SECTION ECEC ENGINE CONTROL SYSTEM o

А

D

Е

CONTENTS

MRA8DE

PRECAUTION)
PRECAUTIONS	9
On Board Diagnostic (OBD) System of Engine and CVT)
PREPARATION13	3
PREPARATION	3
SYSTEM DESCRIPTION18	5
COMPONENT PARTS18	5
ENGINE CONTROL SYSTEM18 ENGINE CONTROL SYSTEM :	5
Component Parts Location	9
Battery Current Sensor (with Battery Temperature Sensor))
Camshaft Position Sensor (PHASE)	1 1
Cooling Fan21 ECM	1 2
Electric Throttle Control Actuator	3
Engine Oil Temperature Sensor24 EVAP Canister Purge Volume Control Solenoid Valve	1

EVAP Canister Vent Control Valve24 EVAP Control System Pressure Sensor25 Exhaust Valve Timing Control Position Sensor25 Exhaust Valve Timing Control Solenoid Valve25	F
Fuel Injector25 Fuel Level Sensor Unit, Fuel Filter and Fuel Pump Assembly	Н
Heated Oxygen Sensor 2 26 Ignition Coil with Power Transistor 27 Intake Valve Timing Control Solenoid Valve 27	
Intake Manifold Runner Control Valve27 Intake Manifold Tuning Valve	1
Knock Sensor28 Mass Air Flow Sensor (with Intake Air Tempera- ture Sensor)	J
Park/Neutral Position Switch	K
STRUCTURE AND OPERATION	M
SYSTEM	
ENGINE CONTROL SYSTEM	N
MULTIPORT FUEL INJECTION SYSTEM35 MULTIPORT FUEL INJECTION SYSTEM : Sys- tem Description	P
ELECTRIC IGNITION SYSTEM	
INTAKE VALVE TIMING CONTROL	

INTAKE VALVE TIMING CONTROL : System De- scription
EXHAUST VALVE TIMING CONTROL
INTAKE MANIFOLD RUNNER CONTROL
INTAKE MANIFOLD TUNING SYSTEM
ENGINE PROTECTION CONTROL AT LOW EN-GINE OIL PRESSURE44ENGINE PROTECTION CONTROL AT LOW EN-GINE OIL PRESSURE : System Description44
FUEL FILLER CAP WARNING SYSTEM 45 FUEL FILLER CAP WARNING SYSTEM : System 45
AIR CONDITIONING CUT CONTROL
ALTERNATOR POWER GENERATION VOLT- AGE VARIABLE CONTROL SYSTEM
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 52 CAN COMMUNICATION : System Description 52
ECO MODE CONTROL 52 ECO MODE CONTROL : System Description 53
SPORT MODE CONTROL 53 SPORT MODE CONTROL : System Description 53
OPERATION54
AUTOMATIC SPEED CONTROL DEVICE (ASCD) 54 AUTOMATIC SPEED CONTROL DEVICE (AS- CD) : Switch Name and Function

ON BOARD DIAGNOSTIC (OBD) SYSTEM 55 Diagnosis Description
DIAGNOSIS SYSTEM (ECM) 56
DIAGNOSIS DESCRIPTION 56 DIAGNOSIS DESCRIPTION : 1st Trip Detection 56 Diagnosis Description Logic 56 DIAGNOSIS DESCRIPTION : DTC and Freeze 56 Frame Data 56 DIAGNOSIS DESCRIPTION : DTC and Freeze 57 DIAGNOSIS DESCRIPTION : Counter System 57 DIAGNOSIS DESCRIPTION : Driving Pattern 60 DIAGNOSIS DESCRIPTION : System Readiness 61 DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC) 62 DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL) 63 On Board Diagnosis Function 63 CONSULT Function 66
ECU DIAGNOSIS INFORMATION
ECM77Reference Value77Fail Safe91DTC Inspection Priority Chart93DTC Index95Test Value and Test Limit99
WIRING DIAGRAM108
ENGINE CONTROL SYSTEM108 Wiring Diagram
BASIC INSPECTION130
DIAGNOSIS AND REPAIR WORKFLOW 130 Work Flow 130 Diagnostic Work Sheet 133 BASIC INSPECTION 135 Work Procedure 135
ADDITIONAL SERVICE WHEN REPLACING
ADDITIONAL SERVICE WHEN REPLACING ECM Description 139 Work Procedure 139
VIN REGISTRATION
ACCELERATOR PEDAL RELEASED POSI- TION LEARNING
THROTTLE VALVE CLOSED POSITION LEARNING143

Description Work Procedure	143
IDLE AIR VOLUME LEARNING	144
Description	
Work Procedure	144
MIXTURE RATIO SELF-LEARNING VALUE	
CLEAR	
Description Work Procedure	
FUEL PRESSURE	147
Work Procedure	147
HOW TO SET SRT CODE	
Description	
SRT Set Driving Pattern Work Procedure	
HOW TO ERASE PERMANENT DTC	
Description	
Work Procedure (Group A)	156
Work Procedure (Group B)	158
DTC/CIRCUIT DIAGNOSIS	161
TROUBLE DIAGNOSIS - SPECIFICATION	
VALUE	161
Description	161
Component Function Check	
Diagnosis Procedure	162
POWER SUPPLY AND GROUND CIRCUIT Diagnosis Procedure	
U0101 CAN COMM CIRCUIT	172
Description	
DTC Logic	
Diagnosis Procedure	172
U1001 CAN COMM CIRCUIT	
Description	
DTC Logic Diagnosis Procedure	
C C	
P0011 IVT CONTROL	
DTC Logic Diagnosis Procedure	
Component Inspection	
P0014 EVT CONTROL	177
DTC Logic	
Diagnosis Procedure	
Component Inspection	
P0030, P0031, P0032 A/F SENSOR 1 HEA	
ER DTC Logic	
Diagnosis Procedure	
Component Inspection (A/F Sensor 1 Heater) .	

P0037, P0038 HO2S2 HEATER 182 DTC Logic 182 Diagnosis Procedure 182 Component Inspection 182	A
Component Inspection (HO2S Heater)	EC
Component Inspection (IVT Control Solenoid Valve)	С
P0078 EVT CONTROL SOLENOID VALVE 187 DTC Logic	D
P0101, P0102, P0103 MAF SENSOR190DTC Logic190Diagnosis Procedure191Component Inspection (MAF Sensor)192	F
P0111 IAT SENSOR195DTC Logic195Component Function Check196Diagnosis Procedure196Component Inspection196	G
P0112, P0113 IAT SENSOR197DTC Logic197Diagnosis Procedure197Component Inspection (IAT Sensor)198	I
P0116 ECT SENSOR199DTC Logic199Component Function Check200Diagnosis Procedure200Component Inspection200	K
P0117, P0118 ECT SENSOR201DTC Logic201Diagnosis Procedure201Component Inspection (ECT Sensor)202	L
P0122, P0123 TP SENSOR203DTC Logic203Diagnosis Procedure203Component Inspection (TP Sensor)205	Ν
P0125 ECT SENSOR206DTC Logic206Diagnosis Procedure206Component Inspection207	O
P0127 IAT SENSOR208DTC Logic208Diagnosis Procedure208Component Inspection209	Г
P0128 THERMOSTAT FUNCTION	

Diagnosis Procedure211 Component Inspection211	
P0130 A/F SENSOR 1	5
Diagnosis Procedure	
P0131 A/F SENSOR 1 217 DTC Logic	
Diagnosis Procedure	}
P0132 A/F SENSOR 1 220	
DTC Logic220 Diagnosis Procedure221	
P0137 HO2S2	; F
DTC Logic223	[,] F
Component Function Check224	•
Diagnosis Procedure	
Component Inspection (HO2S2)226	
P0138 HO2S2 228	
DTC Logic228	
Component Function Check	
Diagnosis Procedure	
Component Inspection (HO2S2)232	2 F
P0139 HO2S2 235	;
DTC Logic235	
Component Function Check	
Diagnosis Procedure	F
Component Inspection (HO2S2)238	i
P014C, P014D, P015A, P015B A/F SENSOR	
1 241	
DTC Logic241	F
Diagnosis Procedure243	
Component Inspection (A/F Sensor 1 Heater)245	
Component Inspection (MAF Sensor)245	j
P0171 FUEL INJECTION SYSTEM FUNC-	F
TION	
DTC Logic	;
Diagnosis Procedure249	1
P0172 FUEL INJECTION SYSTEM FUNC-	F
TION 252	2 0
DTC Logic252	
Diagnosis Procedure253	5
P0181 FTT SENSOR 256	;
DTC Logic256	; F
Component Function Check257	
Diagnosis Procedure258	6
Component Inspection259)
P0182, P0183 FTT SENSOR 260)
DTC Logic	
Diagnosis Procedure	
Component Inspection261	
	- ~
Revision: December 2015	EC-4

P0196 EOT SENSOR	.263
DTC Logic	
Component Function Check	
Diagnosis Procedure	
Component Inspection	
	. 205
P0197, P0198 EOT SENSOR	266
DTC Logic	
Diagnosis Procedure	
Component Inspection (EOT Sensor)	
	. 207
P0222, P0223 TP SENSOR	268
DTC Logic	
Diagnosis Procedure	
Component Inspection (TP Sensor)	. 270
P0300, P0301, P0302, P0303, P0304 MIS-	
FIRE	274
DTC Logic	
Diagnosis Procedure	. 272
P0327, P0328 KS	077
DTC Logic	
Diagnosis Procedure	
Component Inspection (KS)	. 278
	070
P0335 CKP SENSOR (POS)	
DTC Logic	
Diagnosis Procedure	. 279
Component Inspection [CKP Sensor (POS)]	. 281
· · ·	.282
DTC Logic	.282 .282
DTC Logic Diagnosis Procedure	.282 .282 .282
DTC Logic	.282 .282 .282
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)]	.282 . 282 . 282 . 282
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION.	.282 282 282 282 284 .284
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic	.282 .282 .282 .284 .284 .285
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check	.282 .282 .282 .284 .284 .285 .285 .285
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic	.282 .282 .282 .284 .284 .285 .285 .285
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure	.282 .282 .282 .284 .285 .285 .285 .286 .287
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM	.282 .282 .282 .284 .285 .285 .286 .287 .280
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic	.282 .282 .284 .284 .285 .285 .286 .287 .280 .290
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check	.282 282 284 .284 .285 .285 .286 .287 .290 .290 .291
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic	.282 282 284 .284 .285 .285 .286 .287 .290 .290 .291
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure	.282 282 284 .284 .285 .285 .286 .287 .290 .290 .291
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME	.282 282 284 .284 .285 285 286 286 287 .280 .290 .290 .291 .292
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic DTC Logic DTC Logic Component Function Check DTC Logic P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	.282 .282 .284 .285 .285 .285 .286 .287 .290 .290 .291 .292 .295
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic	.282 .282 .284 .285 .285 .285 .286 .287 .290 .291 .290 .291 .292 .295
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic DTC Logic	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .296
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .296
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic Component Inspection	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .296
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic DTC Logic DTC Logic DTC Logic DTC Logic DTC Logic	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .296 .298
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure DTC Logic DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DTC LOGIC	.282 .282 .284 .285 .285 .285 .286 .287 .290 .290 .290 .291 .292 .295 .295 .295 .296 .298 .298
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic DTC Logic DTC Logic DTC Logic DTC Logic	.282 .282 .284 .285 .285 .285 .286 .287 .290 .290 .290 .291 .292 .295 .295 .295 .296 .298 .298
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure DTC Logic DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DIAGNOSIS PROCEDURE DTC LOGIC DTC LOGIC	.282 .282 .284 .285 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .295 .296 .298 .300 .300
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC LOGIC	.282 .282 .284 .285 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .295 .296 .298 .300 .300
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .295 .296 .298 .300 .300
Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC L	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .295 .296 .298 .300 .300
DTC Logic Diagnosis Procedure Component Inspection [CMP Sensor (PHASE)] P0420 THREE WAY CATALYST FUNCTION. DTC Logic Component Function Check Diagnosis Procedure P0441 EVAP CONTROL SYSTEM DTC Logic Component Function Check Diagnosis Procedure P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE DTC Logic DTC Logic	.282 .282 .284 .285 .285 .286 .287 .290 .290 .291 .292 .295 .295 .295 .296 .298 .300 .300

DTC Logic	303
Diagnosis Procedure	
Component Inspection	

P0448 EVAP CANISTER VENT CONTROL

DTC Logic	
Diagnosis Procedure	
Component Inspection	

P0451 EVAP CONTROL SYSTEM PRES-

SURE SENSOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection	

P0452 EVAP CONTROL SYSTEM PRES-

SURE SENSOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection	

P0453 EVAP CONTROL SYSTEM PRES-

SURE SENSOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection	

P0456 EVAP CONTROL SYSTEM	
DTC Logic	
Diagnosis Procedure	
Component Inspection	327

P0460 FUEL LEVEL SENSOR	
DTC Logic	
Diagnosis Procedure	

P0461 FUEL LEVEL SENSOR	
DTC Logic	
Component Function Check	
Diagnosis Procedure	

P0500 VSS	
-----------	--

M/T MODELS : Description	333
M/T MODELS : DTC Logic	333
M/T MODELS : Component Function Check .	
M/T MODELS : Diagnosis Procedure	335
P0506 ISC SYSTEM	336
Description	336
=	

DTC Logic	6 6 A
P0507 ISC SYSTEM	8 8 FO
DTC Logic	0
P050A, P050B, P050E COLD START CON- TROL	C D
Description	
DTC Logic	0 D 1
P0520 EOP SENSOR 34	
DTC Logic	
Diagnosis Procedure	4
P0524 ENGINE OIL PRESSURE	
DTC Logic	
Component Inspection (EOP Sensor)	
P0603 ECM	
DTC Logic	
-	
P0604 ECM	
DTC Logic	
P0605 ECM	
DTC Logic	0
-	
P0606 ECM	
Diagnosis Procedure	
P0607 ECM	
DTC Logic	
Ū	M
P060A ECM	
Diagnosis Procedure	
P060B ECM	
DTC Logic	
Diagnosis Procedure	4 0
P0643 SENSOR POWER SUPPLY	
Description	
DTC Logic	
P0850 PNP SWITCH	
Description	
DTC Logic	
Component Function Check35	8
Diagnosis Procedure 35	8

P1078 EVT CONTROL POSITION SENSOR .	
DTC Logic	.361
Diagnosis Procedure	.361
Component Inspection (EVT Control Position	
Sensor)	.362
P1148 CLOSED LOOP CONTROL	264
DTC Logic	
Diagnosis Procedure	.304
P1212 TCS COMMUNICATION LINE	365
Description	
DTC Logic	
Diagnosis Procedure	
P1217 ENGINE OVER TEMPERATURE	366
DTC Logic	
Component Function Check	.366
Diagnosis Procedure	.367
P1225 TP SENSOR	
DTC Logic	.369
Diagnosis Procedure	.369
P1226 TP SENSOR	370
DTC Logic	
Diagnosis Procedure	
	.570
P1550 BATTERY CURRENT SENSOR	371
DTC Logic	.371
Diagnosis Procedure	.371
Component Inspection (Battery Current Sensor).	.372
P1551, P1552 BATTERY CURRENT SEN-	
SOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection (Battery Current Sensor) .	.375
P1553 BATTERY CURRENT SENSOR	377
DTC Logic	
Diagnosis Procedure	
Component Inspection (Battery Current Sensor).	
Component inspection (Dattery Current Sensor).	.570
P1554 BATTERY CURRENT SENSOR	380
DTC Logic	.380
Component Function Check	
Diagnosis Procedure	
Component Inspection (Battery Current Sensor).	
P1556, P1557 BATTERY TEMPERATURE	
SENSOR	
DTC Logic	
Diagnosis Procedure	
Component Inspection	.384
P1564 ASCD STEERING SWITCH	385
DTC Logic	
Diagnosis Procedure	
Component Inspection	.301

P1564 ICC STEERING SWITCH	
DTC Logic	
Diagnosis Procedure	
Component Inspection	390
P1568 ICC FUNCTION	
DTC Logic	
Diagnosis Procedure	
P1572 ASCD BRAKE SWITCH	202
DTC Logic	
Diagnosis Procedure	
Component Inspection (Brake Pedal Position	
Switch)	395
Component Inspection (Stop Lamp Switch)	396
P1572 ICC BRAKE SWITCH	
DTC Logic	
Diagnosis Procedure	399
Component Inspection (Brake Pedal Position	
Switch)	
Component Inspection (Stop Lamp Switch)	402
P1574 ASCD VEHICLE SPEED SENSOR	404
Description	
DTC Logic	
Diagnosis Procedure	404
P1574 ICC VEHICLE SPEED SENSOR	406
Description	406
DTC Logic	
Diagnosis Procedure	406
P1650 STARTER MOTOR RELAY 2	408
Description	408
DTC Logic	
Diagnosis Procedure	409
P1651 STARTER MOTOR RELAY	411
Description	411
DTC Logic	411
Diagnosis Procedure	411
P1652 STARTER MOTOR SYSTEM COM	M413
Description	
DTC Logic	
Diagnosis Procedure	
P1715 INPUT SPEED SENSOR	415
Description	
DTC Logic	
Diagnosis Procedure	
P1800 INTAKE MANIFOLD TUNING VAL	
DTC Logic	
Diagnosis Procedure	
Component Inspection (Intake Manifold Tunir	
Valve)	
P1805 BRAKE SWITCH	440
DTC Logic	

Component Function Check41	9
Diagnosis Procedure41	9
Component Inspection (Stop Lamp Switch)42	:1
P2004 INTAKE MANIFOLD RUNNER CON- TROL VALVE42	
DTC Logic	
Diagnosis Procedure	
Component Inspection42	23
P2014, P2016, P2017, P2018 INTAKE MANI- FOLD RUNNER CONTROL VALVE POSI-	_
TION SENSOR	
Diagnosis Procedure	
P2096, P2097 A/F SENSOR 142	28
DTC Logic	
Diagnosis Procedure42	
P2100, P2103 THROTTLE CONTROL MO-	
TOR RELAY	
DTC Logic43 Diagnosis Procedure43	
-	, <u> </u>
P2101 ELECTRIC THROTTLE CONTROL FUNCTION	24
DTC Logic	
Diagnosis Procedure43	
Component Inspection (Throttle Control Motor) 43	6
P2118 THROTTLE CONTROL MOTOR43	
DTC Logic43	37
	87 87
DTC Logic43 Diagnosis Procedure43	87 87
DTC Logic	87 87 88 89
DTC Logic	87 87 88 89
DTC Logic	87 87 88 89 89
DTC Logic	37 37 38 39 39 39
DTC Logic	37 37 38 39 39 39 39 39
DTC Logic	37 37 38 9 39 39 39 41
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44	37 37 38 39 39 39 41 41 41
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44	37 37 38 39 39 39 39 41 41 41 44
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic <td>37 37 38 9 39 39 39 41 11 12 14</td>	37 37 38 9 39 39 39 41 11 12 14
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44	37 37 38 9 39 39 39 41 11 12 14
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2127, P2128 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44P2135 TP SENSOR44	37 38 39 39 39 41 41 42 44 44 45 17
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2127, P2128 APP SENSOR44DTC Logic44DTC Logic44	37 37 38 39 39 39 41 11 12 44 44 45 47 77
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Sensor44DTC Logic44DTC Logic44	37 37 38 39 39 39 41 11 12 44 44 15 77 77
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44Diagnosis Procedure44Component Inspection (APP Sensor)44P2127, P2128 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2135 TP SENSOR44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2135 TP SENSOR44DTC Logic44Diagnosis Procedure44Component Inspection (TP Sensor)44	37 37 38 39 39 39 41 41 44 44 45 77 78
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44Diagnosis Procedure44Component Inspection (APP Sensor)44P2127, P2128 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Diagnosis Procedure44Component Inspection (APP Sensor)44P2135 TP SENSOR44DTC Logic44DTC Logic44DTC Logic44P2135 TP SENSOR44P2138 APP SENSOR44P2138 APP SENSOR45	37 37 38 39 39 39 41 41 41 42 44 44 45 77 78 80
DTC Logic43Diagnosis Procedure43Component Inspection (Throttle Control Motor)43P2119 ELECTRIC THROTTLE CONTROLACTUATOR43DTC Logic43Diagnosis Procedure43P2122, P2123 APP SENSOR44DTC Logic44Diagnosis Procedure44Component Inspection (APP Sensor)44P2127, P2128 APP SENSOR44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2135 TP SENSOR44DTC Logic44DTC Logic44Component Inspection (APP Sensor)44P2135 TP SENSOR44DTC Logic44Diagnosis Procedure44Component Inspection (TP Sensor)44	37 788 9 399 11 1112 14 141415 17 7788 30 00

P219A AIR FUEL RATIO	53 A
P2610 ECM INTERNAL TIMER 4 Description 4 DTC Logic 4 Diagnosis Procedure 4	EC 58
SENSOR POWER SUPPLY 2 CIRCUIT	60
BRAKE PEDAL POSITION SWITCH 4 Component Function Check 4 Diagnosis Procedure 4 Component Inspection (Brake Pedal Position 4 Switch) 4	62 62 E
ASCD INDICATOR	65
FUEL INJECTOR 4 Component Function Check 4 Diagnosis Procedure 4 Component Inspection (Fuel Injector) 4	4 66 466 466
FUEL PUMP 4 Component Function Check 4 Diagnosis Procedure 4 Component Inspection (Fuel Pump) 4	69 69
IGNITION SIGNAL 4 Component Function Check 4 Diagnosis Procedure 4 Component Inspection (Condenser) 4 Component Inspection (Ignition Coil with Power 4 Transistor) 4	72 72 75 K
ELECTRICAL LOAD SIGNAL 4 Description 4 Component Function Check 4 Diagnosis Procedure 4	77 77
COOLING FAN	79 N 79
REFRIGERANT PRESSURE SENSOR	81
MALFUNCTION INDICATOR LAMP	83
ON BOARD REFUELING VAPOR RECOV- ERY (ORVR)4	84

Component Inspection486	
SYMPTOM DIAGNOSIS489	F
ENGINE CONTROL SYSTEM 489 Symptom Table	F
NORMAL OPERATING CONDITION 494 Description	E
PERIODIC MAINTENANCE495	_
IDLE SPEED	(
IGNITION TIMING	S (
EVAPORATIVE EMISSION SYSTEM 497 Inspection	
EVAP LEAK CHECK 498	

Inspection	498
POSITIVE CRANKCASE VENTILATION	
REMOVAL AND INSTALLATION	501
ECM Exploded View Removal and Installation	501
SERVICE DATA AND SPECIFICATIO	_
SERVICE DATA AND SPECIFICATION (SDS) SERVICE DATA AND SPECIFICATIONS (SDS) Idle Speed	502

А

EC

Ε

PRECAUTION PRECAUTIONS

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery or batteries, and wait at least three 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 windshield.

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.)
- 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-9</u>, "<u>Harness Connec-</u> <u>tor</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.

K L PIIB3706J

INFOID:0000000012787845

Ο

INFOID-000000012787844

PRECAUTIONS

< PRECAUTION >

- 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

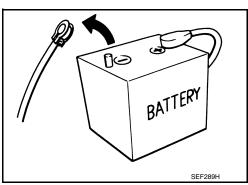
- · Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery 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.

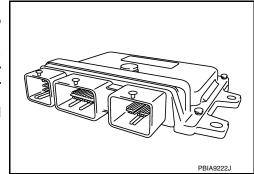
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

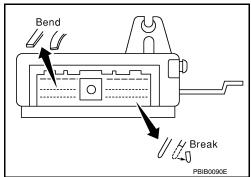
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting or 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.







INFOID:000000012787846

< PRECAUTION >

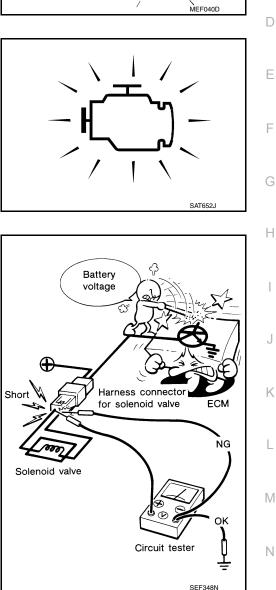
- Before replacing ECM, perform ECM Terminals and Reference • Value inspection and make sure ECM functions properly. Refer to EC-77, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- · Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC **CONFIRMATION PROCEDURE or Component Function** Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

 When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

Do not operate fuel pump when there is no fuel in lines.

EC-11

Tighten fuel hose clamps to the specified torque.



[MRA8DE]

OLD ONE

non

А

EC

С

F

Perform ECM in-

put/output signal)

inspection before

replacement.

Ρ

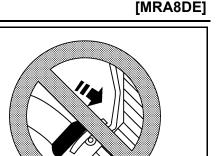
Ο

L

PRECAUTIONS

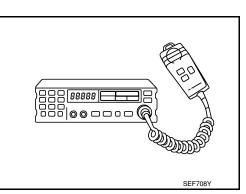
< PRECAUTION >

- · 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.



SEF709Y

- 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

Description

Revision: December 2015

The actual shape of the tools may differ from those illustrated here. Tool number

< PREPARATION >

PREPARATION

PREPARATION

Special Service Tools

(TechMate No.) Tool name		
		Checks fuel pressure
kit	LEC642	
 J-44321-6) Fuel pressure adapter		Connects fuel pressure gauge to quick connector type fuel lines
	LBIA0376E	
(V10120000 —) Fuel tube adapter	<i>A</i>	Measures fuel pressure
	<u> </u>	
	JSBIA0410ZZ	
		INFOID:00000001278784
ool name		
ool name TechMate No.) Quick connector release		
ool name TechMate No.) Quick connector release	Tools	Description Removes fuel tube quick connectors in engine
Contraction Service	Tools	Description Removes fuel tube quick connectors in engine room
Fool name TechMate No.) Quick connector release	Tools	Description Removes fuel tube quick connectors in engine
TechMate No.) Quick connector release J-45488)	Tools	Description Removes fuel tube quick connectors in engine room

[MRA8DE]

INFOID:000000012787847

2016 Sentra NAM

А

EC

C

PREPARATION

< PREPARATION >

Tool name (TechMate No.)		Description
EVAP service port adapt- er i.e.: (J-41413-OBD)	C THE	Applies positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (J-42909)	S-NT704	Checks fuel tank vacuum relief valve opening pressure
Socket wrench (—)	19 mm (0.75 in) 12 mm (1.26 in) S-NT705	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 specification MIL-A-907)	S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

[MRA8DE] < SYSTEM DESCRIPTION > SYSTEM DESCRIPTION А COMPONENT PARTS ENGINE CONTROL SYSTEM EC ENGINE CONTROL SYSTEM : Component Parts Location INFOID:000000012787849 ENGINE ROOM COMPARTMENT (4)3 (5) (2) D Õ Е 8 Н TUUU С 0 0 C 0 0 0 °°° ° 0 Κ (6) $\overline{7}$ (8) ALBIA0980ZZ 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" Ο Without Intelligent Key System PCS-36, "RELAY CONTROL SYSTEM : System Description" Ρ PCS-47, "Fail-Safe" PCS-37, "POWER CONSUMPTION CONTROL SYS-TEM : System Description" EC-28, "Mass Air Flow Sensor (with Intake Air Temperature Mass air flow sensor 2 (with intake air temperature sensor) Sensor)" Electric throttle control actuator EC-22, "Electric Throttle Control Actuator" 3 (with built in throttle position sensor and throttle control motor)

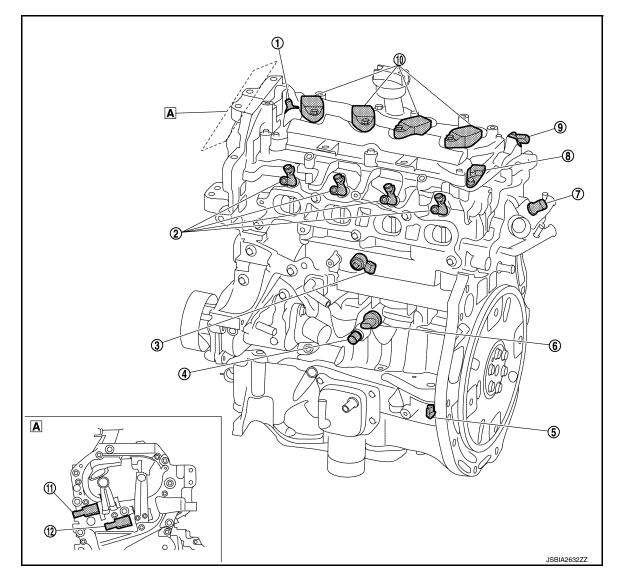
COMPONENT PARTS

Revision: December 2015

< 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	 <u>EC-28. "Intake Manifold Tuning Valve"</u> <u>EC-27. "Intake Manifold Runner Control Valve"</u>
$\overline{\mathcal{O}}$	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"

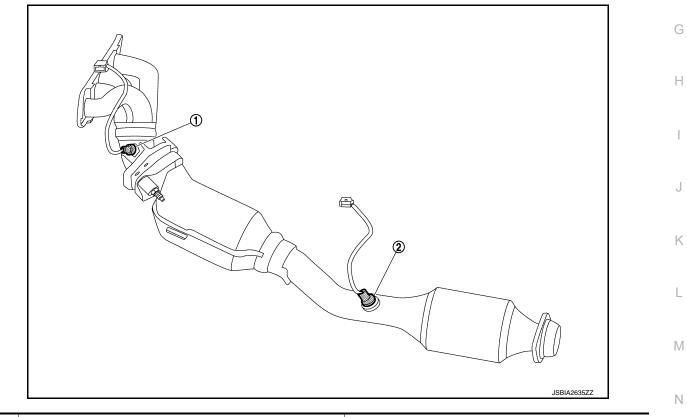
Revision: December 2015

< 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)"	FO
6	Engine oil pressure sensor	EC-23, "Engine Oil Pressure Sensor"	EC
$\overline{\mathcal{O}}$	Engine coolant temperature sensor	EC-23, "Engine Coolant Temperature Sensor"	C
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
(11)	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

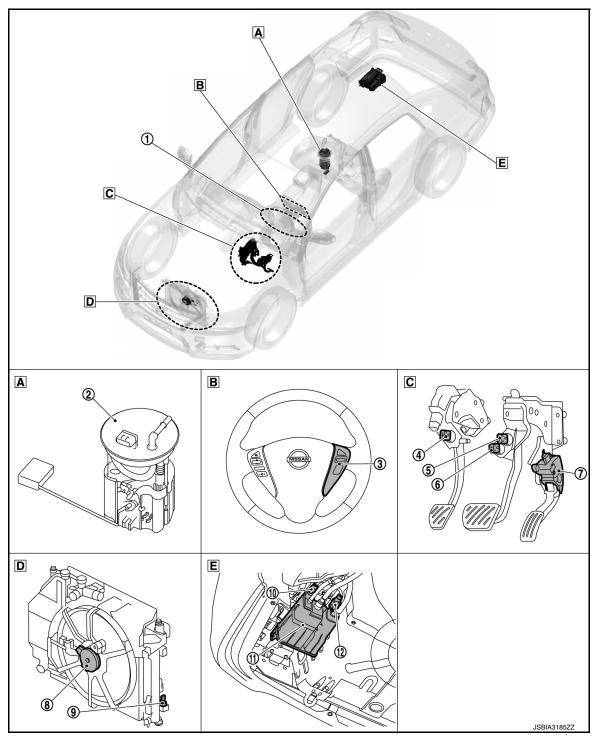


No.	Component	Function	
1	Air fuel ratio (A/F) sensor 1	EC-19, "Air Fuel Ratio (A/F) Sensor 1"	0
2	Heated oxygen sensor 2	EC-26, "Heated Oxygen Sensor 2"	

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-8. "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"
0	ASCD steering switch (ASCD models)	EC-20, "ASCD Steering Switch"
3	ICC steering switch (ICC models)	EC-28, "ICC Steering Switch"

2016 Sentra NAM

< SYSTEM DESCRIPTION >

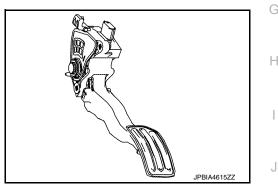
[MRA8DE]

INFOID:000000012787850

No.	Component	Function	Δ
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"	C
8	Cooling fan motor	EC-21, "Cooling Fan"	C
9	Refrigerant pressure sensor	EC-29, "Refrigerant Pressure Sensor"	D
10	EVAP control system pressure sensor	EC-25, "EVAP Control System Pressure Sensor"	D
1)	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.

