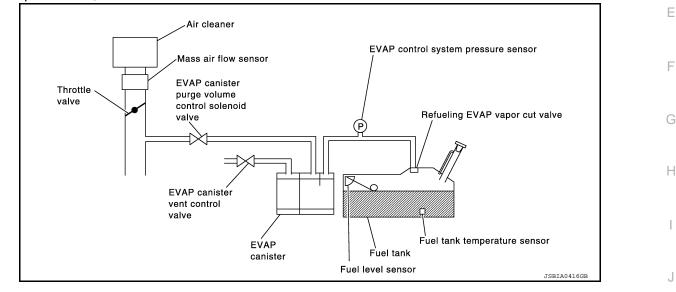
DTC DETECTION LOGIC

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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	K
P0441	EVAP PURG FLOW/MON (Evaporative emission sys- tem incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve 	L M N

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.
- Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 5. INFOID:00000008967777

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< DTC/CIRCUIT DIAGNOSIS >

WITH CONSULT

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

- 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. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLANT TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

NOTÉ:

If "TESTING" does not change for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT screen?

- YES >> GO TO 4.
- NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Proceed to EC-289, "Diagnosis Procedure".

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform component function check. Refer to EC-288. "Component Function Check".

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-289, "Diagnosis Procedure".

Component Function Check

INFOID:000000008967778

1.PERFORM COMPONENT FUNCTION CHECK

- 2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

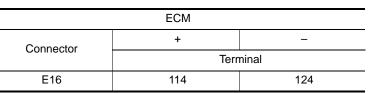


^{1.} Lift up drive wheels.

< DTC/CIRCUIT DIAGNOSIS >

Start engine and wait at least 70 seconds. 4.

Set voltmeter probes to ECM harness connector terminals as per the following. 5.



*1: Except for California

*2: For California

Check EVAP control system pressure sensor value at idle speed and note it. 6.

7. Establish and maintain the following conditions for at least 1 minute.

ON	
ON	
ON	
Approx. 3,000 rpm	
Any position other than P, N or R	
	ON ON Approx. 3,000 rpm

Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (mea-8. sured at step 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed	l to <u>EC-289,</u>	, "Diagnosis Procedure".	
---------------	---------------------	--------------------------	--

Diagnosis Procedure	INFOID:000000008967779
1.CHECK EVAP CANISTER	I
 Turn ignition switch OFF. Check EVAP canister for cracks. 	J
Is the inspection result normal?	
YES-1 >> With CONSULT: GO TO 2. YES-2 >> Without CONSULT: GO TO 3. NO >> Replace EVAP canister. Refer to <u>FL-15, "Removal and Installation"</u> .	K
2.CHECK PURGE FLOW	
 WITH CONSULT Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve vice port. 	
2 Start anging and lot it idlo	IVI IVI

- 2. Start engine and let it idle.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 3.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/V" opening and check vacuum 4. existence.

PURG VOL CONT/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

- Start engine and warm it up to normal operating temperature. 1.
- Stop engine. 2.

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< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

- 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-49</u>, <u>"EVAPORATIVE EMISSION SYSTEM : System Description"</u>.
- 4. Start engine and let it idle. Never depress accelerator pedal even slightly.
- 5. Check vacuum gauge indication before 60 seconds pass after starting engine.

Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

1. Turn ignition switch OFF.

 Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-49, "EVAPORATIVE EMISSION SYSTEM : System Description"</u>.

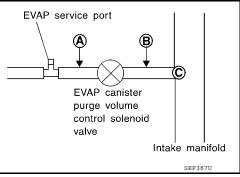
Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair EVAP purge line.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

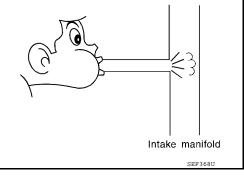
- 1. Disconnect purge hoses connected to EVAP service port (A) and EVAP canister purge volume control solenoid valve (B).
- 2. Blow air into each hose and EVAP purge port C.



3. Check that air flows freely.

Is the inspection result normal?

- YES-1 >> With CONSULT: GO TO 6.
- YES-2 >> Without CONSULT: GO TO 7.
- NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

WITH CONSULT

- 1. Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

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P0441 EVAP CONTROL SYSTEM	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	A
Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-295. "Component Ins</u> <u>Is the inspection result normal?</u> YES >> GO TO 8.	<u>spection"</u> .
NO $>>$ Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Explo</u> 8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
 Disconnect EVAP control system pressure sensor harness connector. Check that water is not inside connectors. Is the inspection result normal? 	C
YES >> GO TO 9. NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15. "Removal and Install</u>	D <mark>ation"</mark> .
9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	E
Refer to <u>EC-312, "DTC Logic"</u> for DTC P0452, <u>EC-315, "DTC Logic"</u> for DTC P0453. <u>Is the inspection result normal?</u> YES >> GO TO 10.	F
YES >> GO TO 10. NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15, "Removal and Install</u> 10. CHECK RUBBER TUBE FOR CLOGGING	1
 Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging. 	
<u>Is the inspection result normal?</u> YES >> GO TO 11. NO >> Clean the rubber tube using an air blower.	F
11. CHECK EVAP CANISTER VENT CONTROL VALVE	1
Check the EVAP canister vent control valve. Refer to EC-302, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 12. NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation</u>	
12. CHECK EVAP PURGE LINE	-
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to <u>EC-481, "Inspection"</u> .	ŀ
Is the inspection result normal?	L
YES >> GO TO 13. NO >> Repair or replace malfunctioning part.	
13. CLEAN EVAP PURGE LINE	Ν
Clean EVAP purge line (pipe and rubber tube) using air blower.	
>> GO TO 14.	1
14.CHECK INTERMITTENT INCIDENT	
Perform <u>GI-43. "Intermittent Incident"</u> .	(
>> INSPECTION END	F

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < DTC/CIRCUIT DIAGNOSIS > [MRA8DE]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000008967780

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0443	PURG VOLUME CONT/V (Evaporative emission system		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 com- pletely closed.	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve
purge control valve circuit)	В	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	 EVAP canister Hoses (Hoses are connected incorrectly or clogged.) 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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:

- 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 so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

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

2.PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Check that the following condition are met. FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
- 4. Start engine and wait at least 60 seconds.
- 5. Check 1st trip DTC.
- Is 1st trip DTC detected?

YES >> Proceed to EC-293, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

With CONSULT

- 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.
- Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 5. Touch "START".
- 6. Start engine and let it idle until "TESTING" on CONSULT 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".

EC-292

OK >>	<u>layed on COI</u> NSPECTION			
NG >> F	Proceed to EC	<u> 293, "Diagnosis F</u>		
4.PERFORM	I DTC CONF	IRMATION PROCI	EDURE A	E
With GST				
	tion switch Ol e voltage bet	N. ween ECM harnes:	s connector and	ground.
	Ū			
	+			
	ECM	_	Voltage	
Connector	Terminal			
E16	125	Ground	3.1 - 4.0 V	
	ine and wait a st trip DTC.	at least 60 seconds	S.	
ls 1st trip DT	<u>C detected?</u>			
	Proceed to <u>EC</u> GO TO 5.	<u> 293, "Diagnosis F</u>	Procedure".	
		IRMATION PROCI		
			EDURE	
With GST	ing and warm	a it up to pormal op	orating tompore	turo.
		n it up to normal op FF and wait at leas		ture.
		idle for at least 20 s		
	st trip DTC.			
s 1st trip DT		_		
	Proceed to <u>EC</u> NSPECTION	<u>2-293, "Diagnosis F</u> END	<u>Procedure"</u> .	
Diagnosis	Procedure	}		INFOID:000000008967781
1.снеске	VAP CANIST	ER PURGE VOLU	ME CONTROL	SOLENOID VALVE POWER SUPPLY
1. Turn igni	tion switch O	FF.		
2. Disconne	ect EVAP can	ister purge volume	control solenoid	l valve harness connector.
	tion switch O		ter nurge volum	e control solenoid valve harness connector and
ground.	e voltage be		ter purge volum	
-				
	+			
	⁻ purge volume enoid valve	-	Voltage	
Connector	Terminal			
	1	Ground	Battery voltage	
F13	ion result nor	mal?		
F13 s the inspect	ion result not			(
s the inspect YES >> 0	GO TO 3. GO TO 2.			
s the inspect YES >> 0 NO >> 0	GO TO 3. GO TO 2.	ER PURGE VOLU	ME CONTROL	SOLENOID VALVE POWER SUPPLY CIRCUIT

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]	
[

	+	-	_	
EVAP canister purge volume control solenoid valve		IPDN	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	•
F13	1	E45	25	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

 ${\bf 3.}$ Check evap canister purge volume control solenoid valve ground circuit

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

	+		_	
EVAP canister purge volume control solenoid valve		E	СМ	Continuity
Connector	Terminal	Connector Terminal		
F13	2	F24 17		Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

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.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15</u>, "<u>Removal and Installation</u>".

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-295. "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15. "Removal and Installation"</u>.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

P0443 EVAP CANISTER PURGE	VOLUME CONTROL SOLENOID VALVE
DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]

< D Check the EVAP canister purge volume control solenoid valve. Refer to EC-295, "Component Inspection". А Is the inspection result normal? YES >> GO TO 8. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View". EC 8.CHECK RUBBER TUBE FOR CLOGGING Disconnect rubber tube connected to EVAP canister vent control valve. 1 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. D 9. CHECK EVAP CANISTER VENT CONTROL VALVE Check the EVAP canister vent control valve. Refer to EC-302. "Component Inspection". Е Is the inspection result normal? YES >> GO TO 10. NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation". F 10.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. 2. Check if water will drain from EVAP canister. Does water drain from the EVAP canister? EVAP canister YES >> GO TO 11. Н NO >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

11.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pr attached.	essure sensor	Κ
The weight should be less than 2.1 kg (4.6 lb).		
Is the inspection result normal?		
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u> . NO >> GO TO 12.		
12. DETECT MALFUNCTIONING PART		M
Check the following.EVAP canister for damageEVAP hose between EVAP canister and vehicle frame for clogging or poor connection		Ν
>> Repair hose or replace EVAP canister. Refer to <u>FL-15, "Removal and Installation"</u> . Component Inspection	INFOID:000000008967782	0
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE		Ρ

- 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 of "ENGINE" using CONSULT.

ÈVAP canister vent

PBIB1213E

control valve

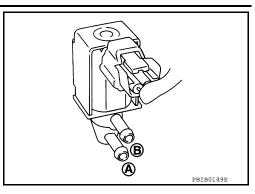
Water-

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

6. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

- Turn ignition switch OFF. Ĩ.
- 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 as per 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. Refer to EM-27, "Exploded View".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000008930266

[MRA8DE]

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge vol- ume control solenoid valve.	 Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or short- ed.) EVAP canister purge volume control solenoid valve
P0445	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit short- ed)	An excessively high voltage signal is sent to ECM through the valve	 Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) EVAP canister purge volume control solenoid valve
	FIRMATION PROCEDU	RE	

1.CONDITIONING

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

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

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 Κ Start engine and let it idle for at least 13 seconds. 1. 2. Check 1st trip DTC. Is 1st trip DTC detected? L YES >> Proceed to EC-297, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

M INFOID:00000008930267

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1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON. 3.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	+		
	ter purge vol- solenoid valve	_	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?



P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

NO >> GO TO 2.

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

	+		_	
	ter purge vol- solenoid valve	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	
F13	1	E45	25	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES-1 (With CONSULT)>>GO TO 4.

YES-2 (Without CONSULT)>>GO TO 5.

NO >> Repair or replace error-detected parts.

${f 3.}$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

	+		_	
	ter purge vol- solenoid valve	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F13	2	F24	17	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 (())With CONSULT)>>GO TO 4.

YES-2 (Without CONSULT)>>GO TO 5.

NO >> Repair or replace error-detected parts.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

()With CONSULT

- T. Reconnect all harness connectors disconnected.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-299</u>, "Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)

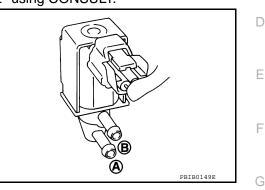
INFOID:00000008930268 A

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- 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 of "ENGINE" using CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

- 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.
- Check air passage continuity of EVAP canister purge volume control solenoid valve as per 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. Refer to <u>EM-27, "Exploded View"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000008967783

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE	An improper voltage signal is sent to	 Harness or connectors
	(Evaporative emission system vent	ECM through EVAP canister vent control	(EVAP canister vent control valve
	control circuit open)	valve.	circuit is open or shorted.) EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-300, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

()With CONSULT

- 1. Turn ignition switch OFF and then turn ON.
- 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Touch "ON/OFF" on CONSULT screen.
- 4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister vent control valve harness connector.
- 3. Turn ignition switch ON.



INFOID:000000008967784

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

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4. Check the voltage between EVAP canister vent control valve harness connector and ground.

	+		
EVAP canister v	ent control valve	_	Voltage
Connector	Terminal		
B17	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

	+	-	-	
	er vent control Ive	IPDM	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	
B17	1	E45	26	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

5.CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT

- 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.

	+		_	
	er vent control Ive	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
B17	2	E16	97	Existed

4. Also check harness for short to power.

4. Also check hamess for short to power.	
Is the inspection result normal?	
YES >> GO TO 6.	Ν
NO >> Repair or replace error-detected parts.	
6.CHECK RUBBER TUBE FOR CLOGGING	
1. Disconnect rubber tube connected to EVAP canister vent control valve.	0
2. Check the rubber tube for clogging.	
Is the inspection result normal?	D

YES >> GO TO 7.

NO >> Clean the rubber tube using an air blower.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-302, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation"

Component Inspection

INFOID:000000008967785

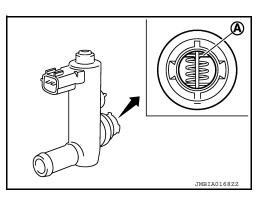
[MRA8DE]

1.CHECK EVAP CANISTER VENT CONTROL VALVE-1

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>15, "Removal and Installation"</u>.
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-2

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

A DELADIOSZ

Operation takes less than 1 second.

Without CONSULT

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. Refer to FL-15, "Removal and Installation".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

(D) With CONSULT

- 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 of "ENGINE" using CONSULT.

< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

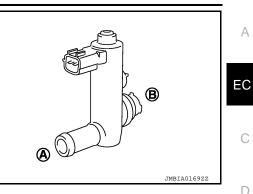
- Clean the air passage [portion (A) to (B)] of EVAP canister vent 1. control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. Make sure new O-ring is installed properly.

Condition	Air passage continuity between \textcircled{B} and \textcircled{B}
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed
Operation takes less than 1 see	cond.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".



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< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000008967786

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (Evaporative emission system vent control circuit shorted)	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

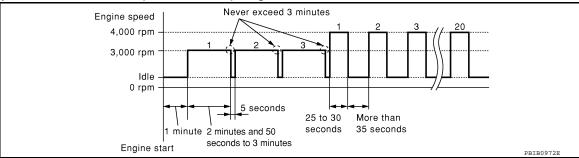
2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 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 of "ENGINE" using CONSULT.
- 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.

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.
- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-305, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Diagnosis Procedure	INFOID:00000008967787
1.CHECK RUBBER TUBE	
 Turn ignition switch OFF. Disconnect rubber tube connected to EVAP canister vent control valve Check the rubber tube for clogging. 	Э.
Is the inspection result normal?	
YES >> GO TO 2. NO >> Clean rubber tube using an air blower.	
2. CHECK EVAP CANISTER VENT CONTROL VALVE	
Check the EVAP canister vent control valve. Refer to EC-306, "Component	t Inspection".
Is the inspection result normal?	
YES >> GO TO 3. NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15</u> , "Re	emoval and Installation".
3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve and EV	AP control system pressure sensor
attached. 2. Check if water will drain from the EVAP canister.	
Does water drain from EVAP canister?	EVAP canister
YES >> GO TO 4. NO >> GO TO 6.	
	Water EVAP canister vent control valve
4.CHECK EVAP CANISTER	PBIB1213E
Weigh the EVAP canister with the EVAP canister vent control valve and EV	AP control system pressure sensor
attached.	
The weight should be less than 2.1 kg (4.6 lb).	
YES >> GO TO 6.	
NO >> GO TO 5.	
5.DETECT MALFUNCTIONING PART	
Check the following. EVAP canister for damage 	
 EVAP hose between EVAP canister and vehicle frame for clogging or portion 	or connection
>> Repair hose or replace EVAP canister. Refer to <u>FL-15, "Remo</u>	val and Installation".
6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECT	
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	
Water should not exist.	
Is the inspection result normal?	
YES >> GO TO 7. NO >> Replace EVAP control system pressure sensor. Refer to FL-15	5 "Removal and Installation"
7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Check the EVAP control system processing concert. Befor to EC 210. "Comp	apont Inspection"

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

EC-305

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15, "Removal and Installation"</u>.

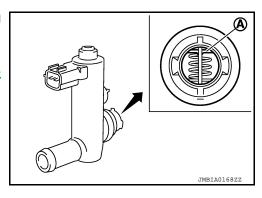
Component Inspection

INFOID:000000008967788

- 1.CHECK EVAP CANISTER VENT CONTROL VALVE-1
- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>15, "Removal and Installation"</u>.
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-2

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

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.

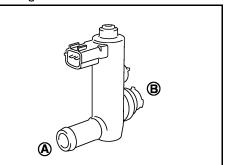
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-15, "Removal and Installation"</u>.

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

(I) With CONSULT

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 of "ENGINE" using CONSULT.



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< DTC/CIRCUIT DIAGNOSIS >

3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

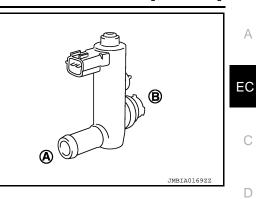
- Clean the air passage [portion (A) to (B)] of EVAP canister vent 1. control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. Make sure new O-ring is installed properly.

Condition	Air passage continuity between \textcircled{A} and \textcircled{B}
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed
Operation takes less than 1 see	cond.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".



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< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000008967789

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0451	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch range/ performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.

(I) With CONSULT>>GO TO 2.

Without CONSULT>>GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and let it idle for least 40 seconds. **NOTE:**

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-309, "Diagnosis Procedure".
- NO >> GO TO 3.
- **3.** PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- 1. Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE".
- 2. Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON.
- 5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE".
- 6. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 4.

- YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.
 - 2. GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

With CONSULT
 Check 1st trip DTC.
 Is 1st trip DTC detected?

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR		
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
YES >> Proceed to <u>EC-309, "Diagnosis Procedure"</u> . NO >> INSPECTION END		
5.PERFORM DTC CONFIRMATION PROCEDURE-4		А
 With GST Start engine and let it idle for least 40 seconds. 	8	EC
NOTE:		
Do not depress accelerator pedal even slightly.2. Check 1st trip DTC.		C
Is 1st trip DTC detected?		0
YES >> Proceed to EC-309, "Diagnosis Procedure".		
NO >> GO TO 6.		D
6. PERFORM DTC CONFIRMATION PROCEDURE-5		
With GST		Е
 Let it idle for at least 2 hours. Turn ignition switch OFF and wait at least 90 minutes. 		
NOTE:		_
Never turn ignition switch ON during 90 minutes.		F
 Turn ignition switch ON. Check 1st trip DTC. 		
Is 1st trip DTC detected?		G
YES >> Proceed to EC-309, "Diagnosis Procedure".		
NO >> INSPECTION END		Н
Diagnosis Procedure	NFOID:000000008967790	
1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER		I
1. Turn ignition switch OFF.		1
 Disconnect EVAP control system pressure sensor harness connector. Check sensor harness connector for water. 		
		J
Water should not exist.		
Is the inspection result normal?		Κ
YES >> GO TO 2. NO >> Repair or replace harness connector.		
2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY		I
1. Turn ignition switch ON.		
 Check the voltage between EVAP control system pressure sensor harness connector and gr 	ound.	
		M
+		
EVAP control system pressure sen-		Ν
Sor (Approx.)		
B47 3 Ground 5 V		
Is the inspection result normal?		0
YES >> GO TO 4.		
NO >> GO TO 3.		Ρ
3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT		
1. Turn ignition switch OFF.		
 Disconnect ECM harness connector. Check the continuity between EVAP control system pressure sensor harness connector a 	nd ECM har-	
ness connector.	-	

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
	l system pres- sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
B47	3	E16	113	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

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.

	+		_	
	l system pres- sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
B47	1	E16	124	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	+	_		
	l system pres- sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
B47	2	E16	114	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

 $\mathbf{6}.$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to <u>EC-310, "Component Inspection"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation".

Component Inspection

INFOID:000000008967791

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.

^{1.} Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

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 A following conditions.

Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage	
	Term	ninal			
E16	114	124	Not applied	0.5 - 4.6 V	
EIO	114	124	-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value	

• 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 cor	ntrol system pressure	sensor. Refer to FL-15,	"Removal and Installation".
----	---------------------	-----------------------	-------------------------	-----------------------------

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< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:00000008967792

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch low)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 3.
- 4. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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 terminals as per the following.

Connector	+	-	Voltage
Connector	Terminal		
E16	114	124	Less than 4.2 V

- Make sure that the voltage is less than 4.2 V. 3.
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- 5. Start engine and wait at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-312, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008967793

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- 1. Turn ignition switch OFF.
- Disconnect EVAP control system pressure sensor harness connector. 2. 3.
 - Check sensor harness connector for water.

EC-312

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Water s	hould no	t exist.				A
s the inspection	n result no	ormal?				
YES >> GO						
· ·		lace harne				E
CHECK EVA	AP CONTE	ROL SYST	EM PRES	SURE SENSO	R POWER SUPPLY	
. Turn ignitio			P control	system pressu	re sensor harness connector and ground.	(
	+				-	[
EVAP control syst	tem pressure or	e sen-	_	Voltage (Approx.)		
Connector	Termin	al				
B47	3	(Ground	5 V	-	
NO >> GO) TO 4.) TO 3.				-	
CHECK EVA	AP CONTR	ROL SYST	EM PRES	SURE SENSO	R POWER SUPPLY CIRCUIT	(
 Turn ignitio Disconnect Check the ness connect 	ECM har	ness conne		trol system pre	essure sensor harness connector and ECM ha	ar-
+			-		-	
+ EVAP control sys sure sens	-	E	_ CM	Continuity	_	
EVAP control sys sure sens	-	E	CM Termina		_	
EVAP control sys sure sens Connector B47	sor Terminal 3	Connector E16	Termina 113	I Existed	-	
EVAP control sys sure sens Connector B47 Also check the inspection YES NO >> Rej	sor Terminal 3 harness f n result no rform the t pair or rep	Connector E16 or short to ormal? rouble diag	Termina 113 ground an nosis for p detected p	d to power.	- - - ircuit. R GROUND CIRCUIT	
EVAP control sys sure sens Connector B47 Also check the inspection YES >> Per NO >> Rep CHECK EVA Turn ignitio Disconnect Check the ness conne	Terminal 3 harness for n result no form the t pair or rep AP CONTF n switch C ECM har continuity	Connector E16 or short to ormal? crouble diag blace error- ROL SYST OFF. ness conne	Termina 113 ground an nosis for p detected p EM PRES	d to power.		ar-
EVAP control sys sure sens Connector B47 Also check the inspection YES >> Per NO >> Re CHECK EVA Turn ignitio Disconnect Check the ness conne	asor Terminal 3 harness fr n result no form the t pair or rep AP CONTF n switch C ECM harn continuity ector.	Connector E16 or short to ormal? crouble diag blace error- ROL SYST OFF. ness conne	Termina 113 ground an nosis for p detected p EM PRES	d to power.	R GROUND CIRCUIT	ar-
EVAP control sys sure sens Connector B47 . Also check the inspection YES >> Per NO >> Rep .CHECK EVA . Turn ignitio . Disconnect . Check the ness conne + EVAP control sys sure sens	sor Terminal 3 harness f n result no rform the t pair or rep AP CONTF n switch C t ECM harn continuity ector.	Connector E16 or short to ormal? crouble diag blace error- ROL SYSTI OFF. ness conne between f	Termina 113 ground an posis for p detected p EM PRES ector. EVAP cont - CM	I Existed d to power. Dower supply carts SURE SENSO trol system pre	R GROUND CIRCUIT	ar-
EVAP control sys sure sens Connector B47 Also check the inspection YES >> Per NO >> Rep CHECK EVA Turn ignitio Disconnect Check the ness connect + EVAP control sys sure sens Connector	sor Terminal 3 harness fr n result no form the t pair or rep AP CONTF n switch C t ECM harn continuity ector.	Connector E16 or short to <u>ormal?</u> rrouble diag lace error- ROL SYST DFF. ness conne between I E Connector	Termina 113 ground an nosis for p detected p EM PRES ector. EVAP cont - CM Termina	I Existed d to power. Dower supply clarts SURE SENSO trol system pre	R GROUND CIRCUIT	ar-
EVAP control sys sure sens Connector B47 Also check the inspection YES YES O YES CHECK EVA Turn ignition Disconnect Check the ness connect + EVAP control sys sure sens Connector B47	sor Terminal 3 harness fron result no rform the t pair or rep AP CONTF n switch C t ECM hard continuity ector.	Connector E16 or short to <u>ormal?</u> crouble diag blace error- ROL SYST OFF. ness conne between B	Termina 113 ground an nosis for p detected p EM PRES ector. EVAP cont - CM Termina 124	I Existed d to power. Dower supply carts SURE SENSO trol system pre	R GROUND CIRCUIT	ar-
EVAP control sys sure sens Connector B47 Also check the inspection YES YES O YES CHECK EVA Turn ignition Disconnect Check the ness connect + EVAP control sys sure sens Connector B47 Also check	sor Terminal 3 harness fr n result no form the t pair or rep AP CONTF n switch C t ECM harn continuity ector. stem pres- sor Terminal 1 harness fr	Connector E16 or short to ormal? crouble diag blace error- ROL SYSTI DFF. ness conne between I E Connector E16 or short to	Termina 113 ground an nosis for p detected p EM PRES ector. EVAP cont - CM Termina 124	I Existed d to power. Dower supply clarts SURE SENSO trol system pre	R GROUND CIRCUIT	ar-
EVAP control sys sure sens Connector B47 Also check s the inspection YES YES Also check EVA . CHECK EVA . Turn ignitio Disconnect . Check the ness connect . Also check the ness connect . Connector B47 . Also check S the inspection YES > GC NO >> Report	sor Terminal 3 harness fin result no rform the t pair or rep AP CONTF n switch C ECM harn continuity ector. stem pres- sor Terminal 1 harness fin n result no 0 TO 5. pair or rep	Connector E16 or short to ormal? crouble diag lace error- ROL SYST OFF. ness conne between B E Connector E16 or short to ormal?	Termina 113 ground an posis for p detected p EM PRES ector. EVAP cont CM Termina 124 power.	I Existed d to power. Description cower supply clarts Description SURE SENSO Description trol system press Description Continuity Description I Existed Parts. Description	R GROUND CIRCUIT	ar-

Revision: October 2012

ness connector.