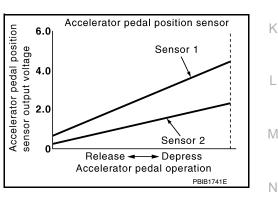


Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the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



INFOID:000000012787851



Ρ

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 sensor element of the A/F sensor 1 is composed an electrode

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).

A/F SENSOR 1 HEATER

< SYSTEM DESCRIPTION >

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:

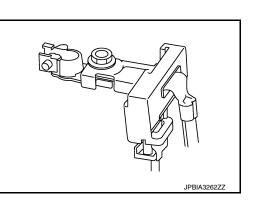
Never connect the electrical component or the ground wire

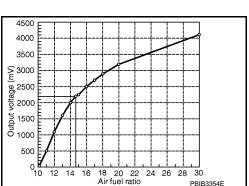
directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

BATTERY CURRENT SENSOR

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

BATTERY TEMPERATURE SENSOR





Holder

Protector

Zirconia element

JPBIA4038GB

INFOID:000000012787853

INFOID:000000012787852

< SYSTEM DESCRIPTION >

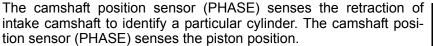
Battery temperature sensor is integrated in battery current sensor. The sensor measures temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.

<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.

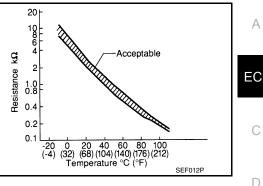
The changing gap causes the magnetic field near the sensor to change.

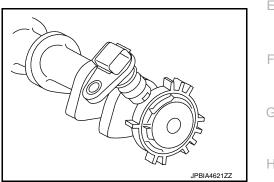
Due to the changing magnetic field, the voltage from the sensor changes.

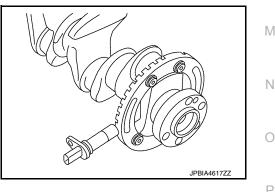
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

Cooling Fan

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







INFOID:000000012787857

А

D

Κ

[MRA8DE]

INFOID:0000000012787854

INFOID:000000012787855

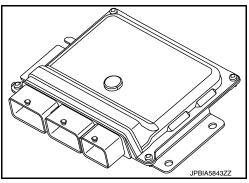
INFOID:000000012787856

< 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.

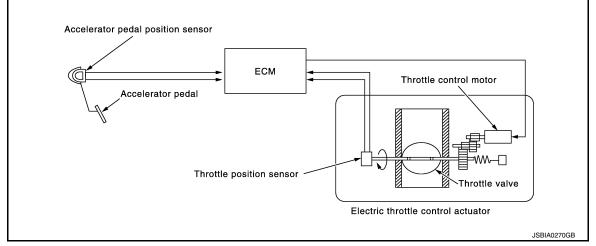


Electric Throttle Control Actuator

INFOID:000000012787859

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.

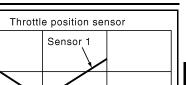
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

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.



90

6.0

4.0

voltage **5.0**

n

20

-20

ĝ

2 1.0 8.0 8.0 8.0 4.0 2.0 1.0

Throttle position sensor output voltage

K

SEF012P

INFOID:000000012787861

А

EC

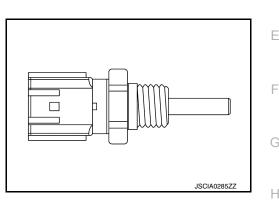
Throttle valve opening angle (deg) PBIB0145E

INFOID:000000012787860

135

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.



Acceptable

Seńsor 2

45

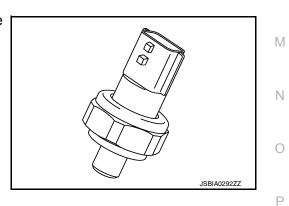
<Reference data>

Voltage [*] (V)	Resistance (k Ω)
4.4	7.0 - 11.4
3.5	2.37 - 2.63
2.2	0.68 - 1.00
0.9	0.236 - 0.260
	4.4 3.5 2.2

*: 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)

< 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.



0.2

EVAP Canister Vent Control Valve

Revision: December 2015

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.

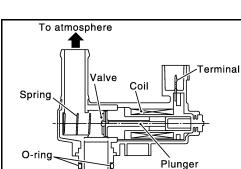
This solenoid valve is used only for diagnosis, and usually remains opened.

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

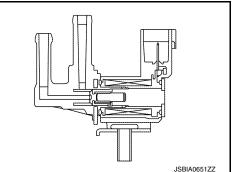
EC-24

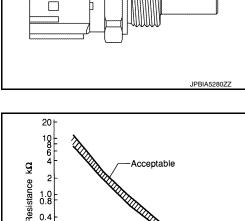
INFOID:000000012787864

PBIB1263E



Canister side





0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F) SEF012P

INFOID:000000012787863

< 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.

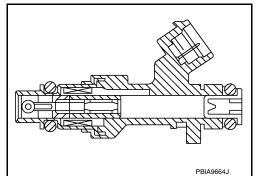
The longer pulse width retards valve angle.

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.



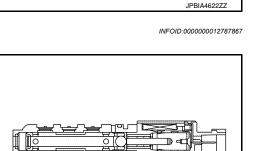


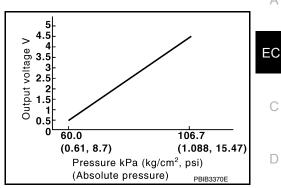




JPBIA5281ZZ

INFOID:000000012787868





А

D

INFOID:000000012787865

INFOID:000000012787866

Ν

Ρ

M

K

< 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*		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

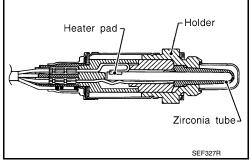
DESCRIPTION

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

INFOID:000000012787870

[MRA8DE]

Revision: December 2015

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 tumble flow.

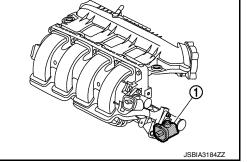
INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

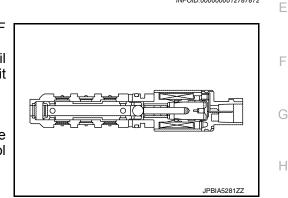
Intake manifold runner control valve motor is connected to the rear end of the valve shaft. The motor opens or closes the valve by the output signal of the ECM.

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.









А

EC

D

[MRA8DE]

JPBIA4613ZZ

INFOID:000000012787872

INFOID:0000000012787873

М

Ν

Ο

P

L

Intake manifold tuning valve motor is connected to the front end of the valve shaft.

INTAKE MANIFOLD TUNING VALVE MOTOR

Intake manifold tuning (IMT) valve (1) is integrated to intake manifold.

Intake manifold tuning valve is used to control the suction passage of

Intake manifold tuning valve consists of valve and motor.

ICC Steering Switch

< SYSTEM DESCRIPTION >

Intake Manifold Tuning Valve

the intake manifold tuning system.

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

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 (MAF 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 MAF 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.

INTAKE AIR TEMPERATURE SENSOR 1

The intake air temperature sensor 1 (IAT sensor 1) is built-into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

EC-28

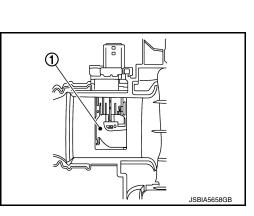
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

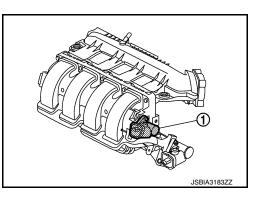
<Reference data>

The motor is operated by the ECM and it opens and closes the intake manifold tuning valve. INFOID 000000013469561 INFOID:000000012787875

INFOID:000000012787876

JSBIA0284ZZ







[MRA8DE]

< SYSTEM DESCRIPTION >

Intake air temperature	Voltage [*]
25°C (77°F)	2.0 – 2.2 V
80°C (176°F)	3.0 – 3.2 V

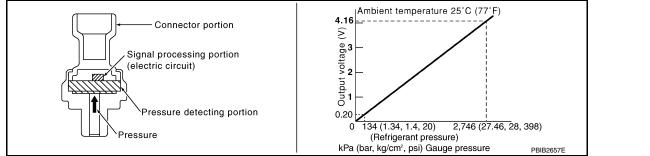
*: These data are reference values on the diagnosis tool.

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

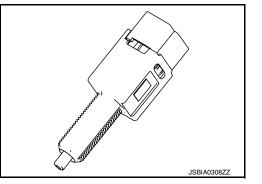
The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



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	

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.

[MRA8DE]

INFOID:000000012787877

INFOID:000000012787878

INFOID:000000012787879

D

Ε

А

EC

K

Н

Μ

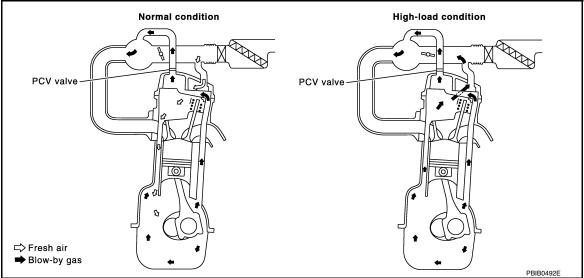
INFOID:000000012787880

STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:000000012787881

[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.

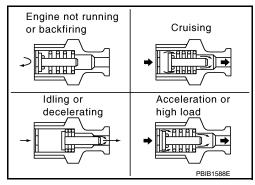
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

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.

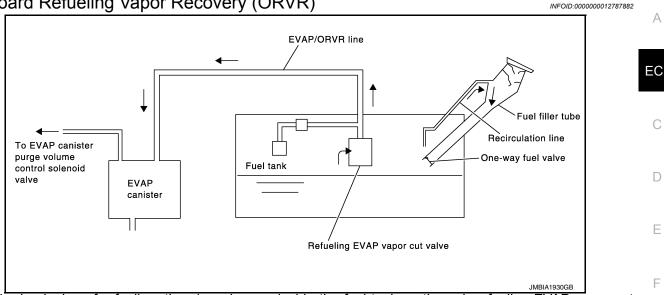
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



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-497, "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.

M

Κ

L

[MRA8DE]

Ν

Ρ

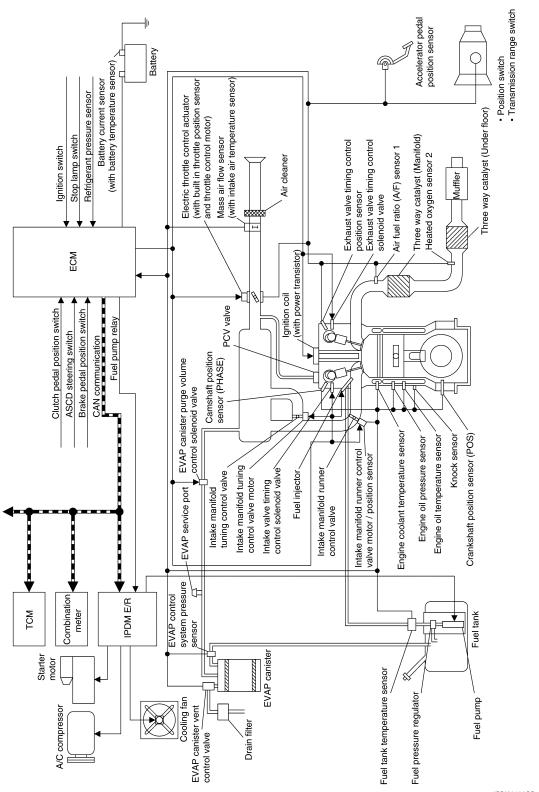
INFOID:000000012787883

SYSTEM

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : System Description

SYSTEM DIAGRAM



< SYSTEM DESCRIPTION >

· Position switch and clutch pedal position switch are not used in models with CVT.

• 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-49, "STARTER MOTOR DRIVE CONTROL : System Descrip- tion"
Evaporative emission	EC-50, "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-26, "ECO MODE CONTROL : System Description"</u> (CVT models)
SPORT mode control	DMS-43, "SPORT MODE CONTROL : System Description" (M/ T models) DMS-63, "SPORT MODE CONTROL : System Description" (CVT models)
CAN communication	EC-52, "CAN COMMUNICATION : System Description"

ENGINE CONTROL SYSTEM : Fail Safe

INFOID:000000013239114

Ν

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.

Ρ

А

EC

SYSTEM

< SYSTEM DESCRIPTION >

Fail safe 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 OEE (intake manifold runner control)

The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

Fail Safe Pattern

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

Fail Safe List

 $\times : \mbox{Applicable} \longrightarrow : \mbox{Not applicable}$

		Vehicle behavior		Vehicle behavior	
DTC Detected items	Detected items	Pattern			Others
		А	В	С	Others
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.
P0117 P0118	Engine coolant temperature sensor	×	×	_	_
P0171 P0172	Fuel injection system	×	_	_	-
P0197 P0198	Engine oil temperature sensor	_	_	_	Exhaust valve timing control does not function.
P0300 P0301 P0302 P0303 P0304	Misfire	×	_	_	_
P0500	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.

SYSTEM

< SYSTEM DESCRIPTION >

[MRA8DE]

		Vehicle behavior				
DTC No.	Detected items	Pattern			Others	
		А	В	С		
P0603	ECM	—	—	—		
F 0003	LOW	—	×		ASCD operation may be deactive	vated.
P0604	ECM	×	—	×	ASCD operation may be deactivated.	
P0605 P060B	ECM	—	_	_		
		×	_	×	ASCD operation may be deactive	vated.
P0606	FOM	_	_	—	ASCD operation may be deactive	vated.
	ECM	×	_	×	ASCD operation may be deactive	vated.
P0607	5014		_		<u> </u>	
	ECM	_	×	_		
P060A	501	×	_	×	_	
	ECM	×	×	×	ASCD operation may be deactivated.	
P0643	ECM	×		×		
P1078	Exhaust valve timing control					
	position sensor circuit	×		×		
P1568	ICC COMMAND VALUE	—	—	—	ICC canceld	
P1650 P1651	Starter relay	×	×	_	_	
P1805	Brake switch				ECM controls the electric throttle 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 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 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:000000012787885

Ρ

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	ЕСМ	
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	→	
Combination meter	Vehicle speed signal	→	
	Air conditioner operation signal	⇒	

- *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>

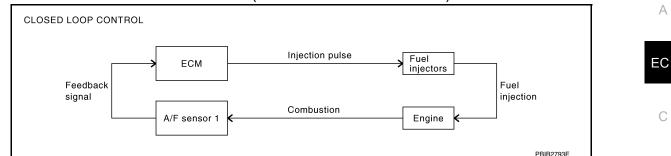
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<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 EC-19. "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 sensing element) 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.

Ρ

Н

Κ

[MRA8DE]



< SYSTEM DESCRIPTION >

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:000000012787886

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 transisted
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

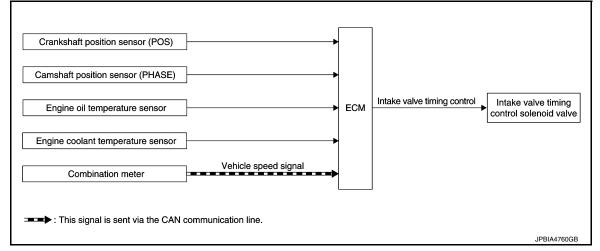
< SYSTEM DESCRIPTION >

Sensor	1	Input Signal to ECM	ECM func- tion	Actuator	А
Crankshaft position sensor (POS)	Engine spee	ed ^{*3}			
Camshaft position sensor (PHASE)	Piston posit	ion			EC
Mass air flow sensor	Amount of inta	ake air			
Engine coolant temperature sensor	Engine coolan	it temperature			0
Throttle position sensor	Throttle position	on			С
Accelerator pedal position sensor	Accelerator pedal position		Ignition tim-	Ignition coil (with power tran-	
Transmission range switch ^{*1}			ing control	sistor)	D
Park/neutral position (PNP) switch ^{*2}	Gear position	Gear position			
Battery Battery voltage ^{*3}					Е
Knock sensor					
Combination meter CAN commu- nication Vehicle speed signal				F	
Firing order: 1 - 3 - 4 - 2 The ignition timing is controlled engine. The ignition timing data The ECM receives information nal. Computing this information, During the following conditions,	is stored in the such as the i	he ECM. injection pulse width and ca als are transmitted to the p	amshaft posi ower transist	tion sensor (PHASE) sig- or.	H
 the ECM. At starting During warm-up At idle At low battery voltage 					J
During acceleration The knock sensor retard system	n is designed	d only for emergencies. Th	e basic igniti	on timing is programmed	Κ
within the anti-knocking zone, if operate under normal driving co The signal is transmitted to the INTAKE VALVE TIMING	recommend onditions. If e ECM. The EC	ed fuel is used under dry c ngine knocking occurs, the CM retards the ignition timir	onditions. The knock sense	e retard system does not or monitors the condition.	L
INTAKE VALVE TIMING	CONTRO	L : System Descriptio	on	INFOID:000000012787887	M
SYSTEM DIAGRAM					Ν

0

Р

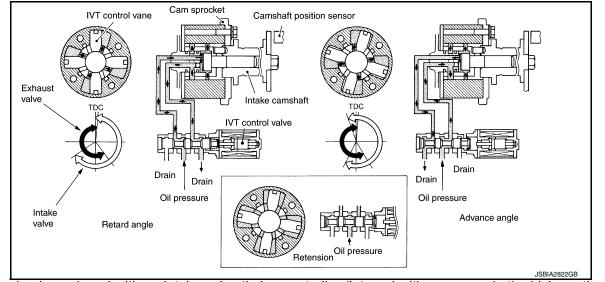
< SYSTEM DESCRIPTION >



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 oil temperature sensor	Engine oil temperature		Intake valve tim- ing control	Intake valve timing con- trol solenoid valve
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	ŀ
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.

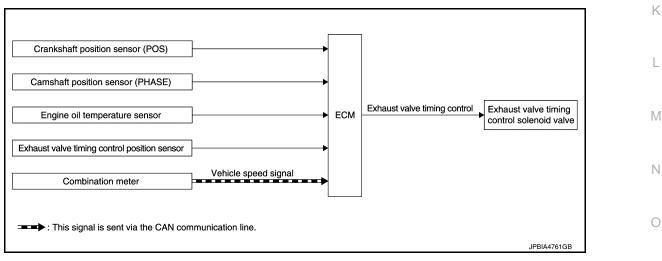
Feedback Control

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

Ρ

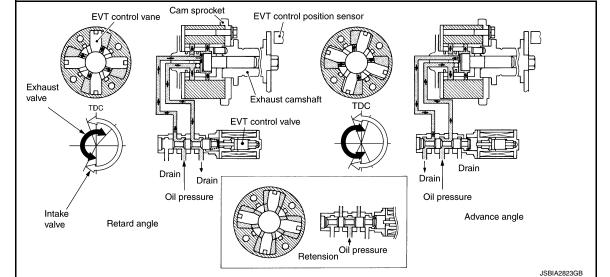
Н

INFOID:000000012787888

< SYSTEM DESCRIPTION >

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position			
Camshaft position sensor (PHASE)				Exhaust valve timing control solenoid valve
Engine oil temperature sensor	Engine oil temperature		Exhaust valve	
Exhaust valve timing control position sensor	Exhaust valve	Exhaust valve timing signal		
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

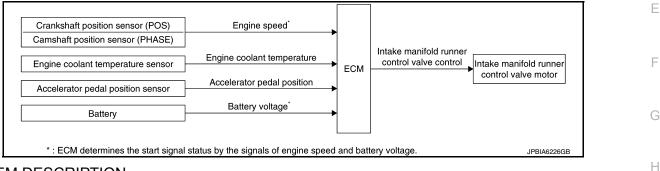
The exhaust valve control position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/ closing timing according to a driving condition.

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

INFOID:000000012787889

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			JSBIA2817GB	

SYSTEM DESCRIPTION

А

Κ

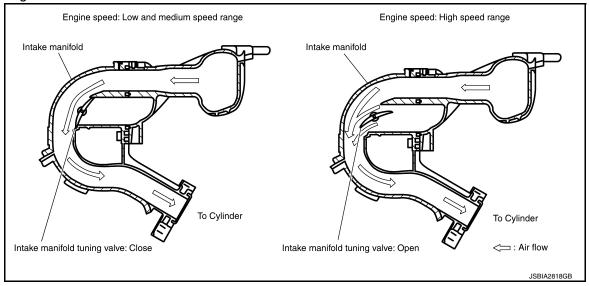
L

M

INFOID:000000012787890

< 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

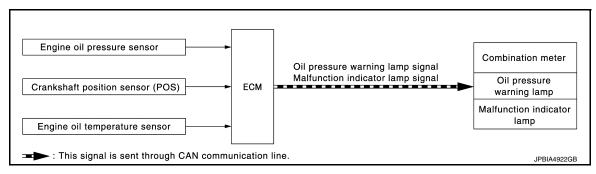
ECM opens the intake manifold tuning valve when all of the following conditions are satisfied.

- 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:000000012787891

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

				-
Sensor	Input signal to ECM	ECM function	Actuator	А
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.

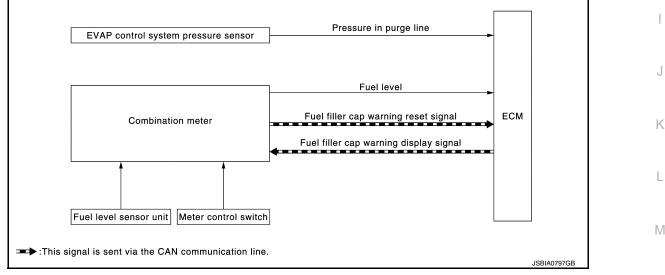
Decrease in engine oil	Engine speed	Combination meter	Fuel cut	
pressure	Engine speed	Oil pressure warning lamp		
Detection	Less than 1,000 rpm	ON*	NO	
Detection	1,000 rpm or more	ON	YES	

*: 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:



INFOID:000000012787892

D

Е

Н

Ν

Ο

Ρ

< SYSTEM DESCRIPTION >

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-</u> <u>17, "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:

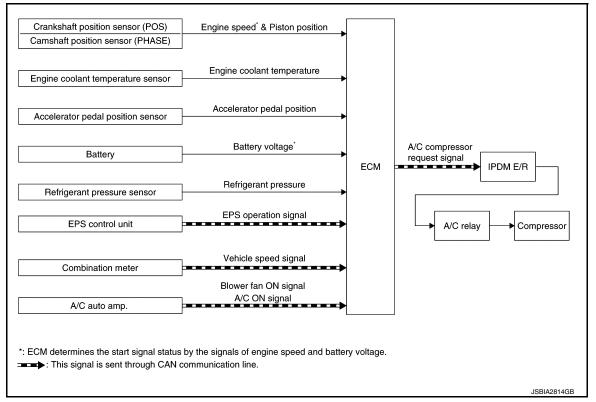
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Description

INFOID:000000012787893

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

< SYSTEM DESCRIPTION >

Γ	Μ	R/	48	D	E1
L				_	-1

Sensor	In	put Signal to ECM	ECM function	Actuator	А
Crankshaft position sensor (POS)	Engine speed	•			
Camshaft position sensor (PHASE)	Piston position	1			
Engine coolant temperature sensor	Engine coolan	t temperature			EC
Accelerator pedal position sensor	Accelerator pe	Accelerator pedal position Battery voltage [*]			
Battery	Battery voltage			IPDM E/R	С
Refrigerant pressure sensor	Refrigerant pro	essure	Air conditioner	↓ Air conditioner relay	
EPS control unit	CAN commu- nication	EPS operation signal	cut control	↓ Compressor	D
Combination meter	CAN commu- nication	Vehicle speed signal			
A/C auto amp.	CAN commu- nication	 A/C ON signal Blower fan ON signal			E
SYSTEM DESCRIPTION This system improves engine open Under the following conditions, the • When the accelerator pedal is fu • When cranking the engine.	e air conditione				F
· When the engine coolant temper	 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 refrigerant pressure is exc ALTERNATOR POWER TEM	essively low o		ARIABLE C	ONTROL SYS-	I
ALTERNATOR POWER G	ENERATIO	N VOLTAGE VARI	ABLE CONT	ROL SYSTEM : INFOID:000000012787894	J
The alternator power generation according to a battery loaded con					Κ

The alternator power generation voltage variable control system controls the amount of power generation, according to a battery loaded condition. ECM judges a battery condition, according to a signal received from the battery current sensor which detects a charge/discharge current. ECM then transmits a signal to IPDM E/ R to command power generation via CAN communication. IPDM E/R transmits a power generation control signal to the alternator so that the system can control the amount of power generation. The voltage of power generation is lowered during battery low-load conditions and boosted under heavy load conditions. In this way, the system reduces the engine load through the adequate power generation control. For details, refer to <u>CHG-8</u>, "System Description".

COOLING FAN CONTROL : System Description

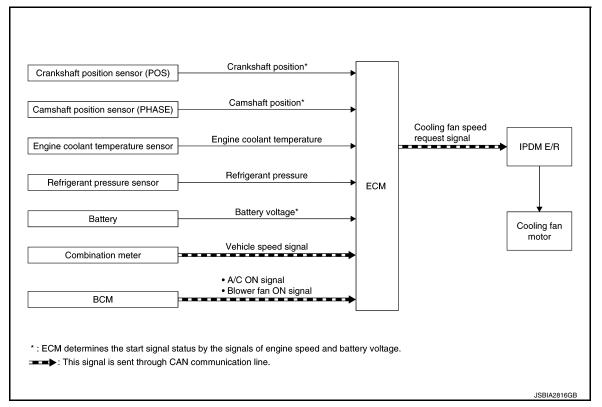
SYSTEM DIAGRAM

Ο

Ν

INFOID:000000012787895

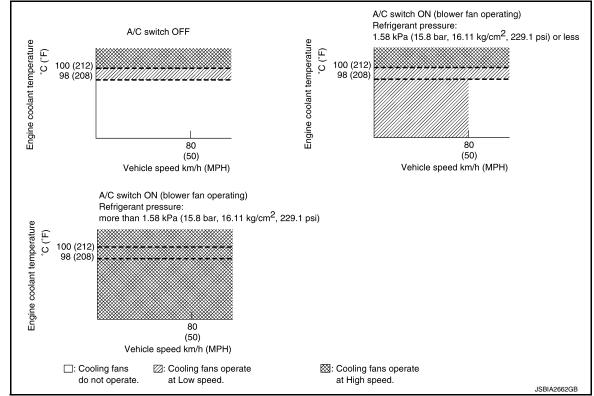
< SYSTEM DESCRIPTION >



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.



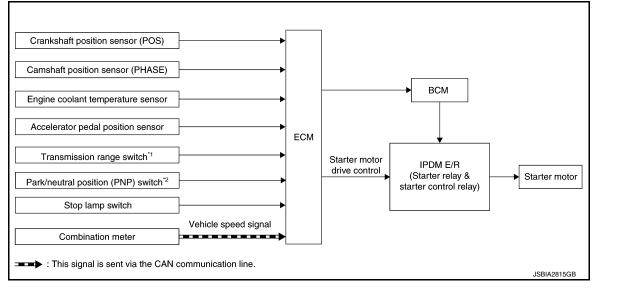
< SYSTEM DESCRIPTION >

		Cooling fan relay		
Cooling fan 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

SYSTEN DIAGRAM



*1: CVT models

*2: M/T models

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine spece	Engine speed		
Camshaft position sensor (PHASE)	Piston posit	Piston position		
Engine coolant temperature sensor	Engine coolar	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pe	Accelerator pedal position		BCM IPDM E/R (Starter relay & start-
Transmission range switch (CVT)	Gear position	Gear position		
Park/ Neutral position switch (M/T)	Gear position	Gear position		er control relay)
Stop lamp switch	Brake pedal p	Brake pedal position		
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.