< DTC/CIRCUIT DIAGNOSIS >

	+		_	
	l system pres- sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
B47	2	E16	114	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation".

Component Inspection

INFOID:000000008967794

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		
Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage	
Connector	Terr	ninal			
E16	114	124	Not applied	0.5 - 4.6 V	
L10	114	124	-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. Refer to FL-15, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000008967795

[MRA8DE]

EC

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch high)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) EVAP control system pressure sensor
DTC CO	NFIRMATION PROCEDUR	RE	
1. PREC	ONDITIONING		
before co 1. Turn 2. Turn 3. Turn TESTING	onfirmation Procedure has inducting the next test. Ignition switch OFF and wait Ignition switch ON. Ignition switch OFF and wait CONDITION: Ignorm test at a temperatur	at least 10 seconds. at least 10 seconds.	ays perform the following procedure
· ·	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION	PROCEDURE	
2. Turn 3. Turn 4. Selec 5. Make 6. Start	engine and warm it up to nor ignition switch OFF and wait ignition switch ON. t "DATA MONITOR" mode of sure that "FUEL T/TMP SE" engine and wait at least 20 se	at least 10 seconds. "ENGINE" using CONSULT. indication is more than 0°C (32°F).
7. Chec	k 1st trip DTC. ST		
1. Start	engine and warm it up to nor	mal operating temperature. ess connector terminals as per the	e following.
	ECM		
Connecto	+ –	Voltage	
Connecti	Terminal		
E16	114 124	Less than 4.2 V	
4. Turn 5. Start	sure that the voltage is less gnition switch OFF and wait engine and wait at least 20 so k 1st trip DTC.	at least 10 seconds.	
	DTC detected?		
	 Proceed to <u>EC-315, "Diagnostics</u>" > INSPECTION END 	nosis Procedure".	
Diagnos	sis Procedure		INF0ID:00000008967796
1.снес	K EVAP CONTROL SYSTEM	PRESSURE SENSOR CONNEC	CTOR FOR WATER
1. Turn 2. Disco	gnition switch OFF.	pressure sensor harness connecto	

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Water should not exist.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace harness connector.

2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

	+		
-	tem pressure sen- or	-	Voltage (Approx.)
Connector	Terminal		
B47 3		Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

 ${
m 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 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.

	+			
	l system pres- sensor	ECM		Continuity
Connector Terminal		Connector	Terminal	
B47	3	E16	113	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

- 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.

	+			
	system pres- sensor	ECM		Continuity
Connector Terminal		Connector	Terminal	
B47	1	E16	124	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	F				
EVAP control sure s		EC	М	Continuity	
Connector	Terminal	Connector	Terminal		
B47	2	E16	114	Existed	
		for short to g	round and	to power.	
	tion result n	ormal?			
	GO TO 6. Bonair ar rai	place error-de	stacted par	te	
	RUBBER TU		elecieu pai	15.	
		ube connecte be for cloggin		canister vent control	valve.
	tion result n		9.		
-	GO TO 7.	<u></u>			
			-	lower, repair or repla	ace rubber tube.
CHECK E	EVAP CANIS	STER VENT (CONTROL	VALVE	
efer to EC-	302, "Comp	onent Inspec	tion".		
s the inspec	tion result n	ormal?			
	GO TO 8.				
`	•				5, "Removal and Installation".
D.CHECK E	EVAP CONT	ROL SYSTE	M PRESSU	JRE SENSOR	
-		onent Inspec	<u>tion"</u> .		
•	tion result n	ormal?			
	GO TO 9. Replace EV/	AP control sv	stem nress	ure sensor Refer to	FL-15, "Removal and Installation".
	•	•	•	WITH WATER	
					nd EVAP control system pressure senso
attached					id EVAl control system pressure sense
		rain from the		ster.	
		VAP canister	<u>?</u>		EVAP canister
	GO TO 10. Check intern	nittent incide	nt Referto	GI-43, "Intermittent	
	Incident".				
					Water EVAP canister vent control valve
					PBIB1213E
	_	-		want control value o	nd EVAD control system procesure conce
ttached.	VAF Carlister		AF Carlister	vent control valve a	nd EVAP control system pressure senso
	should be l	ess than 1.9	kg (4.2 lb)		
	tion result n				
	Check intern GO TO 11.	nittent incider	nt. Refer to	GI-43, "Intermittent	Incident".
		CTIONING P/	4K I		
Check the fo	llowing. ster for dam	ane			
			and vehicl	e frame for clogging	or poor connection
	· October 20			FC-317	2013 Sentra NAM

Revision: October 2012

EC-317

2013 Sentra NAM

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

>> Repair hose or replace EVAP canister. Refer to FL-15, "Removal and Installation".

Component Inspection

INFOID:000000008967797

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	+	-	Condition [Applied vacuum kPa (kg/cm ² , psi)]	
Connector	Terminal			
E16	114	124	Not applied	0.5 - 4.6 V
LIU	114	124	-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. Refer to <u>FL-15, "Removal and Installation"</u>.

< DTC/CIRCUIT DIAGNOSIS >

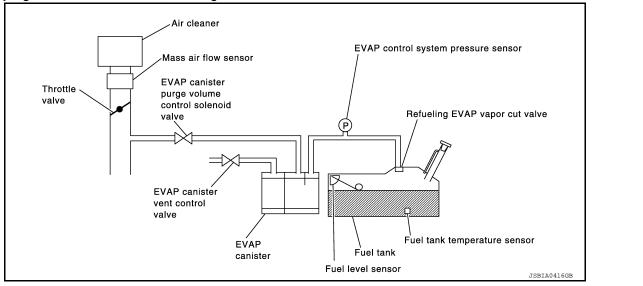
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK [Evaporative emission system leak detected (very small leak)]	 EVAP system has a leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or does not close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister purge volume control valve and the circuit EVAP canister purge volume control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

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< DTC/CIRCUIT DIAGNOSIS >

1.PRECONDITIONING

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

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

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

(I) WITH CONSULT

- 1. Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE:
 - It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".
- 3. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**
 - Never turn ignition switch ON during 90 minutes.
- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-320, "Diagnosis Procedure".
- NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

WITH GST

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-320, "Diagnosis Procedure".
- NO >> INSPECTION END.

Diagnosis Procedure

INFOID:000000008967799

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

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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. 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 reteaching 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-324, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-481, "Inspection".

Is there any leak in EVAP line? YES >> Repair or replace.

NO >> GO TO 6.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

 EVAP canister vent control valve is installed properly. Refer to FL-14, "Exploded View".

 EVAP canister vent control valve. Refer to FL-15, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.

>> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-15, "Removal and NO Installation".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

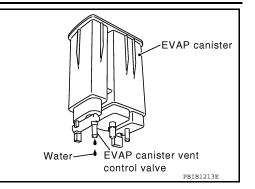
Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor 1. attached.

< DTC/CIRCUIT DIAGNOSIS >

2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 8.
- NO-1 >> With CONSULT: GO TO 10.
- NO-2 >> Without CONSULT: GO TO 11.



[MRA8DE]

8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-15</u>, "<u>Removal and Installation</u>". **The weight should be less than 2.1 kg (4.6 lb).**

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10. YES-2 >> Without CONSULT: GO TO 11. NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-15, "Removal and Installation".

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

() With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

NO >> GO TO 12.

11.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT

- 1. 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 13. NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
YES >> GO TO 13.	
NO >> Repair or reconnect the hose.	A
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-295</u> , "Component Ir	nspection". EC
<u>Is the inspection result normal?</u> YES >> GO TO 14.	
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Expl</u>	oded View".
14. CHECK FUEL TANK TEMPERATURE SENSOR	<u>Caba Hom</u> C
Check the fuel tank temperature sensor. Refer to EC-256, "Component Inspection".	
Is the inspection result normal?	D
YES >> GO TO 15.	
NO >> Replace fuel level sensor unit. Refer to <u>FL-6, "Removal and Installation"</u> .	F
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	E
Check the EVAP control system pressure sensor. Refer to FL-15, "Removal and Installation".	
Is the inspection result normal?	F
YES >> GO TO 16.	
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-15</u> , " <u>Removal and Insta</u>	
16.CHECK EVAP PURGE LINE	G
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper of patents and EVAP canister provide the second state of the second stat	connection.
Refer to <u>EC-49, "EVAPORATIVE EMISSION SYSTEM : System Description"</u> . Is the inspection result normal?	H
YES >> GO TO 17.	
NO >> Repair or reconnect the hose.	
17. CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	J
>> GO TO 18.	
18.CHECK EVAP/ORVR LINE	K
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and	improper con-
nection. For location, refer to EC-49, "EVAPORATIVE EMISSION SYSTEM : System Description	<u>n"</u> .
Is the inspection result normal?	L
YES >> GO TO 19. NO >> Repair or replace hoses and tubes.	
19. CHECK RECIRCULATION LINE	IV
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, lo improper connection.	oseness and
Is the inspection result normal?	Ν
YES >> GO TO 20.	
NO >> Repair or replace hose, tube or fuel filler tube. Refer to <u>FL-10, "Exploded View"</u> .	
20. CHECK REFUELING EVAP VAPOR CUT VALVE	C
Check the refueling EVAP vapor cut valve. Refer to FL-13, "Inspection".	
Is the inspection result normal?	P
YES >> GO TO 21.	
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Removal an</u>	d Installation".
21.CHECK FUEL LEVEL SENSOR	
Check the fuel level sensor. Refer to MWI-60, "Component Inspection".	
Is the inspection result normal?	
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u> .	

Revision: October 2012

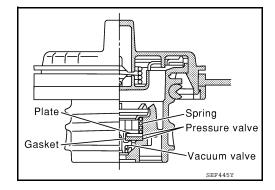
< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace fuel level sensor unit. Refer to <u>FL-6, "Removal and Installation"</u>.

Component Inspection

1.CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



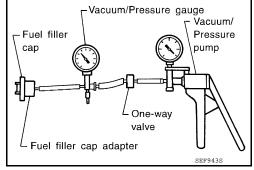
- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. Check valve opening pressure and vacuum.

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

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P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0460 FUEL LEVEL SENSOR

DTC Logic

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-349, "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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	E
P0460	FUEL LEV SEN SLOSH (Fuel Level Sensor "A" Circuit)	Even though the vehicle is parked, a sig- nal being varied is sent from the fuel level sensor to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor 	F
	FIRMATION PROCEDU	RE		Н
before cond 1. Turn ig 2. Turn ig	nfirmation Procedure has ducting the next test. Inition switch OFF and wait Inition switch ON. Inition switch OFF and wait	at least 10 seconds.	vs perform the following procedure	I

>> 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 >> Proceed to <u>EC-325, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK COMBINATION METER FUNCTION

Refer to <u>MWI-17, "CONSULT Function (METER/M&A)"</u>.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Refer to <u>MWI-59</u>, "Diagnosis Procedure".

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0461 FUEL LEVEL SENSOR

DTC Logic

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-349, "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 been driven.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0461	FUEL LEVEL SENSOR (Fuel level sensor "A" 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 distance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-326, "Component Function Check".

Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-327, "Diagnosis Procedure".

Component Function Check

INFOID:000000008967804

1.PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>EC-10,</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?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- 2. Release fuel pressure from fuel line, refer to EC-142. "Work Procedure".
- 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 of "ENGINE" using CONSULT.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.

EC-326

P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
 Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it. Check "FUEL LEVEL SE" output voltage and note it. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). Check "FUEL LEVEL SE" output voltage and note it. 		A
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.		EC
<u>Is the inspection result normal?</u> YES >> INSPECTION END		
NO >> Proceed to <u>EC-327, "Diagnosis Procedure"</u> .		С
3.PERFORM COMPONENT FUNCTION CHECK		C
Without CONSULT		D
NOTE: Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 \Box		D
Imp gal) in advance.	-	_
 Prepare a fuel container and a spare hose. Release fuel pressure from fuel line. Refer to EC-142, "Work Procedure". 		Е
3. Remove the fuel feed hose on the fuel level sensor unit.		
 Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch ON. 		F
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 ℓ (7-7/8 US gal, 6-5/8 Imp gal).		G
9. Confirm that the fuel gauge indication varies.		
Is the inspection result normal?		
YES >> INSPECTION END		Н
NO >> Proceed to <u>EC-327. "Diagnosis Procedure"</u> .		
Diagnosis Procedure	NFOID:000000008967805	I
1. CHECK COMBINATION METER FUNCTION		
Refer to MWI-17, "CONSULT Function (METER/M&A)".		J
Is the inspection result normal?		
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u> .		
NO >> Refer to <u>MWI-59</u> , "Diagnosis Procedure".		Κ
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P0462, P0463 FUEL LEVEL SENSOR

DTC Logic

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-349, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0462	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit low)	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The CAN communication line is open
P0463	FUEL LEVL SEN/CIRC (Fuel level sensor "A" circuit high)	An excessively high voltage from the sen- sor is sent to ECM.	or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-328, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008967807

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-59, "Diagnosis Procedure".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Proceed to EC-328, "Diagnosis Procedure".

P0500 VSS

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

EXCEPT FOR M/T MODELS : 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 <u>EC-349, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	F
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	At 20 km/h (13 MPH), ECM detects the fol- lowing status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN com- munication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	 Harness or connector (CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed sensor 	G H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine.
- 2. Shift the selector lever to D range and wait at least for 2 seconds.
- 3. Drive the vehicle at least 10 seconds at 20 km/h (13 MPH) or more.

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.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-329</u>, "EXCEPT FOR M/T MODELS : Diagnosis Procedure" NO >> INSPECTION END

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

1.CHECK DTC WITH TCM Check DTC with TCM. Refer to <u>TM-107. "CONSULT Function"</u>. Is the inspection result normal?

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P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>TM-125</u>, "<u>DTC Index</u>".

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

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-31, "CONSULT Function (ABS)"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-43</u>, "DTC Index".

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>MWI-26, "DTC Index"</u>.

4.CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to TM-172, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace or replace error-detected parts.

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to BRC-66, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS : Description

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

M/T MODELS : DTC Logic

INFOID:000000008930273

INFOID:000000008930272

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-349, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEHICLE SPEED SEN A (Vehicle speed sensor "A")	The vehicle speed signal sent to ECM is al- most 0 km/h (0 MPH) even when vehicle is being driven.	 Harness or connectors (CAN communication line is open or shorted) Harness or connectors (Vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT? Do you have CONSULT?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2. NO >> GO TO 5.		А
2.PRECONDITIONING		
If DTC Confirmation Procedu before conducting the next test		EC
2. Turn ignition switch ON.	nd wait at least 10 seconds. nd wait at least 10 seconds.	С
>> GO TO 3.		
3. CHECK VEHICLE SPEED	SIGNAL	D
NOTE:		
	ucted with the drive wheels lifted in the shop or by driving the vehicle. If a asier, it is unnecessary to lift the vehicle.	E
2. Read "VHCL SPEED SE" on CONSULT should exce	in "DATA MONITOR" mode of "ENGINE" using CONSULT. The vehicle speed ed 10 km/h (6 mph) when rotating wheels with suitable gear position.	F
<u>Is the inspection result normal</u> YES >> GO TO 4.	<u> </u>	G
NO >> Proceed to EC-33	2, "M/T MODELS : Diagnosis Procedure".	
4.PERFORM DTC CONFIRM		Н
 Select "DATA MONITOR" Warm engine up to norma 	mode of "ENGINE" using CONSULT.	
3. Maintain the following con	ditions for at least 50 consecutive seconds.	
CAUTION: Always drive vehicle at a	i safe speed.	
		J
ENG SPEED	2,100 - 6,000 rpm	0
	More than 70°C (158°F)	
B/FUEL SCHDL	4.0 - 19.0 msec	Κ
Selector lever PW/ST SIGNAL	Except Neutral position OFF	
4. Check 1st trip DTC.		L
<u>Is 1st trip DTC detected?</u>		
	2, "M/T MODELS : Diagnosis Procedure".	
NO >> INSPECTION END		Μ
5.PERFORM COMPONENT	FUNCTION CHECK	
Perform component function cl Use component function chec check, a 1st trip DTC might no	heck. Refer to <u>EC-331, "M/T MODELS : Component Function Check"</u> . k to check the overall function of the vehicle speed signal circuit. During this t be confirmed.	Ν
Is the inspection result normal		0
YES >> INSPECTION END		
	2. "M/T MODELS : Diagnosis Procedure".	P
M/T MODELS : Compor	Nent Function Check	Г
1.PERFORM COMPONENT	FUNCTION CHECK	
With GST1. Lift up drive wheels.		
2. Start engine.		
3. Read vehicle speed signal	In Service \$01 with GST.	

P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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 >> Proceed to EC-332, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:000000008930275

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

Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-31, "CONSULT Function (ABS)"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-43</u>, "DTC Index".

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-17, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>MWI-26, "DTC Index"</u>.

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0506 ISC SYSTEM

Description

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000008967809

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle air control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuatorIntake air leak
DTC CO	NFIRMATION PROCEDURE		
1.PREC	ONDITIONING		
		en previously conducted, always pe	rform the following procedure
	nducting the next test. ignition switch OFF and wait at I	east 10 seconds.	
2. Turn	ignition switch ON.		
If the targ		east 10 seconds. pecified value, perform <u>EC-139, "W</u>	ork Procedure", before con-
	OTC Confirmation Procedure.		
• Before	performing the following proc	edure, confirm that battery voltage	is more than 11 V at idle.
 Always 	perform the test at a tempera	ture above –10°C (14°F).	
;	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION PR	OCEDURE	
	engine and warm it up to norma		
	ignition switch OFF and wait at I engine and run it for at least 1 m		
	k 1st trip DTC.		
	DTC detected?		
	>> Proceed to <u>EC-333, "Diagnos</u> >> INSPECTION END	sis Procedure".	
Diagnos	sis Procedure		INFOID:00000008967810
1. CHEC	K INTAKE AIR LEAK		
	engine and let it idle.	·	_
	n for an intake air leak after the r <u>air leak detected?</u>	nass air flow sensor.	
	Discover oir look location and	Iropair	

YES >> Discover air leak location and repair.

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P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace ECM. Refer to <u>EC-484</u>, "Removal and Installation".

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0507 ISC SYSTEM

Description

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value 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:000000008967812

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle air control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	 Electric throttle control actuator Intake air leak PCV system
DTC CON	FIRMATION PROCEDURE		
1.PRECO	NDITIONING		
before cond 1. Turn ig 2. Turn ig 3. Turn ig If the targeducting D TESTING (• Before p • Always p	ducting the next test. Inition switch OFF and wait at I Inition switch ON. Inition switch OFF and wait at I et idle speed is out of the sp IC Confirmation Procedure. CONDITION:	east 10 seconds. pecified value, perform <u>EC-139, "W</u> edure, confirm that battery voltage	ork Procedure", before con-
~	RM DTC CONFIRMATION PR	OCEDURE	
2.PERFO 1. Start e 2. Turn ig 3. Start e 4. Check Is 1st trip D YES >>		l operating temperature. east 10 seconds. ninute at idle speed.	
2.PERFO 1. Start e 2. Turn ig 3. Start e 4. Check Is 1st trip D YES >> NO >>	RM DTC CONFIRMATION PR ngine and warm it up to norma pition switch OFF and wait at I ngine and run it for at least 1 m 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-335, "Diagnos</u>	l operating temperature. east 10 seconds. ninute at idle speed.	INFOID:00000008967813
2.PERFO 1. Start e 2. Turn ig 3. Start e 4. Check Is 1st trip D YES >> NO >> Diagnosi	RM DTC CONFIRMATION PR ngine and warm it up to norma inition switch OFF and wait at I ngine and run it for at least 1 m 1st trip DTC. <u>DTC detected?</u> > Proceed to <u>EC-335, "Diagnos</u> > INSPECTION END	l operating temperature. east 10 seconds. ninute at idle speed.	INFCID:00000008967813

[MRA8DE]

INFOID:000000008967811

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2. CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- 2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> Replace ECM. Refer to EC-484, "Removal and Installation".

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P050A, P050B, P050E 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 P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	E
P050A	COLD START CONTROL (Cold start idle air control system performance)	ECM does not control engine idle speed properly when engine is started with pre-warming up con- dition.		F
P050B	COLD START CONTROL (Cold start ignition timing perfor- mance)	ECM does not control ignition timing properly when engine is started with pre-warming up con- dition.	 Lack of intake air volume Fuel injection system ECM 	G
P050E	COLD START CONTROL (Cold start engine exhaust tem- perature too low)	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.		Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT.
- 4. Check the indication of "COOLANT TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLANT TEMP/S" between 15°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of "COOLANT TEMP/S" reaches 15°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- 1. Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLANT TEMP/S" between 15°C (59°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

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P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-338. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-139, "Work Procedure".

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
- Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

 $\mathbf{3}$. Check fuel injection system function

Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-245, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Proceed to <u>EC-246, "Diagnosis Procedure"</u> for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-337, "DTC Logic"</u>.

Is the 1st trip DTC P050A, P050B or P050E displayed again?

- YES >> Replace ECM. Refer to EC-484, "Removal and Installation".
- NO >> INSPECTION END

EC-338

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0520 EOP SENSOR

DTC DETECTION LOGIC

DTC Logic

[MRA8DE]

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EC

INFOID:000000008930276

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH (Engine oil pressure sensor/ switch circuit)	 ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V. 	 Harness or connectors (EOP sensor circuit is open or short- ed) EOP sensor Sensor power supply 2 circuit
	NFIRMATION PROCEDU	JRE	
efore con	nducting the next test.	s been previously conducted, always	penorm the following procedure
	gnition switch OFF and wa gnition switch ON.	it at least 10 seconds.	
	gnition switch OFF and wa	it at least 10 seconds.	
>	>> GO TO 2.		
CHEC	K ENGINE OIL LEVEL		
	gnition switch OFF.	11.7 "Increation"	
	k engine oil level. Refer to <u>l</u> ion result normal?		
	> GO TO 3.	efer to <u>LU-6, "Engine Lubrication Syste</u>	m Schomatic"
	ORM DTC CONFIRMATION		an ochematic.
. Start	engine and let it idle for at l		
	k 1st trip DTC. <u>DTC detected?</u>		
YES >	>> Proceed to EC-339, "Dia	gnosis Procedure".	
	> INSPECTION END		
Jagnos	sis Procedure		INFOID:00000008930277
	K EOP SENSOR POWER	SUPPLY CIRCUIT-1	
	gnition switch OFF. nnect EOP sensor harness	connector.	
6. Turn i	gnition switch ON.	sensor harness connector terminals.	
	the voltage between EUF		
	EOP sensor	Voltage	
		, onugo	

Is the inspection result normal?

3

Terminal

1

YES >> GO TO 2. NO

F2

5.0 V

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. CHECK EOP SENSOR SIGNAL CIRCUIT

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

	+		_	
EOP	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F2	2	F24	39	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-341, "Component Inspection (EOP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace EOP sensor. Refer to <u>EM-94</u>, "Exploded View".

4.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-2

Check the voltage between EOP sensor harness connector terminal and ground.

+			
EOP sensor		-	Voltage (Approx.)
Connector	Terminal		
F2	3	Ground	5.0 V

Is the inspection result normal?

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

5. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

6.CHECK EOP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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

	+		_	
EOP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F2	1	F24	38	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	F	_		
EC	CM	_	Continuity	
onnector	Terminal			
F24	12	_		
	16	_		
F25	52	Ground	Existed	
E16	123	-		
	128			
•	tion result n			
			nt. Refer to <u>GI-43, "Intermittent Incident"</u> . etected parts.	
	-	-		
mpone	nt inspec	tion (EOP	Sensor)	INFOID:00000008930278
CHECK E	OP SENSO)R		
Turn ian	ition switch	OFF.		
Disconn	ect EOP se	nsor harness		
Check th	ne resistanc	e between E	OP sensor connector terminals.	
EOP s		"		
+	-	Resistance (k	Ω)	
Term				
	2	4 – 10		
1				
1	3	2 – 8		
1	3 1	4 - 10		
	3 1 3	4 - 10 1 - 3		
	3 1 3 1	4 - 10 1 - 3 2 - 8		
2 -	3 1 3 1 2	4 - 10 1 - 3 2 - 8 1 - 3		
2 3 ne inspec	3 1 3 1 2 etion result n	4 - 10 1 - 3 2 - 8 1 - 3 normal?		
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? DN END	efer to EM-94 "Exploded View"	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? DN END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	ofer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to <u>EM-94, "Exploded View"</u> .	
2 3 ne inspec ES >> I	3 1 3 1 2 tion result n	4 - 10 1 - 3 2 - 8 1 - 3 ormal? N END	efer to EM-94, "Exploded View".	

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:000000008930279

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm ore more.	 Decrease in engine oil pressure Decrease in engine oil level Engine oil condition EOP sensor Engine body

DTC CONFIRMATION PROCEDURE CAUTION:

If "Diagnosis Procedure" is unfinished, be sure to perform Step 3 and 4.

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.

TEST CONDITION:

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

>> GO TO 2.

2. PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

YES \rightarrow GO TO 5. NO \rightarrow GO TO 3. **3.**CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Proceed to EC-343, "Diagnosis Procedure".

4.CHECK ENGINE OIL PRESSURE

With CONSULT

1. Turn ignition switch ON.

2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.

3. Start the engine and check that "EOP SENSOR" changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
	 Engine oil temperature: 80°C (176°F) Selector lever: P or N (CVT), Neutral (M/T) Air conditioner switch: OFF No load 	Engine speed: Idle	1,450 mV or more
EOP SENSOR		Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT

Check engine oil pressure. Refer to <u>LU-7, "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 5.

Revision: October 2012



< DTC/CIRCUIT	DIAGNO	P0524 ENGIN	NE OIL PRES	SSURE	[MRA8DE]	
		343, "Diagnosis Proced	dure".			
_		RMATION PROCEDUR			A	
		it up to normal operatin onditions for about 10 (onds.	EC	
Selector lever		P or N (CVT), Neutral (M/T)	_		_
Engine coolant temp	perature	70°C (158°F) or more			С	
Engine speed		1,000 rpm or more		_		
3. Check 1st trip Is 1st trip DTC de	o DTC. etected?			n be reproduced more easi		
	eed to <u>EC-</u> ECTION E	343, "Diagnosis Proced ND	<u>dure"</u> .		E	
Diagnosis Pro	ocedure				INFOID:00000008930280	
1.CHECK ENGI	NE OIL LE	VEL				
1. Turn ignition					G	
-		Refer to <u>LU-7, "Inspect</u>	<u>ion"</u> .			
Is the inspection I YES >> GO T		<u>181 /</u>			Н	
NO >> GO T	TO 4.				11	
2.CHECK ENGI	NE OIL PF	RESSURE				
	MONITO	R" mode of "ENGINE" ι				
3. Start the engi	ine and ch	eck that "EOP SENSO	R" changes, acco	ording to engine speeds.	J	
				Value		
Monitor item		Condition		(Approx.)	К	
EOP SENSOR	0	il temperature: 80°C (176°F) lever: P or N (CVT), Neutral	Engine speed: Idle	1,450 mV or more		
LOF BENBOIN	· · ·	ioner switch: OFF	Engine speed: 2,000 rpm	2,850 mV or more	L	
Without CONS					M	
Is the inspection i	•	Refer to <u>LU-7, "Inspect</u>	<u>ion"</u> .			
YES >> GO T					NI	
~		. Refer to <u>LU-15, "Rem</u>	oval and Installa	<u>tion"</u> .	Ν	
3.CHECK EOP	SENSOR					
		EC-341, "Component	Inspection (EOF	<u>P Sensor)"</u> .	0	
<u>Is the inspection I</u> YES >> Chec			1.42 "Intermitten	t Incident"		
		ent incident. Refer to <u>G</u> ce error-detected parts.		it incident.	Р	
4.CHECK ENGI	NE OIL LE	AKAGE				
•	-	Refer to <u>LU-7, "Inspection</u>	<u>on"</u> .			
Is the inspection I	result norn	<u>nal?</u>				

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-483, "Inspection"		
2	Exhaust front tube	Visual	No blockingNo abnormal sounds	_
3	Oil pump	LU-16, "Inspection"		
4	PistonPiston pinPiston ring	Piston to piston pin oil clearancePiston ring side clearancePiston ring end gap		EM-112, "Description"
5	Cylinder block	Cylinder block top surface distortionPiston to cylinder bore clearance		EM-103, "Inspection"

>> Repair or replace error-detected parts.

Component Inspection (EOP Sensor)

1.CHECK EOP SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOP sensor harness connector.
- 3. Check the resistance between EOP sensor connector terminals.

EOP :		
+	_	Resistance (k Ω)
Terminal		
1	2	4 – 10
I	3	2 – 8
2	1	4 - 10
2	3	1 – 3
3	1	2 – 8
	2	1 – 3

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to EM-94, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS > P0603 ECM

DTC Logic

EC

INFOID:000000008930282

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP CIRCUIT [Internal control module keep alive memory (KAM) error]	 Malfunction in the internal back up RAM of ECM. Malfunction in the internal EEP-ROM system of ECM. 	ECM power supplyECM
DTC CO	NFIRMATION PROCE	DURE	
1.PREC	ONDITIONING		
		procedure, confirm that battery voltag	e is 11 V or more with ignition
:	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATI	ON PROCEDURE	
 Turn Repeted Turn Check Is 1st trip YES 	ignition switch ON and w ignition switch OFF and w eat step 1 and 2 for 10 tim ignition switch ON. k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-345, "I</u> >> INSPECTION END	vait at least 10 seconds. les.	
	sis Procedure		INFOID:00000008930283
1. CHEC	K ECM POWER SUPPL	AND GROUND CIRCUIT	
Perform t	rouble diagnosis for ECN	I power supply and ground circuit. Refer to	EC-163. "Diagnosis Procedure".
	pection result normal?		
	>> GO TO 2.		
-	>> Repair or replace erro	•	
	pection result normal?	to GI-43, "Intermittent Incident".	
	>> GO TO 3.		
NO	>> Repair or replace erro	•	
3.PERF	ORM DTC CONFIRMATI	ON PROCEDURE	
	ignition switch ON.		
	e DTC. orm DTC confirmation pro	cedure. Refer to EC-345, "DTC Logic".	
	trip DTC P0603 displaye	-	
	>> Replace ECM. Refer t >> INSPECTION END	o EC-484, "Removal and Installation".	

P0604 ECM

DTC Logic

INFOID:000000008930284

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- 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 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

 Turn ignition switch ON (engine stopped) and wait least 20 minutes. CAUTION:

Never start engine during this procedure.

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-346, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930285

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC confirmation procedure. Refer to <u>EC-346</u>, "DTC Logic".

Is the 1st trip DTC P0604 displayed again?

- YES >> Replace ECM. Refer to EC-484, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0605 ECM

DTC Logic

INFOID:000000008930286

[MRA8DE]

DTC DETECTION LOGIC CONSULT screen terms DTC No. DTC detecting condition Possible cause (Trouble diagnosis content) ECM [Internal control module P0605 ECM Malfunction in the internal ROM of ECM. read only memory (ROM) error] DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON (engine stopped) and wait least 20 minutes. **CAUTION:** Never start engine during this procedure. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. Check 1st trip DTC. 4. Is 1st trip DTC detected? YES >> Proceed to EC-347, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000008930287 **1.**PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure. Refer to EC-347, "DTC Logic". Is the 1st trip DTC P0605 displayed again? YES >> Replace ECM. Refer to EC-484, "Removal and Installation". NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS > P0606 ECM

INFOID:000000008930288

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- 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 11 V or more with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON (engine stopped) and wait at least 10 seconds. CAUTION:

Never start engine during this procedure.

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-348, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- 1. Start engine.
- 2. Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
- 3. Let the engine idle and wait at least 10 seconds.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-348</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930289

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC confirmation procedure for 3 times. Refer to EC-348, "DTC Logic".
- Is the 1st trip DTC P0606 displayed again?
- YES >> Replace ECM. Refer to <u>EC-484, "Removal and Installation"</u>.
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0607 ECM

DTC Logic

DTC No.

P0607

1.

2.

3.

INFOID:000000008930290

[MRA8DE]

DTC DETECTION LOGIC CONSULT screen terms DTC detecting condition Possible cause (Trouble diagnosis content) ECM ECM internal communication system is malfunc-(Control module perfor-ECM tioning. mance) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

_	>> GO TO 2.
2.	PERFORM DTC CONFIRMATION PROCEDURE
1.	Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2	Turn ignition switch OFF and wait at least 10 seconds

- 3. Turn ignition switch ON.
- Check 1st trip DTC. 4.

Is 1st trip DTC detected?

YES >> Proceed to EC-349, "Diagnosis Procedure". >> INSPECTION END NO

Diagnosis Procedure

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- Perform DTC confirmation procedure. Refer to EC-349, "DTC Logic". 3.

Is the 1st trip DTC P0607 displayed again?

- >> Replace ECM. Refer to EC-484, "Removal and Installation". YES
- NO >> INSPECTION END

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INFOID:000000008930291

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EC

< DTC/CIRCUIT DIAGNOSIS > P060A ECM

INFOID:000000008930292

INFOID:000000008930293

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	CONTROL MODULE (Internal control module monitoring processor per- formance)	ECM internal monitoring processor is malfunction- ing.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- 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 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 10 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Repeat step 1 and 2 for 5 times.
- 4. Turn ignition switch ON.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-350, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to EC-350, "DTC Logic".
- Is the 1st trip DTC P060A displayed again?
- YES >> Replace ECM. Refer to EC-484, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > **P060B ECM**

DTC Logic

P060B

1.

2.

3.

INFOID:000000008930294

[MRA8DE]

DTC DETECTION LOGIC CONSULT screen terms DTC No. DTC detecting condition Possible cause (Trouble diagnosis content) CONTROL MODULE ECM internal analog/digital conversion processing ECM (Internal control module A/ system is malfunctioning. D processing performance) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:** Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON. >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.

- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Turn ignition switch ON. 3.
- Check 1st trip DTC. 4.

Is 1st trip DTC detected?

YES >> Proceed to EC-351, "Diagnosis Procedure". >> INSPECTION END NO

Diagnosis Procedure

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- Perform DTC confirmation procedure. Refer to EC-351, "DTC Logic". 3.

Is the 1st trip DTC P060B displayed again?

- >> Replace ECM. Refer to EC-484, "Removal and Installation". YES
- NO >> INSPECTION END

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P0643 SENSOR POWER SUPPLY

Description

ECM supplies a voltage of 5.0 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the shorted-circuit sensor.

Sensor power supply 1

- Battery current sensor
- Crankshaft position (CKP) sensor (POS)
- Throttle position (TP) sensor
- Accelerator pedal position (APP) sensor 1

NOTE:

If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Camshaft position (CMP) sensor (PHASE)
- Mass air flow (MAF) sensor
- Engine oil pressure (EOP) sensor
- Exhaust valve timing (EVT) control position sensor
- Accelerator pedal position (APP) sensor 2
- Intake manifold runner control valve position sensor

DTC Logic

INFOID:000000008930297

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0643	SENSOR POWER/CIRC (Sensor reference voltage "A" circuit high)	ECM detects that the voltage of sensor power supply 1 is excessively low or high.	 Harness or connectors (Battery current sensor circuit is shorted.) (CKP sensor circuit is shorted.) (TP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (APP sensor 1 circuit is shorted.) Battery current sensor CKP sensor TP sensor Refrigerant pressure sensor APP sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 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 >> Refer to EC-353, "Diagnosis Procedure".

P0643 SENSOR POWER SUPPLY

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > NO >> INSPECTION END А **Diagnosis** Procedure INEOID-000000008930298 1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT EC Disconnect accelerator pedal position (APP) sensor harness connector. 1. 2. Turn ignition switch ON. Check the voltage between APP sensor harness connector and ground. 3. + Voltage APP sensor D (Approx.) Connector Terminal E12 4 Ground 5.0 V Е Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 2. F 2.CHECK SENSOR POWER SUPPLY CIRCUITS Check harness for short to power and short to ground, between the following terminals. ECM Sensor Connector Terminal Name Connector Terminal Н 72 CKP sensor (POS) F22 3 64 Battery current sensor F54 1 F25 Electric throttle control actu-80 F7 2 ator APP sensor 1 E16 122 E12 4 Is the inspection result normal? YES >> GO TO 3. NO >> Repair short to ground or short to power in harness or connectors. 3. CHECK COMPONENTS Κ Check the following. Sensor Reference EC-374, "Component Inspection Battery current sensor (Battery Current Sensor)" M EC-278, "Component Inspection CKP sensor [CKP Sensor (POS)]"

Refrigerant pressure sensor

Is the inspection result normal?

>> GO TO 4.

Is the inspection result normal?

Revision: October 2012

4.CHECK APP SENSOR

TP sensor

YES

YES

NO

NO

>> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

EC-464, "Diagnosis Procedure"

EC-201, "Component Inspection

(TP Sensor)"

Check APP sensor. Refer to EC-432, "Component Inspection (APP Sensor)".

>> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> Repair or replace malfunctioning component.

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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:000000008930300

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/Neutral switch input circuit)	 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/ neutral position (PNP) switch is not changed in the process of engine starting and driving. 	 Harness or connectors [Transmission range switch circuit is open or shorted. (CVT models)] [Park/neutral position (PNP) switch cir- cuit is open or shorted. (M/T models)] Transmission range switch (CVT mod- els) Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-355. "Component Function Check".

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Proceed to EC-355, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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.

ENG SPEED	1,200 - 6,375 rpm (CVT) 1,600 - 6,375 rpm (M/T)
COOLANT TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.3 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

With GST

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > Follow the procedure "With CONSULT" above. А Is 1st trip DTC detected? YES >> Proceed to EC-355, "Diagnosis Procedure". NO >> INSPECTION END EC Component Function Check INFOID:000000008930301 **1.**CHECK PNP SIGNAL FUNCTION (P)With CONSULT Turn ignition switch ON. 1. 2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N D POSI SW" signal as per the following conditions. Indication Selector lever position Е N or P position (CVT) ON Neutral position (M/T) OFF Except above position F Is the inspection result normal? YES >> GO TO 2. NO >> Proceed to EC-355, "Diagnosis Procedure". 2.PERFORM COMPONENT FUNCTION CHECK 1. Turn ignition switch ON. Н Check the voltage between ECM harness connector and ground as per the following conditions. 2. ECM Voltage + Condition _ (Approx.) Connector Terminal P or N (CVT) Battery voltage Neutral (M/T) E16 117 128 Selector lever Κ Except above 0 V Is the inspection result normal? YES >> INSPECTION END L NO >> Proceed to EC-355, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000008930302 Μ **1.**INSPECTION START Check which type of transmission the vehicle is equipped with. Ν Which type of transmission? CVT models>>GO TO 2. M/T models>>GO TO 6. 2.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY 1. Turn ignition switch OFF. 2. Disconnect transmission range switch harness connector. Ρ 3. Turn ignition switch ON. 4.

P0850 PNP SWITCH

P0850 PNP SWITCH

	+		
Transmissior	range switch	_	Voltage
Connector	Terminal		
F26	7	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. check transmission range switch power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between transmission range switch harness connector and IPDM E/R harness connector.

+			_	
Transmission range switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F26	7	E43	14	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

4.CHECK TRANSMISSION RANGE SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between transmission range switch harness connector and ECM harness connector.

+			_	
Transmission range switch		ECM		Continuity
Connector	Terminal	Connector Terminal		
F26	10	E16	117	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to <u>TM-161, "Component Inspection"</u>.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".
- NO >> Replace transaxle assembly. Refer to <u>TM-272, "Removal and Installation"</u>.

6. Check park/neutral position (pnp) switch power supply

1. Turn ignition switch OFF.

- 2. Disconnect PNP switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between PNP switch harness connector and ground.

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

-	-			
PNP switch		_	Voltage	
Connector	Terminal			
F52	2	Ground	Battery voltag	ge
s the inspec	<u>tion result n</u>	ormal?		
NO >> I		0	•	ver supply circuit.
CHECK F	NP SWITC	H INPUT SIG	GNAL CIRCU	JIT
	ition switch			
		rness conne		man connector and CCM horness connector
 Check th 	ie continuity	between PI	NP SWITCH Ha	rness connector and ECM harness connector.
+	<u>_</u>		_	
PNP s			СМ	Continuity
Connector	Terminal	Connector	Terminal	
F52	3	E16	117	Existed
-				
	tion result n	-	ground and to	o power.
	GO TO 8.	<u>umar</u>		
		olace error-o	letected parts	S.
	NP SWITC			
				NELITRAL DOSITION (DND) SWITCH : Component Income
oneck the P	INP SWIICH.	Relef to <u>Thi</u>	-17, PARK/I	NEUTRAL POSITION (PNP) SWITCH : Component Inspec-
	tion result n	ormal?		
		nittent incide	ent. Refer to	GI-43. "Intermittent Incident".
	Replace PN			GI-43, "Intermittent Incident". , "Removal and Installation".
	Replace PN			

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P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:000000008930303

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1078	EXH TIM SEN/CIRC-B1 (Exhaust valve timing con- trol position sensor circuit bank 1)	An excessively high or low voltage from the sensor is sent to ECM.	 Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted) Accumulation of debris to the signal pick-up portion of the camshaft Exhaust valve timing control position sensor Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-358, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930304

$1. \mathsf{CHECK} \text{ EXHAUST} \text{ VALVE TIMING} (\mathsf{EVT}) \text{ CONTROL POSITION} \text{ SENSOR POWER SUPPLY}$

- 1. Turn ignition switch OFF.
- 2. Disconnect exhaust valve timing (EVT) control position sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVT control position sensor harness connector and ground.

	+	-	Voltage (Approx.)
EVT control p	osition sensor		
Connector	Terminal		X TT - 7
F57	1	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

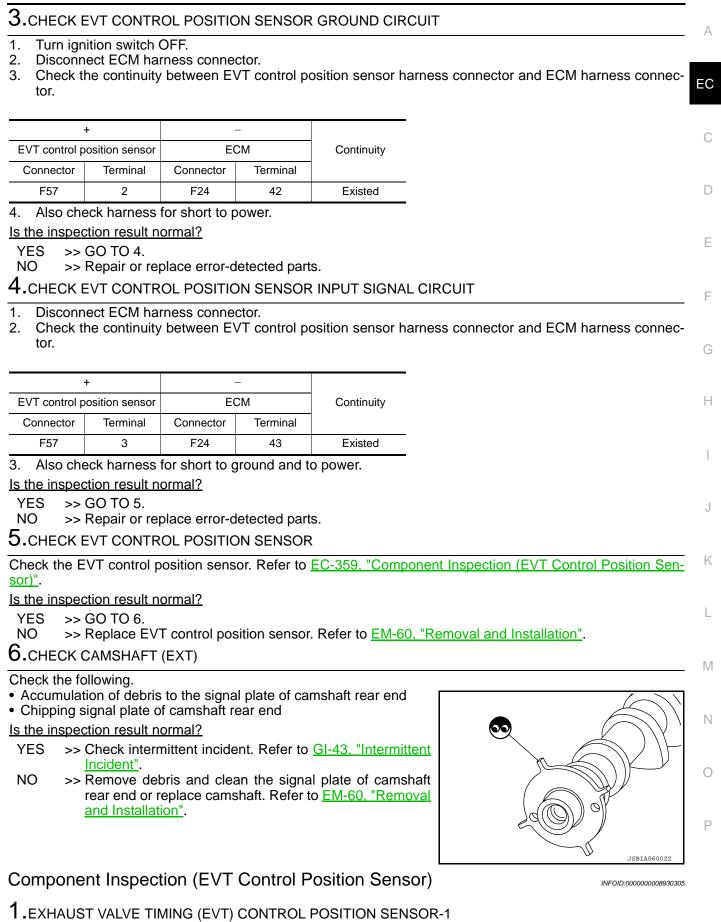
NO >> Repair or replace error-detected parts.



P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



1. Turn ignition switch OFF.

P1078 EVT CONTROL POSITION SENSOR

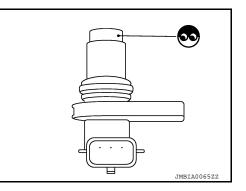
< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect EVT control position sensor harness connector.
- 3. Loosen the fixing bolt of the sensor.
- 4. Remove EVT control position sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace EVT control position sensor. Refer to <u>EM-60.</u> <u>"Removal and Installation"</u>.



$2. {\tt EVT CONTROL POSITION SENSOR-2}$

Check resistance EVT control position sensor terminals as shown below.

EVT control position sensor		Condition		
+	_	Condition		Resistance
Terminal				
1	2			
I	3	Temperature °C (°F)	25 (77)	Except 0 or ∞ Ω
2	3			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVT control position sensor. Refer to EM-60, "Removal and Installation".

P1148 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

P1148 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 is displayed with DTC for A/F sensor 1. When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	D
P1148	CLOSED LOOP-B1 (CLOSED LOOP-B1)	The closed loop control function does not operate even when vehicle is being driven in the specified condition.	 Harness or connectors (A/F sensor 1 circuit is open or shorted.) A/F sensor 1 A/F sensor 1 heater 	E

Diagnosis Procedure

DTC P1148 is displayed with DTC for A/F sensor 1. When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1. Refer to <u>EC-93, "DTC Index"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

P117A AIR FUEL RATIO

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P117A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to <u>EC-93, "DTC Index"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P117A	AIR FUEL RATIO B1 (AIR FUEL RATIO B1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor Intake air leaks Lack of fuel Incorrect PCV hose connection Improper spark plug Insufficient compression The fuel injector circuit is open or shorted ignition coil The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

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.

NOTE:

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

>> GO TO 2.

2. PRECONDITIONING-2

- 1. Turn ignition switch ON.
- 2. Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure".

Will CONSULT be used?

YES >> GO TO 3.

NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

- 1. Turn ignition switch ON.
- 2. Select "COOLANT TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Start engine.
- 4. Make sure that "COOLANT TEMP/S" indicates more than 80°C (176°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

- 1. Select "SYSTEM 1 DIAGNOSIS B B1" and "SYSTEM 1 DIAGNOSIS A B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds. CAUTION:



INFOID:000000008967819

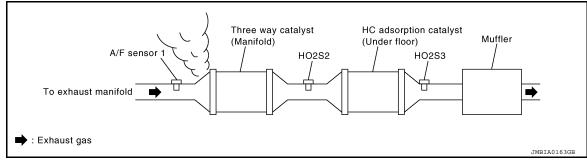
• Always drive vehicle at a safe speed.

			А
ENG SPEED	1,000 – 1,250rpm		
COOLANT TEMP/S	More than 80°C (176°F)		
B/FUEL SCHDL	4 – 8 msec		EC
Selector lever	D position	- -	
SYSTEM 1 DIAGNOSIS B B1	PRSENT	-	С
	oximately 88 km/h (55MPH) allows ea dal as possible during crusing.	sy diagnosis.	D
3. Check "SYSTEM 1 DIAGN <u>Is "CMPLT" displayed?</u> YES >> GO TO 5.	OSIS A B1" indication.		Е
NO >> GO TO 2.			
5. PERFORM DTC CONFIRM	ATION PROCEDURE-3		F
Check 1st trip DTC.			
Is 1st trip DTC detected?			G
YES >> Proceed to EC-363 NO >> INSPECTION END	<u>3, "Diagnosis Procedure"</u> .		0
6.PERFORM DTC CONFIRM	-		
Without CONSULT	ATION PROCEDURE-4		Н
CAUTION: • Always drive vehicle at Engine speed	a safe speed.		J
Calculated load value	26 – 46 %	-	
Selector lever	D position	-	К
	D position		N
Keep the accelerator per Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-363	oximately 88 km/h (55MPH) allows ea dal as possible during crusing. <u>3. "Diagnosis Procedure"</u> .	sy diagnosis.	L
NO >> INSPECTION END)		
Diagnosis Procedure		INF01D:00000008967820	Ν
1.CHECK FOR INTAKE AIR L	.EAK		
1. Stop engine and check the	following for connection.		0
Air ductVacuum hoses			
- PCV hose			_
	n air duct to intake manifold		Ρ
 Start engine and let it idle. Listen for an intake air leal 	after the mass air flow sensor.		
Is the inspection result normal?			
YES >> GO TO 2. NO >> Repair or replace e			
^			

2. CHECK EXHAUST GAS LEAK

< DTC/CIRCUIT DIAGNOSIS >

- 1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
- 2. Start engine and let it idle.
- 3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL PRESSURE

- 1. Release fuel pressure to zero. Refer to EC-142, "Work Procedure".
- 2. Check fuel pressure. Refer to EC-142, "Work Procedure".

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 9.

4.CHECK MASS AIR FLOW SENSOR

With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. For specification, refer to <u>EC-485, "Mass Air Flow Sensor"</u>.

With GST

Check mass air flow sensor signal in Service \$01 using GST. For specification, refer to <u>EC-485, "Mass Air Flow Sensor"</u>.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-186, "Diagnosis Procedure"</u>.

5. CHECK FUNCTION OF FUEL INJECTOR-1

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

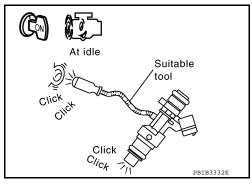
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-</u> <u>449, "Component Function Check"</u>.



6. CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION:

< DTC/CIRCUIT DIAGNOSIS >

Perform the following procedure in a place with no combustible objects and good ventilation.

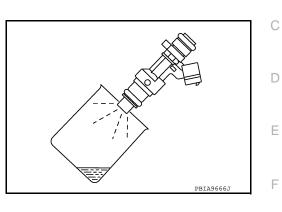
- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for approximately 3 seconds.

• Fuel should be sprayed evenly for each fuel injector.

• Fuel must not drip from the tip of fuel injector.

Is the inspection result normal?

NO >> Replace fuel injector. Refer to <u>EM-40, "Removal and</u> <u>Installation"</u>.



7.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Perform the following steps in a well-ventilated area with no combustibles.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse from IPDM E/R to release fuel pressure. **NOTE:**

CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.

- 3. Start the engine.
- 4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
- 7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-45, "Removal and Installation".
- 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. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
- 11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.
- Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.

NOTE:

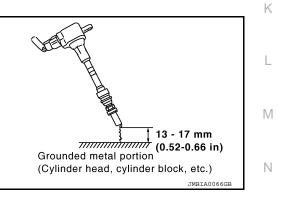
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 10.