EC-49

INFOID:000000012787896

Е

Н

Κ

Ρ

А

< SYSTEM DESCRIPTION >

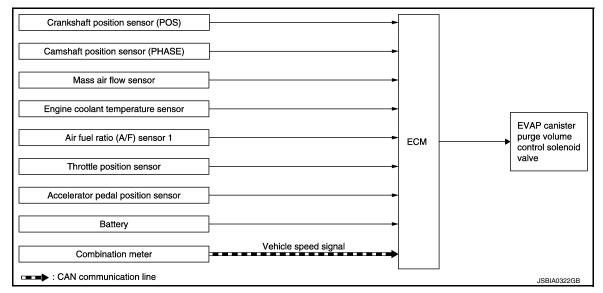
[MRA8DE]

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:000000012787897

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

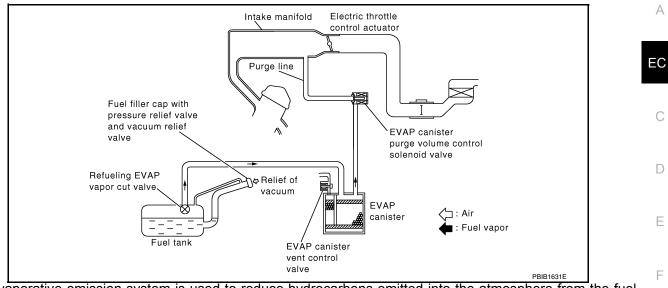
Sensor	Input signal to ECM		ECM function	Actuator		
Crankshaft position sensor (POS)	_ *					
Camshaft position sensor (PHASE)	Engine speed	Engine speed [*]				
Mass air flow sensor	Amount of intake air					
Engine coolant temperature sensor	Engine coolant temperature		EVAP canister	EVAP canister purge vol- ume control solenoid valve		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)					
Throttle position sensor	Throttle positio	Throttle position				
Accelerator pedal position sensor	Accelerator pe	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 >

INFOID:000000012787898

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

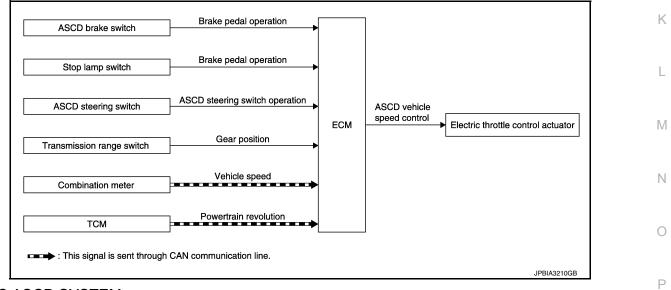
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

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

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/ h (25 MPH) and 144 km/h (89 MPH).

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

< SYSTEM DESCRIPTION >

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

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:000000012787899

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-32</u>, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

ECO MODE CONTROL

< SYSTEM DESCRIPTION >

ECO MODE CONTROL : System Description

INFOID:000000012787900

[MRA8DE]

А

EC

D

Ε

F

Н

Κ

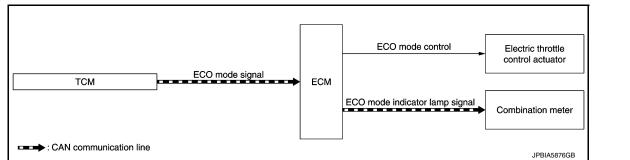
L

Μ

Ν

INFOID:000000012787901

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

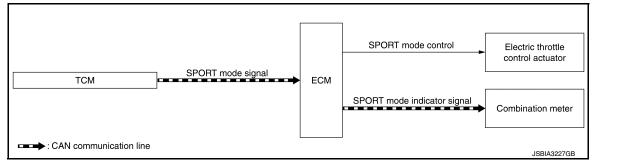
- ECM receives an ECO mode signal from combination meter via CAN communication and improves the fuel economy by controlling the throttle movement to less than usual. Therefore, driving characteristic is controlled (reducing energy consumption by decreasing needless acceleration and deceleration), so 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 DMS-26, "ECO MODE CONTROL : System Description" (CVT mod-	
els) or <u>DMS-6, "ECO MODE CONTROL : System Description"</u> (M/T models).	

SPORT MODE CONTROL

SPORT MODE CONTROL : System Description

SYSTEM DIAGRAM



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 <u>DMS-63</u>, "<u>SPORT MODE CONTROL</u>: <u>System Description</u>" (CVT models) or <u>DMS-43</u>, "<u>SPORT MODE CONTROL</u>: <u>System Description</u>" (M/T models).

Ρ

OPERATION

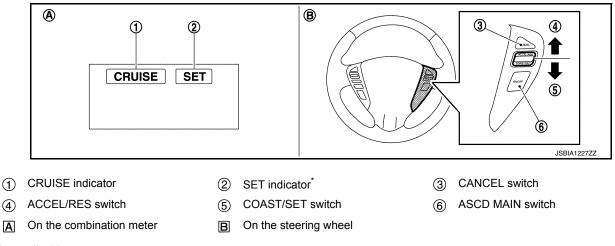
< SYSTEM DESCRIPTION >

OPERATION AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:000000012787902

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-49, "Descrip-</u><u>tion"</u>.

NOTE:

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

INFOID:000000012787904

INFOID:000000012787903

А

С

Е

Н

Κ

L

Μ

Ν

Ο

Ρ

EC

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

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

INFOID:000000012787905

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		DTC 1st		1st trip	trip DTC	
Items	1st trip 2nd trip		1st trip	2nd trip	1st trip	2nd trip			
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying displaying	displaying display ing	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-95, "DTC Index"</u> .)	_	×	_	_	×		—	_	
Except above	_	_	_	×	—	×	×	_	

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000012787906

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-95, "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-130</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)	ľ
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"

INFOID:000000012787907

А

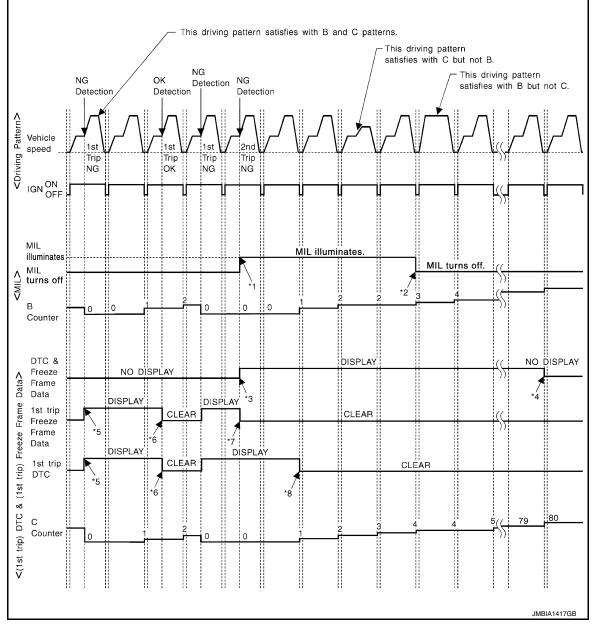
EC

Е

Н

NЛ

< 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".

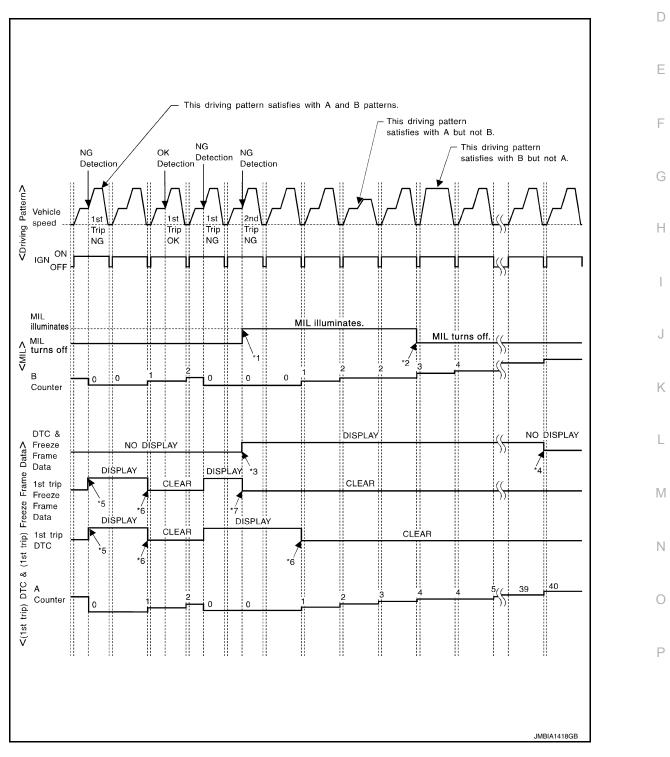
< SYSTEM DESCRIPTION >

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

INFOID:000000012787908

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:

EC-60

< 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.

А

D

Е

F

J

Κ

Ρ

INFOID:000000012787909

< SYSTEM DESCRIPTION >

				Example		
Self-diagno	Self-diagnosis result		$\leftarrow ON \rightarrow$		on cycle DFF $\leftarrow ON \rightarrow OF$	F \leftarrow ON \rightarrow
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
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)

INFOID:000000012787910

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 1. not running). NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to EC-483, "Component Function Check".

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-142. "Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-143. "Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-144. "Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-146, "Description".

BULB CHECK MODE

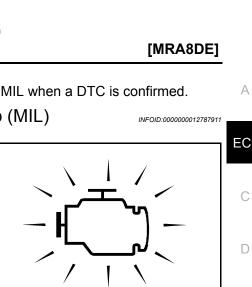
Description This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).	M
Operation Procedure	NI
1. Turn ignition switch ON.	IN
 The MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-483</u>, "Diagnosis Procedure". 	0
SRT STATUS MODE	0

Description

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

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.



SAT652

А

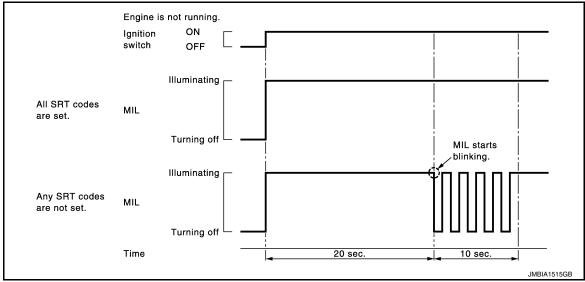
D

Ε

< SYSTEM DESCRIPTION >

[MRA8DE]

• 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.

< SYSTEM DESCRIPTION >

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

[MRA8DE]



EC

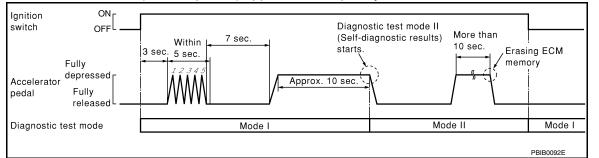
D

Ε

Κ

L

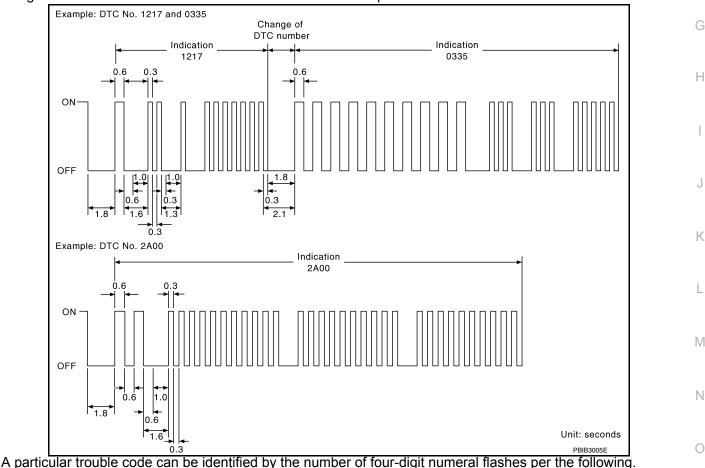
NOTE: Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



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 A В С D Е F Ρ Flashes 10 1 2 3 4 5 6 7 8 9 12 14 16 11 13 15

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-95</u>, "<u>DTC Index</u>".

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

INFOID:000000012787913

[MRA8DE]

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

SELF DIAGNOSTIC RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-95, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "Self-diag results".

- When ECM detects a 1st trip DTC, "1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

< SYSTEM DESCRIPTION >

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for CVT related items (see EC-95, "DTC Index"), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-106, "Description".
- 2. Select "ENGINE" using CONSULT.
- Select "SELF-DIAG RESULTS". 3.
- Touch "ERASE". (DTC in ECM will be erased.) 4.

Freeze Frame Data and 1st Trip Freeze Frame Data

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-95. "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 as those of 1st trip freeze frame data.

DATA MONITOR MODE

- Monitored Item NOTE:
- 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 <u>EC-77, "Reference Value"</u>.

А

EC

0

Ρ

< SYSTEM DESCRIPTION >

[MRA8DE]

×: Applicable

		Monitor Iten	n 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 AIR FLOW SENSOR (HZ)	Hz	×	×	The signal frequency of the mass air flow sensor is display.	
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	x	×	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
ACCEL SEN 2	V			The accelerator pedal position sensor signal voltage is displayed.	converted by ECM internal- ly. Thus, it differs from ECM terminal voltage signal.
TP SEN 1-B1 TP SEN 2-B1	V	×	×	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is con- verted by ECM internally. Thus, it differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F			• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item	1 Selection		
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
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.	
INT/V SOL (B1)	%			 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
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 	
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.	
FUEL PUMP RLY	ON/OFF			Indicates the fuel pump relay control condi- tion determined by ECM according to the in- put signals.	
VENT CONT/V	On/Off			 The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. On: Closed Off: Open 	
THRTL RELAY	ON/OFF			Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
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 	
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.	
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 	
I/P PULLY SPD	rpm			Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehi- cle speed signal sent from TCM is dis- played.	
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. 	
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.	

Revision: December 2015

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item	Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
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. 		EC
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehi- cle speed signal sent from combination meter is displayed.		C
SET VHCL SPD	km/h or mph			The preset vehicle speed is displayed.		D
MAIN SW	On/Off			Indicates [ON/OFF] condition from MAIN switch signal.		F
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.		F
SET SW	On/Off			Indicates [ON/OFF] condition from SET/ COAST switch signal.		0
BRAKE SW 1	On/Off			Indicates [ON/OFF] condition from ASCD brake switch signal.		G
BRAKE SW 2	On/Off			Indicates [ON/OFF] condition from stop lamp switch signal.		Н
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. 		I
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. 		K
AT OD MONI- TOR	On/Off			Indicates [ON/OFF] condition of A/T O/D ac- cording to the input signal from the TCM.		L
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.		Μ
SET LAMP	On/Off			Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.		Ν
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.		0
BAT CUR SEN	mV			The signal voltage of battery current sensor is displayed.		Ρ
A/F ADJ-B1	_			Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.		

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
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.	
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.	
AC PRESS SEN	V			The signal voltage from the refrigerant pres- sure sensor is displayed.	
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. 	
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. 	
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. 	
BAT TEMP SEN	V			The signal voltage of battery temperature sensor is displayed.	
THRTL STK CNT B1	_			_	
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. 	
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. 	
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. 	
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. 	
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.	

Revision: December 2015

< SYSTEM DESCRIPTION >

[MRA8DE]

		Monitor Item	Selection			
Monitored item	Unit	ECU INPUT SIGNALS	MAIN SIGNALS	Description	Remarks	A
SPORT MODE SWITCH	On/Off			Displays the reception status of the sport mode switch signal received through CAN communication.		EC
ECO MODE SWITCH	ON/OFF	×		Displays the reception status of the ECO mode switch signal received through CAN communication.		С
A/F-S ATM- SPHRC CRCT B1	_			Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.		D
A/F-S ATM- SPHRC CRCT UP B1	count			Displays the number of updates of the A/F sensor atmospheric correction factor.		F
SYSTEM 1 DI- AGNOSIS A B1	INCMP/CM- PLT			 Indicates DTC P219A self-diagnosis con- dition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete. 		G
SYSTEM 1 DI- AGNOSIS B B1	ABSNT/ PRSNT			 Indicates DTC P219A self-diagnosis con- dition. ABSNT: Self-diagnosis standby PRSNT: Under self-diagnosis 		Н

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
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 "BAT-TERY 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
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
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self- learning value
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition tim- ing
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position

Revision: December 2015

< SYSTEM DESCRIPTION >

[MRA8DE]

Work item	Condition	Usage
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by "SAVE DATA FOR CPU REPLC" in work support mode to ECM.	When ECM is replaced.

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

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 connectors Alternator IPDM 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 connectors Fuel pump relay
VIAS S/V-1	 Ignition switch: ON (Engine stopped) Turn Intake Manifold Tuning (IMT) Valve "ON" and "OFF" us- ing CONSULT and listen to oper- ating 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
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.

< SYSTEM DESCRIPTION >

[MRA8DE]

Н

Μ

Ν

Ο

Ρ

Test item	Condition	Judgement	Check item (Remedy)	٨
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 	EC 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	D
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 solenoid valve 	E
EXH V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change exhaust valve timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Exhaust valve timing control solenoid valve 	G

*: 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	
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-213	
EVAPORATIVE SYS-	PURG FLOW P0441	P0441	<u>EC-290</u>	
TEM	PURG VOL CN/V P1444	P0443	<u>EC-295</u>	
	HO2S2 (B1) P1146	P0138	<u>EC-228</u>	J
HO2S2	HO2S2 (B1) P1147	P0137	<u>EC-223</u>	
	HO2S2 (B1) P0139	P0139	<u>EC-235</u>	K

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

- 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.
- Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP). CAUTION:

< SYSTEM DESCRIPTION >

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

CAUTION: Turn ignition switch from O status screen.	N to OFF twice to update the informa	ation on the				
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D				
xxxx	INCMP	INCMP				
хххх	CMPLT	INCMP				
XXXX	XXXX INCMP CMPLT					
xxxx	CMPLT	INCMP				
XXXX	INCMP	INCMP				
XXXX	XXXX INCMP INCMP					
-	The previous trip information is displayed.					

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

ECU DIAGNOSIS INFORMATION ECM

Reference Value

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

Monitor Item	C	Condition	Values/Status
ENG SPEED	Run engine and compare CONSL	Almost the same speed as the tachometer indication.	
MASS AIR FLOW SENSOR (Hz)	See EC-162. "Diagnosis Procedure"		
B/FUEL SCHDL	See EC-162, "Diagnosis Procedure"	<u>'</u> -	
A/F ALPHA-B1	See EC-162, "Diagnosis Procedure"	<u>'</u> .	
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 een 3,500 and 4,000 rpm for 1 minute and at	0 - 0.3 V ↔ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	 Revving engine from idle up to 3,0 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \longleftrightarrow RICH$	
VHCL SPEED SE	Turn drive wheels and compare C cation.	Almost the same speed as speedometer indication	
BATTERY VOLT	Ignition switch: ON (Engine stopp	ed)	11 - 14 V
ACCEL SEN 1	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
ACCEL SEN I	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
ACCEL SEN 2* ¹	Ignition switch: ON	Accelerator pedal: Fully released	0.5 - 1.0 V
ACCEL SEN 2	(Engine stopped)	Accelerator pedal: Fully depressed	4.2 - 4.8 V
	Ignition switch: ON (Engine standed)	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

INFOID:0000000012787914

А

EC

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch $ON \rightarrow START \rightarrow O$	N (start switch is released)	$Off\toOn\toOff$
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	On
	(Engine stopped)	Accelerator pedal: Slightly depressed	Off
	Engine: After warming up, idle the	Air conditioner switch: OFF	Off
AIR COND SIG	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
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
LUAD SIGNAL		Rear window defogger switch and lighting switch: OFF	Off
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$On\toOff\toOn$
HEATER FAN SW	• Engine: After warming up, idle the	Heater fan switch: ON	On
HEATER FAIN SW	engine	Heater fan switch: OFF	Off
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
BIARE 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 Selector lever: P or N Air conditioner switch: OFF No load 	Idle	3° - 13° BTDC
IGN TIMING		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	ldle	Approx. 1.6 g/s
MASS AIRFLOW	 Selector lever: P or N Air conditioner switch: OFF No load 	2,500 rpm	Approx. 5.0 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	ldle	–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	ldle	0%-2%
INT/V SOL (B1)	 Selector lever: P or N Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0%– 90%

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Values/Status	
	Ignition switch: ON	Accelerator pedal: Fully released	On
SWRL CONT S/V	 Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) 	Accelerator pedal: Fully depressed	Off
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	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 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
COOLING FAN		Engine coolant temperature between 100°C (212°F) or more	Hi
	 Engine: After warming up, idle the engine Air conditioner switch: ON Refrigerant pressure is less than 1,280 kPa (12.80 bar, 13.05 kg/ cm², 185.6 psi) 	Engine coolant temperature is 97°C (207°F) or less	Low
		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
HO2S2 HTR (B1)	 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 		On
	Engine speed: Above 3,600 rpm	Off	
ALT DUTY SIG	Power generation voltage variable	On	
10011010	Power generation voltage variable	e control: Not operating	Off
/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 C cation.	ONSULT value with the speedometer indi-	Almost the same speed as the speedometer indication
		Idle air volume learning has not been per- formed yet.	YET
IDL A/V LEARN	Engine: running	Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
VF 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.	Almost the same speed as the speedometer indication	
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed

< ECU DIAGNOSIS INFORMATION >

Monitor Item	C	Condition	Values/Status
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	On
MAIN SW	· Ignition switch. ON	MAIN switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
CANCEL SW	s ignition switch. On	CANCEL switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	On
RESUME/ACC SW		RESUME/ACCELERATE switch: Re- leased	Off
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	On
SET SW	ignition switch. Or	SET/COAST switch: Released	Off
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	On
DIVILE OW I		Brake pedal: Slightly depressed	Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	Off
BIARE SW2	ightion switch. On	Brake pedal: Slightly depressed	On
VHCL SPD CUT	Ignition switch: ON		Non
LO SPEED CUT	Ignition switch: ON		Non
AT OD MONITOR	Ignition switch: ON		Off
AT OD CANCEL	Ignition switch: ON		Off
CRUISE LAMP	Ignition switch: ON	$On\toOff$	
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
INT/A TEMP SE	Ignition switch: ON		Indicates intake air tempera- ture
AC PRESS SEN	Engine speed: IdleBoth A/C switch and blower fan switch and blower fan	witch: ON (Compressor operates)	1.0 - 4.0 V
	Engine: After warming up	Idle	0 - 2%
VTC DTY EX B1	 Selector lever: P or N Air conditioner switch: OFF No 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.

< ECU DIAGNOSIS INFORMATION >

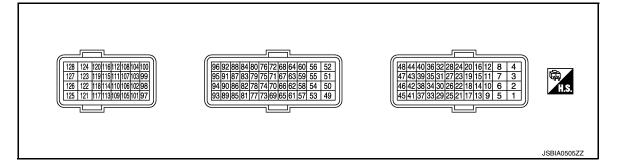
[MRA8DE]

Monitor Item		Condition	Values/Status
BAT TEMP SEN	 Engine: After warming up, idle the Selector lever: P or N Air conditioner switch: OFF No load 	Applox. 0.68 V	
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	osis is incomplete.	INCMP
(B1)	DTC P014C and P014D self-diagno	osis is complete.	CMPLT
A/F SEN1 DIAG3	The vehicle condition is not within th P015A or P015B.	he diagnosis range of DTC P014C, P014D,	ABSNT
(B1)	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
	DTC P0139 self-diagnosis (delayed response) is incomplete.		INCMP
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is complete.		CMPLT
	DTC P0139 self-diagnosis (slow res	INCMP	
HO2 S2 DIAG2 (B1)	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	ignition quitch: ON	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
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the e	engine	Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running	Varies depending on the number of updates.	
SYSTEM 1 DIAG-	DTC P219A self-diagnosis is incom	plete.	INCMP
NOSIS A B1	DTC P219A self-diagnosis is compl	ete.	CMPLT
SYSTEM 1 DIAG-	DTC P219A self-diagnosis is on sta	indby.	ABSENT
NOSIS B B1	DTC P219A self-diagnosis is under	diagnosis.	PRSENT

*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-65, "How to Handle Battery".

TERMINAL LAYOUT



PHYSICAL VALUES

Ν

Ο

Ρ

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.

	nal No. e color)	Description		Condition	Value	
+	-	Signal name	Input/ Output	Condition	(Approx.)	
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	
2 (G)	128 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	
3 (V)	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 5V/div JMBIA0324GB	
4 (W)	8 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V	
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.	
6 (R)	128 (B/Y)	Intake manifold tuning valve motor power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	
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.	
8 (B)	—	Sensor ground (Knock sensor)	<u> </u>	_	_	

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	А
+	_	Signal name	Input/ Output	Condition	(Approx.)	
9 (BR) 10 (SB)	128			 [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 € 10V/div JSBIA3228ZZ	C D
13 (O) 14 (V)	(B/Y)	Fuel injector No. 1 Fuel injector No. 2		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Battery voltage (11 - 14 V)★ 50mSec/div 50mSec/div 10V/div JMBIA0090GB	E F G
12 (B)	_	ECM ground	_	_	_	Н
16 (B)	_	ECM ground	_	_	—	11
17	128	EVAP canister purge vol- ume control solenoid	Output	 [Engine is running] Idle speed Accelerator pedal: Not depressed even slightly, after engine starting 	Battery voltage (11 - 14 V)★ 50mSec/div € 20V/div JMBIA0087GB	I J K
(L)	(B/Y)	(Y) valve		 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.) 	10 V★ 50mSec/div ↓	L
18 (GR)		Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.0 V	N
	(B/Y)			[Ignition switch: ON]More than 1 second after turning ignition switch ON	Battery voltage (11 - 14 V)	0
21 (Y)	128 (B/Y)	Throttle control motor re-	Output	[Ignition switch: OFF]	Battery voltage (11 - 14 V)	Ρ
(1)	(0/1)	lay		[Ignition switch: ON]	0 - 1.0 V	

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value						
+	_	Signal name	Input/ Output	Condition	(Approx.)						
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.						
30 (L)		Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_						
31	30			20 Completing correct	30 Camshaft position sensor) Camshaft position sensor	Camshaft position sensor	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)	mput	[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)	_		_						

< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

Terminal No. (Wire color)		Description		Condition	Value					
+	-	Signal name	Input/ Output	Condition	(Approx.)					
				[Ignition switch: ON] • Engine stopped	Approx. 3,700 Hz					
35 (G)	34 (W)	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	5,100 - 5,500 Hz					
(-)				[Engine is running]Warm-up conditionEngine is revving from idle to about 4,000 rpm	5,100 - 5,500 to Approx. 7,000 Hz					
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)	_	_	-					
39	38		Engine oil pressure sen-	Engine oil pressure sen-	38 Engine oil pressure sen-	38 Engine oil pressure sen-	38 Engine oil pressure sen-	locut	[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 2V/div JPBIA3360ZZ					
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]		_	_					

Ρ

< ECU DIAGNOSIS INFORMATION >

Terminal No. Description (Wire color) Value Condition (Approx.) Input/ + Signal name Output 1.0★ [Engine is running] 50mSec/div • Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 2v/div JSBIA2672ZZ 43 42 Exhaust valve timing con-Input (P) (W) trol position sensor 1.0★ 50mSec/div [Engine is running] · Engine speed is 2,500 rpm 2v/div JSBIA2673ZZ Sensor power supply 44 5 V [Exhaust valve timing [Ignition switch: ON] (R) control position sensor] 2.2 V 45 128 [Engine is running] A/F sensor 1 Input Output voltage varies with air fuel (BR) (B/Y) · Engine speed is 2,000 rpm ratio. [Ignition switch ON] Intake manifold runner Engine coolant temperature: More 49 128 Battery voltage appears for about control valve motor Output than 60°C (140°F) 1 second. (G) (B/Y) (Close) Accelerator pedal: Depressed → fully released Intake manifold runner 50 128 Battery voltage control valve motor power Input [Ignition switch: ON] (R) (B/Y) (11 - 14 V) supply [Ignition switch ON] Intake manifold runner · Engine coolant temperature: More 51 128 Battery voltage appears for about control valve motor Output than 60°C (140°F) (R) (B/Y) 1 second. (Open) Accelerator pedal: Fully released → depressed 52 ECM ground _ (B) 10 V★ 00mSec/div [Engine is running] · Warm-up condition 53 128 A/F sensor 1 heater Input Idle speed (G) (B/Y) (More than 260 seconds after starting engine) 5V/div JPBIA4732ZZ

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	
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 € 10V/div JMBIA0325GB	C D
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	Battery voltage (11 - 14 V)	E
61 (BG)	62 (BR)	Battery temperature sen- sor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.3 V	F
62 (BR)	_	Sensor ground (Battery current sensor, battery temperature sen- sor)	_		_	G
63 (G)	62 (BR)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged[*] Idle speed 	2.6 - 3.5 V	Н
64 (Y)	_	Sensor power supply (Battery current sensor)	_	[Ignition switch: ON]	5.0 V	
70 (W)		Sensor ground [Crankshaft position sen- sor (POS)]		_	_	J
71	70	Crankshaft position sen-		 [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 5mSec/div 2V/div 2V/div	K
(R)	(W)	sor (POS)	Input	[Engine is running] • Engine speed: 2,000 rpm	1.0 V★ 5mSec/div	M N
72 (G)	_	Sensor power supply [Crankshaft position sen- sor (POS)]	_	[Ignition switch: ON]	5.0 V	P
73 (GR)	_	Shield			_	Г

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
77	78	Throttle position sensor 2	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	Less than 4.75 V	
(W)	(R)		mput	 [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)		input	 [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 (LG)	92 (V)	Intake manifold runner control valve position sen- sor	Input	 [Ignition switch ON] Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) Accelerator pedal: Fully released [Ignition switch ON] Engine coolant temperature: Be- tween 0°C (32°F) and 45°C (113°F) Accelerator pedal: Slightly de- pressed 	Less than 2.4 V More than 3.5 V	
84 (W)	_	Sensor power supply (Intake manifold runner control valve position sen- sor)	_	[Ignition switch: ON]	More than 4.98 V	
86 (R)		Ignition signal No. 1		[Engine is running] • Warm-up condition	0 - 0.1 V★ 100mSec/div	
87 (LG)	128	Ignition signal No. 2	0.1.1	Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2V/div JPBIA4733ZZ	
90 (P)	(B/Y)	Ignition signal No. 3	Output		0 - 0.2 V★ 100mSec/div	
91 (SB)		Ignition signal No. 4		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	2V/div	

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
89 (GR)	128 (B/Y)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0 V	
(011)	(0,1)			[Ignition switch: OFF]More than a few seconds after turn- ing ignition switch OFF	Battery voltage (11 - 14 V)	
92 (LG)	_	Sensor ground (Intake manifold runner control valve position sen- sor)	_	_	_	
				[Engine is running]Warm-up conditionIdle speed	0 V	
93 (LG)	128 (B/Y)	Intake valve timing control solenoid valve	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	11 – 14 V ★	
94	128	Exhaust valve timing con-	Output	[Engine is running] • Warm-up condition • Idle speed	0 V	
(G)	(B/Y)	trol solenoid valve	Output	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Battery voltage (11 - 14 V)	
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	_	_	
100 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	_	
101	128		Input/	[Ignition switch: ON]	0 V	
(G)	(B/Y)	Starter relay cut off signal	Output	[Engine is running]Warm-up conditionIdle speed	Battery voltage (11 - 14 V)	
103 (LG)	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	

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire color)		Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
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 EC-408, "DTC Logic". 	0 V (While operating the starter mo- tor)
				[Engine is running]Warm-up conditionIdle speed	Battery voltage (11 - 14 V)
100	100			[Ignition switch: OFF]	0 V
109 (O)	128 (B/Y)	Ignition switch	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
110 (G)		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 lamp switch	Input	[Ignition switch: OFF] Brake pedal: Fully released 	0 V
(SB)	(B/Y)		mpac	[Ignition switch: OFF] Brake pedal: Slightly depressed 	Battery voltage (11 - 14 V)
116	128	Brake pedal position	Input	[Ignition switch: OFF] • Brake pedal: Fully released	Battery voltage (11 - 14 V)
(G)	(B/Y)	switch	input	[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)
		INeutral switch (M/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

< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

Terminal No. (Wire color)		Description		Condition	Value	А
+	-	Signal name	Input/ Output	Condition	(Approx.)	
119	120	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.3 – 0.6 V	EC
(W)	(Y)	tion sensor 2	input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	1.95 – 2.4 V	С
120 (Y)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_	D
121 (G)	128 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)	Е
122 (V)	_	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5.0 V	F
123 (B/Y)	_	ECM ground	_	_	_	
124 (V)	_	Sensor ground (EVAP control system pressure sensor, refriger- ant pressure sensor)	_	_	_	G
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 stoppedAccelerator pedal: Fully depressed	3.9 – 4.7 V	I
127 (GR)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)	_	_	_	J
128 (B/Y)	_	ECM ground	_	_	_	K

★: 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-65. "How to</u> <u>L</u> <u>Handle Battery"</u>.