8.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to <u>EM-23, "Inspection"</u>. <u>Is the inspection result normal?</u>



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< DTC/CIRCUIT DIAGNOSIS >

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace fuel filter and fuel pump assembly. Refer to FL-6, "Removal and Installation".
- NO >> Repair or replace error-detected parts.

10.check function of ignition coil-2

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for approximately 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?

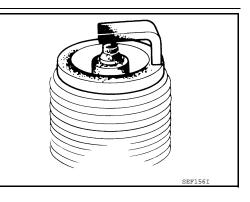
- YES >> GO TO 11.
- NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-455</u>, "Component Function <u>Check"</u>.

11.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> 1. Repair or clean spark plug. Refer to <u>EM-45</u>, <u>"Removal and Installation"</u>.
 - 2. GO TO 12.
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark Plug"</u>.



12. CHECK FUNCTION OF IGNITION COIL-3

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for approximately 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 >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark</u> <u>Plug"</u>.

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

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-168, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1212	TCS/CIRC (TCS/CIRC)	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) Dead (Weak) battery 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2. L 2. PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for at least 10 seconds. 1. Check 1st trip DTC. 2. M Is 1st trip DTC detected? >> Proceed to EC-367, "Diagnosis Procedure". YES NO >> INSPECTION END Ν Diagnosis Procedure INFOID:000000008967823 Perform the trouble diagnosis for TCS. Refer to BRC-51, "Work Flow". NOTE: If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.

- Trouble diagnosis for DTC UXXXX Refer to EC-93. "DTC Index".
- Trouble diagnosis for DTC P0607 Refer to <u>EC-349, "DTC Logic"</u>.

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P1217 ENGINE OVER TEMPERATURE

< 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 <u>EC-349, "DTC Logic"</u>.

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

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P1217	ENG OVER TEMP (Engine over tempera- ture)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (Cooling fan circuit is open or shorted.) IPDM E/R Cooling fan motor Radiator hose Radiator Radiator cap Reservoir tank Water pump Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-12, "Changing Engine</u> <u>Coolant"</u>. Also, replace the engine oil. Refer to <u>LU-9, "Refilling"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to <u>MA-13</u>, "Engine Coolant Mixture Ratio".
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-368. "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-369, "Diagnosis Procedure".

Component Function Check

INFOID:000000008930307

1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure 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:00000008930306

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS > Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. А Is the coolant level in the reservoir tank and/or radiator below the proper range? YES >> Proceed to EC-369, "Diagnosis Procedure". EC MAX NO >> GO TO 2. ΟK MIN SEF621W 2. PERFORM COMPONENT FUNCTION CHECK-2 Confirm whether customer filled the coolant or not. Did customer fill the coolant? YES >> Proceed to EC-369, "Diagnosis Procedure". NO >> GO TO 3. **3.**PERFORM COMPONENT FUNCTION CHECK-3 F (P)With CONSULT 1. Turn ignition switch ON. Perform "COOLING FAN" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 3. Check that cooling fan speed varies according to the percentage. Without CONSULT Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-9, "Diagnosis Н Description" (With Intelligent Key System) or PCS-37, "Diagnosis Description" (Without Intelligent Key Svstem). 2. Check that cooling fan operates. Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-369, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000008930308 1. CHECK COOLING FAN OPERATION Κ With CONSULT 1. Turn ignition switch ON. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 2. Check that cooling fan speed varies according to the percentage. 3. Without CONSULT Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-9, "Diagnosis 1. Μ Description" (With Intelligent Key System) or PCS-37, "Diagnosis Description" (Without Intelligent Key System). 2. Check that cooling fan operates. Ν Is the inspection result normal? YES >> GO TO 2. NO >> Proceed to EC-462, "Diagnosis Procedure". 2.CHECK COOLING SYSTEM FOR LEAK-1 Check cooling system for leak. Refer to CO-11, "System Inspection". Ρ Is leakage detected? YES >> GO TO 3. NO >> GO TO 4. 3.CHECK COOLING SYSTEM FOR LEAK-2

Check the following for leak.

Hose (Refer to <u>CO-11, "System Inspection"</u>.)

Radiator (Refer to CO-16, "Inspection".)

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P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

• Water pump (Refer to <u>CO-19</u>, "Removal and Installation".)

>> Repair or replace malfunctioning part.

4.CHECK RADIATOR CAP

Check radiator cap. Refer to CO-11, "System Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap. Refer to <u>CO-15, "Exploded View"</u>.

5.CHECK THERMOSTAT

Check thermostat. Refer to CO-22, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-20, "Removal and Installation of Thermostat".

6.CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-24, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve. Refer to <u>CO-24</u>, "Removal and Installation".

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-198, "Component Inspection (ECT Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-23, "Exploded View"</u>.

8.OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-9. "Troubleshooting Chart".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P1225 TP SENSOR

DTC Logic

INFOID:000000008930309

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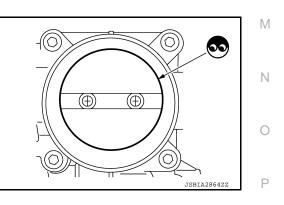
DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause	
P1225	CTP LEARNING-B1 (Closed throttle position learning bank 1)	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)	
DTC COI	NFIRMATION PROC	EDURE		
1.PREC	ONDITIONING			
		e has been previously conducted, always	perform the following procedure	
	nducting the next test. anition switch OFF an	d wait at least 10 seconds.		
2. Turn i	gnition switch ON.			
		d wait at least 10 seconds.		
TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.				
Before pe	erforming the followi	ng procedure, confirm that battery voltag	e is more than 10 V at idle.	
-	-	ng procedure, confirm that battery voltag	e is more than 10 V at idle.	
>	-> GO TO 2.		e is more than 10 V at idle.	
> 2.PERFC	-> GO TO 2. DRM DTC CONFIRMA		e is more than 10 V at idle.	
> 2.PERFC 1. Turn i 2. Turn i	S GO TO 2. DRM DTC CONFIRMA gnition switch ON. gnition switch OFF an		e is more than 10 V at idle.	
> 2.PERFC 1. Turn i 2. Turn i 3. Turn i	S GO TO 2. ORM DTC CONFIRMA gnition switch ON. gnition switch OFF an gnition switch ON.	ATION PROCEDURE	e is more than 10 V at idle.	
> 2.PERFC 1. Turn i 2. Turn i 3. Turn i 4. Checl	S GO TO 2. DRM DTC CONFIRMA gnition switch ON. gnition switch OFF an	ATION PROCEDURE	e is more than 10 V at idle.	
2.PERFC Turn i Turn i Turn i Turn i Turn i Turn i 	 > GO TO 2. > GO TO 2. > DRM DTC CONFIRMA gnition switch ON. gnition switch OFF an gnition switch ON. < 1st trip DTC. > DTC detected? > Proceed to EC-371 	ATION PROCEDURE	e is more than 10 V at idle.	
2.PERFC Turn i Turn i Turn i Turn i Turn i Turn i 	S GO TO 2. ORM DTC CONFIRMA gnition switch ON. gnition switch OFF an gnition switch ON. < 1st trip DTC. DTC detected?	ATION PROCEDURE d wait at least 10 seconds.	e is more than 10 V at idle.	
> 2.PERFO 1. Turn i 2. Turn i 3. Turn i 4. Checl Is 1st trip YES > NO >	 > GO TO 2. > GO TO 2. > DRM DTC CONFIRMA gnition switch ON. gnition switch OFF an gnition switch ON. < 1st trip DTC. > DTC detected? > Proceed to <u>EC-371</u> 	ATION PROCEDURE d wait at least 10 seconds.	e is more than 10 V at idle.	
> 2.PERFC 1. Turn i 2. Turn i 3. Turn i 4. Checl Is 1st trip YES > NO > Diagnos	 > GO TO 2. ORM DTC CONFIRMA gnition switch ON. gnition switch OFF an gnition switch ON. < 1st trip DTC. DTC detected? > Proceed to EC-371 > INSPECTION END sis Procedure 	ATION PROCEDURE d wait at least 10 seconds.		

- 2. Remove the intake air duct. Refer to EM-25, "Exploded View".
- 3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to <u>EM-</u> <u>27, "Removal and Installation"</u>.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-138</u>, "Work Procedure".



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< DTC/CIRCUIT DIAGNOSIS >

P1226 TP SENSOR

DTC Logic

INFOID:000000008967824

INFOID:00000008967825

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (CTP LEARNING-B1)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF, wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-372, "Diagnosis Procedure".

NO >> INSPECTION END

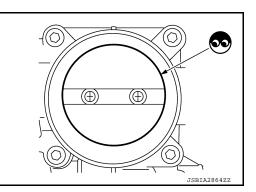
Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct. Refer to EM-25, "Exploded View".
- 3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to <u>EM-</u> <u>27. "Removal and Installation"</u>.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-138</u>, "Work Procedure".



P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1550 BATTERY CURRENT SENSOR

DTC Logic

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INFOID:000000008930311

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DTC DETECTION LOGIC

DTC No.		Γ screen terms agnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURREI (Battery curre		The output voltage of the battery current sensor remains within the specified range while engine is running.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit
		PROCEDUR	RE	
1.PRECON	IDITIONING			
		cedure has be	en previously conducted, always pe	rform the following before conduct-
ing the next 1. Turn igr		OFF and wait	at least 10 seconds.	
	nition switch (at least 10 seconds.	
TESTING C	ONDITION:			
Before perf	orming the	following pro	cedure, confirm that battery volta	ge is more than 8 V at idle.
>>	GO TO 2.			
2.PERFOR		FIRMATION F	PROCEDURE	
		t at least 10 se	econds.	
	st trip DTC.)		
		-	nosis Procedure".	
NO >>	INSPECTIO	N END		
Diagnosis	Procedu	re		INF01D:00000008930312
1. CHECK	BATTERY CI	JRRENT SEN	SOR POWER SUPPLY	
1. Turn igr	ition switch	OFF.		
	ect battery c		harness connector.	
			current sensor harness connector	and ground.
	+		Voltage	
			vollage	
Battery cu	rrent sensor Terminal	-	(Approx.)	
	rrent sensor Terminal 1	- Ground		
Battery cur Connector F54	Terminal		(Approx.)	

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

$\mathbf{3}$.check battery current sensor ground circuit

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	
F54	3	F25	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

	+		_	
Battery cur	rent sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
F54	4	F25	63	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts

5. CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to <u>EC-374. "Component Inspection (Battery Current Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

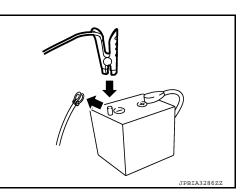
NO >> Replace battery current sensor. Refer to <u>PG-53</u>, "Removal and Installation".

Component Inspection (Battery Current Sensor)

INFOID:000000008930313

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable between battery negative terminal and body ground.



P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

Connector	+	-	Voltage (Approx.)
Terminal			()
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, <u>"How to</u> <u>Handle Battery"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to PG-53, "Removal and Installation".

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000008930314

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor)	An excessively low voltage from the sensor is sent to ECM.	(Battery current sensor circuit is open
P1552	BAT CURRENT SENSOR (Battery current sensor)	An excessively high voltage from the sensor is sent to ECM.	or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 1 circuit

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 >> Proceed to EC-376, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930315

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

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

+			
Battery current sensor		_	Voltage (Approx.)
Connector	Terminal		
F54	1	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT	•	1552 BAT	TERY CUR	RENT SENSOR [MRA8DE]
Check sensor pow		. Refer to FC	-443, "Diagnos	
Is the inspection re			. ior Diagnoo	A
	m the trouble diag or replace error-			
3.CHECK BATTE	RY CURRENT S	ENSOR GRO	UND CIRCUIT	EC
	CM harness conne		sensor harnes	s connector and ECM harness connector.
+		-		D
Battery current se	nsor E	СМ	Continuity	
Connector Ter	ninal Connector	Terminal		
F54	3 F25	62	Existed	E
Is the inspection re YES >> GO To NO >> Repai) 4. [.] or replace error-	detected parts		F
4.CHECK BATTE				G
1. Check the cor	tinuity between b	attery current	sensor harnes	s connector and ECM harness connector.
+		_		Н
Battery current se	nsor E	СМ	Continuity	
	ninal Connector	Terminal	Continuity	
F54	4 F25	63	Existed	I
Is the inspection re YES >> GO Te) 5. or replace error-	detected parts		J K
Is the inspection re YES >> Check	esult normal? intermittent incid	ent. Refer to (GI-43, "Intermit	Inspection (Battery Current Sensor)".
Component In	spection (Batt	ery Curren	t Sensor)	INFOID:000000008930316 M
1. СНЕСК ВАТТЕ	RY CURRENT S	ENSOR		
3. Disconnect ba	witch OFF. rness connectors ttery negative cat cable between ba	ole.		nody

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

ECM			
Connector	+	-	Voltage (Approx.)
Connector	Terr		
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to <u>PG-53, "Removal and Installation"</u>.

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000008930317

[MRA8DE]

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DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis conten) DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit
	FIRMATION PROCED	JRE	
	irmation Procedure has	peen previously conducted, always pe	rform the following before conduct-
2. Turn igr	nition switch OFF and wa nition switch ON. nition switch OFF and wa ONDITION:		
		rocedure, confirm that battery volta	ge is more than 8 V at idle.
-	o		-
>>	GO TO 2.	N PROCEDURE	-
>> 2.PERFOR 1. Start en	GO TO 2. M DTC CONFIRMATION gine and wait at least 10		
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >>	GO TO 2. M DTC CONFIRMATIO	seconds.	
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >> NO >>	GO TO 2. M DTC CONFIRMATIO gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-379, "Dia</u>	seconds.	- INFOID:00000008930318
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >> NO >> Diagnosis	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-379, "Dia</u> INSPECTION END S Procedure	seconds.	- INFOID:00000008930318
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >> NO >> Diagnosis 1.CHECK I 1. Turn igr 2. Disconr 3. Turn igr	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-379, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current sens nition switch ON.	seconds. gnosis Procedure". NSOR POWER SUPPLY or harness connector.	
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >> NO >> Diagnosis 1.CHECK I 1. Turn igr 2. Disconr 3. Turn igr	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-379, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current sens nition switch ON.	seconds. gnosis Procedure". NSOR POWER SUPPLY	
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip D YES >> NO >> Diagnosis 1.CHECK I 1. Turn igr 2. Disconr 3. Turn igr 4. Check t	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-379, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current sens nition switch ON.	seconds. gnosis Procedure". NSOR POWER SUPPLY or harness connector.	

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

$\mathbf{3}$.check battery current sensor ground circuit

- 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	Battery current sensor ECM		ECM	
Connector	Terminal	Connector	Terminal	
F54	3	F25	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

	+		_	
Battery cur	Battery current sensor ECM		ECM	
Connector	Terminal	Connector	Terminal	
F54	4	F25	63	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to <u>EC-380, "Component Inspection (Battery Current Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".

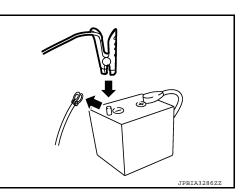
NO >> Replace battery current sensor. Refer to <u>PG-53</u>, "Removal and Installation".

Component Inspection (Battery Current Sensor)

INFOID:000000008930319

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable between battery negative terminal and body ground.



P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

	ECM		
Connector	+ -		Voltage (Approx.)
Connector	Terr	(*********	
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, <u>"How to</u> <u>Handle Battery"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to PG-53, "Removal and Installation".

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[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000008930320

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor Camshaft position sensor Camshaft (Intake) Starter motor Starting system circuit Dead (Weak) battery Sensor power supply 1 circuit

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-382, "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 >> Proceed to EC-383, "Diagnosis Procedure".

Component Function Check

INFOID:000000008930321

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.

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Check "BAT CUR SEN" indication for 10 seconds.

"BAT CUR SEN"

: above 2,300 mv at least once

Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connectors.

	ECM		
Connector	+	-	Voltage
Connector	Terr		
F25	63	62	Above 2.3 V at least once

EC-382

P1554 BATTERY CURRENT SENSOR

< DTC/CIRC			DATIE		[MRA8DE]
Is the inspec	tion result n	ormal?			
	INSPECTIO				
		<u>EC-383, "Dia</u>	gnosis Proc	<u>edure"</u> .	_
Diagnosis	Procedu	re			INFOID:00000008930322
1. СНЕСК В	BATTERY C	URRENT SE	NSOR POW	ER SUPPLY	_
	ition switch	OFF. current senso	or harness co	onnector	
	ition switch				
			ery current se	ensor harness connecte	
	+		Voltage		
-	rent sensor	_	(Approx.)		
Connector	Terminal				
F54	1	Ground	5.0 V		
	tion result n	ormal?			
	GO TO 3.				
	GO TO 2.				
CHECK S	SENSOR PC	WER SUPP	LY 2 CIRCU	IT	
Check sense	or power sup	oply 2 circuit.	Refer to EC	<u>-443, "Diagnosis Proce</u>	<u>edure"</u> .
<u>s the inspec</u>	<u>tion result n</u>	ormal?			
				ver supply circuit.	
•	•	place error-d			
3. CHECK E	BATTERY C	URRENT SE	NSOR GRC	UND CIRCUIT	
	ition switch				
		rness conne		concor hornoss conno	ector and ECM harness connector.
	le continuity	Detween pa		Sensor namess conne	
	+	-	_		
Battery cur	rent sensor	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
F54	3	F25	62	Existed	
I. Also che	eck harness	for short to p	ower.		
<u>s the inspec</u>	<u>tion result n</u>	ormal?			
	GO TO 4.				
4	-	place error-d	•		
I.CHECK E	BATTERY C	URRENT SE	NSOR INPL	IT SIGNAL CIRCUIT	
. Check tl	ne continuity	v between ba	ttery current	sensor harness conne	ector and ECM harness connector.
	+	-	_		
	rent sensor		CM	Continuity	
Connector	Terminal	Connector	Terminal		
F54	4	F25	63	Existed	
-					
		for short to g	jiouna ana t	phowei.	
•	<u>xtion result n</u> GO TO 5.	<u>uiiiai (</u>			
		place error-d	etected part	3	

5. CHECK BATTERY CURRENT SENSOR

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Check the battery current sensor. Refer to EC-384. "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-43. "Intermittent Incident".
- NO >> Replace battery current sensor. Refer to PG-53, "Removal and Installation".

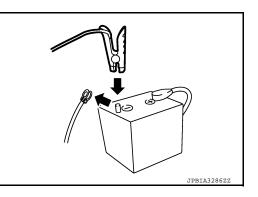
Component Inspection (Battery Current Sensor)

INFOID:000000008930323

[MRA8DE]

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable between battery negative terminal and body ground.



- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals.

	ECM		
Connector	+	-	Voltage (Approx.)
Connector	Terr	(11 -)	
F25	63	62	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-4</u>, "How to <u>Handle Battery"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to <u>PG-53, "Removal and Installation"</u>.

P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1556 or P1557 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screer (Trouble diagnosis		DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (BAT TMP SEN/CIRC	c) (2	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 sec- onds or more.	Harness or connectors [Battery current sensor (Battery tem- perature sensor) circuit is shorted.]
P1557	BAT TMP SEN/CIRC (BAT TMP SEN/CIRC	c) (2	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 sec onds or more.	 Battery current sensor (Battery tem-
DTC CONF	IRMATION PRO	CEDURE		
1.PRECON	IDITIONING			
	ition switch OFF a	nd wait at I	east 10 seconds.	
	ition switch ON. ition switch OFF a	nd wait at I	east 10 seconds.	
TESTING C	ONDITION:			and in 10 V or more at idle
Before perf	orming the follow	ing proce	dure, confirm that battery volt	age is 10 v or more at idle.
>>	GO TO 2.			
2.PERFOR	M DTC CONFIRM	ATION PR	OCEDURE	
1. Start the	e engine and let it id	dle at least	10 seconds.	
	st trip DTC.			
	<u>C detected?</u> Proceed to <u>EC-385</u>	5 "Diagnos	sis Procedure"	
	INSPECTION END		<u>sis riocedure</u> .	
Diagnosis	Procedure			INFOID:0000000896782
		RATURES	ENSOR POWER SUPPLY	
	ition switch OFF.			
2. Disconn	ect battery current	sensor ha	rness connector.	
	ition switch ON. he voltage betweer	h batterv ci	urrent sensor harness connector	and ground.
	+			
Battery	current sensor	-	Voltage (Approx.)	
Connector	Terminal			
F54	2	Ground	5 V	
-	tion result normal?	-		
YES >>	GO TO 3.			
	GO TO 2.			

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

EC-385

INFOID:000000008967826

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P1556, P1557 BATTERY TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

+		-		
Battery curr	ent sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	2	F25	61	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3. CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

- 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 current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	3	F25	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EC-386, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000008967828

1.CHECK BATTERY TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect battery current sensor.
- 3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		
+ –		Resistance
Ter	minal	
2 3		Continuity with the resistance value 100 Ω or more

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1564 ASCD STEERING SWITCH

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-347, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD SW)	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (ASCD steering switch circuit is open or shorted.) ASCD steering switch ECM
	NFIRMATION PROCED	URE	
1.PRECO	ONDITIONING		
	onfirmation Procedure handucting the next test.	as been previously conducted, always	perform the following procedure
 Turn i Turn i 	gnition switch OFF and w gnition switch ON. gnition switch OFF and w		
S. Tuilli	gritton switch OFF and w	an at least 10 seconds.	
~	> GO TO 2.		
2.PERFC	ORM DTC CONFIRMATIC	N PROCEDURE	
	gnition switch ON. at least 10 seconds.		
3. Press	MAIN switch for at least	10 seconds, then release it and wait at I	
 5. Press 6. Press 	ACCEL/RES switch for a COAST/SET switch for a	ast 10 seconds, then release it and wait t least 10 seconds, then release it and v t least 10 seconds, then release it and v	vait at least 10 seconds.
	< DTC.		
<u>Is DTC de</u> YES >	Proceed to <u>EC-387, "Di</u>	agnosis Procedure".	
	> INSPECTION END	<u>agnosio i roboatro</u> .	
Diagnos	sis Procedure		INFOID:00000008967830
1. CHECK	KASCD STEERING SWI	TCH CIRCUIT	
(P) With C	ONSULT		
2. Selec	gnition switch ON. t "CANCEL SW", "RESU CONSULT.	ME/ACC SW" and "SET SW" in "DAT	A MONITOR" mode of "ENGINE"

- using CONSULT.
- 3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
OANGEL SW		Released	OFF



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INFOID:000000008967829

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Monitor item	Condition		Indication
RESUME/ACC	ACCEL/RES switch	Pressed	ON
SW	ACCELINES Switch	Released	OFF
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

ECM				
Connector	+	-	Condition	Voltage (Approx.)
Connector	Terr	ninal		
		MAIN switch: Pressed	0 V	
			CANCEL switch: Pressed	1 V
E16	110	111	COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> GO TO 2.

2.check ascd steering switch ground circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch (spiral cable) harness connector.
- 4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

+				
	tion switch l cable)	ECM		Continuity
Connector	Terminal	Connector Terminal		
M80	22	E16	111	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK ascd steering switch input signal circuit

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

+		_		
	tion switch l cable)	ECM		Continuity
Connector	Terminal	Connector	Terminal	
M80	27	E16	110	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

4.CHECK ASCD STEERING SWITCH А Refer to EC-389, "Component Inspection". Is the inspection result normal? >> Check intermittent incident. Refer to GI-43, "Intermittent Incident". YES EC NO >> Replace ASCD steering switch. Refer to EC-15, "ENGINE CONTROL SYSTEM Component Parts Location". **Component Inspection** С INFOID:000000008967831 1.CHECK ASCD STEERING SWITCH D Disconnect combination switch (spiral cable) harness connector. 1. Check the resistance between combination switch harness connector terminals as per the following condi-2. tions. Е Combination switch (Spiral cable) Resistance Condition F (Approx.) + Connector Terminals MAIN switch: Pressed 0Ω CANCEL switch: Pressed 250 Ω M108 3 COAST/SET switch: Pressed 660 Ω 1 Н ACCEL/RES switch: Pressed 1,480 Ω All ASCD steering switches: Released 4.000 Ω Is the inspection result normal? YES >> INSPECTION END >> Replace ASCD steering switch. Refer to EC-15, NO "ENGINE CONTROL SYSTEM : Component Parts Location". Κ L Μ Ν Ρ

< DTC/CIRCUIT DIAGNOSIS >

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:000000008967832

[MRA8DE]

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-347, "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.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
	ASCD BRAKE SW	A)	When the vehicle speed is above 30 km/ h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.	 Harness or connectors (Stop lamp switch circuit is shorted.) (Brake pedal position switch circuit is shorted.) Stop lamp switch
P1572	(ASCD BRAKE SW)	B)	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.	 Brake pedal position switch Stop lamp relay Incorrect stop lamp switch installation Incorrect brake pedal position switch installation ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.

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 as per 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.

Is DTC detected?

NO >> GO TO 3.

YES >> Proceed to EC-396, "Diagnosis Procedure".

 3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B 1. Drive the vehicle for at least 5 consecutive seconds as per the following conditions. CAUTION: Always drive vehicle at a safe speed. 	
 Drive the vehicle for at least 5 consecutive seconds as per 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 drivi If a road test is expected to be easier, it is unnecessary to lift the vehicle.	ing the vehicle.
Vehicle speed More than 30 km/h (19 mph) Selector lever Suitable position	
Depress the brake pedal for more	
Driving location Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehi- cle speed.	
2. Check DTC.	
s DTC detected?	
YES >> Proceed to <u>EC-396, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000008967833
	WW C12.000000000000000000000000000000000000
CHECK OVERALL FUNCTION-1	
 Turn ignition switch ON. Select "BRAKE SW1" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 	
3. Check "BRAKE SW1" indication as per the following conditions.	
Monitor item Condition Indication	
Slightly depressed OFF	
BRAKE SW1 Brake pedal Fully released ON	
Without CONSULT	
I. Turn ignition switch ON.	
2. Check the voltage between ECM harness connector terminals as per the following.	
ECM	
Connector + - Condition Voltage (Approx.)	
Terminal	
E16 116 128 Brake pedal Slightly depressed 0 V	
Fully released Battery voltage	
s the inspection result normal?	
YES >> GO TO 2. NO >> MT models: GO TO 3.	
>> CVT models: GO TO 4.	
2. CHECK OVERALL FUNCTION-2	
With CONSULT	
Select "BRAKE SW2" and check indication as per the following conditions.	