Fail Safe

INFOID:000000012787915

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.

Р

Ο

Μ

Ν

< ECU DIAGNOSIS INFORMATION >

Fail sa	fe mode	Vehicle behavior
g con- le	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.

	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.
	 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
	o 1

valve opens).

Fail Safe Pattern

Traveling con-

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

Fail Safe List

 $\times : \mbox{Applicable} \longrightarrow : \mbox{Not applicable}$

					Vehicle behavior
DTC No.	Detected items	Pattern			Others
		А	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.
P0117 P0118	Engine coolant temperature sensor	×	×	_	_
P0171 P0172	Fuel injection system	×	_	_	_
P0197 P0198	Engine oil temperature sensor	_	_	_	Exhaust valve timing control does not function.
P0300 P0301 P0302 P0303 P0304	Misfire	×	_	_	_
P0500	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.

[MRA8DE]

					Vehicle behavior					
DTC No.	Detected items		Pattern		Others					
		A	В	С						
P0603	ECM	_	—	—	-	_				
1 0000	2011	—	×	—	ASCD operation may be deac	tivated.				
P0604	ECM	×	—	×	ASCD operation may be deac	tivated.				
P0605	ECM		—		-	_	-			
P060B	LOW	×		×	ASCD operation may be deac	ASCD operation may be deactivated. ASCD operation may be deactivated.				
P0606	ECM	_	_							
F0000		×	—	×	ASCD operation may be deactivated.					
P0607	ECM	_	_	_	-	_	•			
P0007	ECIVI		×		_					
	504	×	_	×	-	_	-			
P060A	ECM	×	×	×	ASCD operation may be deac	tivated.	•			
P0643	ECM	×	_	×	-	_	-			
P1078	Exhaust valve timing control position sensor circuit	×		×	_					
P1568	ICC COMMAND VALUE	_	—	—	ICC canceld					
P1650 P1651	Starter relay	×	×	_	_					
P1805	Brake switch				ECM controls the electric throttle control actuator by regulat- ing the throttle opening to a small range. Therefore, acceleration will be poor.					
					Vehicle condition	Driving condition	_			
					When engine is idling	Normal	_			
					When accelerating	Poor acceleration	_			
P2100	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	_	_	_		control actuator control, throttle opening (approx. 5 degrees) by				
P2118	Throttle control motor	_	_	_		control actuator control, throttle opening (approx. 5 degrees) by				
P2119	Electric throttle control actua- tor	×	×	_						
P2122 P2123 P2127 P2128 P2138 P2138	Accelerator pedal position sensor	_	_		ulating the throttle opening in o within +10 degrees.	g speed of the throttle valve to dition.				

DTC Inspection Priority Chart

INFOID:000000012787916

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)
	P0340	Camshaft position sensor (PHASE)
	P0500	Vehicle speed sensor
1	P0520	Engine oil pressure sensor
	P0603, P0604, P0605, P0606, P0607, P060A, P060B, P2610	ECM
	P0643	Sensor power supply
	P0705	Transmission range switch
	P0850	Park/neutral position (PNP) switch
	P1550, P1551, P1552, P1553, P1554	Battery current sensor
	P1556, P1557	Battery temperature sensor
	P1568	ICC function
	P1610 - P1615	NATS
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
	P0011	Intake valve timing control
	P0014	Exhaust valve timing control
	P0030, 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
1	P0444	EVAP canister purge volume control solenoid valv
2	P0710	CVT related sensors, solenoid valves and switche
	P1078	Exhaust valve timing position sensor
	P1217	Engine over temperature (OVERHEAT)
	P1650, P1651, P1652	Starter motor relay
	P1715	CVT related sensors, solenoid valves and switche
	P1800	Intake manifold tuning valve
	P1805	Brake switch
	P2100, P2103	Throttle control motor relay
	P2101	Electric throttle control function
	P2118	Throttle control motor

[MRA8DE]	
----------	--

Priority	DTC	Detected items	
	P0171, P0172	Fuel injection system function	A
	P0201 - P0204	Injector	
	P0234	Turbocharger system	EC
	P0300 - P0304	Misfire	
	P0420	Three way catalyst function	
	P0506, P0507	Idle speed control system	С
3	P0524	Engine oil pressure	
Ū	P1212	TCS communication line	D
	P1564	ASCD steering switch / ICC steering switch	
	P1572	ASCD brake switch / ICC brake switch	
	P1574	ASCD vehicle speed sensor / ICC vehicle speed sensor	E
	P2119	Electric throttle control actuator	
	P219A	Air fuel ratio (A/F) sensor 1	F

DTC Index

INFOID:000000012787917

G

×:Applicable	—: Not	applicable
in oppinooio.o		

						F.F		
DT	[.] C ^{*1}							
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	Η
U0101	0101 ^{*5}	LOST COMM (TCM)	—	2	_	В	<u>EC-172</u>	
U1001	1001 ^{*5}	CAN COMM CIRCUIT	_	1 or 2		_	<u>EC-173</u>	
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing ^{*6}	_	_	J
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-174</u>	K
P0014	0014	EXH/V TIM CONT-B1	—	2	×	В	<u>EC-177</u>	
P0030	0030	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-180</u>	
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-180</u>	L
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	<u>EC-180</u>	
P0037	0037	HO2 HTR (B1)	_	2	×	В	<u>EC-182</u>	M
P0038	0038	HO2 HTR (B1)	_	2	×	В	<u>EC-182</u>	1 V I
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	<u>EC-184</u>	
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	В	<u>EC-187</u>	Ν
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	<u>EC-190</u>	
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-190</u>	0
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-190</u>	0
P0111	0111	IAT SENSOR 1 B1	_	2	×	А	<u>EC-195</u>	
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-197</u>	Р
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	<u>EC-197</u>	
P0116	0116	ECT SEN/CIRC	_	2	×	A	<u>EC-199</u>	
P0117	0117	ECT SEN/CIRC	—	1	×	В	<u>EC-201</u>	
P0118	0118	ECT SEN/CIRC	—	1	×	В	<u>EC-201</u>	
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	<u>EC-203</u>	

Revision: December 2015

< 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
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	В	<u>EC-203</u>
P0125	0125	ECT SENSOR	_	2	×	В	<u>EC-206</u>
P0127	0127	IAT SENSOR-B1	_	2	×	В	<u>EC-208</u>
P0128	0128	THERMSTAT FNCTN	_	2	×	A	<u>EC-210</u>
P0130	0130	A/F SENSOR1 (B1)	_	2	×	A	<u>EC-213</u>
P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	<u>EC-217</u>
P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	<u>EC-220</u>
P0137	0137	HO2S2 (B1)	×	2	×	A	<u>EC-223</u>
P0138	0138	HO2S2 (B1)	×	2	×	А	<u>EC-228</u>
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-235
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	<u>EC-241</u>
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	<u>EC-241</u>
P015A	015A	A/F SENSOR1 (B1)	×	2	×	А	<u>EC-241</u>
P015B	015B	A/F SENSOR1 (B1)	×	2	×	А	<u>EC-241</u>
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	<u>EC-248</u>
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	<u>EC-252</u>
P0181	0181	FTT SENSOR	_	2	×	A and B	<u>EC-256</u>
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-260
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-260
P0196	0196	EOT SENSOR	_	2	×	A and B	EC-263
P0197	0197	EOT SEN/CIRC	_	2	×	В	EC-266
P0198	0198	EOT SEN/CIRC	_	2	×	В	EC-266
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-268
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	<u>EC-268</u>
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	— or ×	В	<u>EC-271</u>
P0301	0301	CYL 1 MISFIRE	_	1 or 2	— or ×	В	<u>EC-271</u>
P0302	0302	CYL 2 MISFIRE	_	1 or 2	— or ×	В	<u>EC-271</u>
P0303	0303	CYL 3 MISFIRE	_	1 or 2	— or ×	В	<u>EC-271</u>
P0304	0304	CYL 4 MISFIRE	_	1 or 2	— or ×	В	<u>EC-271</u>
P0327	0327	KNOCK SEN/CIRC-B1	_	2	—	—	<u>EC-277</u>
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	—	<u>EC-277</u>
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	<u>EC-279</u>
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	<u>EC-282</u>
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	<u>EC-285</u>
P0441	0441	EVAP PURG FLOW/MON	×	2	×	А	<u>EC-290</u>
P0443	0443	PURG VOLUME CONT/V	_	2	×	А	<u>EC-295</u>
P0444	0444	PURG VOLUME CONT/V	-	2	×	В	<u>EC-300</u>
P0445	0445	PURG VOLUME CONT/V		2	×	В	<u>EC-300</u>
P0447	0447	VENT CONTROL VALVE		2	×	В	<u>EC-303</u>
P0448	0448	VENT CONTROL VALVE	-	2	×	В	<u>EC-307</u>
P0451	0451	EVAP SYS PRES SEN	_	2	×	А	<u>EC-311</u>
P0452	0452	EVAP SYS PRES SEN	-	2	×	В	<u>EC-315</u>

< ECU DIAGNOSIS INFORMATION >

DT	⁻ C ^{*1}							
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	A
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-318	EC
P0456	0456	EVAP VERY SML LEAK	×* ⁷	2	×	A	EC-322	
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	A	<u>EC-328</u>	С
P0461	0461	FUEL LEVEL SENSOR		2	×	В	<u>EC-329</u>	
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	<u>EC-331</u>	
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	<u>EC-331</u>	D
P0500	0500	VEHICLE SPEED SEN A* ⁸		2	×	В	<u>EC-332</u> (CVT models) <u>EC-333</u> (M/T models)	E
P0506	0506	ISC SYSTEM	_	2	×	В	EC-336	
P0507	0507	ISC SYSTEM	_	2	×	В	<u>EC-338</u>	F
P050A	050A	COLD START CONTROL	_	2	×	А	<u>EC-340</u>	
P050B ^{*9}	050B ^{*9}	COLD START CONTROL	_	2	×	А	<u>EC-340</u>	G
P050E	050E	COLD START CONTROL	_	2	×	А	<u>EC-340</u>	
P0520	0520	EOP SENSOR/SWITCH	_	2	_		EC-342	
P0524	0524	ENGINE OIL PRESSURE	_	1	—	_	<u>EC-345</u>	Н
P0603	0603	ECM BACK UP/CIRCUIT ^{*10}	_	2	× or —	В	<u>EC-348</u>	
P0604	0604	ECM	_	1	×	В	<u>EC-349</u>	
P0605	0605	ECM	_	1 or 2	× or —	В	<u>EC-350</u>	
P0606	0606	CONTROL MODULE	_	1	× or —	В	<u>EC-351</u>	
P0607	0607	ECM	_	1 or 2	× or —	В	<u>EC-352</u>	J
P060A	060A	CONTROL MODULE	_	1 or 2	×	В	<u>EC-353</u>	
P060B	060B	CONTROL MODULE	—	1	×	В	<u>EC-354</u>	Κ
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	<u>EC-355</u>	
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	В	<u>EC-357</u>	
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	В	<u>EC-361</u>	L
P1148	1148	CLOSED LOOP-B1	_	1	×	А	<u>EC-364</u>	
P1212	1212	TCS/CIRC	_	2	—		<u>EC-365</u>	M
P1217	1217	ENG OVER TEMP	_	1	×	В	<u>EC-366</u>	
P1225	1225	CTP LEARNING-B1	_	2	—		<u>EC-369</u>	
P1226	1226	CTP LEARNING-B1	—	2	—	—	<u>EC-370</u>	Ν
P1550	1550	BAT CURRENT SENSOR	_	2	—		<u>EC-371</u>	
P1551	1551	BAT CURRENT SENSOR	—	2	—	—	<u>EC-374</u>	0
P1552	1552	BAT CURRENT SENSOR	—	2	—		<u>EC-374</u>	-
P1553	1553	BAT CURRENT SENSOR	—	2	—		<u>EC-377</u>	
P1554	1554	BAT CURRENT SENSOR	-	2	—	_	<u>EC-380</u>	Ρ
P1556	1556	BAT TMP SEN/CIRC	-	2	—	_	<u>EC-383</u>	
P1557	1557	BAT TMP SEN/CIRC	-	2	—	_	<u>EC-383</u>	
P1564	1564	ASCD SW	_	1	_		<u>EC-385</u> (With ASCD) <u>EC-388</u> (With ICC)	

< ECU DIAGNOSIS INFORMATION >

DT	⁻ C ^{*1}						
CON- SULT GST ^{*2}	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page
P1568	1568	ICC COMMAND VALUE	—	1	_	—	<u>EC-391</u>
P1572	1572	ASCD BRAKE SW	_	1	_	_	<u>EC-392</u> (With ASCD) <u>EC-398</u> (With ICC)
P1574	1574	ASCD VHL SPD SEN	_	1	_	_	<u>EC-404</u> (With ASCD) <u>EC-406</u> (With ICC)
P1610	1610	LOCK MODE		2	_		<u>SEC-63</u> (With intelligent key system), <u>SEC-</u> <u>182</u> (Without in- telligent key system)
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	—	<u>SEC-64</u>
P1612	1612	CHAIN OF ECM-IMMU	_	2	_		<u>SEC-65</u>
P1650	1650	STR MTR RELAY 2	_	2	× or —	В	<u>EC-408</u>
P1651	1651	STR MTR RELAY	_	2	×	В	<u>EC-411</u>
P1652	1652	STR MTR SYS COMM		1	×	В	<u>EC-413</u>
P1715	1715	IN PULY SPEED	_	2	_		<u>EC-415</u>
P1800	1800	VIAS S/V-1	_	2	_	_	<u>EC-417</u>
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	—	<u>EC-419</u>
P2004	2004	TUMBLE CONT/V	_	2	×	В	<u>EC-422</u>
P2014	2014	IN/MANIFOLD RUNNER POS SEN B1	_	2	×	В	<u>EC-425</u>
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1		2	×	В	<u>EC-425</u>
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1	_	2	×	В	<u>EC-425</u>
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1	_	2	×	В	<u>EC-425</u>
P2096	2096	POST CAT FUEL TRIM SYS B1	—	2	×	A	<u>EC-428</u>
P2097	2097	POST CAT FUEL TRIM SYS B1		2	×	А	<u>EC-428</u>
P2100	2100	ETC MOT PWR-B1		1	×	В	<u>EC-432</u>
P2101	2101	ETC FNCTN/CIRC-B1		1	×	В	<u>EC-434</u>
P2103	2103	ETC MOT PWR	_	1	×	В	<u>EC-432</u>
P2118	2118	ETC MOT-B1		1	×	В	<u>EC-437</u>
P2119	2119	ETC ACTR-B1		1	×	В	<u>EC-439</u>
P2122	2122	APP SEN 1/CIRC		1	×	В	<u>EC-441</u>
P2123	2123	APP SEN 1/CIRC		1	×	В	<u>EC-441</u>
P2127	2127	APP SEN 2/CIRC		1	×	В	<u>EC-444</u>
P2128	2128	APP SEN 2/CIRC		1	×	В	<u>EC-444</u>
P2135	2135	TP SENSOR-B1		1	×	В	<u>EC-447</u>
P2138	2138	APP SENSOR	_	1	×	В	<u>EC-450</u>

< ECU DIAGNOSIS INFORMATION >

DTC ^{*1}								Δ
CON- SULT	ECM ^{*3}	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group ^{*4}	Reference page	~
GST ^{*2}	_							EC
P219A	219A	AIR FUEL RATIO IMBARANCE B1	—	2	×	А	<u>EC-453</u>	LO
P2610	2610	ECM/PCM INTERNAL ENG OFF TIMER	_	2	×	A and B	<u>EC-458</u>	C

*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-155, "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:000000013471082

[MRA8DE]

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.

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)

D

E

Κ

N

0

Ρ

< ECU DIAGNOSIS INFORMATION >

Item	OBD- MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
	NID			TID	Unitand Scaling ID	
			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)
			P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A00 or P2097	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	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
			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
			P0133	95H	04H	Response rate: Response ratio (lean to rich)
			P0133	96H	84H	Response rate: Response ratio (rich to lean)

< ECU DIAGNOSIS INFORMATION >

ltem	OBD-	Self-diagnostic test item		Test value and Test limit (GST display)			A
	MID		DTC	TID	Unitand Scaling ID	Description	EC
			P0138	07H	0CH	Minimum sensor output voltage for test cycle	С
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle	0
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage	D
			P0139	81H	0CH	Difference in sensor output voltage	
			P0139	82H	11H	Rear O2 sensor delay response diag- nosis	E
			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	F
			P0146	80H	0CH	Sensor output voltage	
			P0145	81H	0CH	Difference in sensor output voltage	G
		Air fuel ratio (A/F) sensor 1	P0151	83H	0BH	Minimum sensor output voltage for test cycle	Н
			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	
HO2S			P0153	87H	04H	Response rate: Response ratio (lean to rich)	J
			P0153	88H	04H	Response rate: Response ratio (rich to lean)	K
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)	
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)	L
	05H	(Bank 2)	P0150	8BH	0BH	Difference in sensor output voltage	
			P0153	8CH	83H	Response gain at the limited frequency	N
			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	N
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1	С
			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	Ρ
			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	

< ECU DIAGNOSIS INFORMATION >

				li	e and Test mit		
Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description	
	MID	NDSelf-diagnostic test itemDTC11DAir fuel ratio (A/F) sensor 1 (Bank 2)P015D5HAir fuel ratio (A/F) sensor 1 (Bank 2)P01536HHeated oxygen sensor 2 (Bank 2)P01587HHeated oxygen sensor 3 	TID	Unitand Scaling ID			
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	
	05H		P0153	95H	04H	Response rate: Response ratio (lean to rich)	
			P0153	96H	84H	Response rate: Response ratio (rich to lean)	
			P0158	07H	0CH	Minimum sensor output voltage for test cycle	
		Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle	
HO2S	06H		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		P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	
			P0420	80H	01H	O2 storage index	
	21H		P0420	82H	01H	Switching time lag engine exhaust in- dex value	
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage	
CATA- LYST			P2423	84H	84H	O2 storage index in HC trap catalyst	
LYST			P0430	80H	01H	O2 storage index	
	ാവ		P0430	82H	01H	Switching time lag engine exhaust in- dex value	
	2211		P2424	83H	0CH	Difference in 3rd O2 sensor output voltage	
			P2424	84H	84H	O2 storage index in HC trap catalyst	
			P0400	80H	96H	Low flow faults: EGR temp change rate (short term)	
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)	
EGR	21⊔		P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition	
SYSTEM	SIH		P0400	83H	96H	Low flow faults: Max EGR temp	
			P1402	84H	96H	High Flow Faults: EGR temp increase rate	
			P0402	85H	FCH	EGR differential pressure high flow	
			P0401	86H	37H	EGR differential pressure low flow	
			P2457	87H	96H	EGR temperature	

< ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		Test value and Test limit (GST display)			А
Utem	MID		DTC -	TID	Unitand 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
	0011		P100A	84H	10H	VEL slow response diagnosis	
			P1090	85H	10H	VEL servo system diagnosis	
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)	F
VVT			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock posi- tion check diagnosis)	G
	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
	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
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)	
EVAP SYSTEM	3CH	EVAP control system leak (Very small leak)	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 >

Item O2 SEN- SOR HEATER SEC- OND- ARY AIR	OBD-		DTC -	Test value and Test limit (GST display)		Developing
	MID	Self-diagnostic test item		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
			P0030	83H	0BH	A/F sensor heater circuit malfunction
	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
			P0141	81H	14H	Rear O2 sensor internal impedance
	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of heater electric cur- rent to voltage
	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
			P0036	83H	0BH	A/F sensor heater circuit malfunction
	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
			P0161	81H	14CH	Rear O2 sensor internal impedance
	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of heater electric cur- rent to voltage
		H 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
OND-	71H		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

< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

				Test value and Test limit			A
Item	OBD-	Self-diagnostic test item	DTC		display)	Description	
	MID	Sen-ulagnosiic test item		TID	Unitand Scaling ID	Description	EC
			P0171 or P0172	80H	2FH	Long term fuel trim	-
			P0171 or P0172	81H	24H	The number of lambda control clamped	С
			P117A / P219A	82H	03H	Cylinder A/F imbalance monitoring	-
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #1 cylinder parameter	D
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #2 cylinder parameter	E
	81H	Fuel injection system function (Bank 1)	P219E	85H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #3 cylinder parameter	F
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #4 cylinder parameter	G
FUEL			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #5 cylinder parameter	Н
SYSTEM			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #7 cylinder parameter	
			P0174 or P0175	80H	2FH	Long term fuel trim	_
			P0174 or P0175	81H	24H	The number of lambda control clamped	J
			P117B / P219B	82H	03H	Cylinder A/F imbalance monitoring	_
		Fuel injection system function (Bank 2)	P219D	84H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #2 cylinder parameter	К
	82H		P219F	86H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #4 cylinder parameter	L
			P21A1	88H	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #6 cylinder parameter	M
			P21A3	8AH	83H	Air-fuel ratio cylinder imbalance diag- nosis CPS (Crankshaft Position Sen- sor) method #8 cylinder parameter	N

0

Ρ

< ECU DIAGNOSIS INFORMATION >

Item	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description
Item	MID	Self-diagnostic test item	DIC	TID	Unitand Scaling ID	Description
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
		Multiple cylinder misfires	P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
MICEIDE	A1H		P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
MISFIRE	AIN		P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

< ECU DIAGNOSIS INFORMATION >

[MRA8DE]

				Test value and Test limit			
Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description	
	MID		510	TID	Unitand Scaling ID	Doonpion	EC
	A2H	No. 1 cylinder misfire	P0301	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	С
			P0301	0CH	24H	Misfire counts for last/current driving cycles	
	A3H	No. 2 cylinder misfire	P0302	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	D
			P0302	0CH	24H	Misfire counts for last/current driving cycles	E
	A4H	No. 3 cylinder misfire	P0303	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cycles	G
	A5H	No. 4 cylinder misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Н
MISFIRE			P0304	0CH	24H	Misfire counts for last/current driving cycles	
MISFIRE	A6H	No. 5 cylinder misfire	P0305	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0305	0CH	24H	Misfire counts for last/current driving cycles	J
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	K
			P0306	0CH	24H	Misfire counts for last/current driving cycles	
	A8H	No. 7 cylinder misfire	P0307	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	L
			P0307	0CH	24H	Misfire counts for last/current driving cycles	M
	A9H	No. 8 cylinder misfire	P0308	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Ν
			P0308	0CH	24H	Misfire counts for last/current driving cycles	0

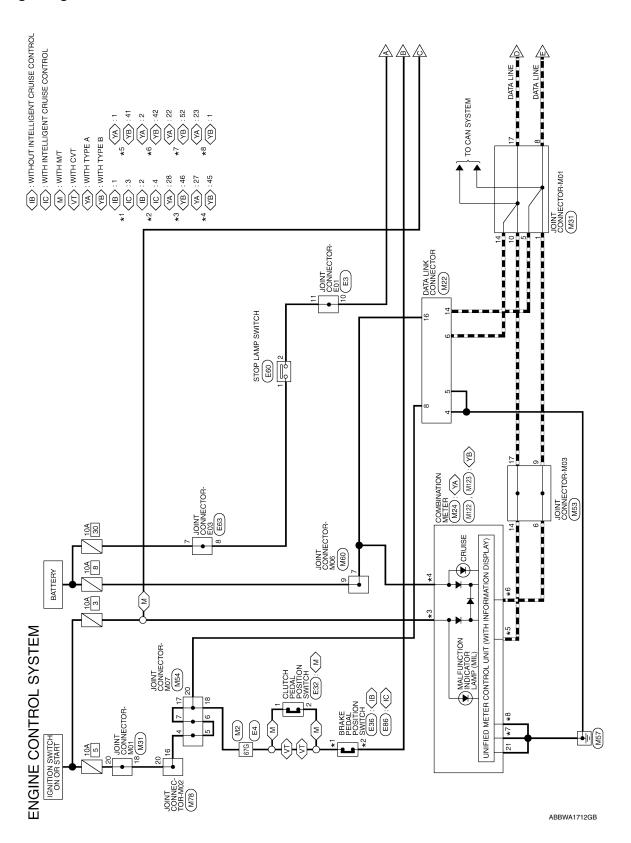
Ρ

[MRA8DE]

WIRING DIAGRAM ENGINE CONTROL SYSTEM

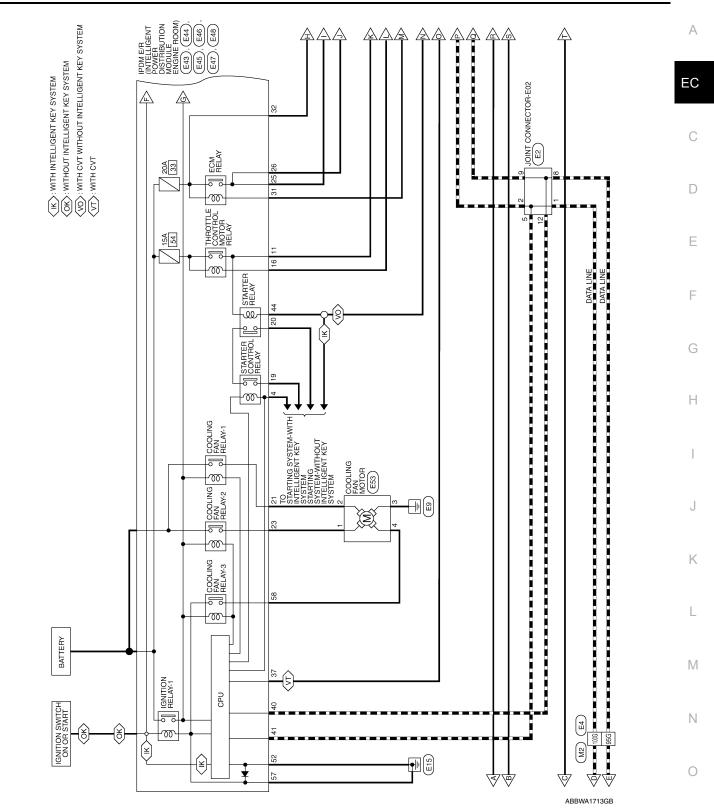
Wiring Diagram

INFOID:000000012787919



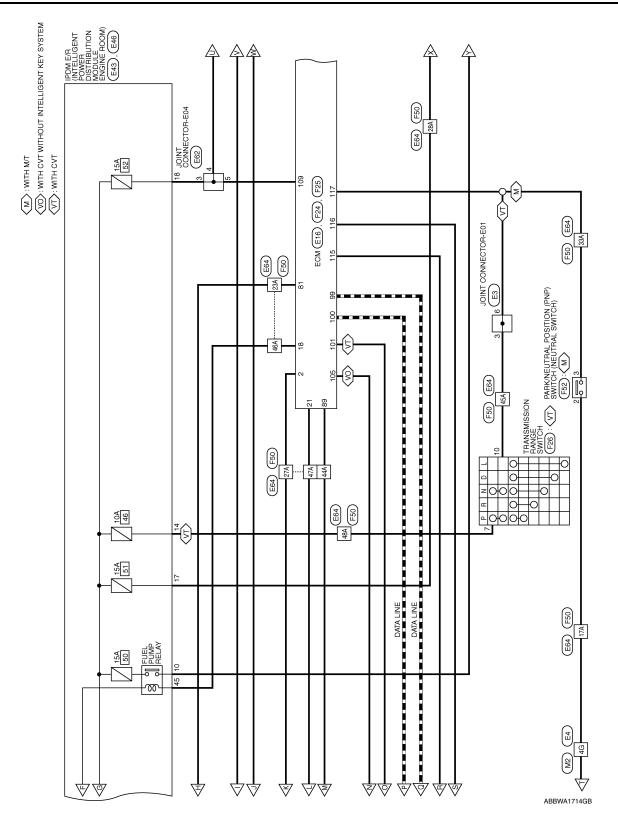
< WIRING DIAGRAM >





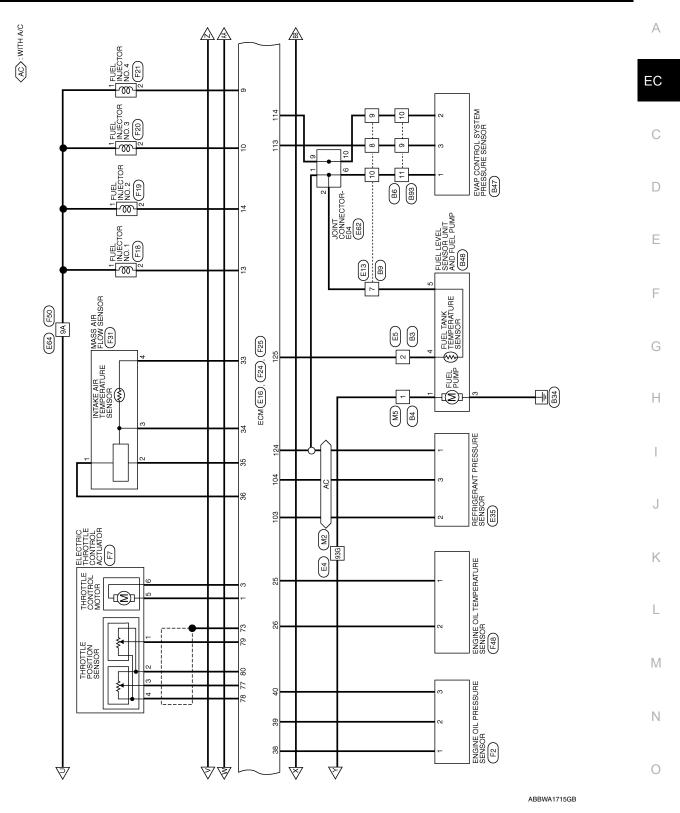
Ρ

< WIRING DIAGRAM >

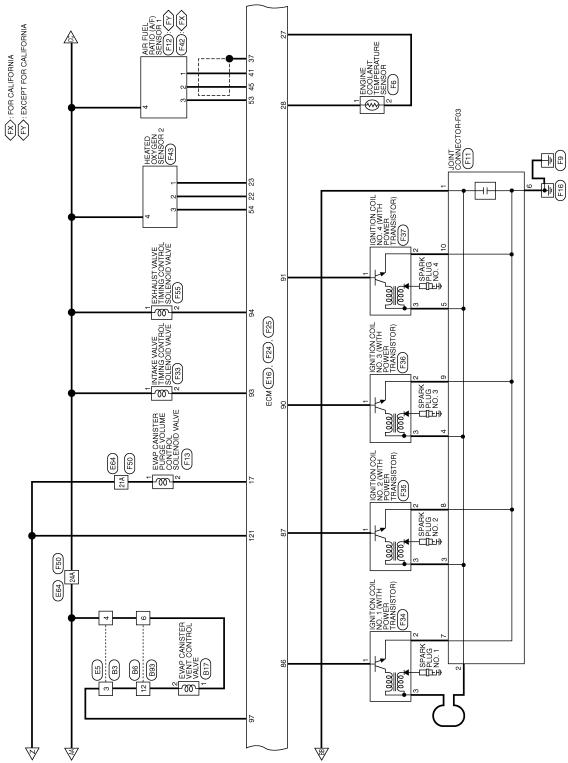


< WIRING DIAGRAM >

[MRA8DE]

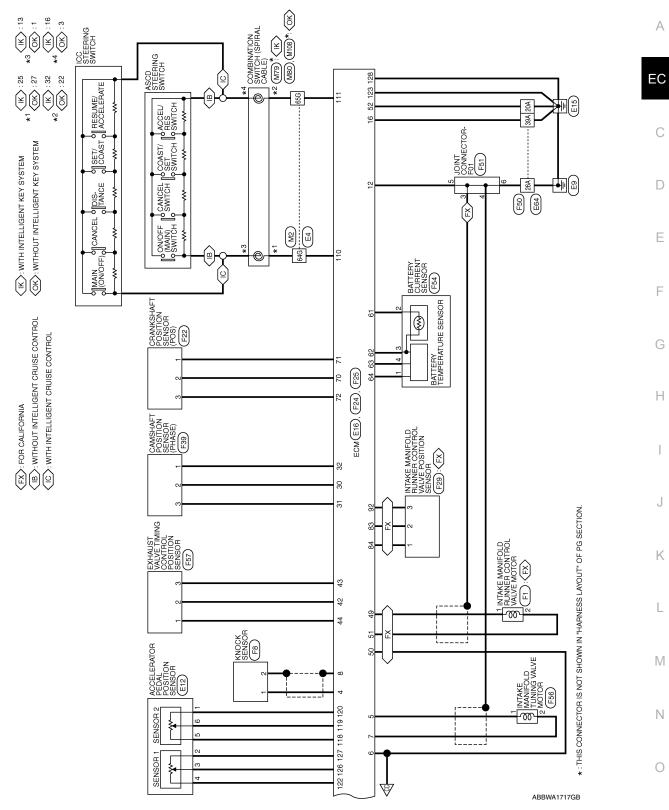


Ρ



ABBWA1716GB

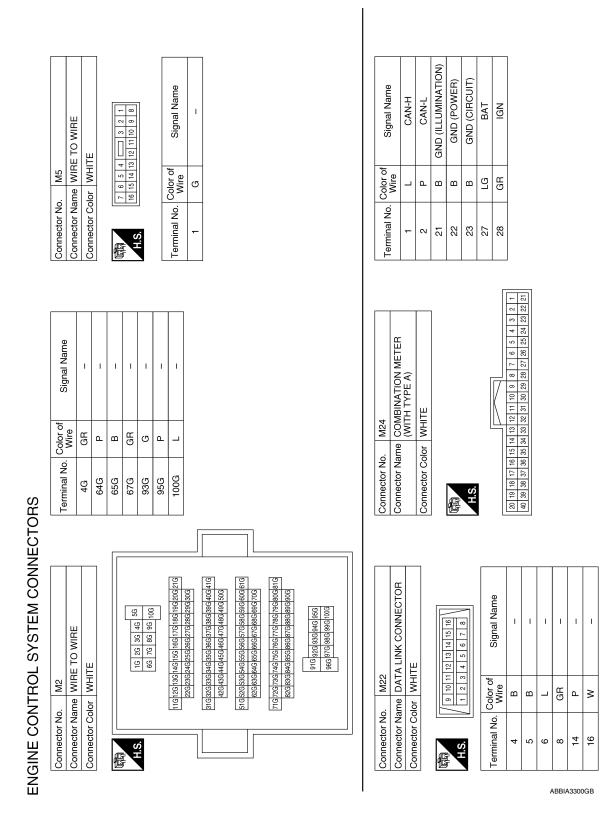
< WIRING DIAGRAM >



Ρ

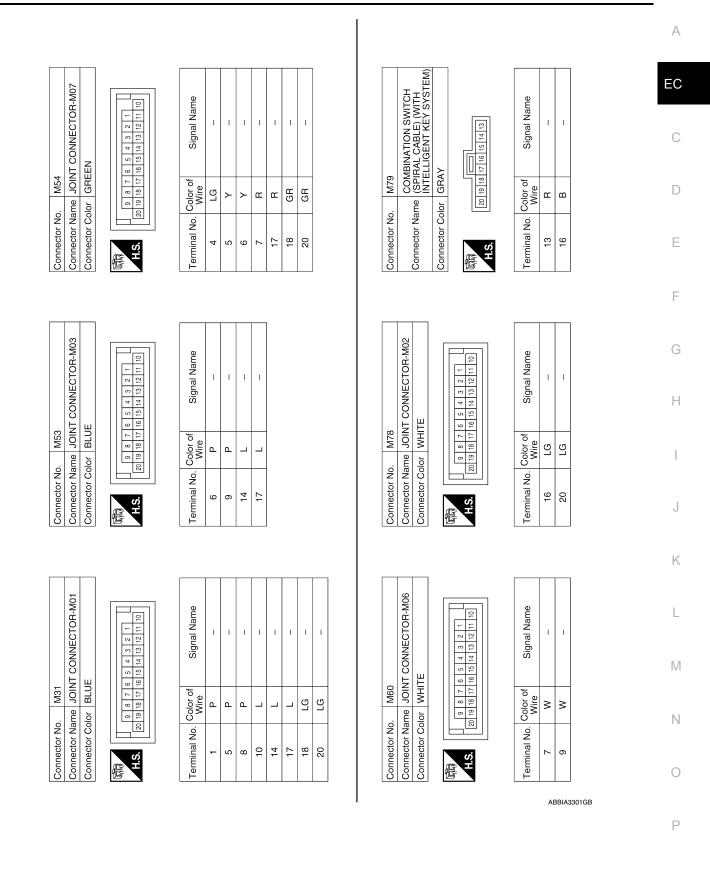


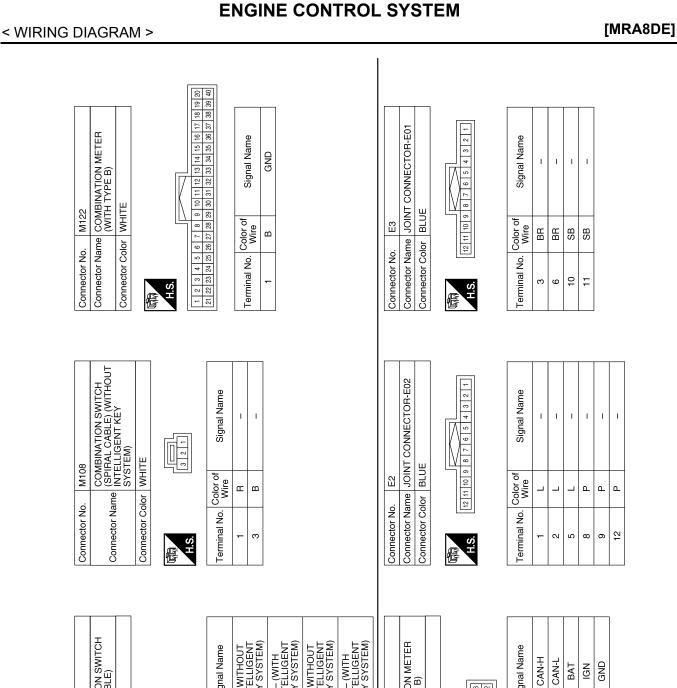
< WIRING DIAGRAM >





< WIRING DIAGRAM >





Connector Name COMBINATION SWITCH (SPIRAL CABLE) GRAY M80 Connector Color Connector No.



Signal Name	– (WITHOUT INTELLIGENT KEY SYSTEM)	– (WITH INTELLIGENT KEY SYSTEM)	- (WITHOUT INTELLIGENT KEY SYSTEM)	– (WITH INTELLIGENT KEY SYSTEM)	
Color of Wire	В	٩	٩	В	
Terminal No. Color of Wire	22	25	27	32	

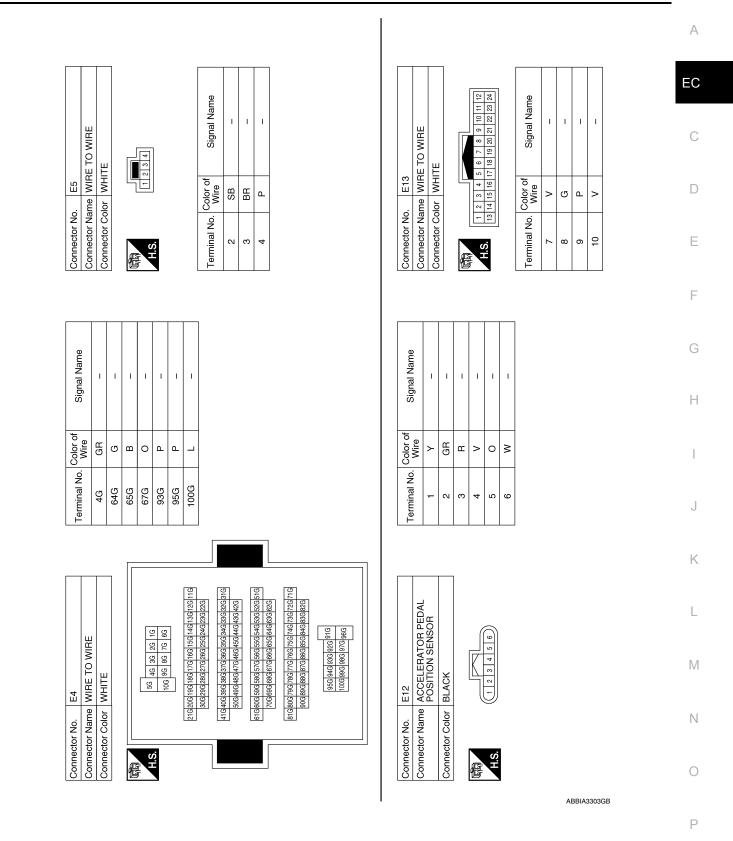
M123	Connector Name COMBINATION METER (WITH TYPE B)	WHITE	
Connector No.	Connector Name	Connector Color WHITE	ليليا الم

Signal Name	CAN-H	CAN-L	BAT	IGN	GND	
Color of Wire	Γ	٩	ГG	GR	В	
Terminal No. Olor of Wire	41	42	45	46	52	

ABBIA3302GB

< WIRING DIAGRAM >

[MRA8DE]



Revision: December 2015

		ĺ

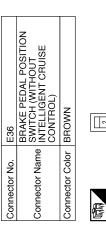
< WIRING DIAGRAM >

Signal Name

Color of Wire

Terminal No.

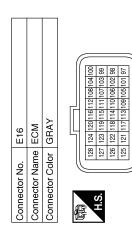
STOP LAMP SWITCH	BRAKE PEDAL POSITION SWITCH	PNP SIGNAL	SENSOR POWER SUPPLY	ACCELERATOR PEDAL POSITION SENSOR 2	SENSOR GROUND	POWER SUPPLY FOR ECM	SENSOR POWER SUPPLY	ECM GROUND	SENSOR GROUND	FUEL TANK TEMPERATURE SENSOR	ACCELERATOR PEDAL POSITION SENSOR 1	SENSOR GROUND	ECM GROUND	
SB	ŋ	BR	0	Ν	≻	ŋ	>	B/Y	>	SB	н	GR	B/Y	
115	116	117	118	119	120	121	122	123	124	125	126	127	128	



	Signal Name	– (WITH CVT)	– (WITH M/T)	I	
	Color of Wire	0	GR	U	
中国 H.S.	Terminal No. Color of Wire	1	-	2	

Т

Signal Name	STARTER RELAY CUT OFF SIGNAL	I	REFRIGERANT PRESSURE SENSOR	SENSOR POWER SUPPLY	STARTER MOTOR RELAY CONTROL SIGNAL	I	1	I	IGNITION SWITCH	ASCD STEERING SWITCH	SENSOR GROUND	I	SENSOR POWER SUPPLY	EVAP CONTROL SYSTEM PRESSURE SENSOR	
Color of Wire	SB	I	ГG	Г	>	I	I	I	0	U	в	I	U	٩	
Terminal No.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	



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

]

	REFRIGERANT PRESSURE SENSOR	CK		Signal Name	-
. E35	me REI PRI	lor BL∕		Color of Wire	^
Connector No.	Connector Name REFRIGERANT PRESSURE SE	Connector Color BLACK	际 H.S.	Terminal No.	ł

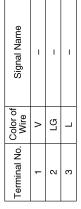
Connector Name CLUTCH PEDAL POSITION SWITCH

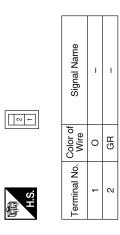
E32

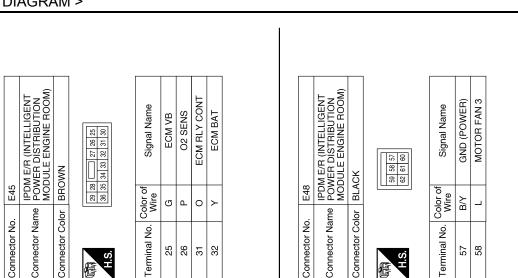
Connector No.

BROWN

Connector Color







Connector No.	E44
Connector Name	Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color WHITE	WHITE
頃 H.S.	21 22 19 24 23 22

Connector Color

Connector No.

	Signal Name	STARTER MOTOR	F/L IGN SW	MOTOR FAN 1	MOTOR FAN 2
_	Color of Wire	В	Ь	ГG	٢
	Terminal No.	19	20	21	23

Terminal No.

H.S.

悟

25 26 31 32

POWER DISTRIBUTION MODULE ENGINE ROOM)	ITE	9 8 7 6 5 4 3 18 17 16 15 14 13 12 11 10	Signal Name	MP SW	FUEL PUMP MOTOR	
	lor WHITE	9 8 1	Color of Wire	ВВ	٩	0
Connector Name	Connector Color	子 子 子 子 子 子 子 子 子 子 子 子 子 子 子 子 子 子 子	Terminal No.	4	10	ŦŦ

Signal Name	NP SW	FUEL PUMP MOTOR	ETC VB	REVERSE LAMP IGN	ETC RLY CONT	IGN COIL	INJECTOR	
Color of Wire	ВВ	Ч	GR	LG	SB	ГG	0	
Terminal No.	4	10	÷	14	16	17	18	

E46	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	WHITE	42 41 40 39 38 37 46 47 44 43
Connector No.	Connector Name	Connector Color WHITE	S:H

Connector Color

Terminal No.

H.S.

E

H.S.

E

57 58

GND (SIGNAL) Signal Name

Color of Wire B/Υ

> Terminal No. 52

Connector No.

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

Connector Name Connector Color

E47

Connector No.

BROWN

42 41 40 39 38 37 48 47 46 45 44 43	f Signal Name	INHIBIT CUT	CAN-L	CAN-H	START CONT	FUEL RLY CONT
42 4	Color of Wire	SB	٩	L	>	≻
H.S.	Terminal No. Color of Wire	37	40	41	44	45

ABBIA3305GB

Ρ

Ο

< WIRING DIAGRAM >

[MRA8DE]

А

EC

С

D

Ε

F

G

Н

J

Κ

L

Μ

Ν

E43

Connector No.

< WIRING DIAGRAM >

ENGINE CONTROL SYSTEM

[MRA8DE]

1 1 1 1 1

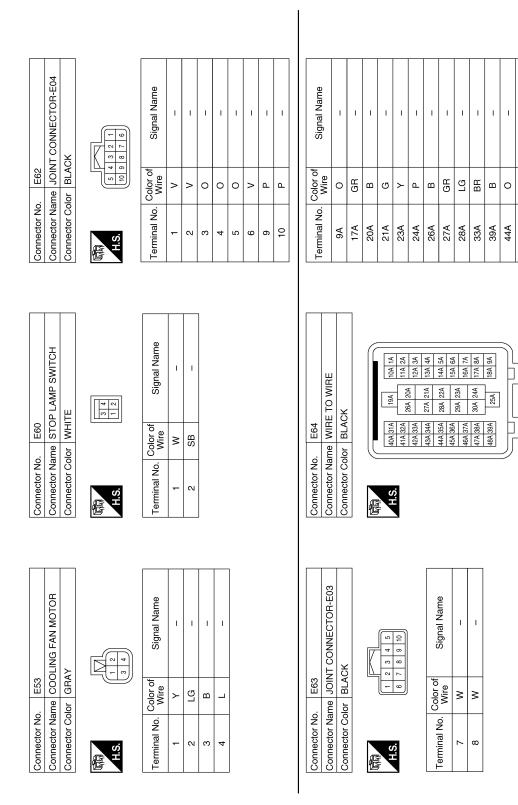
ВВ

45A

≻

LG SB

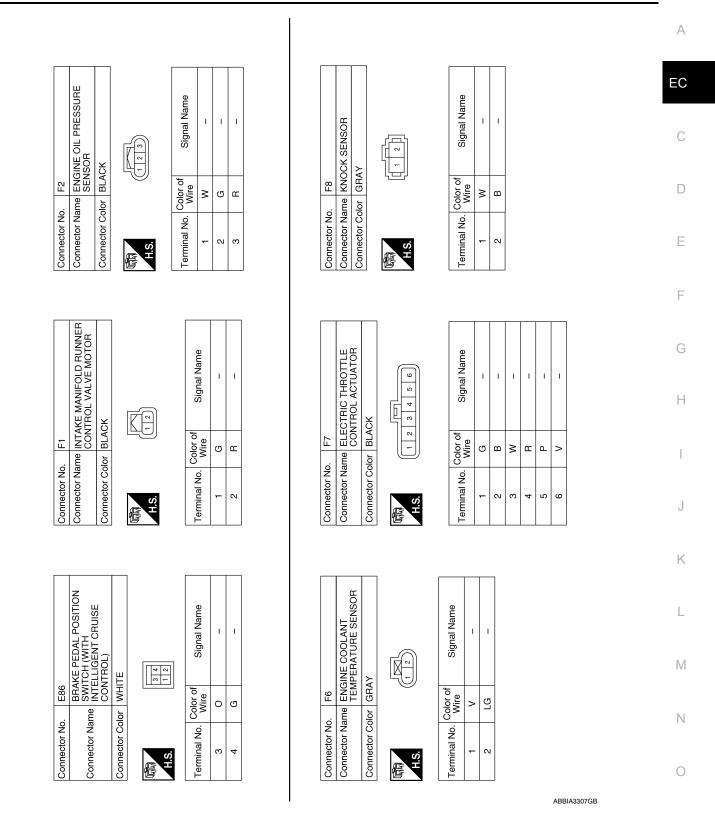
46A 47A 48A



ABBIA3306GB

< WIRING DIAGRAM >

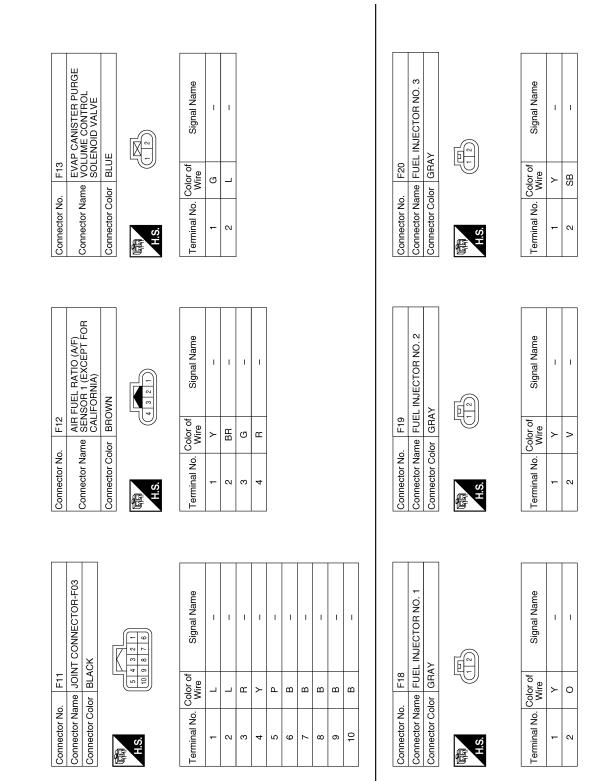
[MRA8DE]



Ρ



< WIRING DIAGRAM >



ABBIA3308GB

< WIRING DIAGRAM >

Signal Name T. Т I

Terminal No. Color of

∝ |≥

N ო

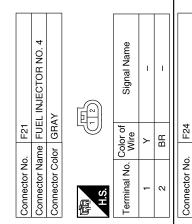
-

G

Connector No.	F22
Connector Name	Connector Name CRANKSHAFT POSITION SENSOR (POS)
Connector Color BLACK	BLACK
国 H.S.	

500	
	<u>v</u> i

Signal Name	I	ECM GROUND	FUEL INJECTOR NO. 1	FUEL INJECTOR NO. 2	I	ECM GROUND	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	FUEL PUMP RELAY	I	I	THROTTLE CONTROL MOTOR RELAY	HEATED OXYGEN SENSOR 2	SENSOR GROUND	I	ENGINE OIL TEMPERATURE SENSOR	SENSOR GROUND	SENSOR GROUND	ENGINE COOLANT TEMPERATURE SENSOR	I
Color of Wire	I	В	0	>	I	ш		GR	I	I	~	×	BR	Ι	≻	Р	ГG	>	I
Terminal No.	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29



		(1		_		
				4	e	~	,
				80	7	9	L
				12	Ξ	10	4
				16	19 15	14	Ş
		Г	1	20	19	18	1
				24	33	22	č
		٦	1	28	27	26	ų
~	ð			32	31	30	8
б С				36	35 31	8	ę
ш	ш			40 36 32 28 24 20 16 12	39	38	5
ne	5			48 44	43	46 42 38 34 30 26 22 18 14	AE 44 07 00 00 05 04
Connector Name ECM	Connector Color BLACK		Į	48	47	46	ų
~	2		1	_			
ō	ō						
ũ	0						
e	l e			U H	5		
Ē	Ē	Æ					
18	18	9e	÷				
0			-				

45 41 37 33 29 25 21 17 13 9 5 1	Signal Name	THROTTLE CONTROL MOTOR (CLOSE)	THROTTLE CONTROL MOTOR POWER SUPPLY	THROTTLE CONTROL MOTOR (OPEN)	KNOCK SENSOR	INTAKE MANIFOLD TUNING VALVE MOTOR (CLOSE)	INTAKE MANIFOLD TUNING VALVE MOTOR POWER SUPPLY	INTAKE MANIFOLD TUNING VALVE MOTOR (OPEN)	SENSOR GROUND	FUEL INJECTOR NO. 4	FUEL INJECTOR NO. 3
41 37 33 2	Color of Wire	٩	ŋ	>	8	IJ	щ	н	в	BR	SB
4	Terminal No.	÷	2	3	4	5	9	7	8	6	10

ABBIA3309GB

[MRA8DE]

А

EC

С

D

Е

F

G

Н

J

Κ

L

Μ

Ν

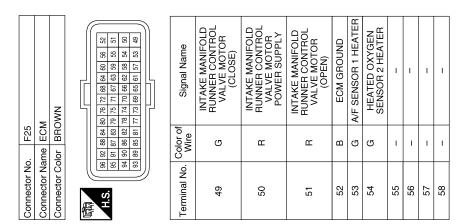
Ο

Revision: December 2015

< WIRING DIAGRAM >

Terminal No.	Color of Wire	Signal Name
80	в	SENSOR POWER SUPPLY
81	٢	POWER SUPPLY FOR ECM (BACKUP)
82	I	I
83	ГС	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
84	M	SENSOR POWER SUPPLY
85	I	I
86	щ	IGNITION SIGNAL NO. 1
87	LG	IGNITION SIGNAL NO. 2
88	I	I
89	GR	ECM RELAY (SELF SHUT-OFF)
06	Ρ	IGNITION SIGNAL NO. 3
91	SB	IGNITION SIGNAL NO. 4
92	^	SENSOR GROUND
93	ГG	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
94	G	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
95	Ι	I
96	I	I

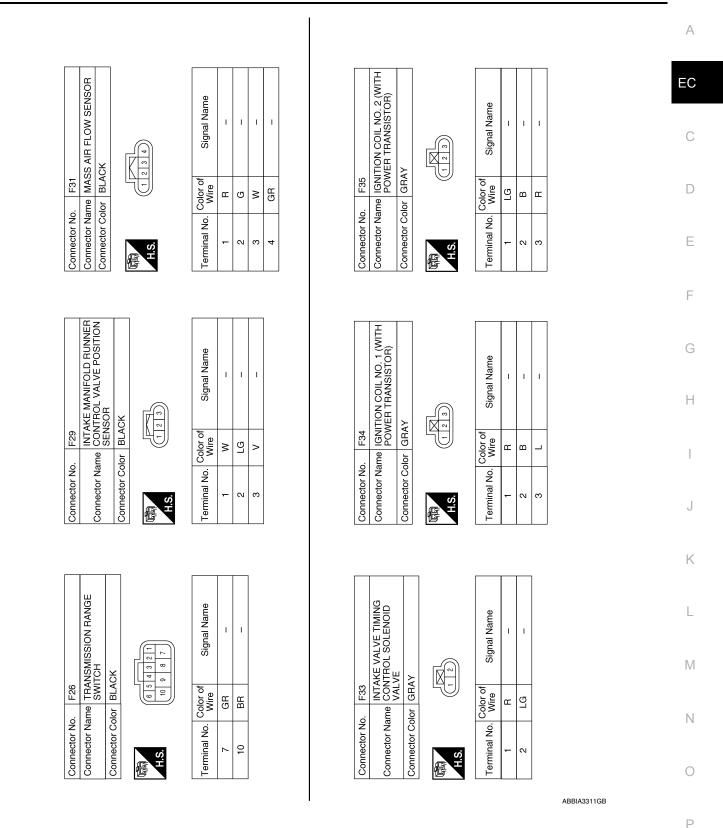
Signal Name	1	I	BATTERY TEMPERATURE SENSOR	SENSOR GROUND	BATTERY CURRENT SENSOR	SENSOR POWER SUPPLY	I	I	I	I	I	SENSOR GROUND	CRANKSHAFT POSITION SENSOR (POS)	SENSOR POWER SUPPLY	SHIELD	I	I	I	THROTTLE POSITION SENSOR 2	SENSOR GROUND	THROTTLE POSITION SENSOR 1
Color of Wire	I	I	0	BR	G	¥	I	I	I	I	I	Μ	В	G	GR	Ι	I	I	Μ	В	თ
Terminal No.	59	60	61	62	63	64	65	66	67	68	69	20	71	72	73	74	75	76	77	78	79



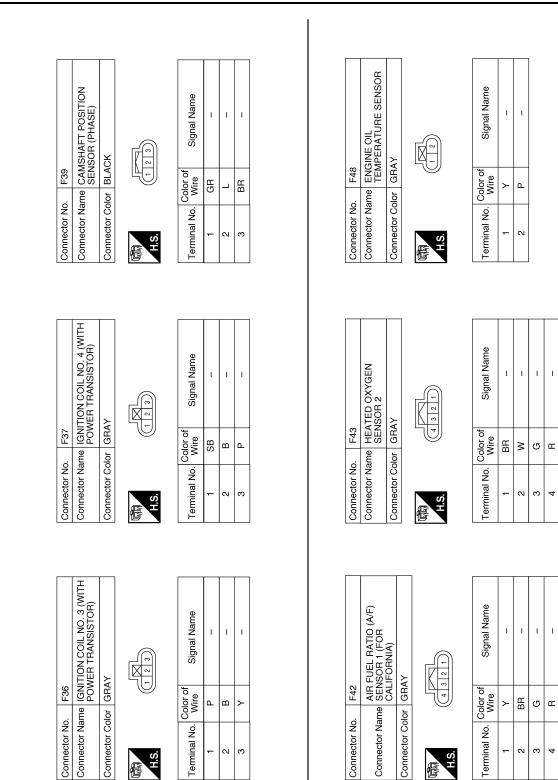
ABBIA3310GB

< WIRING DIAGRAM >

[MRA8DE]



Revision: December 2015

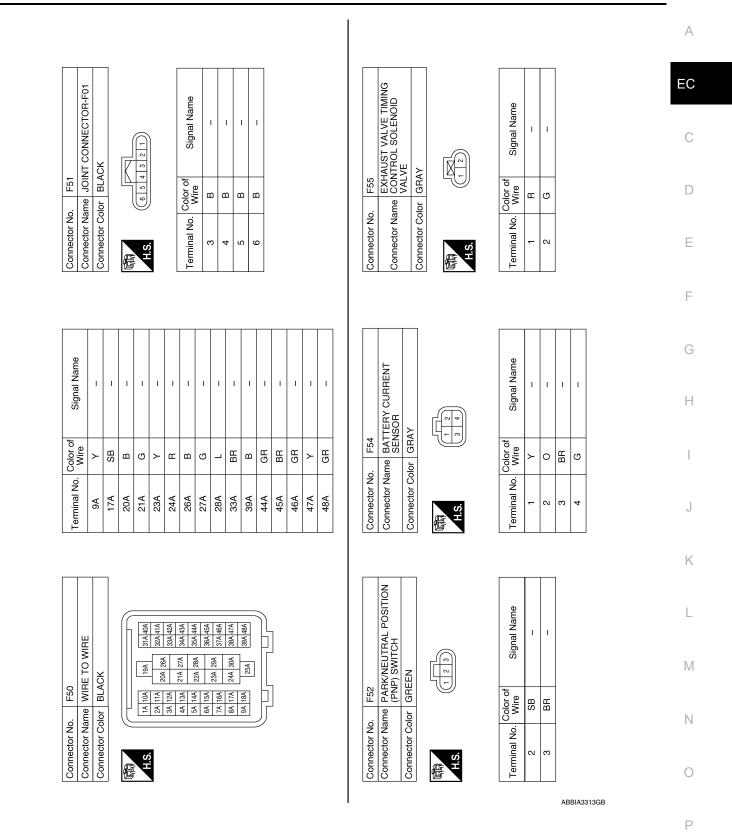


ABBIA3312GB

< WIRING DIAGRAM >

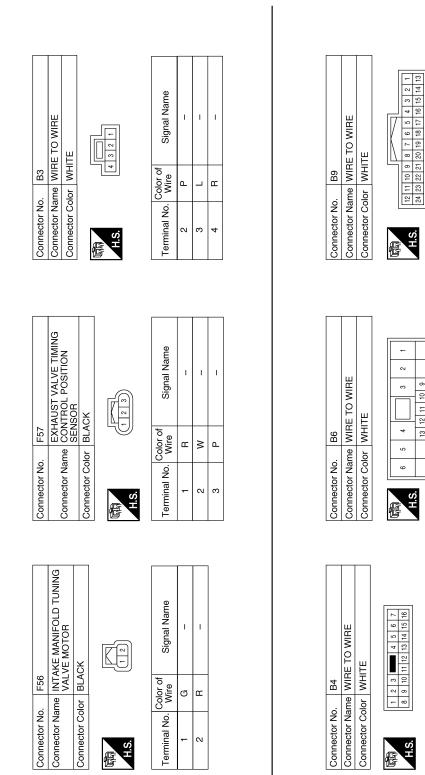


< WIRING DIAGRAM >



< WIRING DIAGRAM >

[MRA8DE]



Signal Name	I	I	I	I	I
Color of Wire	щ	_	٩	×	_
Terminal No. Color of Wire	9	6	10	11	12

Signal Name

Color of Wire

Terminal No.