Monitor item	C	Indication	
BRAKE SW2	Brake pedal	Slightly depressed	ON
DIVARE SW2	Brake pedar	Fully released	OFF

< DTC/CIRCUIT DIAGNOSIS >

Without CONSULT

Check the voltage between ECM harness connector terminals as per the following conditions.

	ECM		Condition				
Connector	+	_			Condition Voltage (Approx.)		(Approx.)
Connector	Tern	ninal					
E16	115	128	Brake pedal	Slightly depressed	Battery voltage		
LIU	115	120	Brake pedai	Fully released	0 V		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> GO TO 7.

3.CHECK CLUTCH PEDAL POSITION SWITCH POWER SUPPLY

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

+			
Clutch pedal p	Clutch pedal position switch		Voltage
Connector	Terminal		
E32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

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

+			
Brake pedal position switch		-	Voltage
Connector	Terminal		
E36	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform the trouble diagnosis for power supply circuit.

5.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-		
Brake pedal pe	Brake pedal position switch		ECM	
Connector	Terminal	Connector	Terminal	
E36	2	E16	116	Existed

4. Also check harness for short to ground and to power. <u>Is the inspection result normal?</u>



< DTC/CIRC	UIT DIAGI	NOSIS >	1372 AU		[MRA8DE]	
	O TO 6.					
NO >> F 6.CHECK B	•	place error-o	•			A
					Power and the second care (Decks, Decks, Dec	
Switch)"	rake pedal	position sv	vitch. Refer	to <u>EC-393,</u>	"Component Inspection (Brake Pedal Position	EC
Is the inspect	ion result r	ormal?				
					rmittent Incident".	С
7.CHECK S	•				R-21, "Exploded View". IT	
-	tion switch					D
2. Disconne	ect stop lan	np switch hai				D
3. Check th	e voltage b	etween stop	lamp switc	h harness co	nnector and ground.	_
	+				-	E
Stop I	amp switch		-	Voltage		
Connector	Termi	inal				F
E60	1	Gro	und Ba	ttery voltage	-	
Is the inspect		ormal?			_	G
	GO TO 8. Perform the	trouble diad	nosis for po	wer supply o	sircuit	
8.CHECK S		0	•	,		Н
		np relay harn				
					connector and ECM harness connector.	
					-	I
+ Stop lam	switch	F	CM	Continuity		
Connector	Terminal	Connector	Terminal			J
E60	2	E16	115	Existed	-	
3. Also che	ck harness	for short to	ground and	to power.	-	Κ
Is the inspect		ormal?				
	GO TO 9. Repair or re	place error-o	detected pa	rts		L
9.CHECK S	•	•				
·			EC-394, "(Component I	nspection (Stop Lamp Switch)".	Μ
Is the inspect						IVI
					rmittent Incident".	
	•				loded View".	Ν
Componer	it inspec	tion (Brak	e Pedal I	osition 5	WITCN) INFOID:00000008967834	
1.снеск в	1.CHECK BRAKE PEDAL POSITION SWITCH-1					
	tion switch		harness of	nnoctor		
		edal position / between br			h terminals as per the following conditions.	Ρ

< DTC/CIRCUIT DIAGNOSIS >

Brake pedal	position switch	Condition			
+	_			Continuity	
Tern	ninals				
			Fully released	Existed	
1	2	Brake pedal	Slightly de- pressed	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH-2

- 1. Adjust brake pedal position switch installation. Refer to <u>BR-15, "Adjustment"</u>.
- 2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal	oosition switch	Condition		
+	_			Continuity
Tern	ninals			
			Fully released	Existed
1	2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to <u>BR-21, "Exploded View"</u>.

Component Inspection (Stop Lamp Switch)

INFOID:000000008967835

1.CHECK STOP LAMP SWITCH-1

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lan	np switch	Condition			
+	_			Continuity	
Tern	ninals				
			Fully released	Not existed	
1	2	Brake pedal	Slightly de- pressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. Refer to <u>BR-15, "Adjustment"</u>.

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

Stop lan	np switch	Condition		
+	_			Continuity
Tern	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

< DTC/	CIRCUIT DIAGNOSIS >	[MRA8DE]
Is the ir	nspection result normal?	
YES	>> INSPECTION END	ŀ
NO	>> Replace stop lamp switch. Refer to <u>BR-21, "Exploded View"</u> .	

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P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"</u> for ASCD functions.

DTC Logic

INFOID:000000008967838

[MRA8DE]

INFOID:00000008967837

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-167, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-329, "EXCEPT FOR M/T MODELS : DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-347, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN	ECM detects a difference between two vehicle speed signals is out of the speci-	 Harness or connectors
	(ASCD VHL SPD SEN)	fied range.	(CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) TCM ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine.
- 2. Drive the vehicle at more than 40 km/h (25 MPH).
- CAUTION:

Always drive vehicle at a safe speed.

NOTÉ:

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.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to <u>EC-396. "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to <u>TM-107, "CONSULT Function"</u>. Is DTC detected?

P1574 ASCD VEHICLE SPEED SENSOR

P1574 ASCD VEHICLE SPEED SENSOR		
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
NO >> GO TO 2.		
YES >> Perform trouble shooting relevant to DTC indicated.	A	k.
2.check dtc with "abs actuator and electric unit (control unit)"		
Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-31. "CONSULT Fund	tion (ABS)".	
Is DTC detected?	EC	
NO >> INSPECTION END		_
YES >> Perform trouble shooting relevant to DTC indicated.	С	1. P
	D)
	E	
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P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

P1650 STARTER MOTOR RELAY 2

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R via BCM by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition: • Engine is running.

• Selector lever is D position.

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:000000008930325

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-168</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349</u>.
 <u>"Diagnosis Procedure"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause
			Starter relay is stuck ON.	 Harness and connectors (Between IPDM E/R harness connector and BCM harness connector is shorted to ground.) IPDM E/R
P1650	P1650 STR MTR RELAY 2 (Starter motor relay 2)	В	Starter relay power supply circuit is excessively high voltage.	 Harness and connectors (Between IPDM E/R harness connector and BCM harness is open or shorted to power.) (Between IPDM E/R harness connector and battery is open.) IPDM E/R
		с	Starter relay circuit is excessively low voltage	 Harness and connectors (Starter relay circuit is open or shorted.) IPDM E/R

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND C

- 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.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-399, "Diagnosis Procedure".

NO >> GO TO 3.

INFOID:00000008930324

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

· ·)	
.)	.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B
\sim	

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	Λ
With CONSULT	A
CAUTION:	
Always drive at a safe speed.	EC
 Start the engine. Turn ignition switch OFF and wait at least 10 seconds. 	
3. Turn ignition switch ON.	
4. Start the engine and warm it up to normal operating temperature.	С
5. Turn ignition switch OFF.	
6. Lift up drive wheels.	
 Turn ignition switch ON. Select "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 	D
9. Restart the engine and let it idle at least 10 seconds.	
10. Shift the selector lever to D position while depressing fully the brake pedal.	
11. Select 1 - 4 cylinders in "POWER BALANCE" and cut the fuel of all cylinders.	E
12. Check 1st trip DTC.	
Without CONSULT	_
Always drive at a safe speed.	F
1. Start the engine.	
2. Turn ignition switch OFF and wait at least 10 seconds.	\sim
3. Turn ignition switch ON.	G
4. Start the engine and warm it up to normal operating temperature.	
 Turn ignition switch OFF. Lift up drive wheels. 	Н
7. Restart the engine and let it idle at least 10 seconds.	
8. For CVT models: Shift the selector lever to D position while depressing fully the brake pedal.	
For M/T models: Fully release the clutch pedal.	
9. Disconnect vacuum hoses from intake manifold.	I
10. Check 1st trip DTC.	
Is 1st trip DTC detected?	J
YES >> Proceed to <u>EC-399, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	Κ
1.CHECK SELF-DIAGNOSTIC RESULT IN BCM	
With CONSULT Charles and diagnostic result in BCM	L
Check self-diagnostic result in BCM.	
Are any DTC detected?	M
YES >> Check the DTC. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), <u>PCS-48, "DTC Index"</u> (with-	IVI
out intelligent key). NO >> GO TO 2.	
	Ν
2.CHECK SELF-DIAGNOSTIC RESULT IN IPDM E/R	1.4
With CONSULT	
Check self-diagnostic result in IPDM E/R.	0
Are any DTC detected?	
YES >> Check the DTC. Refer to <u>BCS-50, "DTC Index"</u> (with intelligent key), <u>BCS-110, "DTC Index"</u>	
(without intelligent key).	Ρ
NO >> GO TO 3.	
3. CHECK STARTER RELAY POWER SUPPLY CIRCUIT	
Check the starter motor relay power supply circuit. Refer to PCS-29, "Diagnosis Procedure" (with intelligent	
key), or <u>PCS-57. "Diagnosis Procedure"</u> (without intelligent key).	
Is the inspection result normal?	
YES SS GO TO 4	

YES >> GO TO 4.

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

NO >> Repair or replace error-detected parts.

4. CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Disconnect ECM harness connector.

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

	+		_	
IPD	M E/R	ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	44	E16	105	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-30, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1651 STARTER MOTOR RELAY

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition:

• Engine is running.

• Selector lever is D position. (CVT models)

Clutch pedal is fully released. (M/T models)

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:000000008930328

DTC DETECTION LOGIC

NOTE:

- If DTC P1651 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-168</u>, <u>"DTC Logic"</u>.
- If DTC P1651 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	Н
P1651	STR MTR RELAY (Starter motor relay)	A correlated error is detected for 2 sec- onds or more between a control signal transmitted from ECM and a feedback sig- nal transmitted from IPDM E/R via CAN communication line.	 Harness or connectors (Between ECM harness connector and IPDM E/R harness connector is short- ed to power.) IPDM E/R 	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION	Μ
 Turn ignition switch OFF and wait at least 10 seconds. Start the engine and let it idle at least 30 seconds. Check 1st trip DTC. 	Ν
<u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-401, "Diagnosis Procedure"</u> . NO >> INSPECTION END	0
Diagnosis Procedure	D
1.INSPECTION START	٢

Check the starter motor operation.

Is the starter motor operated?

YES >> GO TO 3. NO >> GO TO 2. INFOID:00000008930327

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< DTC/CIRCUIT DIAGNOSIS >

2.CHECK DTC WITH IPDM E/R

Check DTC with IPDM E/R. Refer to <u>PCS-10, "CONSULT Function (IPDM E/R)"</u> (with intelligent key), or <u>PCS-38, "CONSULT Function (IPDM E/R)"</u> (without intelligent key).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis for DTC indicated. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), or <u>PCS-48, "DTC Index"</u> (without intelligent key).

3.CHECK CRANKING REQUEST SIGNAL CIRCUIT-1

- 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.

	+		-	
E	ECM		IPDM E/R	
Connector	Terminal	Connector	Terminal	
E16	101	E46	37	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to PCS-30, "Removal and Installation".
- NO >> Repair or replace error-detected parts.

P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >

P1652 STARTER MOTOR SYSTEM COMM

Description

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. ECM transmits a control signal to IPDM E/R via BCM by CAN communication.

Under normal conditions, ECM controls and maintains the starter relay in OFF state during following condition:

• Engine is running.

• Selector lever is D position. (CVT models)

Clutch pedal is fully released. (M/T models)

When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.

IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:00000008930331

DTC DETECTION LOGIC

NOTE:

- If DTC P1652 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-168</u>, <u>"DTC Logic"</u>.
- If DTC P1652 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349</u>, <u>"DTC Logic"</u>.
- If DTC P1652 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to <u>SEC-120</u>, "<u>DTC Logic</u>" or <u>SEC-122</u>, "<u>DTC Logic</u>".
- If DTC P1652 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B26F9 or B26FA.
 H Refer to <u>SEC-114, "DTC Logic"</u> or <u>SEC-116, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P1652	STR MTR SYS COMM (Starter motor system com- munication)	ECM detects malfunction in starter motor drive circuit of the IPDM E/R.	IPDM E/R	J

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start the engine and wait at least 5 minutes.
- 3. Repeat step 1 and 2 for 20 times.
- 4. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-403, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK SELF-DIAGNOSTIC RESULT IN BCM

With CONSULT
 Check self-diagnostic result in BCM.

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INFOID:000000008930330

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P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >

Are any DTC detected?

- YES >> Check the DTC. Refer to <u>BCS-50, "DTC Index"</u> (with intelligent key), <u>BCS-110, "DTC Index"</u> (without intelligent key).
- NO >> GO TO 2.

2. CHECK SELF-DIAGNOSTIC RESULT IN IPDM E/R

(D)With CONSULT

Check self-diagnostic result in IPDM E/R.

Are any DTC detected?

- YES >> Check the DTC. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), <u>PCS-48, "DTC Index"</u> (without intelligent key).
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.

- 2. Perform DTC confirmation procedure again. Refer to EC-403, "DTC Logic".
- Check DTC.

Is the P1652 displayed again?

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

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to PCS-58, "Removal and Installation".
- NG >> Repair or replace error-detected parts.

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1715 INPUT SPEED SENSOR

Description

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

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-276, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-279, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-347, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-349, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	(
P1715	IN PULY SPEED (IN PULY SPEED)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and en- gine rpm signal.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (Input speed sensor circuit is open or shorted) TCM 	F

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

 Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. CAUTION: Always drive vehicle at a safe speed.
 Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-405, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-107, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

INFOID:000000008967842

INFOID:00000008967840

INFOID-00000000896784



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< DTC/CIRCUIT DIAGNOSIS >

2.REPLACE TCM

Replace TCM. Refer to TM-257, "Removal and Installation".

>> INSPECTION END

P1800 INTAKE MANIFOLD TUNING VALVE

< DTC/CIRCUIT DIAGNOSIS >

P1800 INTAKE MANIFOLD TUNING VALVE

DTC Logic

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INFOID:000000008930333

[MRA8DE]

DTC No.		screen terms gnosis content)	l	DTC detecting condition	Possible cause
P1800	VIAS S/V-1 (Variable intak trol solenoid va	e air system con alve-1)		sively low or high voltage signal ECM through the intake manifold lve.	 Harness or connectors (The solenoid valve 1 circuit is open or shorted.) Intake manifold tuning valve
		N PROCEDU	IRE		
	TIONING				
f DTC Con ng the nex		ocedure has b	een previ	ously conducted, always pe	erform the following before conduct-
I. Turn ig	nition switch	OFF and wai	t at least ²	10 seconds.	
	nition switch	ON. OFF and wai	t at least ²	10 seconds.	
TESTING O	CONDITION:	1			e were then 44 V of Julie
sefore per	forming the	following pr	oceaure,	confirm battery voltage is	s more than 11 v at Idle.
>>	• GO TO 2.				
2.PERFO	RM DTC CO	NFIRMATION		DURE	
				operating temperature. [mo	
2. Let it id	lle for at leas	t 10 seconds		operating temperature. [mo speed: less than 1,000 rpm]	
 Let it ic Check 		t 10 seconds			
2. Let it id 3. Check I <u>s 1st trip D</u> YES >>	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to	t 10 seconds <u>EC-407, "Dia</u>	(engine s	speed: less than 1,000 rpm)	
2. Let it id 3. Check <u>ls 1st trip D</u> YES >> NO >>	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to NSPECTIC	t 10 seconds <u>EC-407, "Dia</u> DN END	(engine s	speed: less than 1,000 rpm))
2. Let it ic 3. Check <u>s 1st trip D</u> YES >> NO >> Diagnosi	Ile for at leas 1st trip DTC <u>DTC detected</u> Proceed to INSPECTIC S Procedu	t 10 seconds <u>?</u> <u>EC-407, "Dia</u> DN END I I E	. (engine s gnosis Pro	speed: less than 1,000 rpm)) INFOID:000000008930334
2. Let it ic 3. Check l <u>s 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu	t 10 seconds <u>P</u> <u>EC-407, "Dia</u> N END Ire NIFOLD TUN	. (engine s gnosis Pro	speed: less than 1,000 rpm)) INFOID:000000008930334
2. Let it ic 3. Check <u>s 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "Dia</u> <u>IRE</u> NIFOLD TUN ON.	(engine s gnosis Pro	Speed: less than 1,000 rpm)) INFOID:000000008930334
2. Let it ic 3. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA	t 10 seconds <u>P</u> <u>EC-407, "Dia</u> N END Ire NIFOLD TUN	(engine s gnosis Pro	Speed: less than 1,000 rpm)) INFOID:000000008930334
2. Let it ic 3. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA nition switch the voltage b	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "Dia</u> <u>IRE</u> NIFOLD TUN ON.	(engine s gnosis Pro	Speed: less than 1,000 rpm)) INFOID:0000000893033-
2. Let it ic 3. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Check	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA nition switch the voltage t	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "Dia</u>	(engine s gnosis Pro ING VALV harness o	Speed: less than 1,000 rpm)) INFOID:000000008930334
2. Let it ic 3. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Check Connector	Ile for at leas 1st trip DTC <u>OTC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA INTAKE MA INTAKE MA INTAKE MA INTAKE MA EC + Terminal	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "Dia</u> <u>DN END</u> <u>Ire</u> <u>NIFOLD TUN</u> <u>ON.</u> <u>ON.</u> <u>ON.</u> <u>Connector</u>	(engine s gnosis Pro ING VALV harness o Terminal	Speed: less than 1,000 rpm) Decedure". YE MOTOR POWER SUPP connector.) INFOID:000000008930334
2. Let it ic 3. Check <u>Is 1st trip D</u> YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Check Connector F24	Ile for at leas 1st trip DTC <u>TC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA nition switch the voltage to <u>EC</u> + Terminal 6	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "EC-407, "E</u>	(engine s gnosis Pro ING VALV harness o	Speed: less than 1,000 rpm) Decedure". YE MOTOR POWER SUPP connector.) INFOID:000000008930334
2. Let it ic 3. Check 1s 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Check Connector F24 Is the inspe	Ile for at leas 1st trip DTC <u>OTC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA INTAKE MA INTAKE MA INTAKE MA INTAKE MA EC + Terminal	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "EC-407, "E</u>	(engine s gnosis Pro ING VALV harness o Terminal	Speed: less than 1,000 rpm) Decedure". YE MOTOR POWER SUPP connector.) INFOID:000000008930334
2. Let it ic 3. Check Is 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Check Connector F24 Is the inspec YES >> NO >>	Ile for at leas 1st trip DTC <u>OTC detected</u> Proceed to INSPECTIC S Procedu INTAKE MA INTAKE MA INTAKE MA INTAKE MA INTAKE MA ECC + Terminal 6 ection result n GO TO 3. GO TO 2.	t 10 seconds <u>EC-407, "Dia</u> <u>EC-407, "EC-407, "Dia</u> <u>EC-407, "EC-407, "EC</u>	(engine s gnosis Pro ING VALV harness o Terminal 128	Speed: less than 1,000 rpm) Decedure". YE MOTOR POWER SUPP connector.) INFOID:00000008930334 LY

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

+			_	
E	ECM		IPDM E/R	
Connector	Terminal	Connector	Terminal	
F24	6	E45	26	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK INTAKE MANIFOLD TUNING VALVE MOTOR OUTPUT SIGNAL CIRCUIT

- 1. Disconnect intake manifold tuning valve motor harness connector.
- 2. Check the continuity between intake manifold tuning valve motor harness connector and ECM harness connector.

+				
Intake manifold tuning valve motor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
	1	1		Existed
F56		F24	7	Not existed
1 30		1 24	5	Not existed
	2		7	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK INTAKE MANIFOLD TUNING VALVE MOTOR

Check the intake manifold tuning valve motor. Refer to <u>EC-408</u>, "Component Inspection (Intake Manifold Tuning Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace intake manifold assembly. Refer to <u>EM-27</u>, "<u>Removal and Installation</u>".

Component Inspection (Intake Manifold Tuning Valve)

INFOID:000000008930335

1. CHECK INTAKE MANIFOLD TUNING VALVE MOTOR

1. Turn ignition switch OFF.

2. Disconnect intake manifold tuning valve motor harness connector.

3. Check the resistance between intake manifold tuning valve motor terminals as per the following.

IMT val	ve motor	Desistant
+	_	Resistance (Approx.)
Term	ninals	
1	2	3 - 8 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake manifold. Refer to EM-27. "Removal and Installation".

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1805 BRAKE SWITCH

CONSULT screen terms

DTC DETECTION LOGIC

DTC Logic

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INFOID:000000008930336

[MRA8DE]

DTC No. DTC detecting condition Possible cause (Trouble diagnosis content) Harness or connectors **BRAKE SW/CIRCUIT** Stop lamp signal is not sent to ECM for ex-(Stop lamp switch circuit is open or P1805 tremely long time while the vehicle is driving. (Brake switch circuit) shorted.) Stop lamp switch DTC CONFIRMATION PROCEDURE **1.**PERFORM DTC CONFIRMATION PROCEDURE NOTE: Since this DTC is difficult to be confirmed, check component function to judge the normality. >> Proceed to EC-409, "Component Function Check". Component Function Check INFOID:000000008930337 1. CHECK BRAKE SWITCH FUNCTION (P)With CONSULT On the CONSULT screen, select "ENGINE" >> "DATA MONITOR" >> "BRAKE SW 2". 1. Check "STOP LAMP SW" indication under the following conditions. 2. Monitor item Condition Indication Slightly depressed ON STOP LAMP SW Brake pedal Fully released OFF Without CONSULT Turn ignition switch ON. 1. Check the voltage between ECM harness connector terminals under the following conditions. 2. ECM Voltage + Condition (Approx.) Connector Terminal Terminal Slightly depressed Battery voltage E16 115 128 Brake pedal Fully released 0 V Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-409, "Diagnosis Procedure". **Diagnosis** Procedure INFOID:000000008930338 **1.**CHECK STOP LAMP SWITCH OPERATION 1. Turn power switch OFF.

2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated



P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.

2. Check the voltage between stop lamp switch harness connector and ground.

	+		
Stop lan	np switch	-	Voltage
Connector	Terminal		
E60	1	Ground	Battery voltage

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Pull out #30 fuse.

- 2. Check that the fuse is not fusing.
- 3. Check the continuity between stop lamp switch harness connector and fuse terminal.

	+		
Stop lan	np switch	-	Continuity
Connector	Terminal		
E60	1	#30 fuse ter- minal	Existed

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

Is the inspection result normal?

YES >> Check power supply circuit for 12V battery power supply.

NO >> Repair or replace error-detected parts.

4.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to EC-411, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace stop lamp switch. Refer to <u>BR-21, "Exploded View"</u>.

 ${f b}.$ CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect stop lamp switch harness connector.

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

+				
Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E60	2	E16	115	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Stop Lamp Switch)

INFOID:000000008930339

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1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.

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

Stop lan	np switch			
+	-	Condition		Continuity
Term	ninals			
1	2	2 Brake pedal	Fully released	Not existed
1	2	Blake pedal	Slightly depressed	Existed
na inshar	tion result i	ormal?		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-15, "Adjustment".

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

Stop lan	np switch				
+	-	Co	ondition	Continuity	
Term	ninals				
1	2	Brake pedal	Fully released	Not existed	
1	2		Slightly depressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-21, "Exploded View"</u>.

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Logic

INFOID:000000008969818

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2004	TUMBLE CONT/V (Intake manifold runner control stuck open bank 1)	The target angle of intake manifold runner control valve controlled by ECM and the in- put signal from intake manifold runner con- trol valve position sensor is not in the normal range.	 Harness or connectors (Intake manifold runner control valve motor circuit is open or shorted.) Intake manifold runner control valve motor Intake manifold runner control valve is stuck

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.
- Always perform the test at a temperature above –7°C (19°F)

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT.
- Make sure that "COOLANT TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). If not, cool engine down or warm engine up until "COOLANT TEMP/S" indicates between -7°C (19°F) to 60°C (140°F). Then go to the following steps.
- 4. Fully release accelerator pedal and wait at least 10 seconds.
- 5. Depress accelerator pedal and wait at least 10 seconds.
- 6. Check 1st trip DTC.

With GST

Following the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to EC-412, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008969819

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY

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

	+		-	
Connector	Terminal	Connector	Terminal	
F25	50	E16	128	Battery voltage

Is the inspection result normal?

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

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

< DTC/CIR(CUIT DIAGN	NOSIS >			[MRA8DE]
2.снески	NTAKE MAN	NIFOLD RUN	INER CON	ROL VALVE MOTOR POWER SUI	PPLY CIRCUIT
. Turn igr 2. Disconr	nition switch nect ECM ha	OFF. rness conne	ctor.		
		R harness c between EC		onnector and IPDM E/R harness o	connector.
	+	-	_		
E	СМ	IPDN	/I E/R	Continuity	
Connector	Terminal	Connector	Terminal		
F25	50	E45	26	Existed	
		for short to g	round.		
	ction result n				
		trouble diagi place error-d		er supply circuit.	
	•	•	•	ROL VALVE MOTOR OUTPUT SIG	GNAL CIRCUIT
				ve motor harness connector.	
Check t	the continuity			d runner control valve motor harr	ness connector and ECM
harness	connector.				
	+		_		
	bld runner con-				
	ve motor	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
	1		49	Not existed	
F1		F25	51	Existed	
	2		49	Existed	
		-	51	Not existed	
		for short to g	ground and	power.	
•	<u>ction result n</u> GO TO 4.	ormal?			
		place error-d	letected par		
.CHECK I	NTAKE MAN	NIFOLD RUN	INER CON	ROL VALVE MOTOR	
neck the ir	ntake manifo	ld runner cor	ntrol valve n	tor. Refer to <u>EC-413, "Component</u>	Inspection".
	ction result n				
				GI-43, "Intermittent Incident".	11 - 21 - 11
	•		assembly. I	efer to <u>EM-27, "Removal and Insta</u>	<u>llation"</u> .
ompone	ent Inspec	τιοη			INFOID:00000008969820
CHECK I	NTAKE MAN		INER CON	ROL VALVE	
With CO					
				т	
		TOR" mode [,] OLANT TEM		₋ı. s between –7°C (19°F) to 60°C (1≀	40°F).
lf not, c	ool engine d	own or warm	n engine up	ntil "COOLANT TEMP/S" indicate	
		go to the foll rator pedal a		e that "TUMBLE POS SEN" indica	ates between 2 8 V to 4 1
V.					
		pedal and n	nake sure th	t "TUMBLE POS SEN" indicates b	etween 0.2 V to 1.4 V.
Check 1	lst trip DTC. T				

(a) With GST

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Following the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Replace intake manifold assembly. Refer to EM-27, "Removal and Installation".

NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

1. Turn ignition switch OFF.

- 2. Disconnect intake manifold runner control valve motor harness connector.
- 3. Check the resistance between intake manifold runner control valve motor terminals as per the following.

	inner control valve otor	Resistance
+	_	(Approx.)
Terminals		
1	2	3 - 8 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake manifold assembly. Refer to EM-27, "Removal and Installation".

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:00000000896982

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2014, P2016, P2017 or P2018 is displayed with DTC P0643, first perform the trouble diagnosis (for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P2014	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit bank 1)	An excessively low voltage from the sen-		E
P2016	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit low bank 1)	sor is sent to ECM.	Harness or connectors (Intake manifold runner control position sensor circuit is short- od)	F
P2017	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit high bank 1)	An excessively high voltage from the sen-	 ed.) Intake manifold runner control position sensor Sensor power supply 2 circuit 	C
P2018	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit intermittent bank 1)	sor is sent to ECM.		F

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 11 V at idle.

>> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF.

2. Disconnect intake valve manifold runner control valve position sensor harness connector.

3. Turn ignition switch ON.

4. Check the voltage between intake valve manifold runner control valve position sensor harness connector.

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P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Intake manifold					
Connector	+	-	Voltage (Approx.)		
Connector	Terminal				
F29	1	5 V			

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

Check the voltage between intake valve manifold runner control valve position sensor harness connector and ground.

	+		
	nner control valve sensor	-	Voltage (Approx.)
Connector	Terminal		
F29	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443. "Diagnosis Procedure".

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

4.CHECK ECM GROUND CIRCUIT

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

	+		Continuity	
E	СМ	-		
Connector	Terminal	*		
F24	12			
1 24	16	Ground	Existed	
F25	52	Giouna	LAISIEU	
E16	128	*		

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

5.check intake manifold runner control valve position sensor ground circuit

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

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

)SIS >			[MRA8DE]
+		-			
Intake manifold valve positi		EC	М	Continuity	
Connector	Terminal	Connector	Terminal	-	
F29	3	F25	92	Existed	
1. Also chec	k harness fo	r short to po	wer.	I	
<u>s the inspecti</u>	<u>on result nor</u>	mal?			
	О ТО 6.				
~	epair or repla		•		
					POSITION SENSOR INPUT SIGNAL CIRCUIT
	e continuity b ness connect		e manifold	runner cor	trol valve position sensor harness connector and
		01.			
+		-			
Intake manifold		EC	М	Continuity	
valve positi			1		
Connector	Terminal	Connector	Terminal		
F29	2	F25	83	Existed	
	k harness fo	r short to gro	ound and to	nower	
	سمير الأربي معرف			power.	
-	on result nor	<u>mal?</u>		power.	
YES >> G	<u>on result nor</u> O TO 7. epair or repla				
YES >> G NO >> R	O TO 7. epair or repla	ace error-det	ected parts		
YES >> G NO >> R 7.CHECK IN	O TO 7. epair or repla TERMITTEN	ace error-det	ected parts		
YES >> G NO >> R 7.CHECK IN Perform <u>GI-43</u>	O TO 7. epair or repla TERMITTEN 3. "Intermitter	ace error-det IT INCIDENT <u>at Incident"</u> .	ected parts		
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform GI-43 Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform GI-43 Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES >> G NO >> R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES >> R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES >> G NO >> R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES >> R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES >> G NO >> R 7.CHECK IN Perform <u>GI-43</u> Is the inspecti YES >> R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".
YES $>>$ G NO $>>$ R 7.CHECK IN Perform GI-43 Is the inspecti YES $>>$ R	O TO 7. epair or repla TERMITTEN 3. "Intermitter on result nor eplace intake	ace error-det IT INCIDENT <u>nt Incident"</u> . <u>mal?</u> e manifold as	ected parts	s. efer to <u>EM-</u>	27, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P2096, P2097 A/F SENSOR 1

DTC Logic

INFOID:000000008967843

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	 A/F sensor 1 A/F sensor 1 heater Heated oxygen sensor 2
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a spec- ified period.	 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Clear the mixture ratio self-learning value. Refer to EC-141, "Work Procedure".
- 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.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-418, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008967844

1.CHECK HARNESS CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace harness connector.

2.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to <u>EM-30. "Exploded View"</u>, <u>EX-5.</u> "<u>Exploded View"</u>.

>> GO TO 3.

P2096, P2097 A/F SENSOR 1

	UIT DIAG	NOSIS >			[MRA8DE]	
3.CHECK F	OR EXHAL	JST GAS LE	AK			/
	ine and ru					P
2. Listen fo		•	efore the t	hree way catal	yst 2.	
YES >> I	Repair or re	place malfur	nctioning p	arts.		EC
	GO TO 4.					
4.CHECK F						C
2. Start eng	jine and rui					
			the mass	air flow senso	ſ.	C
<u>Is intake air I</u> YES >> I		eplace malfur	nctionina p	oarts.		
_NO >> (GO TO 5.		•			E
5. CLEAR T	HE MIXTUI	RE RATIO S	ELF-LEAR	NING VALUE		
		tio self-learn ast 10 minut			41, "Work Procedure".	F
0				Is it difficult to a	start engine?	
			sis for DT	C P0171 or P0	172. Refer to <u>EC-245, "DTC Logic"</u> or <u>EC-249,</u>	G
	DTC Logic 30 TO 6.					
6.CHECK A	/F SENSO	R 1 POWER	SUPPLY			F
	tion switch					
2. Disconne	ect A/F sen	sor 1 narnes				
3. Turn igni	tion switch			or.		I
5		ON.			ctor and ground.	I
5		ON.			ctor and ground.	l
4. Check th	ie voltage b	ON.			ctor and ground.	 J
4. Check th	e voltage b	ON. between A/F		narness connec	ctor and ground.	J
4. Check th 	+ sensor 1	ON. between A/F		narness connec	ctor and ground.	l I
4. Check th 	+ F sensor 1 Term 4	ON. between A/F	sensor 1 h	Narness connec	ctor and ground.	R J
4. Check th 	+ F sensor 1 Term 4 pt California	ON. between A/F	sensor 1 h	Narness connec	ctor and ground.	R I
4. Check th A/F Connector F12 ^{*1} F42 ^{*2} *1: Exce *2: For C Is the inspec	+ F sensor 1 Term 4 pt California California tion result r	ON. between A/F	sensor 1 h	Narness connec	ctor and ground.	R I
4. Check th 	+ F sensor 1 Term 4 pt California	ON. between A/F	sensor 1 h	Narness connec	ctor and ground.	I J M
4. Check th A/F Connector F12 ^{*1} F42 ^{*2} *1: Exce *2: For C Is the inspec YES >> 0	+ F sensor 1 Term 4 pt California california california tion result r GO TO 8. GO TO 7.	ON. between A/F	sensor 1 h	Noltage Battery voltage	ctor and ground.	L
4. Check th <u>A/F</u> <u>Connector</u> F12 ^{*1} F42 ^{*2} *1: Exce *2: For C Is the inspec YES >> C NO >> C 7. CHECK A 1. Turn igni	+ F sensor 1 Term 4 pt California california tion result r GO TO 8. GO TO 8. GO TO 7. /F SENSO tion switch	ON. between A/F	sensor 1 h	Noltage Battery voltage	ctor and ground.	L
4. Check the second se	+ F sensor 1 Term 4 pt California california tion result r GO TO 8. GO TO 8. GO TO 8. GO TO 7. /F SENSO tion switch ect IPDM E	ON. between A/F	SUPPLY	Noltage Battery voltage		L
4. Check the second se	+ F sensor 1 Term 4 pt California california tion result r GO TO 8. GO TO 8. GO TO 8. GO TO 7. /F SENSO tion switch ect IPDM E	ON. between A/F	SUPPLY	Noltage Battery voltage	ector and IPDM E/R harness connector.	L
4. Check the second se	e voltage b + 	ON. between A/F inal inal comal? R 1 POWER OFF. /R harness of y between A/	SUPPLY SUPPLY	Voltage Battery voltage CIRCUIT 1 harness conr		L N
4. Check the second se	+ sensor 1 Term 4 pt California california california tion result r GO TO 8. GO TO 8. GO TO 8. GO TO 8. GO TO 7. /F SENSO tion switch ec ontinuity nsor 1	ON. between A/F inal inal comal? R 1 POWER OFF. /R harness co y between A/	SUPPLY SUPPLY Sonnector. F sensor	Voltage Battery voltage CIRCUIT 1 harness conre		L N
4. Check the second se	e voltage b + 	ON. between A/F inal inal comal? R 1 POWER OFF. /R harness of y between A/	SUPPLY SUPPLY	Voltage Battery voltage CIRCUIT 1 harness conre		

*1: Except California

*2: For California

4. Also check harness for short to ground.

P2096, P2097 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

8. CHECK A/F SENSOR 1 INPUT 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 ser	A/F sensor 1		ECM	
Connector	Terminal	Connector	Terminal	
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	F24	45	Existed

*1: Except California

*2: For California

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

	+		
A/F s	ensor 1	-	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Glound	NOT EXISTED

*1: Except California

*2: For California

	+		
E	СМ	-	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
1 24	45	Giodila	NOT EXISTED

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-176, "Component Inspection (A/F Sensor 1 Heater)".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 12.

10.CHECK HEATED OXYGEN SENSOR 2

Check heated oxygen sensor 2. Refer to EC-222, "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

11.CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
YES >> GO TO 12.		
NO >> Repair or replace error-detected parts.		А
12. REPLACE AIR FUEL RATIO (A/F) SENSOR 1	_	
Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".		EC
• Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in)		-0
surface such as a concrete floor; use a new one.	onto a naru	
 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thr [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (service tool). 		С
Do you have CONSULT?		D
YES >> GO TO 13.		
NO >> GO TO 14.		
13.CONFIRM A/F ADJUSTMENT DATA		Е
With CONSULT		
 Turn ignition switch ON. Select "A/F ADJ-B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 		F
3. Make sure that "0.000" is displayed on CONSULT screen.		
<u>Is "0.000" displayed?</u>		
YES >> INSPECTION END		G
NO $>>$ GO TO 14.		
14.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE		Н
Clear the mixture ratio self-learning value. Refer to <u>EC-141, "Work Procedure"</u> .		
Do you have CONSULT? YES >> GO TO 15.		
NO >> INSPECTION END		I
15. CONFIRM A/F ADJUSTMENT DATA		
(a) With CONSULT		J
1. Turn ignition switch ON.		
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.		k
3. Make sure that "0.000" is displayed on CONSULT screen.		Κ
>> INSPECTION END		
		L
		M
		IVI
		Ν
		0
		D

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:000000008930340

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2100	ETC MOT PWR-B1 (Throttle actuator "A" control motor circuit/ open)	ECM detects a voltage of power source for throttle control motor is excessively low.	 Harness or connectors (Throttle control motor relay circuit is open) Throttle control motor relay
P2103	ETC MOT PWR (Throttle actuator "A" control motor circuit high)	ECM detect the throttle control motor relay is stuck ON.	 Harness or connectors (Throttle control motor relay circuit is shorted) Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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.

Witch DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

- 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 >> Proceed to EC-422, "Diagnosis Procedure".

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-422, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

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

	ECM					
Connector	Terminal	Connector	Terminal			
F24	21	E16	128	Battery voltage		

INFOID:000000008930341

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRC			IHRUI	ILE CONTROL	MOTOR RELAT	[MRA8DE]
Is the inspec						
· · · · · ·	GO TO 3.					A
-	GO TO 2.					
2.снеск 1	THROTTLE	CONTROL M	IOTOR REI	LAY POWER SUPPL	Y CIRCUIT	EC
		rness connec				EC
		R harness co		connector and IPDM	1 E/R harness connector.	
J. CHECK I	le continuity		IN Harness			С
	+	_	-			
EC	CM	IPDM	1 E/R	Continuity		D
Connector	Terminal	Connector	Terminal	-		D
F24	21	E43	16	Existed		
4. Also che	eck harness	for short to g	round.			E
Is the inspec		•				
				wer supply circuit.		_
•	•	place error-d	•			F
3.CHECK 1	THROTTLE	CONTROL M	10TOR REI	LAY INPUT SIGNAL		
Check the ve	oltage betwe	en ECM har	ness conne	ctor and ground as p	per the following condition	ns. G
				1		
	E	CM		_	Voltage	Н
	+	-	-	Condition	(Approx.)	
Connector	Terminal	Connector	Terminal			
F24	2	E16	128	Ignition switch: OFF	0 V	
				Ignition switch: ON	Battery voltage	
Is the inspec						J
	Check interr GO TO 4.	nittent incide	nt. Refer to	GI-43, "Intermittent	Incident".	
4				LAY INPUT SIGNAL		К
				LAT INPUT SIGNAL	CIRCUIT	
	ition switch	OFF. rness connec	rtor			
		R harness co				L
4. Check tl	ne continuity	between EC	M harness	connector and IPDM	I E/R harness connector.	
						M
	+	-	-			1 1 1
	CM	IPDN		Continuity		
Connector	Terminal	Connector	Terminal			Ν
F24	2	E43	11	Existed		
		for short to g	round and t	to power.		\cap
Is the inspec			nt Datast		la cide a fil	0
		nittent incide place error-d		<u>GI-43, "Intermittent</u> ts.	incident".	
						Р

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-422, "DTC Logic".
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-429, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2101	ETC FNCTN/CIRC-B1 (Throttle actuator "A" control motor circuit range/performance)	Electric throttle control function does not operate properly.	 Harness or connectors (Throttle control motor circuit is open or shorted) Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 2 seconds. 1.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC. 3.

Is DTC detected?

YES >> Proceed to EC-424, "Diagnosis Procedure". NO

>> INSPECTION END

Diagnosis Procedure

INFOID:000000008930343

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following conditions.

	E	СМ		Malaasa		
	+ –		_	Condition	Voltage (Approx.)	
Connector	Terminal	Connector	Terminal		()))))))))))))))))))	
F24	2	E16	128	Ignition switch: OFF	0 V	
1 24	F24 2	LIU	120	Ignition switch: ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 2. INFOID:00000008930342

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

3. Disconr	nition switch hect ECM ha hect IPDM E/	OFF. rness conne R harness c	ctor. onnector.	AY INPUT SIG		A EC
	+	-	_			
E	СМ	IPDN	/IE/R	Continuity		С
Connector	Terminal	Connector	Terminal			
F24	2	E43	11	Existed	-	D
Is the inspect YES >> NO >>	eck harness <u>ction result n</u> GO TO 3. Repair or rej FHROTTLE (ormal? place error-d	etected part	s.	JPPLY CIRCUIT	E
					IPDM E/R harness connector.	
	+ CM	IPDN	- / E/R	Continuity	-	G
Connector	Terminal	Connector	Terminal		_	Н
F24	21	E43	16	Existed	-	
Is the inspec	eck harness <u>ction result n</u> Perform the	ormal?				1
NO >>	Repair or rep	place error-d	etected part	ver supply circo s. ГРUT SIGNAL		J
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr	Repair or re THROTTLE ition switch hect electric t hect ECM ha	place error-d CONTROL M OFF. hrottle contro rness conne	etected part IOTOR OUT ol actuator h ctor.	s. IPUT SIGNAL arness connec	CIRCUIT	JK
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector.	Repair or re THROTTLE ition switch hect electric t hect ECM ha	place error-d CONTROL M OFF. hrottle contro rness conner between ele	etected part IOTOR OUT ol actuator h ctor.	s. IPUT SIGNAL arness connec	CIRCUIT tor.	L J
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector.	Repair or re THROTTLE nition switch nect electric t nect ECM ha he continuity	place error-d CONTROL M OFF. hrottle contro rness conner between ele	etected part IOTOR OUT ol actuator h ctor. ectric throttle	s. IPUT SIGNAL arness connec	CIRCUIT tor.	J K L M
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector.	Repair or re THROTTLE (nect electric t nect ECM ha he continuity + le control actu-	place error-d CONTROL M OFF. hrottle contro rness conner between ele	etected part IOTOR OUT ol actuator h ctor. ectric throttle	s. IPUT SIGNAL arness connec e control actual	CIRCUIT tor.	L
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector. Electric thrott	Repair or re THROTTLE (hition switch (hect electric t hect ECM ha he continuity + le control actu- tor	place error-d CONTROL M OFF. hrottle contro rness conner between ele	etected part AOTOR OUT ol actuator h ctor. ectric throttle 	s. FPUT SIGNAL arness connec e control actuat Continuity Not existed	CIRCUIT tor.	L
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector. Electric thrott	Repair or re THROTTLE (nect electric t nect ECM ha he continuity + le control actu- tor Terminal	place error-d CONTROL M OFF. hrottle contro rness conner between ele	etected part AOTOR OUT ol actuator h ctor. ectric throttle 	s. FPUT SIGNAL arness connec control actuat Continuity Not existed Existed	CIRCUIT tor.	M
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector. Electric thrott a Connector	Repair or re THROTTLE (nect electric t nect ECM ha he continuity + le control actu- tor Terminal	place error-d CONTROL M OFF. hrottle contro rness conner between ele connector	etected part AOTOR OUT ol actuator h ctor. ectric throttle 	s. FPUT SIGNAL arness connec e control actuat Continuity Not existed Existed Existed	CIRCUIT tor.	L M
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector. Electric thrott a Connector	Repair or re THROTTLE (hition switch (hect electric t hect ECM ha he continuity + le control actu- tor Terminal 5 6	place error-d CONTROL M OFF. hrottle contro rness conner between ele connector F24	etected part AOTOR OUT ol actuator h ctor. ectric throttle 	s. FPUT SIGNAL arness connec e control actuat Continuity Not existed Existed Existed Not existed	CIRCUIT tor.	M
NO >> 4.CHECK 1. Turn igr 2. Disconr 3. Disconr 4. Check t nector. Electric thrott a Connector F7 5. Also che	Repair or re THROTTLE (nition switch (nect electric t nect ECM ha he continuity + le control actu- tor Terminal 5	place error-d CONTROL M OFF. hrottle contro rness conner between ele Connector F24 for short to g	etected part AOTOR OUT ol actuator h ctor. ectric throttle 	s. FPUT SIGNAL arness connec e control actuat Continuity Not existed Existed Existed Not existed	CIRCUIT tor.	M

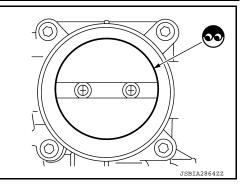
P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-138. "Work Procedure"</u>.



6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to <u>EC-428</u>, "Component Inspection (Throttle Control Motor)". Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

Component Inspection (Throttle Control Motor)

INFOID:000000008930344

[MRA8DE]

1.CHECK THROTTLE CONTROL MOTOR

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

Electric throttle control actu- ator			Resistance	
+	_	Condition	(Approx.)	
Terminals				
5	6	Temperature °C (°F)25 (77)		1 - 15 Ω

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P2118 THROTTLE CONTROL MOTOR

DTC Logic

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EC

INFOID:000000008930345

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scre (Trouble diagno tent)		DTC de	etecting condition	Possible cause
P2118	ETC MOT-B1 (Throttle actuat trol motor curre performance)		CM detects short CM and throttle c	t in both circuits betwee control motor.	 Harness or connectors (Throttle control motor circuit is shorted.) Electric throttle control actuator (Throttle control motor)
DTC CON	FIRMATION	PROCED	URE		
1.PRECO	NDITIONING				
before conc 1. Turn igi	lucting the ne nition switch (ext test. OFF and wa			, always perform the following procedure
	nition switch (nition switch (ait at least 10	seconds.	
>>	GO TO 2.				
2.PERFOR	RM DTC CON	IFIRMATIO	N PROCEDL	JRE	
	nition switch (ngine and let i DTC.			econds.	
Is DTC dete					
	Proceed to E		agnosis Proc	<u>edure"</u> .	
Diagnosis	s Procedur	re			INFOID:000000008930346
1.снеск	THROTTI E (FPUT SIGNAL CI	RCUIT
	nition switch (
	nect electric tl nect ECM har			arness connector	
				e control actuator	harness connector and ECM harness con-
	+		_		
	tle control actu- ator	E	CM	Continuity	
Connector	Terminal	Connector	Terminal		
	5		3	Not existed	
F7	5	F24	1	Existed	
. /	6	. 27	3	Existed	
			4	Nat avaiate al	

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

Not existed

1

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to <u>EC-428</u>, "Component Inspection (Throttle Control Motor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.
- NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

Component Inspection (Throttle Control Motor)

INFOID:000000008930347

1. CHECK THROTTLE CONTROL MOTOR

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

Electric throttle control actu- ator			Resistance	
+	_	Condition	(Approx.)	
Terminals				
5	6	Temperature °C (°F) 25 (77)		1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:000000008930348

DTC DETECTION LOGIC

DTC No.	TC No. (Trouble diagnosis con- tent) DTC detecting condition Possible cause						
	ETC ACTR-B1	А	Electric throttle control actuator does not function properly due to the return spring malfunction.				
P2119	(Throttle actuator con- trol throttle body range/ performance)	В	Throttle valve opening angle in fail-safe mode is not in specified range.				
		C ECM detect the throttle valve is stuck open.					
DTC CON	FIRMATION PROCI	EDU	RE				
.PRECO	NDITIONING						
efore cond . Turn ig 2. Turn ig	nfirmation Procedure ducting the next test. nition switch OFF and nition switch ON. nition switch OFF and	l wait		rform the following procedure			
>>	• GO TO 2.						
2.PERFO	RM DTC CONFIRMAT	ΓΙΟΝ	PROCEDURE FOR MALFUNCTION A	AND B			
	nition switch ON and			!-			
	ector lever to D (CVT) ector lever to P (CVT)		st (M/T) position and wait at least 3 seco leutral (M/T) position.	nas.			
l. Turn ig	nition switch OFF and	l wait	t at least 10 seconds.				
	nition switch ON and vector lever to D (CVT)		st (M/T) position and wait at least 3 seco	nds.			
	ector lever to P (CVT)		leutral (M/T) position. east 10 seconds and then turn ON.				
). Check		it at i	east to seconds and then turn ON.				
s DTC det	ected?						
	 Proceed to <u>EC-429</u>, GO TO 3. 	"Diag	<u>gnosis Procedure"</u> .				
_			PROCEDURE FOR MALFUNCTION C				
	nition switch ON and						
2. Set sel	ector lever to D (CVT)) or 1	st (M/T) position and wait at least 3 seco	nds.			
	ector lever to P (CVT) ngine and let it idle for						
5. Check		0.50					
s DTC dete							
	 Proceed to <u>EC-429</u>, INSPECTION END 	"Diag	gnosis Procedure".				
	s Procedure			INFOID:00000008930349			
.снеск	ELECTRIC THROTTI	LE C	ONTROL ACTUATOR VISUALLY				
			r to EM-25, "Exploded View".				

[MRA8DE]

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

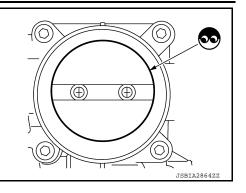
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to <u>EM-</u> <u>27, "Removal and Installation"</u>.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to <u>EC-138, "Work Proce-dure"</u>.



P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2122, P2123 APP SENSOR

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-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2122			 Harness or connectors (APP sensor 1 circuit is open or shorted.)
P2123	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit high)	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)
DTC CON	FIRMATION PROCE	DURE	
1.preco	NDITIONING		
2. Turn ig 3. Turn ig TESTING (nition switch ON. nition switch OFF and ^s CONDITION:	wait at least 10 seconds. wait at least 10 seconds. I procedure, confirm that battery vo	Itage is more than 8 V at idle
>> 2.perfoi	GO TO 2. RM DTC CONFIRMATI	ON PROCEDURE	lage is more than o v at luie.
>> 2.perfoi	GO TO 2. RM DTC CONFIRMATI	ON PROCEDURE	
>> 2.PERFOI 1. Start er 2. Check Is DTC dete YES >>	GO TO 2. RM DTC CONFIRMATI ngine and let it idle for DTC.	ON PROCEDURE 1 second.	
>> 2.PERFOI 1. Start en 2. Check Is DTC dete YES >> NO >>	GO TO 2. RM DTC CONFIRMATIngine and let it idle for 1 DTC. ected? Proceed to <u>EC-431, "</u> I	ON PROCEDURE 1 second.	INFOID:000000008930351
>> 2.PERFOI 1. Start ei 2. Check Is DTC dete YES >> NO >> Diagnosi	GO TO 2. RM DTC CONFIRMATIngine and let it idle for DTC. <u>ected?</u> Proceed to <u>EC-431, "I</u> NSPECTION END	ON PROCEDURE 1 second. Diagnosis Procedure".	
>> 2.PERFOI 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	GO TO 2. RM DTC CONFIRMATI Ingine and let it idle for DTC. Ected? Proceed to EC-431, "I NSPECTION END S Procedure APP SENSOR 1 POW Inition switch OFF. nect accelerator pedal nition switch ON.	ON PROCEDURE 1 second. Diagnosis Procedure". ER SUPPLY position (APP) sensor harness connec	- INFOID:000000008930351
>> 2.PERFOI 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	GO TO 2. RM DTC CONFIRMATI Ingine and let it idle for DTC. Ected? Proceed to EC-431, "I NSPECTION END S Procedure APP SENSOR 1 POW Inition switch OFF. nect accelerator pedal nition switch ON.	ON PROCEDURE 1 second. Diagnosis Procedure".	- INFOID:000000008930351
>> 2.PERFOI 1. Start en 2. Check Is DTC detr YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	GO TO 2. RM DTC CONFIRMATI Ingine and let it idle for DTC. Ected? Proceed to EC-431, "I NSPECTION END S Procedure APP SENSOR 1 POW Inition switch OFF. nect accelerator pedal nition switch ON.	ON PROCEDURE 1 second. Diagnosis Procedure". ER SUPPLY position (APP) sensor harness connec	- INFOID:000000008930351

Terminal 4

Ground

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

Connector

E12

5.0 V

INFOID:000000008930350

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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 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	
E12	4	E16	122	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.

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		
E12	2	E16	127	Existed	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		_		
APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	126	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR

Check APP sensor. Refer to EC-432, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

Component Inspection (APP Sensor)

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

3. Turn ignition switch ON.

INFOID:000000008930352

^{1.} Turn ignition switch OFF.

^{2.} Reconnect all harness connectors disconnected.

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ECM harness connector terminals as per the following condition.

ECM						
Connector	+	_	Condition		Voltage	
Connector	Terr	ninal				
	126	127		Fully released	0.6 - 0.9 V	
E16	120	127	Accelerator pedal	Fully depressed	3.9 - 4.7 V	
ETO	119	120		Fully released	0.3 - 0.6 V	
	119	120		Fully depressed	1.95 - 2.4 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

DTC Logic

INFOID:000000008930353

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2127	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit low)	An excessively low voltage from the APP sensor 2 is sent to ECM.	 Harness or connectors (APP sensor 2 circuit is open or shorted.) Accelerator pedal position sensor
P2128	APP SEN 2/CIRC (Throttle/Pedal position sensor/switch "E" circuit high)	An excessively high voltage from the APP sensor 2 is sent to ECM.	 Acceleration pedar position sensor (APP sensor 2) Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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 let it idle for 1 second.

2. Check DTC.

Is DTC detected?

- YES >> Proceed to EC-434, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930354

1.CHECK APP SENSOR 2 POWER SUPPLY

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

	+		
APP :	sensor	-	Voltage (Approx.)
Connector	Connector Terminal		()
E12	5	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

P2127, P2128 APP SENSOR

		F	2127, P2	128 APP S	SENSOR			
< DTC/CIRC	CUIT DIAGN	IOSIS >					[MRA8DE]	
Is the inspec	ction result n	ormal?						
YES >>	Perform the	trouble diag	nosis for pov	ver supply circ	uit.			А
•	•	place error-d	•	S.				
3.CHECK A	APP SENSO	R 2 GROUN	ID CIRCUIT					EC
	ition switch							LO
	· · · · · ·	rness conne		rness conner	tor and ECM b	arness connector		
5. Check li		Detween Ai	1 3611301 112					С
	+		_		_			
APPs	sensor	EC	CM	Continuity				
Connector	Terminal	Connector	Terminal					D
E12	1	E16	120	Existed	_			
	eck harness	for short to p	-		_			Е
Is the inspec								
-	GO TO 4.							
NO >>	Repair or re	place error-d	etected part	S.				F
4.CHECK A	APP SENSO	R 2 INPUT S	SIGNAL CIR	CUIT				
1. Check tl	he continuity	between AF	P sensor ha	rness connec	tor and ECM h	arness connector	•	G
	,							0
	+		-		-			
APP s	sensor	EC	CM	Continuity				Н
Connector	Terminal	Connector	Terminal					
E12	6	E16	119	Existed	_			
2. Also che	eck harness	for short to g	round and to	o power.	-			I
Is the inspec	<u>ction result n</u>	ormal?						
	GO TO 5.							J
_	•	place error-d	etected part	S.				
5.CHECK A	APP SENSO	R						LZ.
Check APP	sensor. Refe	er to <u>EC-435</u> .	"Componer	nt Inspection (APP Sensor)".			K
Is the inspec								
					ittent Incident"			L
	•	•		Refer to ACC	-3, "Removal a	and Installation".		
Compone	nt Inspec	tion (APP	Sensor)				INFOID:000000008930355	
1. CHECK A								M
			FUSITION	BLINGOR				
	ition switch (OFF. ss connecto	rs disconnec	ted				Ν
	ition switch							
4. Check tl	he voltage b	etween ECN	I harness co	nnector termir	als as per the	following conditio	n.	
					1			0
	ECM							
Connector	+	-		Condition		Voltage		Р
	Terr	ninal						P
	126	127			Fully released	0.6 - 0.9 V		
	-			I.,		0 0 4 7 14		

 119
 120

 Is the inspection result normal?

E16

Accelerator pedal

Fully depressed

Fully depressed

Fully released

3.9 - 4.7 V

0.3 - 0.6 V

1.95 - 2.4 V

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P2135 TP SENSOR

DTC Logic

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle/Pedal position sensor/switch "A" / "B" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	 Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 or 2)
DTC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
 Turn ig Turn ig 	nition switch ON.	d wait at least 10 seconds. I wait at least 10 seconds.	
TESTING C Before per	• GO TO 2.	ng procedure, confirm that battery v	oltage is more than 8 V at idle.
TESTING C Before per >> 2.PERFOR 1. Start er	Forming the followin GO TO 2. RM DTC CONFIRMAT	ig procedure, confirm that battery v	oltage is more than 8 V at idle.
TESTING C Before per >> 2.PERFOR 1. Start er 2. Check Is DTC dete YES >>	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. ected?	ig procedure, confirm that battery v	oltage is more than 8 V at idle.
TESTING C Before per >> 2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >>	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. Ected? Proceed to <u>EC-437.</u>	ng procedure, confirm that battery v TION PROCEDURE	oltage is more than 8 V at idle.
TESTING C Before per >> 2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. <u>ected?</u> Proceed to <u>EC-437,</u> INSPECTION END S Procedure	ng procedure, confirm that battery v TION PROCEDURE	
TESTING C Before per >> 2.PERFOR 1. Start er 2. Check IS DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon	Forming the followin GO TO 2. RM DTC CONFIRMAT Ingine and let it idle for DTC. ected? Proceed to <u>EC-437,</u> INSPECTION END S Procedure THROTTLE POSITIC nition switch OFF.	ng procedure, confirm that battery v TION PROCEDURE r 1 second. "Diagnosis Procedure".	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

 $2. {\sf CHECK \ THROTTLE \ POSITION \ SENSOR \ POWER \ SUPPLY \ CIRCUIT}$

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

	+		_	
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F25	80	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

$\mathbf{3}$.check throttle position sensor ground circuit

- 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 actu- ator		ECM	
Connector	Connector Terminal		Terminal	
F7	4	F25	78	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

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

	+	-		
Electric throttle control actu- ator		ECM		Continuity
Connector	Terminal	Connector Terminal		
F7	1	F25	79	Existed
	3	125	77	Existed

2. Also check harness for short to ground and 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

Check throttle position sensor. Refer to <u>EC-438</u>, "Component Inspection (<u>TP Sensor</u>)". Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

Component Inspection (TP Sensor)

INFOID:000000008930358

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 2. Reconnect all harness connectors disconnected.
- 3. Perform "Throttle Valve Closed Position Learning". Refer to EC-138, "Work Procedure".
- 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 terminals as per the following conditions.

ECM						
Connec- + –		Condition		Voltage		
tor	Terr	ninal				
	77	- 78	Accelerator pedal	Fully released	Less than 4.75 V	
F25				Fully depressed	More than 0.36 V	
F23	70			Fully released	More than 0.36 V	
	79			Fully depressed	Less than 4.75 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

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< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

DTC Logic

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Throttle/Pedal position sensor/switch "D" / "E" voltage correlation)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	 Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 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 let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Proceed to <u>EC-440, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000008930360

1.CHECK APP SENSOR 1 POWER SUPPLY

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

	+			
APP	sensor	_	Voltage (Approx.)	
Connector	Connector Terminal			
E12	4	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector.

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

	+		_	
APP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E12	4	E16	122	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 POWER SUPPLY

Check the voltage between APP sensor harness connector and ground.

	+		
APP	sensor	_	Voltage (Approx.)
Connector	Terminal		
E12	5	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-443, "Diagnosis Procedure".

Is inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit.
- NO >> Repair or replace error-detected parts.

5. CHECK APP SENSOR GROUND CIRCUIT

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

	+	-	_		
APP s	sensor	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
E12	1	E16	120	- Existed	
LIZ	2		127	LAISted	
4 Also ch	ock harnoss	for short to p	ower		

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

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

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P2138 APP SENSOR

	+		_	
APP	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	126	Existed
LIZ	6		119	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts

7.CHECK APP SENSOR

Check APP sensor. Refer to EC-442, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

Component Inspection (APP Sensor)

INFOID:000000008930361

$1. {\sf CHECK} \ {\sf ACCELERATOR} \ {\sf PEDAL} \ {\sf POSITION} \ {\sf SENSOR}$

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.

4. Check the voltage between ECM harness connector terminals as per the following condition.

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terr	ninal			
	126	127		Fully released	0.6 - 0.9 V
E16	120	121	Accelerator pedal	Fully depressed	3.9 - 4.7 V
EIO	119	120		Fully released	0.3 - 0.6 V
	119	120		Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

SENSOR POWER SUPPLY 2 CIRCUIT

Description

ECM supplies a voltage of 5.0 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the shorted-circuit sensor.

in the sensor	is belonging		group as in	e shohed-circuit sensor.	
Sensor power • Battery cur • Crankshaft • Throttle po	rent sensor position (C sition (TP) s	sensor			C
 Accelerato NOTE: 	r pedal posi	tion (APP) se	ensor 1		D
	ver supply 1	circuit is ma	Ifunctioning,	DTC P0643 is displayed.	E
Sensor power • Camshaft • Mass air fle • Engine oil • Exhaust va	oosition (CN ow (MAF) se pressure (E alve timing (I	ensor OP) sensor EVT) control	position sen	sor	F
 Accelerato Intake mar 				nsor	C
Diagnosis			- p - c - c - c -	INFOID:000000008930363	G
1.CHECK A	CCELERAT	FOR PEDAL	POSITION S	SENSOR 2 POWER SUPPLY CIRCUIT-1	Н
 Disconn Turn ign 	ition switch	ator pedal po ON.	. ,	sensor harness connector. ess connector and ground.	I
	F			_	J
APP s		_	Voltage		
Connector	Terminal		(Approx.)		K
E12	5	Ground	5.0 V		rx.
NO >>	GO TO 4. GO TO 2.				L
			POSITION S	SENSOR 2 POWER SUPPLY CIRCUIT-2	Μ
 Disconn Turn ign 	ition switch	rness conne ON.		irness connector and ECM.	N
CVT mode	ls				
		-	-		0
APP s		EC		Continuity	
Connector	Terminal	Connector	Terminal		D
E12	5	E16	118	Existed	Ρ
	GO TO 3.	ormal? place error-d	etected parts	S.	

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

INFOID:000000008930362

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SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

E	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
	32	CMP sensor (PHASE)	F39	1	
F24	40	EOP sensor	F2	1	
	44	EVT control position sensor	F57	1	
F25	36	MAF sensor	F31	1	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

```
4.CHECK COMPONENTS
```

Check the following.

Sensor	Reference
CMP sensor (PHASE)	EC-281, "Component Inspection [CMP Sensor (PHASE)]"
MAF sensor	EC-187, "Component Inspection (MAF Sensor)"
EOP sensor	EC-341, "Component Inspection (EOP Sensor)"
EVT control position sensor	EC-359, "Component Inspection (EVT Control Position Sensor)"

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning component.

5.CHECK APP SENSOR

Check APP sensor. Refer to EC-435, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

BRAKE PEDAL POSITION SWITCH Component Function Check INFOID:00000008930364 **1.**CHECK BRAKE PEDAL POSITION SWITCH FUNCTION With CONSULT 1. Turn ignition switch ON. Select "ENGINE" using CONSULT. 2. Select "BRAKE SW1" in "DATA MONITOR" mode. 3. Check "BRAKE SW1" indication under the following conditions. 4 Condition Monitor item Indication Slightly depressed OFF **BRAKE SW1** Brake pedal Fully released ON Without CONSULT Turn ignition switch ON. 1. Check the voltage between ECM harness connector terminals under the following conditions. 2. ECM Voltage Condition + _ (Approx.) Connector Terminal Terminal Slightly depressed 0 V E16 116 127 Brake pedal Fully released Battery voltage Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-445, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000008930365 1. CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect brake pedal position switch harness connector. 3. Turn ignition switch ON. 4. Check the voltage between brake pedal position switch harness connector and ground. + Brake pedal position switch Voltage Connector Terminal E36 1 Ground Battery voltage Is the inspection result normal?

BRAKE PEDAL POSITION SWITCH

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

2.check stop lamp switch power supply circuit

1. Pull out #5 fuse.

2. Check that the fuse is not fusing.

< DTC/CIRCUIT DIAGNOSIS >

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

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BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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	+		
Brake pedal p	position switch	_	Continuity
Connector	Terminal		
E36	1	#5 fuse ter- minal	Existed

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

Is the inspection result normal?

YES >> Check power supply circuit for 12V battery power supply.

NO >> Repair or replace error-detected parts.

$\mathbf{3.}$ CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between brake pedal position switch harness connector and ECM harness connector.

	+		_	
Brake pedal p	position switch	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E36	2	E16	116	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK BRAKE PEDAL POSITION SWITCH

Check brake pedal position switch. Refer to <u>EC-446</u>, "Component Inspection (Brake Pedal Position Switch)" Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Replace brake pedal position switch. Refer to <u>BR-21, "Exploded View"</u>.

Component Inspection (Brake Pedal Position Switch)

INFOID:000000008930366

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.

- 2. Disconnect brake pedal position switch harness connector.
- 3. Check the continuity between brake pedal position switch terminals under the following conditions.

Brake pedal p	position switch				
+	_	Co	ondition	Continuity	
Term	ninals				
1	2	Brako podal	Fully released	Existed	
I	2	Brake pedal Slightly depressed		Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-15, "Adjustment".

2. Check the continuity between brake pedal position switch terminals under the following conditions.

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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_ als	Co				
als		ondition	Continuity		
	1				EC
2	Brake pedal	Fully released	Existed		
2	Brane pedar	Slightly depressed	Not existed		
					С
ISPECTIO eplace bra	N END ke pedal position	switch. Refer to <u>BR</u>	-21, "Exploded	<u>iew"</u> .	D
					E
					F
					G
					F
					J
					K
					L
					N
					Ν
					С
					Ρ
	ISPECTIO	on result normal? ISPECTION END eplace brake pedal position	SPECTION END	SPECTION END	

< DTC/CIRCUIT DIAGNOSIS >

ASCD INDICATOR

Component Function Check

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	COND	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 is between 38 km/h (24 MPH) and 160 km/h (100 MPH) 	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-448, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000008930368

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 COMBINATION METER

Check DTC with combination meter. Refer to MWI-26, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace combination meter. Refer to <u>MWI-77, "Removal and Installation"</u>.
- NO >> Repair or replace error-detected parts.

FUEL INJECTOR

Component Function Check

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Proceed to EC-449, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

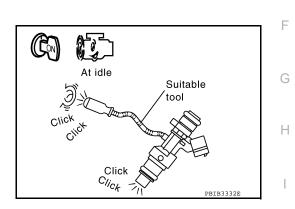
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-449, "Diagnosis Procedure".



INFOID:000000008930370

Diagnosis Procedure

1.CHECK FUSE	J
 Turn ignition switch OFF. Pull out #52 fuse and check that the fuse is not fusing. 	K
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Replace the fuse after repairing the applicable circuit.	
2. CHECK FUEL INJECTOR POWER SUPPLY	
1. Insert the fuse which pulled out.	M
2. Disconnect fuel injector harness connector.	IVI
3. Turn ignition switch ON.	

4. Check the voltage between fuel injector harness connector and ground.

			1	1
	+			
	Fuel injector	-	Voltage	
Cylinder	Connector	Terminal		
1	F18	1		
2	F19	1	Ground	Battery voltage
3	F20	1		Dattery Voltage
4	F21	1		

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. А

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< DTC/CIRCUIT DIAGNOSIS >

3.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between fuel injector harness connector and IPDM E/R harness connector.

+					
	Fuel injector		IPDM E/R		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F18	1	E43 18		
2	F19	1		Existed	
3	F20	1		Existed	
4	F21	1			

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

4.CHECK FUEL INJECTOR CONTROL CIRCUIT

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		ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F18	2		13	
2	F19	2	F24	14	Existed
3	F20	2	F24	10	LAISted
4	F21	2		9	

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-450. "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident"

NO >> Replace malfunctioning fuel injector. Refer to <u>EM-40, "Removal and Installation"</u>.

Component Inspection (Fuel Injector)

INFOID:000000008930371

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.

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

				A
+ –	Cond	Condition		
Terminals				EC
1 2	Temperature °C (°F)	10 - 60 (50 - 140)	11.1 – 14.5 Ω	
he inspection result r ES >> INSPECTIC O >> Replace ma		or. Refer to <u>EM-40, "F</u>	Removal and Installa	ation"
				D
				E
				F
				G
				Н
				I
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FUEL PUMP

Component Function Check

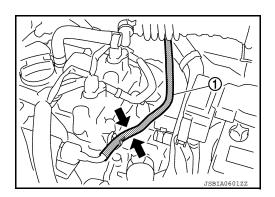
1.CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose ① with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-452, "Diagnosis Procedure".



INFOID:000000008930373

Diagnosis Procedure

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-1

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

	+		_	Voltage
Connector	Terminal	Connector	Terminal	
F24	18	E16	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-2

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

	+		_	
IPD	M E/R	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E46	45	F24	18	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-3

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect fuel pump harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between fuel pump harness connector and ground.

EC-452

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

Fuel	+				
			Vo	Itage	
Connector	Terminal	_		1490	
B48	1	Ground	Battery volt for exist 1 s ignition swit ON.	second after	
s the inspect	ion result no	ormal?			
NO >> 0	GO TO 6. GO TO 4.				
4.CHECK F	USE				
		OFF. (No. 50) fror	m IPDM E/R		
<u>s the inspect</u> YES >> 0	t <u>ion result no</u> GO TO 5.				
_	Replace 15A				
			PPLY CIRCI	4-۱۱ل	
2. Disconne		R harness co		ess connector and fuel pump harness connector.	
+		_			
IPDM		Fuel p	-	Continuity	
Connector	Terminal	Connector	Terminal		
E43	10	B48	1	Existed	
<u>s the inspect</u> YES >> 0	tion result no 30 TO 6.	ormal?		nort to power.	
NO \rightarrow R $3.CHECK FI$	• •	olace error-de GROUND C	•	i.	
	tion switch C e continuity		l pump harn	ess connector and ground.	
+				—	
Fuel p	ump	-	Continuity		
Connector	Terminal				
B48	3	Ground	Existed	—	
3. Also che	ck harness f	or short to po	ower.	—	
s the inspect	tion result no	ormal?			
		blace error-de	etected parts).	
YES >> 0 NO >> R					
YES >> 0	UEL PUMP				
YES >> 0 NO >> R 7.CHECK FI		o <u>EC-454, "C</u>	Component I	nspection (Fuel Pump)".	
YES >> 0 NO >> R 7.CHECK FI	ump. Refer t		Component I	nspection (Fuel Pump)".	
YES >> 0 NO >> R 7.CHECK FI Check fuel pu s the inspect YES >> 0	ump. Refer t tion result no GO TO 8.	ormal?	·	nspection (Fuel Pump)". er to <u>FL-6, "Exploded View"</u> .	

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to <u>PCS-30, "Removal and Installation"</u> (With intelligent key) or <u>PCS-58,</u> <u>"Removal and Installation"</u> (Without intelligent key).
- NO >> Repair or replace error-detected parts.

Component Inspection (Fuel Pump)

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 pump terminals as follows.

Fuel	pump				
+	-	Condition Resistance		Resistance	
Terr	ninals				
1	3	Temperature °C (°F)25 (77)		0.2 - 5.0 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filter and fuel pump. Refer to <u>FL-6, "Removal and Installation"</u>.

Component	Function	Check
-----------	----------	-------

- 1. Turn ignition switch OFF.
- 2. Start engine.

Does the engine start?

- YES >> GO TO 2.
- NO >> Proceed to EC-455, "Diagnosis Procedure".

2. IGNITION SIGNAL FUNCTION

With CONSULT

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 2. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

- 1. Let engine idle.
- 2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.

	E	СМ			G
+	-	-	-	Voltage signal	
Connector	Terminal	Connector	Terminal		Н
	86				
	87				
F25	90	E16	128		I
F25	91	E16	128	2V/div JPBIA47332Z	J
Is the inspec	•		ling on rpm	at idle.	K
		EC-455, "Dia	gnosis Proc	cedure".	L
Diagnosis	Procedu	ire		INFOID:000000008	930376
1.снеск г	USE				Μ
		nd check that	the fuse is	not fusing.	N
YES >> (NO >> F	GO TO 2. Replace the			applicable circuit.	0
 Disconne Turn igni 	ect ignition ition switch			ess connector and ground.	Р

4. Check the voltage between ignition coil harness connector and ground.

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< DTC/CIRCUIT DIAGNOSIS >

	+			
	Ignition coil			Voltage
Cylinder	Connector	Terminal		
1	F34	3		
2	F35	3	Ground	Battery voltage
3	F36	3		
4	F37	3		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect IPDM E/R harness connector.

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

	+	-			
IPDN	/I E/R	Ignition coil			Continuity
Connector	Terminal	Cylinder	Connector	Terminal	
		1	F34	3	
E43	17	2	F35	3	Existed
L40	17	3	F36	3	Existed
		4	F37	3	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Incident"</u>.

NO >> Repair or replace error-detected parts.

4.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Check the continuity between ignition coil harness connector and ground.

	+			
	Ignition coil			Continuity
Cylinder	Connector	Terminal		
1	F34	2		
2	F35	2	Ground	Existed
3	F36	2	Giouna	LAISIEU
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

 ${f b}.$ CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

< DTC/CIRCUIT DIAGNOSIS >

	+			_			А
	Ignition coil		E	СМ	Continuity		
Cylinder	Connector	Terminal	Connector	Terminal			EC
1	F34	1		86			
2	F35	1	F25	87	Existed		
3	F36	1	125	90	Existed		С
4	F37	1		91			
3. Also che	eck harness	for short to g	ground and s	short to powe	er.		D
Is the inspec	ction result n	ormal?					D
	GO TO 6.		سمعامه ملم	-			
•	Repair or re		•				E
	GNITION CO						
		power transi	stor. Refer t	to <u>EC-458, "</u>	Component Ins	pection (Ignition Coil with Power	_
<u>Transistor)"</u> .	ction result n	ormal?					F
	GO TO 7.	<u>umar</u>					
-		Ifunctioning i	ignition coil v	with power tr	ansistor. Refer t	to <u>EM-45, "Exploded View"</u> .	G
		-	0	·		· · · ·	
	nition switch						
	nect condens						Н
	ect IPDM E/						
4. Check t	he continuity	between IP	DM E/R har	ness connec	tor and condens	ser harness connector.	1
							I
	+		_				
	M E/R		lenser	Continuity			J
Connector	Terminal	Connector	Terminal				
E43	17	F4	1	Existed			
	eck harness	-	ground.				K
•	ction result n	ormal?					
	GO TO 8. Repair or re	nlaca arror-c	latactad nart	e			L
-			•				
1. Check t	he continuity	between Co	ondenser ha	rness conne	ctor and ground		M
	+		o				NI
	lenser	_	Continuity				Ν
Connector	Terminal						
F4	2	Ground	Existed				0
	eck harness	•	ower.				
-	ction result n	ormal?					
	YES >> GO TO 9.					Ρ	
NO >> Repair or replace error-detected parts. 9.CHECK CONDENSER							
			"Component	Inspection (Condenser)".		
	ction result n		Component		<u>conconcerp</u> .		
	INSPECTIO						
	Replace con						

Revision: October 2012

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Condenser)

1.CHECK CONDENSER

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

3. Check resistance between condenser terminals as per the following.

Condenser					
+	_	Condition	Resistance		
Terr	ninal				
1	2	Temperature °C (°F)25 (77)		Above 1 $M\Omega$	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Condenser.

Component Inspection (Ignition Coil with Power Transistor)

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-1

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

Ignition coil with power tran- sistor		Condition		5	
+	_	Condition		Resistance	
Terminal					
1	2				Except 0 or $\infty\Omega$
I	3	Temperature °C (°F)		25 (77)	Except 0 Ω
2	3				

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-45, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-2

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 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.
- Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to <u>EM-45</u>, "Exploded View".
- 8. Remove ignition coil and spark plug of the cylinder to be checked. Refer to EM-45, "Exploded View".
- 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.

< DTC/CIRCUIT DIAGNOSIS >

- 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:

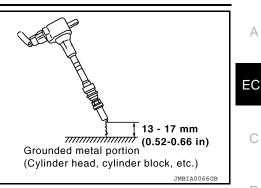
- During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66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

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-45, "Exploded View".



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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

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 3. Select "LOAD SIGNAL" and check indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL Rear wir	Rear window defogger switch	ON	ON
	Real window delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-460, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

(B) With CONSULT

Check "LOAD SIGNAL" indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd posi- tion	ON
	5 5 5 6 6	OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to EC-460, "Diagnosis Procedure".