æ

o 15

15

13

19

20

Т

그 | 죠 | ≻

_

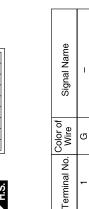
8

1 1

T

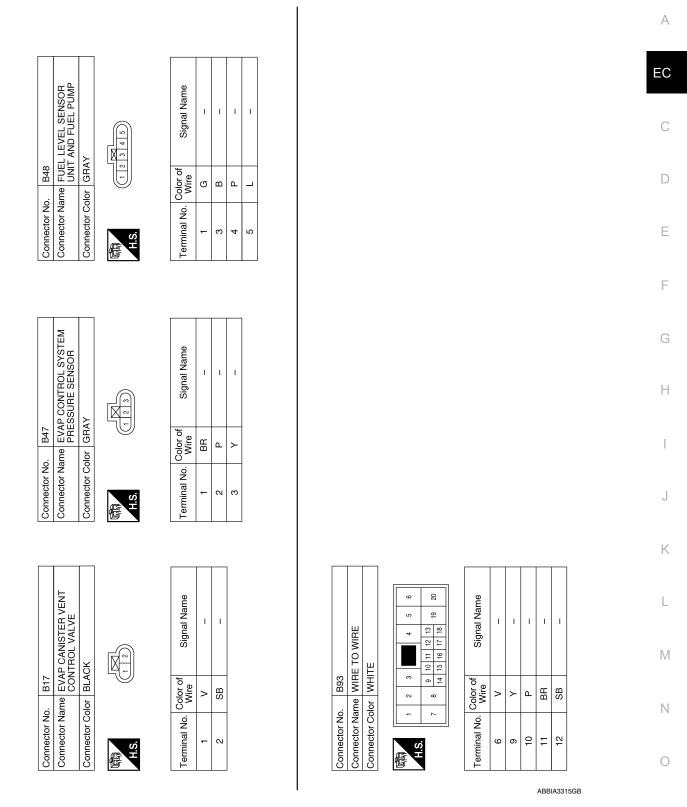
9

6



ABBIA3314GB

< WIRING DIAGRAM >

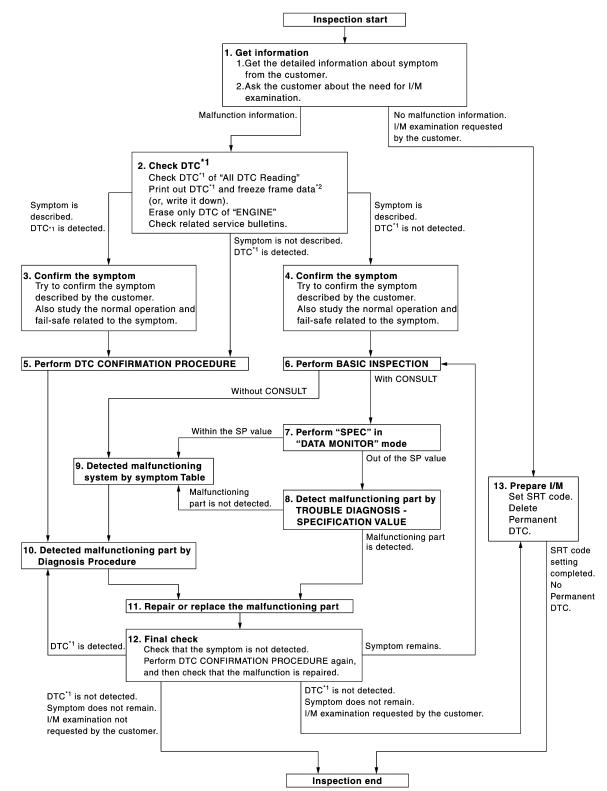


Ρ

BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

OVERALL SEQUENCE



JSBIA0123GB

INFOID:000000012787920

*1: Include 1st trip DTC.	
*2: Include 1st trip freeze frame data.	
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-133</u> , " <u>Diagnostic Work</u> <u>Sheet</u> ".)	
>> GO TO 2.	
2.снеск ртс	
1. Check DTC.	
 Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out using CONSULT or GST.) Erase DTC. 	
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>. Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-489, "Symptom Table"</u>.) Check related service bulletins for information. 	
Is any symptom described and is any DTC detected?	
Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.	
3. CONFIRM THE SYMPTOM	
Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-494</u> , " <u>Description</u> " and <u>EC-91. "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-494</u> , " <u>Description</u> " and <u>EC-91</u> , "Fail <u>Safe</u> ".	
Diagnosis Work Sheet is useful to verify the incident. Verify relation between the symptom and the condition when the symptom is detected.	
>> GO TO 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-93, "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

< BASIC INSPECTION >

YES >> GO TO 10. NO >> Check according to <u>EC-95, "DTC Index"</u>.

6.PERFORM BASIC INSPECTION

Perform EC-135, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 7.

NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT

Make sure that "MASS AIR FLOW (Hz)", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CONSULT in "SPEC" of "DATA MONITOR" mode. Refer to <u>EC-161, "Component Function Check"</u>.

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

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

Detect malfunctioning part according to <u>EC-162</u>, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-489, "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in <u>GI-43. "Circuit Inspection"</u>.

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CON-SULT. Refer to <u>EC-77, "Reference Value"</u>.

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- 3. Check DTC. If DTC is displayed, erase it. Refer to the following.

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>.

>> GO TO 12.

12.FINAL CHECK

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.

Is DTC detected and does symptom remain?

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

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[MRA8DE]

INFOID-000000012787921

SEF907L

А

D

Е

- 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 ((P)With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-66, "CONSULT Function", RWithout CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-63, "On Board Diagnosis Function"). If the completion of EC SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-150, "SRT Set Driving Pattern".
- NO-2 >> I/M examination, requested from the customer: GO TO 13.
- 13. PREPARE FOR I/M EXAMINATION
- Set SRT codes, Refer to EC-149, "Description", 1.
- Erase permanent DTCs. Refer to EC-155, "Description". 2.

>> 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 model WHEN Date, Frequencies WHERE Road conditions **HOW** Operating conditions, Weather conditions, Symptoms

Κ

L

Μ

Ν

Ο

Ρ

Н

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 screwed on. 					
	☐ Startability	 Impossible to start No combust Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other 	nrottle position I by throttle position				
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [High idle 🔲 Low idle]				
- , . ,	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [Lack of power re]				
	Engine stall	At the time of start While idling While accelerating While dece	lerating				
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime					
Frequency		All the time Under certain conditions Sometimes					
Weather cond	ditions	Not affected					
	Weather	Fine Raining Snowing	Others []				
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🔲 Humid °F				
		Cold During warm-up	After warm-up				
Engine conditions		Engine speed 0 2,000	4,000 6,000 8,000 rpm				
Road condition	ons	🗌 In town 🗌 In suburbs 🗌 Hig	hway 🗌 Off road (up/down)				
Driving condi	tions	While accelerating While cruis While decelerating While turning	5				
		Vehicle speed 0 10 20	30 40 50 60 MPH				
Malfunction in	ndicator lamp	☐ Turned on					

MTBL0017

< BASIC INSPECTION >

BASIC INSPECTION

Work Procedure

1.

_

INFOID:000000012787922

А

EC

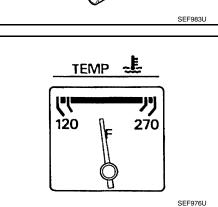
D

Е

F

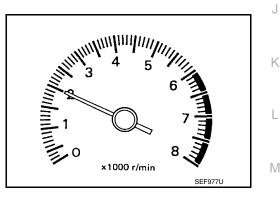
Н

1.INSPECTION START 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. SEF983U Steering wheel is in the straight-ahead position, etc. 4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. TEMP Ensure engine stays below 1,000 rpm.



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

<u>15 aliy i</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.

Ρ

Ο

Ν

L

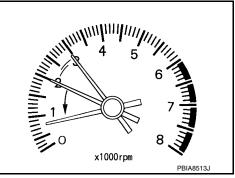
BASIC INSPECTION

< BASIC INSPECTION >

- 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-495</u>, "Inspection".
 For specification, refer to <u>EC-502</u>, "Idle Speed".

Is the inspection result normal?

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



4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform EC-142, "Description".

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-143, "Description".

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-144, "Description".

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-495. "Inspection"</u>. For specification, refer to <u>EC-502, "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 EC-282, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-279, "DTC Logic".

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.)
- Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-61</u>, <u>"ECM : Description"</u> for the one with INTELLIGENT KEY SYSTEM, or <u>SEC-178</u>, "ECM : Description" for the one without INTELLIGENT KEY SYSTEM.

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.

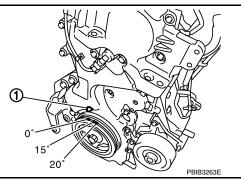
BASIC INSPECTION

< BASIC INSPECTION >

- 2. Check ignition timing with a timing light. For procedure, refer to EC-496, "Inspection" For specification, refer to EC-502, "Ignition Timing".
 - 1 : Timing indicator

Is the inspection result normal?

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



[MRA8DE]

А

EC

D

Е

Н

Κ

11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform EC-142, "Work Procedure".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-143, "Work Procedure".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-144, "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.

2. Check idle speed. For procedure, refer to EC-495, "Inspection". For specification, refer to EC-502, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15. NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

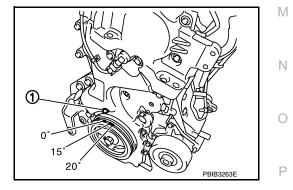
- Run engine at idle. 1.
- Check ignition timing with a timing light. 2. For procedure, refer to EC-496, "Inspection". For specification, refer to EC-502, "Ignition Timing".

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

< BASIC INSPECTION >

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-282, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-279. "DTC Logic".

Is the inspection result normal?

- YES >> GO TO 18.
- NO >> Repair or replace. Then GO TO 4
- 18. 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.)
- Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to <u>SEC-61</u>. <u>"ECM : Description"</u> for the one with INTELLIGENT KEY SYSTEM, or <u>SEC-61</u>. "BCM : Description" for the one without INTELLIGENT KEY SYSTEM.

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION > [N	IRA8DE]
ADDITIONAL SERVICE WHEN REPLACING ECM	A
Description	0:000000012787923
When replacing ECM, the following procedure must be performed. (For details, refer to EC-139, "Wo dure".)	ork Proce- EC
PROGRAMMING OPERATION NOTE:	С
After replacing with a blank ECM, programming is required to write ECM information. Be sure to follo cedure to perform the programming.	
Work Procedure	D:000000012787924
1.SAVE ECM DATA	_
 With CONSULT Turn ignition switch OFF. Reconnect all harness connectors disconnected. Turn ignition switch ON. Select "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using COI 	F NSULT.
 5. Follow the instruction of CONSULT display. NOTE: Necessary data in ECM is copied and saved to CONSULT. 	G
 Go to Step 2 regardless of with or without success in saving data. 	Н
>> GO TO 2. 2.CHECK ECM PART NUMBER	П
Check ECM part number to see whether it is blank ECM or not.	
 NOTE: Part number of blank ECM is 23703 - xxxxx. Check part number when ordering ECM or the one included in the label on the container box. 	J
<u>Is the ECM a blank ECM?</u> YES >> GO TO 3. NO >> GO TO 5.	K
3.SAVE ECM PART NUMBER	
Read out the part number from the old ECM and save the number, following the programming ins Refer to CONSULT Operation Manual. NOTE:	structions.
 The ECM part number is saved in CONSULT. Even when ECM part number is not saved in CONSULT, go to 4. 	Μ
>> GO TO 4.	Ν
4. PERFORM ECM PROGRAMMING After replacing ECM, perform the ECM programming. Refer to CONSULT Operation Manual.	
 NOTE: Refer to <u>EC-501, "Removal and Installation"</u> for replacement of ECM. During programming, maintain the following conditions: Ignition switch: ON 	0
 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 "Data monitor" of CONSULT.) 	P Y VOLT" in

>> GO TO 6.

5.REPLACE ECM

ADDITIONAL SERVICE WHEN REPLACING ECM

< BASIC INSPECTION >

Replace ECM. Refer to EC-501, "Removal and Installation".

[MRA8DE]

>> GO TO 6.

m{0}. PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNITION KEY IDS

Refer to <u>SEC-61, "ECM : Description"</u> (With Intelligent Key System) or <u>SEC-178, "ECM : Description"</u> (Without Intelligent Key System).

>> GO TO 7.

7. CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in CONSULT. Is the data saved successfully?

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

8.WRITE ECM DATA

With CONSULT

I. Select "WRITING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.

2. Follow the instruction of CONSULT display.

NOTE:

The data saved by "SAVING DATA FOR REPLC CPU" is written to ECM.

>> GO TO 10.

9.PERFORM VIN REGISTRATION

Refer to EC-141, "Description".

>> GO TO 10.

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform Accelerator Pedal Released Position Learning. Refer to EC-142. "Description".

>> GO TO 11.

11.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform Throttle Valve Closed Position Learning. Refer to EC-143. "Description".

>> GO TO 12.

12.PERFORM IDLE AIR VOLUME LEARNING

Perform Idle Air Volume Learning. Refer to <u>EC-144, "Description"</u>.

>> END

VIN REGISTRATION

< BASIC INSPECTION >

VIN REGISTRATION

VIN REGISTRATION	А
Description INFOID:000	0000012787925
VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is rep NOTE:	blaced. EC
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M). Refer to <u>EC-141, "Work Procedure"</u> .	0
Work Procedure	C 0000012787926
1.CHECK VIN	D
Check the VIN of the vehicle and note it. Refer to GI-24, "Identification Number".	
>> GO TO 2. 2.PERFORM VIN REGISTRATION	E
With CONSULT	F
 Turn ignition switch ON and engine stopped. Select "VIN REGISTRATION" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. Follow the instruction of CONSULT display. 	G
>> END	
	Н
	I
	J
	12
	K
	L
	M
	Ν
	0
	P

ACCELERATOR PEDAL RELEASED POSITION LEARNING

< BASIC INSPECTION >

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:000000012787927

[MRA8DE]

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected. Refer to <u>EC-142</u>, "Work <u>Procedure</u>".

Work Procedure

INFOID:000000012787928

1.start

- 1. Make sure that accelerator pedal is fully released.
- 2. Turn ignition switch ON and wait at least 2 seconds.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and wait at least 2 seconds.
- 5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

< BASIC INSPECTION >

THROTTLE VALVE CLOSED POSITION LEARNING

Description

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time the harness connector of the electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside is cleaned. Refer to <u>EC-143</u>, "Work Procedure".

Work Procedure

INFOID:000000012787930

1.start	D
With CONSULT Turn ignition switch ON. Construct "OL OD THE DOOL FADM" in "WORK OUPPOPT" mode of "ENCINE" using CONSULT.	
 Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. Follow the instructions on the CONSULT display. Turn ignition switch OFF and wait at least 10 seconds. 	E
Check that throttle valve moves during the above 10 seconds by confirming the operating sound. Without CONSULT 1. Start the engine.	F
 NOTE: Engine coolant temperature is 25°C (77°F) or less before engine starts. Warm up the engine. 	G
 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. 	Н
>> END	I
	J
	K
	L
	M
	Ν
	0
	Ρ

INFOID:000000012787929

А

EC

С

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.
 Refer to EC-144, "Work Procedure".

Work Procedure

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.

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

- Battery voltage: More than 11.6 V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Electric load switch: OFF

 (Air conditioner, headlamp, rear window defogger)
 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
- Transmission: Warmed-up
- CVT models
- With CONSULT: Drive vehicle until "ATF TENP SEN" in "DATA MONITOR" mode of "CVT" system indicates 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. NO >> GO TO 3.
- NU >> GU IU . **)**
- 2.IDLE AIR VOLUME LEARNING

With CONSULT

- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-142, "Description".
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-143, "Description".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode of "ENGINE".
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

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

3. IDLE AIR VOLUME LEARNING

Without CONSULT

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-142. "Description".
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-143, "Description".
- 3. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.

INFOID:000000012787931

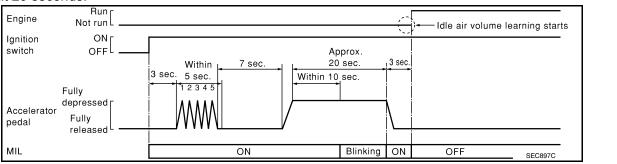
INFOID-000000012787932

IDLE AIR VOLUME LEARNING

< BASIC INSPECTION >

- Fully release the accelerator pedal.

- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approximately 20 seconds until the MIL A 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 specifi-	
cations. For specification, refer to EC-502, "Idle Speed" and EC-502, "Ignition Timing".	C
Is the inspection result normal?	
YES >> INSPECTION END	

IES	
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-161, "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

[MRA8DE]

EC

D

Е

Н

Κ

L

Μ

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". Refer to <u>EC-146, "Work Procedure"</u>.

Work Procedure

INFOID:000000012787934

INFOID:000000012787933

1.start

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Clear mixture ratio self-learning value by touching "CLEAR".

With GST

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

>> END

FUEL PRESSURE

< BASIC INSPECTION >

J

Κ

Ρ

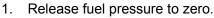
FUEL PRESSURE	
Work Procedure	А
FUEL PRESSURE RELEASE	EC
1.FUEL PRESSURE RELEASE	
 With CONSULT 1. Turn ignition switch ON. 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT. 	С
 Start engine. After engine stalls, crank it two or three times to release all fuel pressure. Turn ignition switch OFF. 	D
Without CONSULT Remove fuel pump fuse located in IPDM E/R. Start engine. 	Е
 After engine stalls, crank it two or three times to release all fuel pressure. Turn ignition switch OFF. Reinstall fuel pump fuse after servicing fuel system. 	F
>> END	G
 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 	Н
 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 shock with electrical systems exercises (i.e. lights, rear defeaser, A/C). 	I

• 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



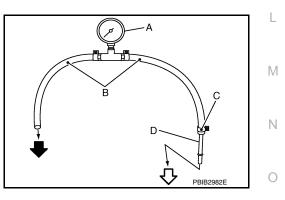
- Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV1011840] (D), then connect fuel pressure gauge (A).
 - \triangleleft : To quick connector
 - : To fuel tube
 - C : Clamp

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.



FUEL PRESSURE

< BASIC INSPECTION >

[MRA8DE]

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)

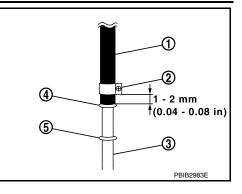
Is the inspection result normal?

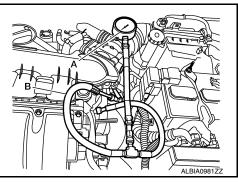
YES >> INSPECTION END NO >> GO TO 2.

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.





< BASIC INSPECTION >

HOW TO SET SRT CODE

Description

INFOID:000000012787936

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.

Κ

J

Μ

L

Ν

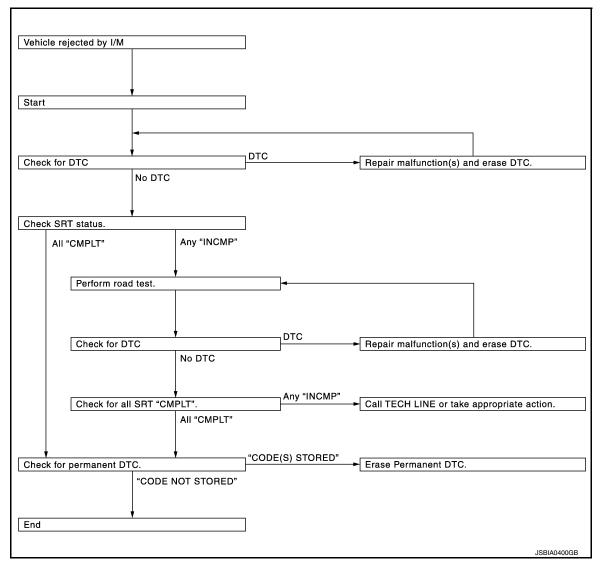
0

P

EC

А

< BASIC INSPECTION >



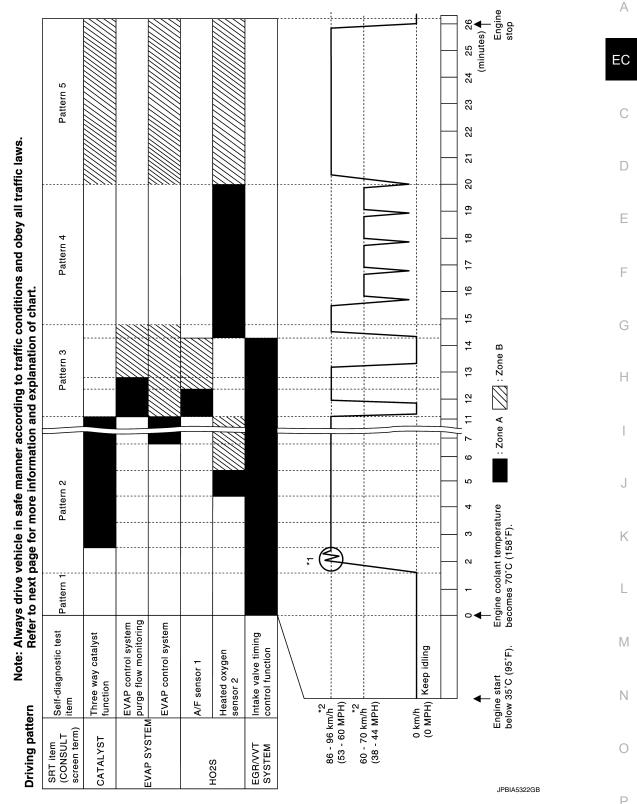
SRT Set Driving Pattern

INFOID:000000012787937

CAUTION:

< 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 shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

- *: Normal conditions refer to the following:
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
- Under different conditions [For example: ambient air temperature other than 20 30°C (68 86°F)], diagnosis may also be performed.
- "EGR/VVT SYSTEM" written in the figure is not applicable to the vehicle.

Work Procedure

INFOID:000000012787938

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-95, "DTC Index".

NO >> GO TO 2.

2.CHECK SRT STATUS

With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" using CONSULT.

Without CONSULT

Perform "SRT status" mode with EC-63, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT code(s) set?

- YES >> END
- NO-1 >> (i) With CONSULT: GO TO 3.
- NO-2 >> Without CONSULT: GO TO 4.

3. DTC CONFIRMATION PROCEDURE

- 1. Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" using CONSULT.
- For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-149</u>, "<u>Description</u>".
- 3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-95, "DTC Index"</u>.

NO >> GO TO 9.

4.PERFORM ROAD TEST

• Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-149, "Description".

• Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-150</u>, "<u>SRT Set Driv-ing Pattern</u>".

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

- 1. Check the vehicle condition;
- Engine coolant temperature is -10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- 2. 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;

Engine coolant temperature

< 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:

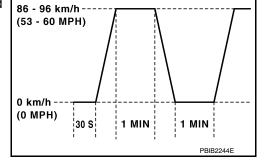
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> 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).

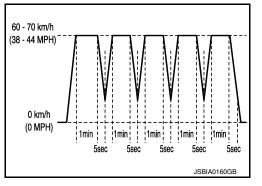
>> GO TO 8.



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

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

EC-153

EC

D

Е

F

Н

Κ

Μ

Ν

Ρ

< BASIC INSPECTION >

NO >> Perform this procedure again.

< BASIC INSPECTION >

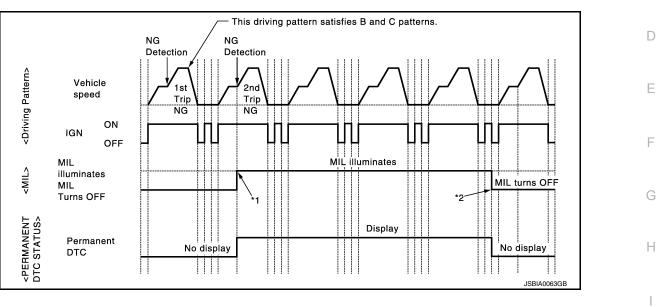
HOW TO ERASE PERMANENT DTC

Description

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 per-

			×: Appli	cable —: Not applicable	
Croup*	Perform "DTC CONFIRMATION PROCE-	Driving	pattern	Reference	L
Group	DURE" for applicable DTCs.	В	D	Relefence	
A	×	_	—	<u>EC-156</u>	NЛ
В		×	×	<u>EC-158</u>	1 V I

*: For group, refer to EC-95, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-95. "DTC Index".

0

Ρ

Ν

А

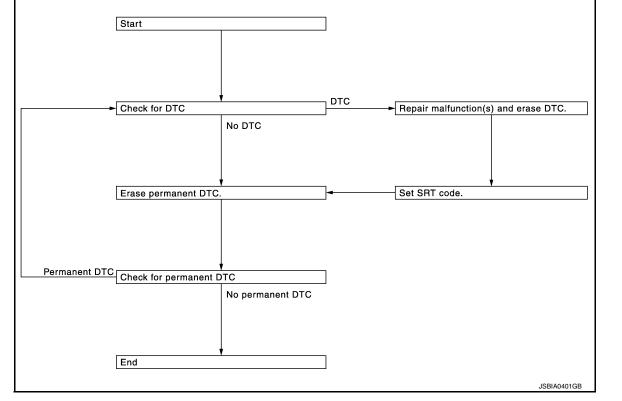
EC

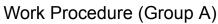
[MRA8DE]

< BASIC INSPECTION >

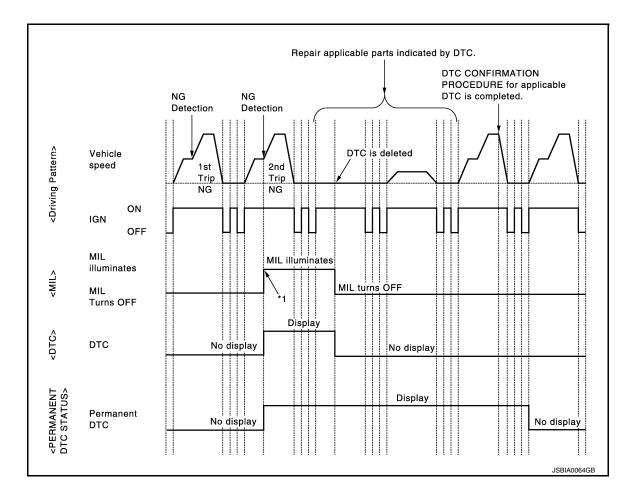
[MRA8DE]

PERMANENT DTC SERVICE PROCEDURE





INFOID:000000012787940



< BASIC INSPECTION >

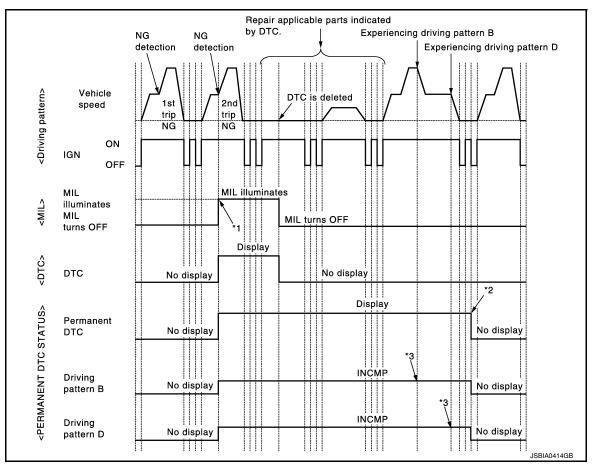
*1: When the same malfunction is de-А tected in two consecutive trips, MIL will illuminate. 1.CHECK DTC EC Check DTC. Is any DTC detected? >> Repair malfunction(s) and erase DTC. Refer to EC-63, "On Board Diagnosis Function", EC-66, YES "CONSULT Function". NO >> GO TO 2. D 2.CHECK PERMANENT DTC (P)With CONSULT Е 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. 4. Turn ignition switch ON. Select "PERMANENT DTC STATUS" mode with CONSULT. 5. With GST 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. Turn ignition switch ON. 4. 5. Select Service \$0A with GST. Н 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 J ECM. Refer to EC-95, "DTC Index". >> GO TO 4. Κ 4.CHECK PERMANENT DTC With CONSULT **1**. L 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. 4. Turn ignition switch ON. M 5. Select "PERMANENT DTC STATUS" mode with CONSULT. With GST Turn ignition switch OFF and wait at least 10 seconds. 1. Ν 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 4. 5. Select Service \$0A with GST. Ο Is any permanent DTC detected? YES >> GO TO 1. NO >> END Ρ

[MRA8DE]

< BASIC INSPECTION >

Work Procedure (Group B)





- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: After experiencing driving pattern B *3: and D, permanent DTC is erased.

Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:

Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-63</u>, "<u>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.

< BASIC INSPECTION > [MF	RA8DE]
 Turn ignition switch ON. Select Service \$0A with GST. 	A
Is any permanent DTC detected?	
YES >> GO TO 3. NO >> END	EC
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 pattern B and D is reset. With CONSULT Start engine and warm it up to normal operating temperature. Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according ing pattern B. Refer to <u>EC-66</u>. "CONSULT Function", <u>EC-60</u>. "DIAGNOSIS DESCRIPTION : Driv tern". 	p to driv-
 With GST 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 :</u> <u>Pattern"</u>. 	
>> GO TO 4.	G
4. CHECK PERMANENT DTC	
With CONSULT	Η
1. Turn ignition switch OFF and wait at least 10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	
4. Turn ignition switch ON.	
5. Select "PERMANENT DTC STATUS" mode with CONSULT.	J
 With GST Turn ignition switch OFF and wait at least 10 seconds. 	0
2. Turn ignition switch ON.	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON 	K
 Turn ignition switch ON. Select Service \$0A with GST. 	
Is any permanent DTC detected?	L
YES >> GO TO 5.	
NO >> END	
5. DRIVE DRIVING PATTERN D	M
 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 pattern B and D is reset. Drive the vehicle according to driving pattern D. Refer to <u>EC-60, "DIAGNOSIS DESCRIPTION : Driv tern"</u>. 	-

>> GO TO 6.

6.CHECK PERMANENT DTC

With CONSULT 1. Turn ignition sv

- 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.

Ρ

< BASIC INSPECTION >

- Select "PERMANENT DTC STATUS" mode with CONSULT. 5.
- With GST1. 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.
- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

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

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

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

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MASS AIR FLOW SENSOR (Hz) (The signal frequency 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-135, "Work Procedure"</u>.
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode of "ENGINE" using CONSULT.

EC-161

- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Proceed to <u>EC-162. "Diagnosis Procedure"</u>.

INFOID:0000000012787942

INEOID 000000012787943

А

EC

Е

Н

Κ

L

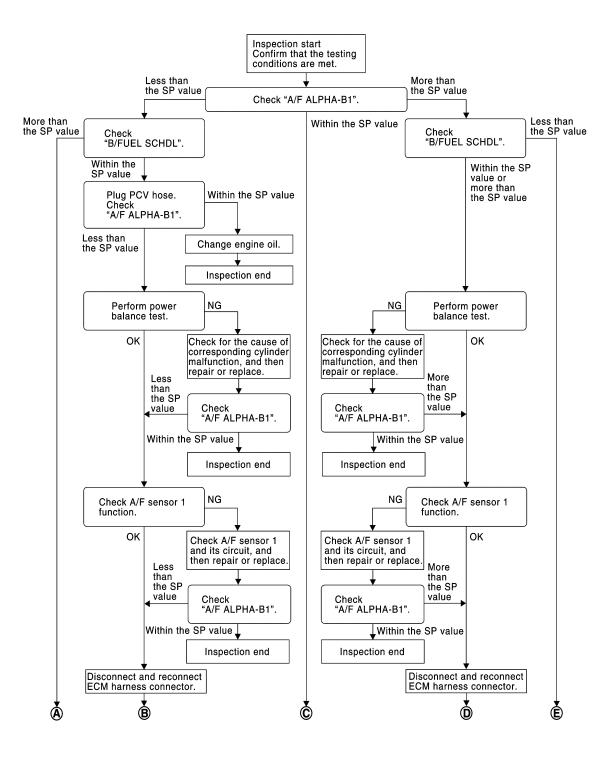
M

Ρ

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

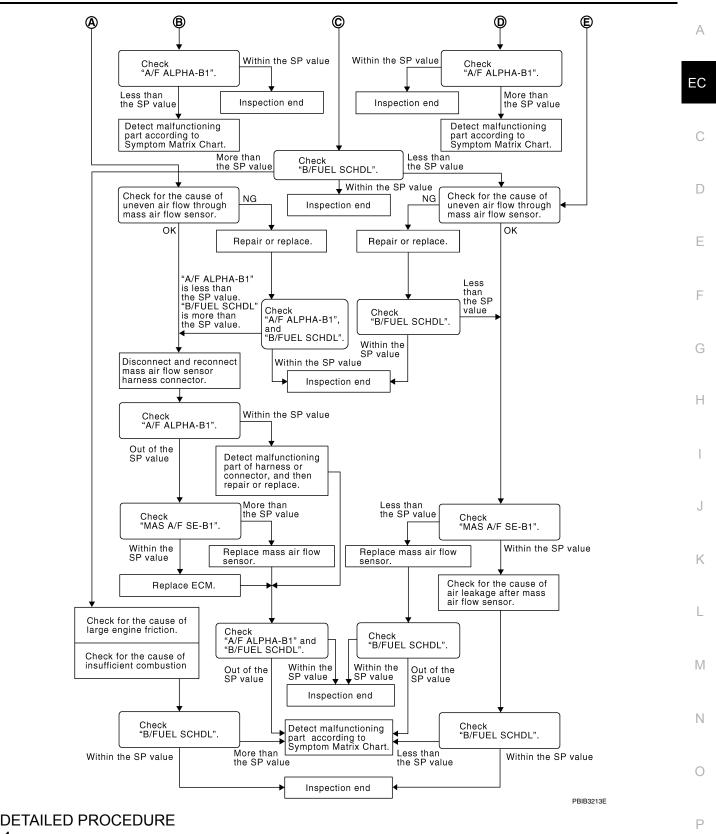
OVERALL SEQUENCE



JSBIA1063GB

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



1.CHECK "A/F ALPHA-B1"

With CONSULT

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-161, "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 indication is out of the SP value even a little.

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.

2.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

- YES >> GO TO 4.
- NO >> More than the SP value: GO TO 16.

3.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 22.

4.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

- 1. Stop the engine.
- 2. Change engine oil.

NOTE:

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

>> INSPECTION END

6.PERFORM POWER BALANCE TEST

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- 2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

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

NO >> GO TO 7.

I.DETECT MALFUNCTIONING PART

Check the following.

- 1. Ignition coil and its circuit (Refer to EC-472, "Component Function Check".)
- 2. Fuel injector and its circuit (Refer to EC-466, "Component Function Check".)
- 3. Intake air leakage
- 4. Low compression pressure (Refer to EM-23, "Inspection".)

Is the inspection result normal?

TROUBLE DIAGNOSIS - SPECIFICATION VALUE
< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]
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"
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END NO >> GO TO 9.
9. CHECK A/E SENSOR 1 FUNCTION
Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
 For DTC P0130, refer to <u>EC-213, "DTC Logic"</u>.
 For DTC P0131, refer to <u>EC-217, "DTC Logic"</u>. For DTC P0132, refer to <u>EC-220, "DTC Logic"</u>.
 For DTC P014C and P014D, refer to <u>EC-241, "DTC Logic"</u>.
For DTC P2096 and P2097, refer to <u>EC-428, "DTC Logic"</u> .
<u>Is any DTC detected?</u> YES >> GO TO 10.
NO >> GO TO 12.
10.check a/f sensor 1 circuit
Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.
Н
>> GO TO 11.
11. СНЕСК "А/F ALPHA-B1"
 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 12.
12.DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR
1. Stop the engine.
 Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.
>> GO TO 13.
13. CHECK "A/F ALPHA-B1"
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
Is the measurement value within the SP value?
YES >> INSPECTION END
NO >> Detect malfunctioning part according to <u>EC-489, "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.

< DTC/CIRCUIT DIAGNOSIS >

15. DETECT MALFUNCTIONING PART

- 1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
- Check for the cause of insufficient combustion. Refer to the following. 2.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 27.

16.CHECK INTAKE SYSTEM

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

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system
- Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 17.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 18.

18.disconnect and reconnect mass air flow sensor harness connector

1. Stop the engine.

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

>> GO TO 19.

19.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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-190, "DTC Logic". Then GO TO 26.

NO

20.check "mass air flow sensor (HZ)"

Select "MASS AIR FLOW SENSOR (Hz)" 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 21.

- NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26.
- 21.REPLACE ECM
- 1. Replace ECM.
- Perform EC-139, "Description". 2.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

>> GO TO 26.	А
22.CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.	EC
 Crushed air ducts Malfunctioning seal of air cleaner element 	
 Uneven dirt of air cleaner element Improper specification of intake air system 	С
Is the inspection result normal?	
YES >> GO TO 24.	D
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	Е
SP value.	
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> Less than the SP value: GO TO 24.	F
24.CHECK "MASS AIR FLOW SENSOR (HZ)"	
Select "MASS AIR FLOW SENSOR (Hz)" in "SPEC" of "DATA MONITOR" mode, and make sure that the indi- cation is within the SP value.	G
Is the measurement value within the SP value?	Н
YES >> GO TO 25. NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.	11
25. CHECK INTAKE SYSTEM	
Check for the cause of air leak after the mass air flow sensor. Refer to the following.	I
 Disconnection, looseness, and cracks in air duct Looseness of oil filler cap 	
Disconnection of oil level gauge	J
 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	Κ
 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.	L
>> GO TO 27.	
26. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"	M
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?	Ν
YES >> INSPECTION END	
NO >> Detect malfunctioning part according to <u>EC-489, "Symptom Table"</u> . 27.CHECK "B/FUEL SCHDL"	0
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.	Р
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> Detect malfunctioning part according to <u>EC-489, "Symptom Table"</u> .	

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
IPDM E/R	#33	20A
	#52	15A

Is the fuse blown (open)?

YES >> If the replaced fuse is blown again. Check IPDM E/R power supply.

NO >> GO TO 2.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9 and E15. Refer to GI-43, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.

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

	+		
E	СМ	-	Continuity
Connector	Terminal		
F24	12		
1 24	16		
F25	52	Ground	Existed
E16	123		
L 10	128		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY (MAIN)-1

1. Reconnect ECM harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector terminals.

	ECM		
Connector	+	_	Voltage
Connector	Terr	ninal	
E16	121	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHECK ECM POWER SUPPLY (MAIN)-2

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

INFOID:000000012787945

< DTC/CIRCUIT DIAGNOSIS >

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

	0				•	0		
	ECM							
a	+	_	Con	ndition	Voltage (Approx.)			
Connector	Ter	minal			(Αρριολ.)			
E16	121	128		ignition switch voltage will ex- seconds	Drop to 0 V			-
the inspec	tion result n	ormal?	L	ł				
	GO TO 9.							
	GO TO 7.							
		R SUPPLY (I	MAIN) CIRC	CUIT				
	ition switch	OFF. Irness conne	ctore					
		/R harness co						
Check th	ne continuity	/ between EC	CM harness	connector an	nd IPDM E/R	harness conne	ector.	
+				Continuit				
EC	Terminal	Connector	M E/R Terminal	Continuity				
Connoctor	Terrinidi	Connector						
	121	E45	25	Lvietod				
E16	121	E45	25	Existed				
E16 Also che	ck harness	for short to g	_	Existed				
Also che the inspec	eck harness tion result n	for short to g ormal?	ground.			:+		
E16 Also che the inspec YES >> I	eck harness tion result n Perform the	for short to g normal? trouble diagr	pround. nosis for IPI	DM E/R powe	er supply circ	uit.		
E16 Also che the inspec YES >> I NO >> I	eck harness tion result n Perform the Repair or re	for short to g <u>tormal?</u> trouble diagr place error-d	pround. nosis for IPI letected part	DM E/R powe	er supply circ	uit.		
E16 Also che the inspec YES >> I YES >> I O >> I	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY	for short to g <u>tormal?</u> trouble diago place error-d CONTROL	ground. nosis for IPI letected part SIGNAL	DM E/R powe ts.				
E16 Also che the inspec YES >> I YES >> I O >> I	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY	for short to g <u>tormal?</u> trouble diago place error-d CONTROL	ground. nosis for IPI letected part SIGNAL	DM E/R powe				
E16 Also che the inspec YES >> I NO >> I .CHECK E heck the vo	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY Ditage betwe	for short to g normal? trouble diago place error-d CONTROL een ECM har	ground. nosis for IPI letected part SIGNAL mess conne	DM E/R powe ts.				
E16 Also che the inspec YES >> I NO >> I .CHECK E	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe	for short to g normal? trouble diagr place error-d CONTROL een ECM har	ground. nosis for IPI letected part SIGNAL	DM E/R powe ts. ctor terminals	s as per the f	öllowing. Voltage		
E16 Also che the inspec /ES >> I NO >> I .CHECK E neck the vo	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe	for short to g normal? trouble diago place error-d CONTROL een ECM har	ground. nosis for IPI letected part SIGNAL mess conne	DM E/R powe ts.	s as per the f	ollowing.		
E16 Also che the inspec (ES >> I NO >> I .CHECK E heck the vo	eck harness tion result n Perform the Repair or re CM RELAY bltage betwe	for short to g normal? trouble diagr place error-d CONTROL een ECM har	ground. nosis for IPI letected part SIGNAL mess conne	DM E/R powe ts. ctor terminals	s as per the f	öllowing. Voltage		
E16 Also che the inspec (ES >> I NO >> I .CHECK E neck the vo	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Ditage betwe Terminal	for short to g normal? trouble diago place error-d CONTROL een ECM har CM Connector	ground. nosis for IPI letected part SIGNAL mess conne 	DM E/R powe ts. ctor terminals Conc Ignition switch	dition	ollowing. Voltage (Approx.)		
E16 Also che the inspec (ES >> I IO >> I .CHECK E neck the vo	eck harness tion result n Perform the Repair or re CM RELAY bltage betwe	for short to g normal? trouble diagr place error-d CONTROL een ECM har	ground. nosis for IPI letected part SIGNAL mess conne	DM E/R powe ts. ctor terminals Conc Ignition switch Turn ignition s and wait at lea	dition	ollowing. Voltage (Approx.)		
E16 Also che the inspec (ES >> I NO >> I CHECK E heck the vo	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Ditage betwe Terminal	for short to g normal? trouble diagr place error-d CONTROL cen ECM har CM Connector E16	ground. nosis for IPI letected part SIGNAL mess conne 	DM E/R powe ts. ctor terminals Conc Ignition switch Turn ignition s	dition	Ollowing. Voltage (Approx.) 0 V		
E16 Also che the inspec (ES >> I O >> I O >> I O => I CHECK E heck the vo f Connector F25	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY oltage betwe Terminal 89 tion result n	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16	ground. nosis for IPI letected part SIGNAL mess conne - Terminal 128	DM E/R powerts.	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage		
E16 Also che the inspec (ES >> I NO >> I CHECK E neck the vo + Connector F25 the inspec (ES >> 0	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16	ground. nosis for IPI letected part SIGNAL mess conne - Terminal 128	DM E/R powe ts. ctor terminals Conc Ignition switch Turn ignition s and wait at lea	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage	· · · · · · · · · · · · · · · · · · ·	
E16 Also che the inspec (ES >> I IO >> I CHECK E neck the vo f Connector F25 the inspec (ES >> 0 IO >> 0	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern GO TO 8.	for short to g normal? trouble diago place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide	ground. nosis for IPI letected part SIGNAL mess conne Terminal 128	DM E/R powerts.	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage		
E16 Also che the inspec (ES >> I NO >> I .CHECK E heck the vo f Connector F25 the inspec (ES >> 0 NO >> 0 .CHECK E	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide	ground. nosis for IPI letected part SIGNAL mess conne Terminal 128	DM E/R powerts.	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage	·	
E16 Also che the inspec (ES >> I NO >> I .CHECK E heck the vo f Connector F25 the inspec (ES >> 0 .CHECK E Turn ign	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY ition switch	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide CONTROL OFF.	ground. nosis for IPI letected part SIGNAL mess conne - Terminal 128 ent. Refer to SIGNAL CIF	DM E/R powerts.	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage		
E16 Also che the inspec (ES >> I NO >> I .CHECK E heck the vo the inspec (ES >> 0 .CHECK E Turn ign Disconne	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide	ground. nosis for IPI letected part SIGNAL mess conne Terminal 128 ent. Refer to SIGNAL CIF	DM E/R powerts.	dition ON witch OFF ast 10 sec-	Ollowing. Voltage (Approx.) 0 V Battery voltage		
E16 Also che the inspec (ES >> I O >> I O >> I CHECK E heck the vo the inspec (ES >> 0 VO >> 0 .CHECK E Turn ign Disconne	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY oltage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha ect IPDM E/	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide CONTROL OFF. rness connector /R harness con	ground. nosis for IPI letected part SIGNAL mess conne 	DM E/R powerts. ctor terminals Conc Ignition switch Turn ignition s and wait at lead onds. GI-41, "Intern RCUIT	as per the f	Ollowing. Voltage (Approx.) 0 V Battery voltage	ector.	
E16 Also che the inspec (ES >> I NO >> I CHECK E heck the vo the inspec (ES >> 0 NO >> 0 .CHECK E Turn ign Disconne	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY oltage betwe Terminal 89 <u>tion result n</u> Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha ect IPDM E/	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide CONTROL OFF. rness connector /R harness con	pround. nosis for IPI letected part SIGNAL mess conne 	DM E/R powerts. ctor terminals Conc Ignition switch Turn ignition s and wait at lead onds. GI-41, "Intern RCUIT	as per the f	Tollowing. Voltage (Approx.) 0 V Battery voltage	ector.	
E16 Also che the inspec (ES >> I NO >> I .CHECK E heck the vo the che vo f f Connector F25 the inspec (ES >> 0 NO >> 0 .CHECK E Turn ign Disconne Disconne	eck harness <u>tion result n</u> Perform the Repair or re ECM RELAY oltage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha ect IPDM E/ he continuity	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide CONTROL OFF. rness connector R harness connector	pround. nosis for IPI letected part SIGNAL mess conne 	DM E/R powerts. ctor terminals Conc Ignition switch Turn ignition s and wait at lead onds. GI-41, "Intern RCUIT	as per the f	Tollowing. Voltage (Approx.) 0 V Battery voltage	ector.	
E16 Also che the inspec YES >> I NO >> I CHECK E heck the vo theck the vo f Connector F25 TES >> 0 NO >> 0 CHECK E OLECK E Disconno Disconno Check the	eck harness tion result n Perform the Repair or re ECM RELAY Ditage betwe Terminal 89 tion result n Check Intern GO TO 8. ECM RELAY ition switch ect ECM ha ect IPDM En he continuity	for short to g normal? trouble diagr place error-d CONTROL een ECM har CM Connector E16 normal? mittent incide CONTROL OFF. rness connector R harness connector between EC	ground. nosis for IPI letected part SIGNAL mess conne - - Terminal 128 ent. Refer to SIGNAL CIF ctor. onnector. CM harness	DM E/R powerts. ctor terminals Conc Ignition switch Turn ignition s and wait at lead onds. GI-41, "Intern RCUIT	as per the f	Tollowing. Voltage (Approx.) 0 V Battery voltage	ector.	

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

E45

31

89

F25

Existed

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-31, "Removal and Installation"</u> (with intelligent key), <u>PCS-60,</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) (alta a a	
Connector	+	Ι	Condition	Voltage (Approx.)	
Connector	Terr	ninal			
E16	109	128	Ignition switch OFF	0 V	
	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.

	+		_	
E	CM	IPDN	/IE/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.

	+		_			
	E	СМ		Voltage (Approx.)		
Connector	Terminal	Connector	Terminal	(FF - 7		
F25	81	E16	128	Battery voltage		

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-41. "Intermittent Incident".

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.

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ŀ	_		
	CM	IPDM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F25	81	E45	32	Existed
5. Also che	eck harness	for short to g		
Is the inspec	tion result n	ormal?		
YES >> NO >>	Perform the Repair or re	trouble diagn	osis for pow	ver supply circu

U0101 CAN COMM CIRCUIT

Description

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

DTC Logic

INFOID:000000012787947

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

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

Is DTC detected?

- YES >> Proceed to EC-172, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012787948

Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-17</u>, "Trouble Diagnosis Flow <u>Chart"</u>.

INFOID:000000012787946

< DTC/CIRCUIT DIAGNOSIS >

U1001 CAN COMM CIRCUIT

Description

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

DTC Logic

INFOID:000000012787950 D

DTC DETECTION LOGIC

DTC No.	No. CONSULT screen terms (Trouble diagnosis content) DTC detecting condition Possible ca					
U1001	CAN COMM CIRCUIT (CAN communication cir- cuit) When ECM is not transmitting or receiving CAN (CAN communication cir- cuit) 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 COI	VFIRMATION PROCE	DURE				
1.PERFC	ORM DTC CONFIRMATI	ON PROCEDURE				
2. Checl	gnition switch ON and w k 1st trip DTC.	ait at least 3 seconds.				
YES >	DTC detected? >> Proceed to <u>EC-173, "I</u> >> INSPECTION END	Diagnosis Procedure".				
Diagnos	sis Procedure		INFOID:000000012787951			
Perform t <u>Chart"</u> .	he trouble diagnosis for	CAN communication system. Refer to	LAN-17, "Trouble Diagnosis Flow			

INFOID:000000012787949

С

Κ

L

Μ

Ν

Ο

Ρ

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-184, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 ("A" 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) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control

DTC 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 11 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 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
COOLANT TEMP/S	More than 60°C (140°F)
Selector lever	P or N position

4. Stop vehicle with engine running and let engine idle for 10 seconds.

5. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-175. "Diagnosis Procedure"</u>.

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

T. Maintain the following conditions for at least 20 consecutive seconds.

P0011 IVT CONTROL

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)		А
COOLANT TEMP/ S	More than 60°C (140°F)		
Selector lever	D position		EC
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)		С
	e at a safe speed.		
2. Check 1st tri With GST	o DTC. dure "With CONSULT" above.		D
Is 1st trip DTC de	etected?		Ε
	eed to <u>EC-175, "Diagnosis Procedure"</u> . ECTION END		
Diagnosis Pro	ocedure	INFOID:000000012787953	F
1.CHECK OIL P	RESSURE WARNING LAMP		G
 Start engine. Check oil pr nated. 	essure warning lamp and confirm it is not ill	umi-	
Is oil pressure wa	arning lamp illuminated?		Н
YES >> Cheo NO >> GO T	ck the engine oil level. Refer to <u>LU-7, "Inspectio</u> TO 2.		I
			J
2.CHECK INTAK	KE VALVE TIMING CONTROL SOLENOID VAL	PBIA8559J	K
Check the intake	valve timing control solenoid valve. Refer to \underline{EC}	C-176. "Component Inspection".	
Is the inspection YES >> GO T			L
	ace intake valve timing control solenoid valve. F	Refer to EM-48. "Exploded View".	
3.CHECK CRAN	KSHAFT POSITION SENSOR (POS)		M
Check the cranks	haft position sensor (POS). Refer to <u>EC-281, "(</u>	Component Inspection [CKP Sensor (POS)]".	IVI
Is the inspection			N
YES >> GO T NO >> Repla	ace crankshaft position sensor (POS). Refer to	EM-33, "Exploded View".	Ν
4.CHECK CAM	SHAFT POSITION SENSOR (PHASE)		
Check the cams (PHASE)]".	haft position sensor (PHASE). Refer to <u>EC-</u>	284. "Component Inspection [CMP Sensor	0
Is the inspection			Ρ
YES >> GO T NO >> Repla	O 5. ace camshaft position sensor (PHASE). Refer t	o EM-60, "Exploded View".	-
5.CHECK CAM			
Check the followi			

Check the following.

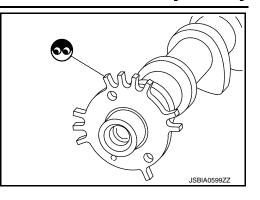
P0011 IVT CONTROL

< 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 <u>EM-60, "Removal</u> and Installation".



[MRA8DE]

INFOID:000000012787954

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>, "<u>Removal and Installation</u>".

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-7, "Inspection", "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Clean lubrication line.

Component Inspection

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.

Intake valve timing o	control solenoid valve		
+	_	Resistance	
Terr	minal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]	
1	Ground	$\Omega \propto$	
2	Ground	(Continuity should not exist)	

Is the inspection result normal?

YES >> GO TO 2.

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

 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:

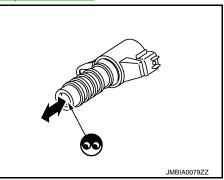
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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 EM-48, "Exploded View".



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-187, "DTC Logic"</u>.
- If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to <u>EC-361,</u> <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	D
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 pick- up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for exhaust valve timing control 	E F

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

- 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.
- 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
 Let engine idle t Check 1st trip D With GST Follow the procedur 	
Is 1st trip DTC detection	cted?
YES >> Proceed NO >> GO TO	d to <u>EC-178. "Diagnosis Procedure"</u> 3.
3. PERFORM DTC	CONFIRMATION PROCEDURE-2

(B)With CONSULT

INFOID:000000012787955

С

Н

Κ

А

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)
Selector lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-178, "Diagnosis Procedure"</u>
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK OIL PRESSURE WARNING LAMP

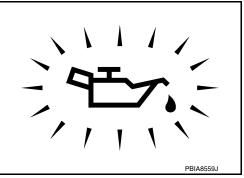
1. Start engine.

 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 EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to <u>EC-176, "Component Inspection"</u>. Is the inspection result normal?

YES >> GO TO 3.

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

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-281, "Component Inspection [CKP Sensor (POS)]"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 4.

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

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to <u>EC-284, "Component Inspection [CMP Sensor (PHASE)]"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace exhaust valve timing control position sensor. Refer to EM-60, "Exploded View".

5.CHECK CAMSHAFT (EXH)

Check the following.

INFOID:000000012787956

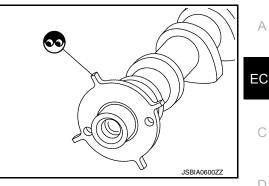
P0014 EVT CONTROL

< 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?

- >> GO TO 6. YES
- NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-60, "Removal and Installation".



[MRA8DE]

Check service records for any recent repairs that may cause timing chain misaligned. Are there any service records that may cause timing chain misaligned? E Are there any service records that may cause timing chain misaligned? F YES >> Check timing chain installation. Refer to EM-49, "Removal and Installation". F NO >> GO TO 7. F Refer to LU-7. "Inspection". Is the inspection result normal? F Refer to LU-7. "Inspection". Is the inspection result normal? G VO >> Clean lubrication line. G Component Inspection ####################################	6.CHECK TIMING	G CHAIN INSTALLA	ATION		D
YES >> Check timing chain installation. Refer to EM-49, "Removal and Installation". NO >> GO TO 7. 7.CHECK LUBRICATION CIRCUIT F Refer to LU-7. "Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". G NO >> Clean lubrication line. G Component Inspection Importance of the second seco	Check service reco	ords for any recent	repairs that may cause timir	ng chain misaligned.	
NO >> GO TO 7. 7.CHECK LUBRICATION CIRCUIT F Refer to LU-7. "Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-41. "Intermittent Incident". G NO >> Clean lubrication line. G Component Inspection wroncocconcentration H 1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1 I 1. Turn ignition switch OFF. I 2. Disconnect exhaust valve timing control solenoid valve harness connector. I 3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following. J Exhaust valve timing control solenoid valve Resistance K 1 2 7.0 - 7.8 Ω [at $20^{\circ}C$ (68°F]] L 1 2 Ground $\infty \Omega$ (Continuity should not exist) L Is the inspection result normal? SO L	Are there any serv	rice records that ma	ay cause timing chain misalio	aned?	E
Refer to LU-7, "Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". NO >> Clean lubrication line. Meroid-component Inspection Meroid-component Inspection Intermittent Incident". Component Inspection Intermittent Incident". Component Inspection Intermittent Incident". Component Inspection Intermittent Incident". Component Inspection Intermittent Incident". Operation Intermittent Incident". Intermittent Incident". Intermittent Incident". Intermittent Incident". Intermittent Incident Incident". Intermittent Incident Incident Incident. Intermittent Incident Incincident Incident Incident Incident Incident Incident			lation. Refer to <u>EM-49, "Ren</u>	noval and Installation".	
Is the inspection result normal? G YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". NO >> Clean lubrication line. Merode accommond of the second of	7.CHECK LUBRI	CATION CIRCUIT			F
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". G NO >> Clean lubrication line. Intermittent Incident". Component Inspection Intermittent Incident Incident". H 1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-1 Intermittent Incident Incident Incident Incident. H 1. Turn ignition switch OFF. Intermittent Incident Incincident Incident Incident Incident Incide	Refer to LU-7, "Ins	spection".			
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". NO >> Clean lubrication line. Component Inspection Import 2000000000000000000000000000000000000	Is the inspection re	esult normal?			G
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. Image: the timing control solenoid valve timing control solenoid valve terminals as per the following. Image: the timing control solenoid valve timing control solenoid valve terminals as per the following. Image: the timing control solenoid valve terminal terminal Image: the timing control solenoid valve terminal <td></td> <td></td> <td>nt. Refer to <u>GI-41, "Intermitte</u></td> <th>ent Incident".</th> <td>G</td>			nt. Refer to <u>GI-41, "Intermitte</u>	ent Incident".	G
1. Turn ignition switch OFF. 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. Image: strain terminal termin	Component In	spection		INFOID:000000012787957	Н
 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. 	1.CHECK EXHAU	JST VALVE TIMING	G CONTROL SOLENOID VA	ALVE-1	
+-ResistanceTerminal 1 2 $7.0 - 7.8 \Omega$ [at 20° C (68° F)]1 2 $7.0 - 7.8 \Omega$ [at 20° C (68° F)]1 Ω $\infty \Omega$ 2 $Ground$ $\infty \Omega$ 1 0 0 2 0 0 1 0 0 1 0 0 2 0 0 1 0 0	2. Disconnect ex	haust valve timing			
Terminal K 1 2 $7.0 - 7.8 \Omega [at 20^{\circ}C (68^{\circ}F)]$ 1 2 $\sigma \Omega$ 1 Ground $\sigma \Omega$ 2 Ground $\sigma \Omega$ Is the inspection result normal? K	Exhaust valve timing	control solenoid valve			J
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	+	_	Resistance		
$ \begin{array}{c c} 1 & & & & & \\ \hline 2 & & & & & \\ \hline 1 & & & & & \\ \hline 2 & & & & & \\ \hline 1 $	Terr	ninal			Κ
Ground Ground 2 Continuity should not exist)	1	2	7.0 - 7.8 Ω [at 20°C (68°F)]	-	
	·	Ground	==	-	L
	•			•	М

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



Provide 12 V DC between exhaust valve timing control solenoid 2. 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".