$\mathbf{3.}$ CHECK HEATER FAN CONTROL SWITCH FUNCTION

With CONSULT

Select "HEATER FAN SW" and check indication as per the following conditions.

Monitor item	Condition		Indication
HEATER FAN	Heater for control switch	ON	ON
SW	Heater fan control switch		OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-460, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-460, "Component Function Check"</u>.

EC-460

Which circuit is related to the incident?

Rear window defogger>>GO TO 2. Headlamp>>GO TO 3. Heater fan>>GO TO 4.

Revision: October 2012

INFOID:00000008930379

INFOID-000000008930380

ELECTRICAL LOAD SIGNAL	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
2.CHECK REAR WINDOW DEFOGGER SYSTEM	A
Check the rear window defogger system. Refer to <u>DEF-26, "Work Flow"</u> .	
>> INSPECTION END	EC
3. CHECK HEADLAMP SYSTEM	
Check the headlamp system. Refer to EXL-83, "Work Flow".	
	С
4.CHECK HEATER FAN CONTROL SYSTEM	D
Check the heater fan control system. Refer to HA-15, "Workflow".	
>> INSPECTION END	E
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< DTC/CIRCUIT DIAGNOSIS >

COOLING FAN

Component Function Check

1.CHECK COOLING FAN FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that cooling fan operates at low speed or high speed.

Without CONSULT

- Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>" (with intelligent key), or <u>PCS-37</u>, "<u>Diagnosis Description</u>" (without intelligent key).
- 2. Check that cooling fan operates.
- Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-462, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000008930387

1. CHECK COOLING FAN MOTOR GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan motor harness connector.
- 3. Check the continuity between cooling fan motor harness connector and ground.

	+		
Cooling fan motor		-	Continuity
Connector	Terminal		
E53	3	Ground	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK COOLING FAN MOTOR CIRCUIT-1

1. Disconnect IPDM E/R harness connector.

2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

	+	_		
IPD	M E/R	Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	23		1	
⊑44	21	E53	2	Existed
E48	58		4	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

 $\mathbf{3.}$ CHECK COOLING FAN MOTOR

Check cooling fan motor. Refer to EC-463, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace cooling fan motor. Refer to <u>CO-17, "Removal and Installation"</u>.

COOLING FAN

[MRA8DE]

	mittent inci	dent. Refer to <u>GI-43, "Inter</u>	rmittent Incident".	
the inspe	ection result	normal?		
ES >>	Check IPE tem) or PC	OM E/R. Refer to <u>PCS-10,</u> CS-38, "CONSULT Function	<u>"CONSULT Function (IPDM E/F</u> n (IPDM E/R)" (Without intelligen	<u>R)</u> (With intelligent key sys- it key system).
0 >>	Repair or i	replace error-detected part	ts.	,
ompone	ent Inspe	ction (Cooling Fan M	Aotor)	INFOID:00000008930388
		FAN MOTOR		
pply cool	ling fan moi	tor terminals with battery v	oltage and check operation.	
Cooling	fan motor			
	rminal	Condition	Operation	
+	_	_		
1	4	12 V direct current supply between terminals 1 and 2	Cooling fan operates.	
•	T	No supply	Cooling fan not operates.	
2 3		12 V direct current supply between terminals 1 and 2	Cooling fan operates.	
		No supply	Cooling fan not operates.	
he inspe	ection result	normal?	<u> </u>	
) >>		ON END ooling fan motor. Refer to j	CO-17. "Removal and Installatior	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .
0 >>			CO-17. "Removal and Installation	<u>)"</u> .

< DTC/CIRCUIT DIAGNOSIS >

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

REFRIGERANT PRESSURE SENSOR

Component Function Check

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 terminals.

Connector	+	_	Voltage
Connector	Terr		
E16	103	124	1.0 - 4.0 V

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to <u>EC-464</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000008930390

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

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

	+		Voltage (Approx.)	
Refrigerant pr	essure sensor	-		
Connector Terminal				
E35	3	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

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

	+	-		
Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E35	3	E16	104	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK REFRIGERANT PRESSURE SENSOR GROUND

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



^{1.} Turn ignition switch OFF.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+	-	-			
Refrigerant pr	ressure sensor	EC	CM	Continuity		
Connector	Terminal	Connector	Terminal			
E35	1	E16	124	Existed		
4. Also che	eck harness	for short to p	ower.			
	ction result n	ormal?				
	GO TO 4. Repair or rep	alago arror d	atacted part			
	• •		•	IS. DR INPUT SIGNAL CIRCUIT		
 Check t tor. 	ne continuity	Detween Et	JM narness	connector and refrigerant pressure sensor harness con	1ec-	
	+	-	_			
Refrigerant pr	ressure sensor	EC	CM	Continuity		
Connector	Terminal	Connector	Terminal			
E35	2	E16	103	Existed		
YES >> NO >> 5.снескт	ction result no GO TO 5. Repair or rep NTERMITTE mittent incide	olace error-d ENT INCIDEI	NT.	r <u>mittent Incident"</u> .		
YES >> NO >> 5.CHECK I Check interrist the inspect YES >>	GO TO 5. Repair or rep NTERMITTE nittent incide ction result ne Replace refi	Diace error-d ENT INCIDEI ent. Refer to <u>ormal?</u> rigerant presendittioner), or	NT. GI-43, "Inter ssure senso HAC-191, "	<u>mittent Incident"</u> . r. Refer to <u>HAC-109, "Removal and Installation"</u> (For a <u>"Removal and Installation"</u> (For manual air condittioner).	uto	
YES >> NO >> 5.CHECK I Check interrist the inspect YES >>	GO TO 5. Repair or rep NTERMITTE nittent incide ction result no Replace refir matic air cor	Diace error-d ENT INCIDEI ent. Refer to <u>ormal?</u> rigerant presendittioner), or	NT. GI-43, "Inter ssure senso HAC-191, "	<u>mittent Incident"</u> . r. Refer to <u>HAC-109, "Removal and Installation"</u> (For a <u>"Removal and Installation"</u> (For manual air condittioner).	uto	
YES >> NO >> 5.CHECK I Check interrist the inspect YES >>	GO TO 5. Repair or rep NTERMITTE nittent incide ction result no Replace refir matic air cor	Diace error-d ENT INCIDEI ent. Refer to <u>ormal?</u> rigerant presendittioner), or	NT. GI-43, "Inter ssure senso HAC-191, "	<u>mittent Incident"</u> . r. Refer to <u>HAC-109, "Removal and Installation"</u> (For a <u>"Removal and Installation"</u> (For manual air condittioner).	uto	
YES >> NO >> 5.CHECK I Check interrist the inspect YES >>	GO TO 5. Repair or rep NTERMITTE nittent incide ction result no Replace refir matic air cor	Diace error-d ENT INCIDEI ent. Refer to <u>ormal?</u> rigerant presendittioner), or	NT. GI-43, "Inter ssure senso HAC-191, "	<u>mittent Incident"</u> . r. Refer to <u>HAC-109, "Removal and Installation"</u> (For a <u>"Removal and Installation"</u> (For manual air condittioner).	uto	

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MALFUNCTION INDICATOR LAMP

Component Function Check

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.

2. Check that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-466, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK DTC WITH ECM

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX. Refer to EC-93, "DTC Index".

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to <u>MWI-17, "CONSULT Function (METER/M&A)"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis for DTC indicated. Refer to <u>MWI-26. "DTC Index"</u>.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to <u>MWI-77, "Removal and Installation"</u>.

NO >> Repair or replace error-detected parts.

INFOID:000000008930391

ON BOARD REFUELING VAPOR RECOVERY (ORVR)
< DTC/CIRCUIT DIAGNOSIS >
ON BOARD REFUELING VAPOR RECOVERY (ORVR)
Component Function Check
1.CHECK ORVR FUNCTION
Check whether the following symptoms are present.Fuel odor from EVAP canister is strong.Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.
Are any symptoms present?
YES >> Proceed to EC-467, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

<u>A or B</u>

- А >> GO TO 2.
- В >> GO TO 7.

2.CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor Н 1. attached. Refer to FL-15, "Removal and Installation".
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

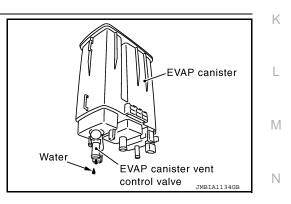
YES >> GO TO 3. NO >> GO TO 4.

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 6.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-15, "Removal and Installation".

>> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose. Refer to FL-15, "Removal and Installation".

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Check refueling EVAP vapor cut valve. Refer to EC-469, "Component Inspection".

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ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Removal and Installation"</u>.

7.CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-15</u>, "<u>Removal and Installation</u>".
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

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

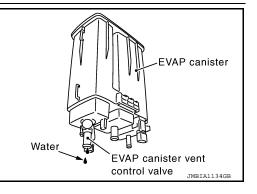
 ${f 8.}$ CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 6.

NO >> GO TO 11.



9.REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-15, "Removal and Installation".

>> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose. Refer to <u>FL-14, "Exploded View"</u>.

11.CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

12.CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace filler neck tube.

13.CHECK REFUELING EVAP VAPOR CUT VALVE

Check refueling EVAP vapor cut valve. Refer to EC-469, "Component Inspection".

Is the inspection result normal?

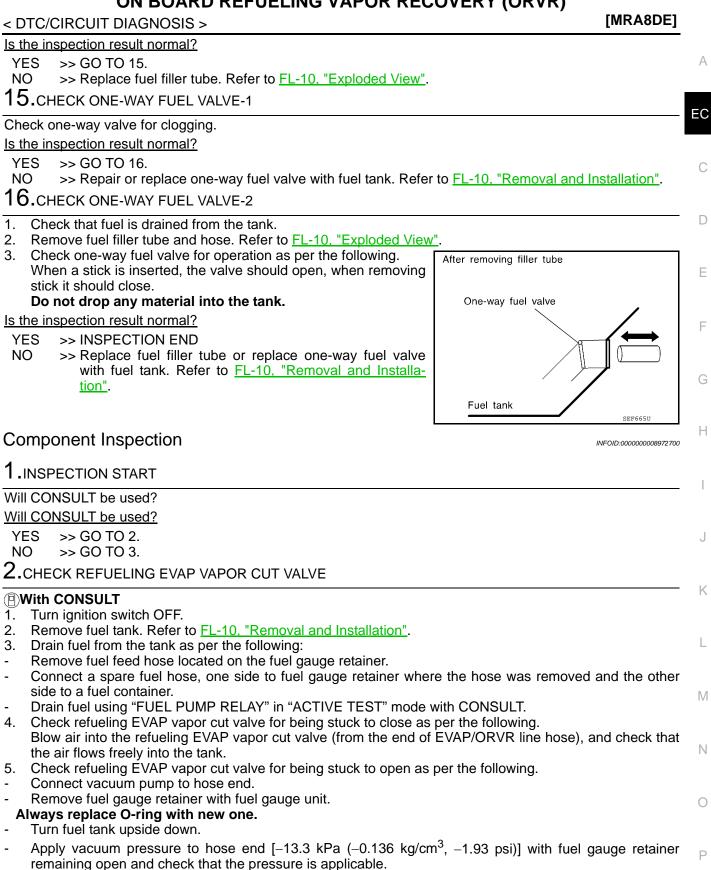
YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10. "Removal and Installation"</u>.

14.CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

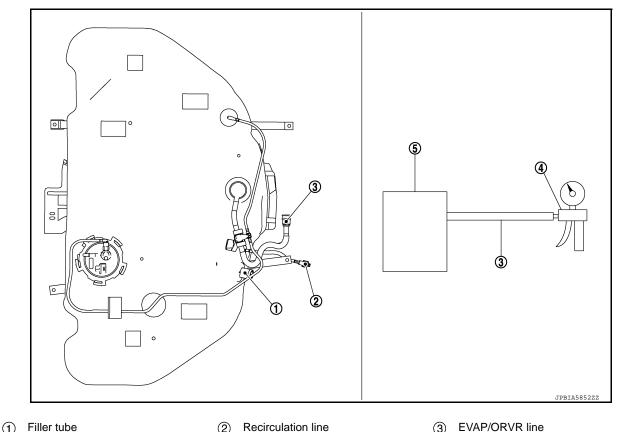
ON BOARD REFUELING VAPOR RECOVERY (ORVR)



ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



(4) Vacuum/pressure handy pump

(5) Fuel tank

(3) EVAP/ORVR line

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-10, "Removal and Installation".

3.CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT

- Turn ignition switch OFF. 1.
- Remove fuel tank. Refer to FL-10, "Removal and Installation". 2.
- 3. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer. -
- Drain fuel from the tank using a handy pump into a fuel container. _
- 4. 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.
- 5. 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.

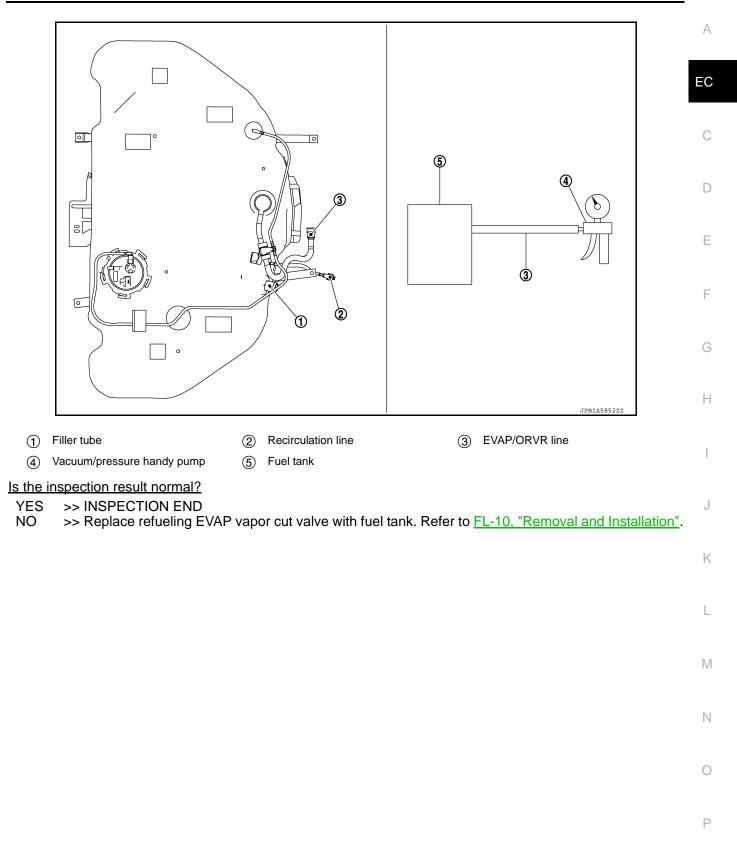
Always replace O-ring with new one.

- Turn 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.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



< SYMPTOM DIAGNOSIS >

[MRA8DE]

INFOID:000000008930393

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

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-452</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-142</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-449</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-49</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-30</u>
	Incorrect idle speed adjustment	1	1	2	3	3	1	1 2	1	1		1		2	<u>EC-478</u> <u>EC-424,</u> <u>EC-427,</u> <u>EC-429</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-479</u>
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-455</u>
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-163
Mass ai	r flow sensor circuit				2										EC-186
Engine	coolant temperature sensor circuit	1					3	-		3		-			EC-197
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			<u>EC-209,</u> <u>EC-213,</u> <u>EC-216</u>
Throttle	position sensor circuit					•	2			2					<u>EC-199,</u> <u>EC-265,</u> <u>EC-371,</u> <u>EC-437</u>
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-431,</u> <u>EC-434,</u> <u>EC-440</u>
Knock s	ensor circuit			2								3			<u>EC-274</u>
Cranksh	naft position sensor (POS) circuit	2	2												EC-276
Camsha	aft position sensor (PHASE) circuit	3	2												<u>EC-279</u>

Revision: October 2012

< SYMPTOM DIAGNOSIS >

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						SI	(MPT)	OM							Δ
	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	A EC C D
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	-	
Vehicle speed signal circuit		2	3		3						3			<u>EC-329</u> (CVT mod- els), <u>EC-</u> <u>330</u> (M/T models)	F
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-345, EC-346, EC-347, EC-348, EC-349, EC-350, EC-351	H
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-179</u>	I
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			<u>EC-182</u>	J
Exhaust valve timing control position sensor circuit		3	2		1	3	2	2	3		3			<u>EC-358</u>	Κ
PNP signal circuit			3		3		3	3			3			<u>EC-354</u>	
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-464</u>	L
Battery current sensor circuit						4	5	5					3	<u>EC-373,</u> <u>EC-376,</u> <u>EC-379,</u> <u>EC-382</u>	M
Starter relay circuit	3													<u>EC-398,</u> <u>EC-401</u>	
Starter control relay circuit	3													<u>EC-398,</u> <u>EC-401</u>	Ν
Electrical load signal circuit							3							<u>EC-460</u>	0
Intake manifold runner control valve motor circuit					4	4								<u>EC-412</u>	0
Intake manifold runner control valve position sensor circuit					4	4								<u>EC-415</u>	Ρ
Intake manifold tuning valve circuit					1									EC-407	

< SYMPTOM DIAGNOSIS >

[MRA8DE]

						S	(MPT	OM						
Warranty symptom and	HARD/NO START/RESTART (EXCP. HA)	B ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	H LACK OF POWER/POOR ACCELERATION		B ROUGH IDLE/HUNTING		SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1140 54
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-51 (Auto A/C), HAC-156 (Manual air condition- ing)
ABS actuator and electric unit (control unit)			4											BRC-51

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDTE/TOM IDTE	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	y symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	F													<u>FL-13</u>
	Fuel piping	5		5	5	5		5	5	İ		5	1		<u>FL-5</u>
	Vapor lock		5												
	Valve deposit												1		
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			—

< SYMPTOM DIAGNOSIS >

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		(1				NOI					HIGH					A
		(EXCP. HA)		OT		ERAT					TURE	NO	7	GE)		E
				NG/FLAT SF	ONATION	OOR ACCEI	ш	ŊĊ		TO IDLE	R TEMPERA	ONSUMPTI	OIL CONSUMPTION	IDER CHAR	Reference	(
		HARD/NO START/RESTART	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 CO	BATTERY DEAD (UNDER CHARGE)	page	[
		HARD/	ENGIN	HESIT	SPAR	LACK	HIGH	ROUG	IDLINC	SLOW	OVERI	EXCE	EXCE:	BATTE		[
Warranty s	ymptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА		1
Air	Air duct														<u>EM-26</u>	
	Air cleaner														<u>EM-26</u>	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-26</u>	(
	Electric throttle control actuator	5			5		5			5						ŀ
	Air leakage from intake manifold/ Collector/Gasket	-													<u>EM-27</u>	
Cranking	Battery	1	1	1		1		1	1					1	<u>PG-4</u>	
	Generator circuit					1		1	1						<u>CHG-14</u>	
	Starter circuit	3													<u>STR-20,</u> <u>STR-23</u>	
	Signal plate	6										1			<u>EM-103</u>	
	PNP signal	4													<u>TM-161</u> (CVT mod- els), <u>TM-</u> <u>17</u> (6MT models)	ł
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-79</u>	
	Cylinder head gasket						-			-	4		3	-		N
	Cylinder block												_			
	Piston	-											4			
	Piston ring	6	6	6	6	6		6	6			6		-	<u>EM-103</u>	Ν
	Connecting rod															
	Bearing	-														(
Volve	Crankshaft														EM 59	
Valve mecha-	Timing chain	-													<u>EM-58</u>	
nism	Camshaft Intake valve timing control														<u>EM-64</u> <u>EC-180</u>	F
	Exhaust valve timing control	5	5	5	5	5		5	5			5			<u>EC-180</u> <u>EC-183</u>	
	Intake valve	-												-	<u> </u>	
	Exhaust valve	-											3		<u>EM-79</u>	
		<u> </u>														

< SYMPTOM DIAGNOSIS >

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							S	YMPT	OM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket Three way catalyst	5	5	5	5	5		5	5			5			<u>EX-4, EX-</u> <u>7, EM-32</u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler Oil level (Low)/Filthy oil	5	5	5	5	5		5	5			5			<u>EM-35, LU-</u> <u>11, LU-16</u> <u>LU-7</u>
Cooling	Radiator/Hose/Radiator filler cap Thermostat Water pump									5					<u>CO-16</u> <u>CO-22</u> <u>CO-19</u>
	Water gallery Cooling fan Coolant level (Low)/Contaminat-	5	5	5	5	5		5	5	5	2	5			<u>CO-6</u> <u>CO-17</u>
NATS (Nis	ed coolant	1	1												<u>CO-11</u> (With intel- ligent key system), <u>SEC-173</u> (Without in- telligent key sys- tem)

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

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 System, <u>EC-35, "MUL-</u> <u>TIPORT FUEL INJECTION SYSTEM : System Description"</u>.

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INFOID:000000008930394

PERIODIC MAINTENANCE IDLE SPEED

Inspection

1.CHECK IDLE SPEED

With CONSULT
 Check idle speed in "DATA MONITOR" mode of "ENGINE" using CONSULT.

Specification

: EC-485, "Idle Speed"

With GST Check idle speed with Service \$01 of GST.

Specification

: EC-485, "Idle Speed"

>> INSPECTION END

INFOID:000000008930395

IGNITION TIMING

< PERIODIC MAINTENANCE >

IGNITION TIMING

Inspection

1. CHECK IGNITION TIMING

- 1. Attach timing light to the ignition coil No.1 harness.
- 2. Check ignition timing.
 - (1) : Timing indicator

Specification

>> INSPECTION END

: EC-485, "Ignition Timing"

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< PERIODIC MAINTENANCE >

EVAPORATIVE EMISSION SYSTEM

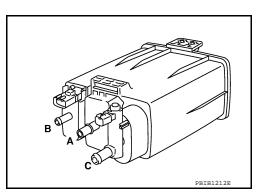
Inspection

EVAP CANISTER

1.CHECK EVAP CANISTER

- 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.

>> INSPECTION END



[MRA8DE]

INFOID:000000008972704

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.

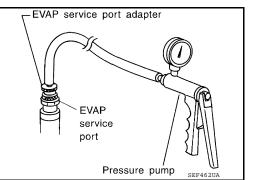
NOTE:

- 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.

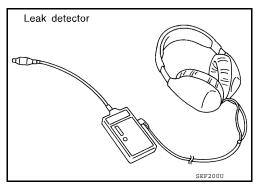
1.EVAP LEAK CHECK

(B)With CONSULT

 Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.

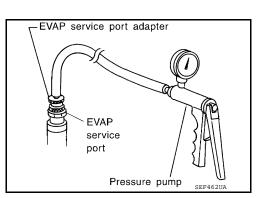


- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Řemove 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-49</u>, "<u>EVAPORATIVE EMISSION SYS-</u> <u>TEM : System Description</u>".



Without CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.



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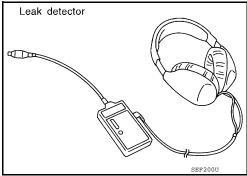
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- 3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4. 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-49</u>, "EVAPORATIVE EMISSION SYS-<u>TEM : System Description</u>".

>> INSPECTION END



< PERIODIC MAINTENANCE >

POSITIVE CRANKCASE VENTILATION

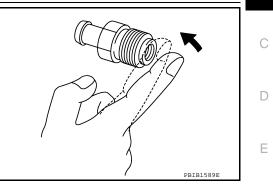
Inspection

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace PCV valve. Refer to <u>EC-15, "ENGINE CON-</u> <u>TROL SYSTEM : Component Parts Location"</u>.



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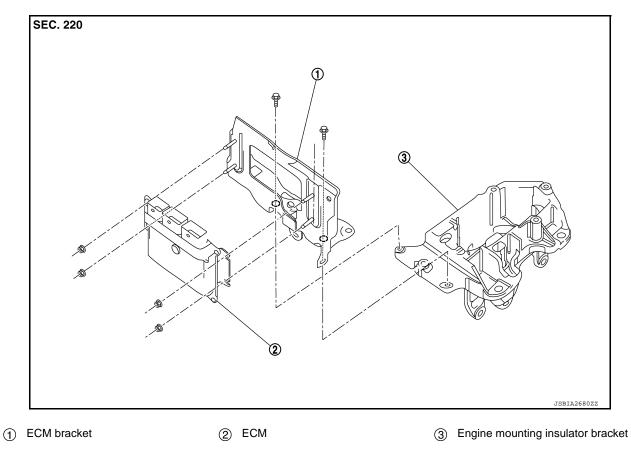
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REMOVAL AND INSTALLATION ECM

Exploded View

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[MRA8DE]



Removal and Installation

INFOID:000000008930400

REMOVAL

- 1. Remove battery. Refer to PG-50, "Removal and Installation (Battery)".
- 2. Disconnect ECM harness connectors. Refer to PG-42. "Description".
- 3. Remove the fuse box bracket from the ECM bracket.
- 4. Remove the ECM bracket from the engine mounting LH, together with ECM.
- 5. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing ECM. Refer to <u>EC-134, "Work Procedure"</u>.

SERVICE DATA AND SPECIFICATIONS (SDS)

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SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification (Approx.)	
CVT	No load* (in P or N position)	700 rpm	_ (
M/T	No load* (in Neutral position)	700 rpm	
*: Under the following conditions			D

*: 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

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Transmission	Condition	Specification (Approx.)	
CVT	No load* (in P or N position)	8° BTDC	
M/T	No load* (in Neutral position)	8° BTDC	

*: 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 or GST)	
At idle	10 – 35 %	
At 2,500 rpm	10 – 35 %	
		_

Mass Air Flow Sensor

Condition	Specification (Using CONSULT)	Ľ
At idle*	Approx. 2.9 g/sec	
At 2,500 rpm*	Approx. 5.5 g/sec	M

*: Engine is warmed up to normal operating temperature and running under no load.

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