JMBIA0079ZZ

Ν

Ρ

P0030, P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0030, P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:000000012787958

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0030	A/F SEN1 HTR (B1) [Air fuel ratio (A/F) sensor 1 heater (bank 1)perfor- mance]	Deterioration in A/F sensor 1 heater performance. (Voltage signal transmitted from A/F sensor 1 heat- er to ECM is higher/lower than voltage in the nor- mal range.)	 Harness or connectors (A/F sensor 1 heater circuit is open or
P0031	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit low)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	shorted.) • A/F sensor 1 heater
P0032	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit high)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (A/F sensor 1 heater circuit is short- ed.) A/F sensor 1 heater

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 between 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 10 seconds.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Proceed to <u>EC-180, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012787959

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

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

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

*1: Except California

*2: For California

P0030, P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIR(•	031, P00	32 A/F SENSOR 1 HEATER [MRA8DE]	
Is the inspec				<u> </u>	
	GO TO 2.				А
		place error-d	etected part	S.	
2.CHECK A	VF SENSOF	R 1 HEATER	OUTPUT S	IGNAL CIRCUIT	
	ition switch				EC
2. Disconn	ect ECM ha	rness conneo			4
3. Check tl	he continuity	/ between A/I	F sensor 1 h	arness connector and ECM harness connector.	С
					0
	+	-	-		
A/F se		EC		Continuity	D
Connector	Terminal	Connector	Terminal		
F12 ^{*1}	3	F25	53	Existed	_
F42 ^{*2}					E
	ept California	a			
	California	for short to a	round and s	hort to power.	F
Is the inspec					
	GO TO 3.	lonnar.			
-		n circuit, shor	t to ground c	or short to power in harness or connectors.	G
3.CHECK A	VF SENSOF	R 1 HEATER			
			to EC-181	"Component Inspection (A/F Sensor 1 Heater)".	Н
Is the inspec			to <u>Lo Tort</u>		Π
			nt. Refer to	GI-41, "Intermittent Incident".	
				(A/F) sensor 1. Refer to EM-30, "Exploded View".	I
Compone	nt Inspec	tion (A/F S	Sensor 1 I		
	•	,			
1. CHECK A	AIR FUEL R	ATIO (A/F) S	ENSOR 1		J
1. Turn ign	ition switch	OFF.			
2. Disconn	ect A/F sens	sor 1 harness			K
3. Check r	esistance be	etween A/F se	ensor 1 term	inals as per the following.	rx.
+	-				L
	ensor 1	R	esistance		
Terr	ninal				
	4	1.8 - 2.44	Ω [at 20°C (68°	²F)]	Μ
3	1				
	2		$\Omega \propto$		Ν
4	1	(Continuity	y should not ex	ist)	IN
	2				
Is the inspec	tion result n	ormal?			0
	INSPECTIO		_,		
NO >>	Replace air	tuel ratio (A/I	-) sensor 1.	Refer to EM-30, "Exploded View".	
					Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:000000012787961

[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)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (Heated oxygen sensor 2 heater cir- cuit is open or shorted.) Heated oxygen sensor 2 heater
P0038 HO2 HTR (B1) (HO2S heater control cir- cuit high hapk 1 sensor 2) HO2S heater control cir- (An excess		The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (Heated oxygen sensor 2 heater cir- cuit is shorted.) Heated oxygen sensor 2 heater

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

(I) 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. Check 1st trip DTC.
- With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:000000012787962

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between HO2S2 harness connector and ground.

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

P0037, P0038 HO2S2 HEATER

NO >> Re CHECK HO . Turn ignitic Disconnec	D TO 2. pair or rep 2S2 OUTI on switch (t ECM har	olace error-de PUT SIGNAL DFF. ness connec	CIRCUIT	5.	
NO >> Re CHECK HO Disconnec Check the + HO2S2	pair or rep 2S2 OUT on switch (t ECM har	PUT SIGNAL DFF. mess connec	CIRCUIT	3.	
CHECK HO Turn ignitic Disconnec Check the + HO2S2 Connector	2S2 OUT on switch (t ECM har	PUT SIGNAL DFF. mess connec	CIRCUIT		
Turn ignitic Disconnec Check the + HO2S2	on switch (t ECM hai	OFF. ness connec	ctor.		
Disconnec Check the + HO2S2 Connector	t ECM har	ness connec			
Check the + HO2S2 Connector					
+ HO2S2 Connector			252 narnes	s connector and ECM harness conr	iector.
HO2S2 Connector					
Connector		_	-		
	2	EC	М	Continuity	
F43	Terminal	Connector	Terminal		
	3	F25	54	Existed	
Also check	harness	for short to a	round and s	nort to power.	
the inspectio		-			
) TO 3.				
NO >> Re	pair or rep	place error-de	etected parts	S.	
.CHECK HE	ATED OX	YGEN SENS	OR 2 HEAT	ER	
heck the heat	ed oxyge	n sensor 2 he	eater. Refer	to EC-183, "Component Inspection	(HO2S Heater)".
the inspectio					·
-			nt. Refer to	GI-41, "Intermittent Incident".	
				fer to <u>EX-5, "Exploded View"</u> .	
omponent	Inspect	ion (HO2	S Heater)		INFOID:000000012787963
•					
.CHECK HE	ATED OX	YGEN SENS	SOR 2 HEAT	ER	
Turn ignitic					
				harness connector.	
Check resi	stance be	tween HO25	2 terminais	as per the following.	
+	_				
Heated oxygen	sensor 2	Re	esistance		
Termina					
3	4	5.4 - 7.3 0	2 [at 25°C (77°	-)]	
-	2	5 7.03		<u>''</u>	
1	3				
	4				
	4	(Continuity	$\infty \Omega$ should not exi	st)	
2		(continuity		- 7	
2	3				
	4	10			
the inspectio					
	SPECTIO				
				fer to EX-5, "Exploded View".	

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve control sole- noid circuit bank 1)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following 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 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-184, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012787965

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

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

	+		
IVT control s	olenoid valve	_	Voltage
Connector	Connector Terminal		
F33	F33 1		Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

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

1. Turn ignition switch OFF.

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

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

+ IVT control so	-	+ IPDM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F33	1	E45	26	Existed	
	-	for short to g	-		I
ls the inspec		-	ounu.		
-			osis for nov	wer supply circuit.	
		place error-de			
3.CHECK II		VE TIMING C		SOLENOID VALVE GROUND CIRCUIT	
	ition switch				
2. Disconne	ect ECM ha	rness connec			
 Check th 	ne continuity	between IVT	control sol	lenoid valve harness connector and ECM harness connector	ector.
+		+			
IVT control so		EC		Continuity	
Connector	Terminal	Connector	Terminal		
F33	2	F25	93	Existed	
		for short to g	round and to	to power.	
Is the inspec		ormal?			
-	GO TO 4. Repair or rei	place error-de	started nort	te	
4			•	SOLENOID VALVE	
Check the in Solenoid Val [,]		iming control	solenoid v	valve. Refer to EC-185, "Component Inspection (IVT Co	ontrol
Is the inspec		ormal?			
			nt Refer to	GI-41, "Intermittent Incident".	
				solenoid valve. Refer to <u>EM-48, "Exploded View"</u> .	
Compone	nt Inspect	tion (IVT C	Control Sc	olenoid Valve)	012787066
4					012101900
1.CHECK II	NTAKE VAL	VE TIMING C	ONTROL S	SOLENOID VALVE-1	
1. Turn igni	ition switch	OFF.			
				oid valve harness connector.	
3. Check re	esistance be	tween intake	valve timing	ng control solenoid valve terminals as per the following.	
Intake valve t	timing control				
	-				
solenoid valve Resistance		Re	esistance		
+					
	ninal				
+	ninal 2	6.7 - 7.7 Ω	[at 20°C (68°	°F)]	
+ Term		6.7 - 7.7 Ω	a [at 20°C (68°l	°F)]	
+ Term 1 1			$\Omega \propto$		
+ Term 1 1 2	2 Ground	(Continuity			
+ Term 1 1 2 Is the inspec	2 Ground tion result n	(Continuity	$\Omega \propto$		
+ Term 1 2 Is the inspec YES >> 0	2 Ground tion result n GO TO 2.	(Continuity ormal?	$\infty \Omega$ should not ex	xist)	
+ Term 1 2 Is the inspec YES >> 0 NO >> F	2 Ground <u>ction result n</u> GO TO 2. Replace inta	(Continuity ormal? ke valve timin	$\infty \Omega$ should not ex		

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

 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:

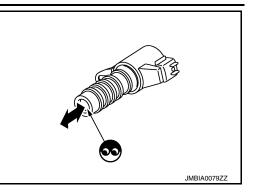
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

А

EC

INFOID:000000012787967

[MRA8DE]

DTC DETECTION LOGIC

DTC No.		screen terms	DTC detecting condition	Possible cause
BTO NO.	(Trouble dia	gnosis content)		
P0078	EX V/T ACT/CIR (Exhaust valve c cuit bank 1)	C-B1 ontrol solenoid cir-	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
отс со	NFIRMATION	PROCEDUR	E	
1.PREC	ONDITIONING			
before co 1. Turn i 2. Turn i	nducting the ne gnition switch gnition switch	ext test. OFF and wait a ON.	peen previously conducted, always at least 10 seconds. at least 10 seconds.	s perform the following procedure
>	•> GO TO2.			
2.PERFO		NFIRMATION F	PROCEDURE	
1. Start	engine and let	it idle for 5 sec		-
	< 1st trip DTC.			
•	DTC detected?	_	osis Procedure".	
	> INSPECTIO			
Diagnos	sis Procedu	re		INFOID:000000012787968
1 .CHEC	K EXHAUST V	ALVE TIMING	CONTROL SOLENOID VALVE PO	WER SUPPLY
	gnition switch			
	nnect exhaust gnition switch		VT) control solenoid valve harness	connector.
			t valve timing control solenoid valve	e harness connector and ground.
	_			-
	+			
EVT contr	ol solenoid valve	_	Voltage	
Connecto	r Terminal			
F55	1		Battery voltage	
	ection result n	ormal?		
	> GO TO 3. > GO TO 2.			
~		ALVE TIMING	CONTROL SOLENOID VALVE PO	WER SUPPLY CIRCUIT
	gnition switch			
2. Disco	nnect IPDM E/	R harness con		nector and IPDM E/R harness con-

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

		+			
-	EVT control solenoid valve		IPDM E/R		Continuity
	Connector	Terminal	Connector	Terminal	
-	F55	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.

3. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		-		
EVT control sc	olenoid valve	EC	Continuity	
Connector	Terminal	Connector	Terminal	
F55	2	F25	94	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 EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to <u>EC-185, "Component Inspection (IVT Control</u> <u>Solenoid Valve)"</u>.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-48, "Exploded View".

Component Inspection (EVT Control Solenoid Valve)

INFOID:000000012787969

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.

	timing control id valve			
+ –		Resistance		
Terr	ninal			
1	2	7.0 - 7.8 Ω [at 20°C (68°F)]		
1 Ground		$\Omega \propto$		
2	Ciouna	(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".

P0078 EVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Ε

F

Н

J

Κ

L

Μ

Ν

Ο

Ρ

 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:

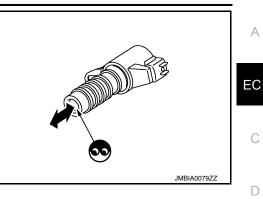
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve. NOTE:

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



< DTC/CIRCUIT DIAGNOSIS >

P0101, P0102, P0103 MAF SENSOR

DTC Logic

INFOID:000000013477353

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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
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

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.

Which DTC is detected?

P0102 >> GO TO 2.

P0101 or P0103>>GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> Proceed to <u>EC-191, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0101 AND P0103-1

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

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-191, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0101 AND P0103-2

1. Start engine and wait at least 5 seconds.

2. Check DTC.

Is DTC detected?

YES >> Proceed to <u>EC-191, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

< DTC/CIRCUI	IT DIAGN		1, P0102	, P0103 MAF SENSOR	[MRA8DE]
Diagnosis P					INFOID:000000013477354
1.INSPECTIO	N START				
Confirm the det	tected DT	C.			
Which DTC is c	detected?				Ξ
P0102 >> GC P0101 and P0		D TO 3.			
2. CHECK INT.	AKE SYS	TEM			
Check the follow • Air duct • Vacuum hose • Intake air pas	es		t to intake m	nanifold	
Is the inspection	-				
	D TO 3.				
-		or replace err		•	
			SENSOR P	POWER SUPPLY	
3. Turn ignitio	t MAF ser	nsor harness ON.		ness connector and ground.	
+					
MAF sens	sor	_	Voltage		
	Terminal		(Approx.)		
F31	1	Ground	5 V		
Is the inspection	n result n	ormal?			
) TO 4.) TO 7.				
4.CHECK MAI	F SENSC	R GROUND	CIRCUIT		
	t ECM ha	rness conne		arness connector and ECM harness conne	ector.
+		-	_		
MAF sens	sor	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		
F31	3	F24	34	Existed	
4. Also check		•	ower.		
Is the inspection		ormal?			
) TO 5. pair or rei	olace error-d	etected nar	ts	
5.CHECK MAI					
				arness connector and ECM harness conne	ector.
+			_		
 MAF sens	sor		- CM	Continuity	
	301				

Connector Terminal Connector Terminal 2 F24 35 F31 Existed

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

P0101, P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts

6.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-192, "Component Inspection (MAF Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace MAF sensor (with intake air temperature sensor). Refer to EM-25. "Exploded View".

7. CHECK MAF SENSOR POWER 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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F24	36	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-460, "Diagnosis Procedure".

Is inspection result normal?

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

Component Inspection (MAF Sensor)

1.CHECK MASS AIR FLOW SENSOR-1

With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode of "ENGINE".
- 5. Select "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Monitor item Condition	
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 frequency between ECM harness connector and ground.

P0101, P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ECM +		Condition	Frequency (Hz)
Connector		 minal		
	IEI		Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
F24	35	34	Idle (Engine is warmed-up to normal oper- ating temperature.)	5,100 – 5,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*
*: Check for	linear frequency i	rise in response to	o engine being increased to about 4,000 rpm.	
	on result norm			
	SPECTION E O TO 2.	ND		
			N AIR FLOW THROUGH MASS AIR	
			IN AIR FLOW THROUGH MASS AIR	FLOW SENSOR
	on switch OFF the cause of i		v through mass air flow sensor. Refer	to the following
Crushed a	ir ducts		-	to the following.
	ning seal of a rt of air cleane	ir cleaner elen	nent	
	/e deposits			
Improper s	specification o	f intake air sys	stem parts	
s the inspection		al?		
	O TO 4.			
	O T O 3			
NO >> G(O TO 3. NSS AIR FLOV	V SENSOR-2		
NO >> GO B.CHECK MA With CONS 1. Repair or	ASS AIR FLOV ULT replace malfur	nctioning part.		
NO >> GO B.CHECK MA With CONS C. Repair or S. Start engir Connect C	ASS AIR FLOW ULT replace malfur ne and warm i CONSULT and	nctioning part. t up to normal l select "DATA	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication.	
NO >> GO B.CHECK MA With CONS CONSTRUCT Start engines Connect C	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOM	nctioning part. t up to normal l select "DATA	operating temperature. MONITOR" mode of "ENGINE".	Indication (Hz)
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOM	nctioning part. t up to normal l select "DATA W SENSOR (I	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication.	Indication (Hz) Approx. 3,700 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monito	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOM	nctioning part. t up to normal l select "DATA W SENSOR (H	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition	
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monito	ASS AIR FLOW ULT replace malfur ne and warm i CONSULT and ASS AIR FLOW	nctioning part. t up to normal l select "DATA W SENSOR (H	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.)	Approx. 3,700 Hz
NO >> GO CHECK MA With CONS Repair or 12 Start engir Connect C Connect C Select "MA Monito	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOW or item	nctioning part. t up to normal l select "DATA W SENSOR (I Ignition switch C Idle (Engine is w Idle to about 4,0	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.)	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 12 Start engir Connect C Select "MA Monitor MASS AIR FLOV *: Check for Without CO	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor MASS AIR FLOW *: Check for Without CO 1. Repair or 1	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT replace malfur	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor MASS AIR FLOW *: Check for Without CO Repair or 1 Start engir	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT replace malfur ne and warm in	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor MASS AIR FLOW *: Check for Without CO Repair or 1 Start engir	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT replace malfur ne and warm in	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor MASS AIR FLOW *: Check for Without CO Repair or 1 Start engir	ASS AIR FLOW ULT replace malfur ne and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT replace malfur ne and warm in	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> Ge 3.CHECK MA With CONS 1. Repair or 1 2. Start engir 3. Connect C 4. Select "MA Monito MASS AIR FLOV *: Check for Without CO 1. Repair or 1 2. Start engir 3. Check the	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency in NSULT replace malfur he and warm in frequency be	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm.	Approx. 3,700 Hz 5,100 – 5,500 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect C Select "MA Monitor MASS AIR FLOW *: Check for Without CO Repair or 1 Start engir	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency to NSULT replace malfur he and warm in frequency be ECM +	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) D00 rpm o engine being increased to about 4,000 rpm. operating temperature. arness connector and ground.	Approx. 3,700 Hz 5,100 – 5,500 Hz 5,100 – 5,500 to Approx. 7,000 Hz
NO >> GO CHECK MA With CONS Repair or 1 Start engir Connect O Select "MA Monito MASS AIR FLOW *: Check for Without CO Repair or 1 Start engir Check the	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency to NSULT replace malfur he and warm in frequency be ECM +	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal tween ECM ha	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) D00 rpm o engine being increased to about 4,000 rpm. operating temperature. arness connector and ground.	Approx. 3,700 Hz 5,100 – 5,500 Hz 5,100 – 5,500 to Approx. 7,000 Hz
NO >> Ge 3.CHECK MA With CONS 1. Repair or 1 2. Start engir 3. Connect C 4. Select "MA Monito MASS AIR FLOV *: Check for Without CO 1. Repair or 1 2. Start engir 3. Check the	ASS AIR FLOW ULT replace malfur he and warm in CONSULT and ASS AIR FLOW or item V SENSOR (Hz) linear frequency to NSULT replace malfur he and warm in frequency be ECM +	nctioning part. t up to normal l select "DATA W SENSOR (H Ignition switch C Idle (Engine is w Idle to about 4,0 rise in response to nctioning part. t up to normal tween ECM ha	operating temperature. MONITOR" mode of "ENGINE". Hz)" and check indication. Condition DN (Engine stopped.) varmed-up to normal operating temperature.) 000 rpm o engine being increased to about 4,000 rpm. operating temperature. arness connector and ground. Condition	Approx. 3,700 Hz 5,100 – 5,500 Hz 5,100 – 5,500 to Approx. 7,000 Hz Frequency (Hz)

Revision: December 2015

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

NO >> GO TO 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 "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

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

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 frequency between ECM harness connector and ground.

	ECM			
Connector	+ –		Condition	Frequency (Hz)
Connector	Terr	minal		
			Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
F24	35	34	Idle (Engine is warmed-up to normal oper- ating temperature.)	5,100 – 5,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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>.

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0111 IAT SENSOR

DTC Logic

А

INFOID:000000012787973

[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 DT(>> GO TO 3. >> GO TO 2. ORM COMPONENT FUNCTIO		
		IN CHECK fer to <u>EC-196, "Component Function (</u>	"hook"
NOTE:			
	omponent function check to c IC might not be confirmed.	heck the overall function of the IAT se	nsor circuit. During this check, a
	pection result normal?		
	> INSPECTION END > Proceed to <u>EC-196, "Diagr</u>	osis Procedure".	
3.PREC	ONDITIONING		
dure befo 1. Turn i	re conducting the next test. ignition switch OFF and wait a	E has been previously conducted, alwa at least 10 seconds.	ays perform the following proce-
3. Turn	ignition switch ON. ignition switch OFF and wait a	at least 10 seconds.	
BeforeBefore		ocedure, do not add fuel. ocedure, check that fuel level is bet ocedure, confirm that battery voltag	
	>> GO TO 4.		
•	ORM DTC CONFIRMATION F	PROCEDURE	
	the vehicle to a cool place.		
NOTE Cool		of ambient air temperature between -	10°C (14°F) and 35°C (95°F).
2. Turn i	ignition switch OFF and leave TION:		
Neve	r turn ignition switch ON du	ring this procedure.	
	vehicle must be cooled with th		
	engine and let it idle for 5 min TION:	utes or more.	
Neve	r turn ignition switch OFF d k 1st trip DTC.	uring idling.	

EC

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Proceed to EC-196, "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-41, "Intermittent Incident"</u>.

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

Diagnosis Procedure

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

Check intake air temperature sensor. Refer to EC-196, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

Component Inspection

INFOID:000000012787976

INFOID:000000012787975

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 <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0112, P0113 IAT SENSOR

DTC Logic

А

EC

INFOID:000000012787977

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen (Trouble diagnosis tent)		DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT- (Intake air temperat sensor 1 circuit low I	ure An	excessively low voltage from the intake air nperature sensor is sent to ECM.	Harness or connectors
P0113	IAT SEN/CIRCUIT- (Intake air temperat sensor 1 circuit high 1)	ure An	excessively high voltage from the intake air nperature sensor is sent to ECM.	(Intake air temperature sensor circuit is open or shorted.)Intake air temperature sensor
	IFIRMATION PE	ROCEDL	IRE	
before cor 1. Turn i 2. Turn i	ducting the next gnition switch OF gnition switch ON	test. F and wai	 been previously conducted, alwa t at least 10 seconds. t at least 10 seconds. 	iys perform the following procedure
•	> GO TO 2. RM DTC CONFI	RMATION	I PROCEDURE	
2. Checł <u>Is 1st trip</u> YES > NO >	1st trip DTC. DTC detected?	<u>-197, "Dia</u>	at least 5 seconds. gnosis Procedure".	
		MPERATI	URE SENSOR POWER SUPPLY	INFOID:000000012787978
1. Turn i 2. Disco 3. Turn i	gnition switch OF nnect mass air flo gnition switch ON	F. w sensor	(with intake air temperature sensor	
MA	+ F sensor	_	Voltage	
Connecto			(Approx.)	
F31	4	Ground	5.0 V	
YES > NO >	<u>ection result norn</u> > GO TO 3. > GO TO 2.		URE SENSOR POWER SUPPLY C	

I urn ignition switch OFF.
 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	ECM		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.

$\mathbf{3}$. 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	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	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-198. "Component Inspection (IAT Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "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:000000012787979

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
	NFIRMATION PROCED	JRE	
	CTION START		
YES	<u>ssary to erase permanent D</u> >> GO TO 3. >> GO TO 2.	DTC?	
2.PERF	ORM COMPONENT FUNC	TION CHECK	
Perform on NOTE:	component function check.	Refer to EC-200, "Component Function	<u>Check"</u> .
Use the c	component function check to TC might not be confirmed.	o check the overall function of the ECT	sensor circuit. During this check, a
	pection result normal?		
	> INSPECTION END > Proceed to <u>EC-200, "Dia</u>	agnosis Procedure".	
3.prec	ONDITIONING		
dure befo	ONFIRMATION PROCEDU ore conducting the next test. ignition switch OFF and wa		ways perform the following proce-
	ignition switch ON. ignition switch OFF and wa	it at least 10 seconds	
TESTING	CONDITION:		
Before	performing the following	procedure, do not add fuel. procedure, check that fuel level is b procedure, confirm that battery volt	
:	>> GO TO 4.		
4.PERF	ORM DTC CONFIRMATION	N PROCEDURE	
1. Move NOT	e the vehicle to a cool place E:		
Cool 2. Turn	the vehicle in an environme	ent of ambient air temperature between ve the vehicle for 12 hours.	−10°C (14°F) and 35°C (95°F).
-	er turn ignition switch ON	during this procedure.	
The 3. Start	c. vehicle must be cooled with engine and let it idle for 5 n TION:		
Neve	er turn ignition switch OFF	⁻ during idling.	

4. Check 1st trip DTC.

А

EC

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

- YES >> Proceed to EC-200, "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-24, "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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> Proceed to <u>EC-200, "Diagnosis Procedure"</u>.

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-200. "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Replace ECT sensor. Refer to <u>CO-24, "Exploded View"</u>.

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

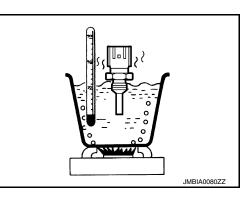
- 1. Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- 3. Remove ECT sensor.
- 4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

ECT :	sensor			Desistance
+	_	Conditi	on	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-24, "Exploded View"</u>.



INFOID:000000012787982

INFOID:000000012787983

JMBIA0080ZZ

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0117, P0118 ECT SENSOR

DTC Logic

А

EC

INFOID:000000012787984

[MRA8DE]

		sis content)		ing condition	Possible cause
P0117 (ECT SEN/CIRC Engine coolant t cure sensor 1 circ	empera-		oltage from the engine sensor is sent to ECM.	 Harness or connectors (Engine coolant temperature sensor cir-
P0118 (ECT SEN/CIRC Engine coolant ture sensor 1 circ	empera-		oltage from the engine ensor is sent to ECM.	cuit is open or shorted.) Engine coolant temperature sensor
	FIRMATION	PROCEDL	JRE		
f DTC Con before cond I. Turn igr 2. Turn igr 3. Turn igr >>	nfirmation Pro lucting the ne nition switch (nition switch (nition switch (GO TO 2.	xt test. DFF and wa DN. DFF and wa	it at least 10 sect it at least 10 sect	onds.	ays perform the following procedure
			N PROCEDURE at least 5 secon	de	
2. Check [<u>s DTC dete</u> YES >>	DTC. <u>ected?</u> Proceed to <u>E</u>	<u>:C-201, "Dia</u>	gnosis Procedur		
	INSPECTION S Procedur				INFOID:000000012787988
1 .снески	ENGINE CO	DLANT TEM	IPERATURE SE	NSOR POWER SL	JPPLY
2. Disconr 3. Turn igr	nition switch (oolant temp ON.	. ,	nsor harness conn connector and grou	
	+				
ECT	sensor	_	Voltage (Approx.)		
Connector F6	Terminal	Ground	5.0 V		
-	ction result no		5.0 V		
YES >> NO >>	GO TO 3. GO TO 2.				
	ENGINE CO	OLANT TEM	IPERATURE SE	NSOR POWER SL	IPPLY CIRCUIT

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

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

		+	-	_	
-	ECT s	sensor	E	CM	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.

$\mathbf{3}$.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-202</u>, "<u>Component Inspection (ECT Sensor</u>)". Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

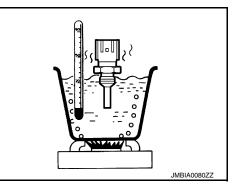
Component Inspection (ECT Sensor)

INFOID:000000012787986

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 <u>CO-24, "Exploded View"</u>.

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-355, "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)
TC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
	nfirmation Procedure ducting the next test.	has been previously conducted, alwa	ys perform the following procedure
1. Turn ig	inition switch OFF and	l wait at least 10 seconds.	
	nition switch ON.	l wait at least 10 seconds.	
3 Turnio			
TESTING	CONDITION:		
	CONDITION:	g procedure, confirm that battery vol	tage is more than 8 V at idle.
TESTING (Before pei	CONDITION:	g procedure, confirm that battery vol	tage is more than 8 V at idle.
TESTING (Before pei	CONDITION: forming the followin		tage is more than 8 V at idle.
TESTING (Before per >> 2.PERFO 1. Start e	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for	TION PROCEDURE	tage is more than 8 V at idle.
TESTING of Before per 2.PERFO 1. Start e 2. Check	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC.	TION PROCEDURE	tage is more than 8 V at idle.
TESTING Before per 2.PERFO 1. Start e 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. DTC detected?	TION PROCEDURE	tage is more than 8 V at idle.
TESTING (Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >>	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. DTC detected?	TION PROCEDURE	tage is more than 8 V at idle.
TESTING of Before per 2.PERFO 1. Start e 2. Check Is 1st trip E 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-203.</u>	TION PROCEDURE	tage is more than 8 V at idle.
TESTING G Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >> NO >> Diagnosi	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>OTC detected?</u> > Proceed to <u>EC-203,</u> > INSPECTION END is Procedure	TION PROCEDURE 1 second. "Diagnosis Procedure".	
TESTING Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >> NO >> Diagnosi 1.CHECK	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>OTC detected?</u> > Proceed to <u>EC-203.</u> > INSPECTION END is Procedure THROTTLE POSITIC	TION PROCEDURE	
TESTING of Before per 2.PERFO 1. Start e 2. Check Is 1st trip D YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon	CONDITION: forming the followin > GO TO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. <u>OTC detected?</u> > Proceed to <u>EC-203.</u> > NSPECTION END is Procedure . THROTTLE POSITIC inition switch OFF. inect electric throttle co	TION PROCEDURE 1 second. "Diagnosis Procedure".	
TESTING of Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	CONDITION: forming the followin SOTO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. DTC detected? Proceed to EC-203. NSPECTION END is Procedure THROTTLE POSITIC polition switch OFF. Inect electric throttle constitution switch ON.	TION PROCEDURE T1 second. TDiagnosis Procedure". ON SENSOR 2 POWER SUPPLY ontrol actuator harness connector.	INFCID:000000012787988
TESTING of Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	CONDITION: forming the followin SOTO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. DTC detected? Proceed to EC-203. NSPECTION END is Procedure THROTTLE POSITIC polition switch OFF. Inect electric throttle constitution switch ON.	TION PROCEDURE T1 second. TDiagnosis Procedure". DN SENSOR 2 POWER SUPPLY	INFCID:000000012787988
TESTING of Before per 2.PERFO 1. Start e 2. Check Is 1st trip E YES >> NO >> Diagnosi 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	CONDITION: forming the followin SOTO 2. RM DTC CONFIRMAT ngine and let it idle for 1st trip DTC. DTC detected? Proceed to EC-203. NSPECTION END is Procedure THROTTLE POSITIC polition switch OFF. Inect electric throttle constitution switch ON.	TION PROCEDURE T1 second. TDiagnosis Procedure". ON SENSOR 2 POWER SUPPLY ontrol actuator harness connector.	INFCID:000000012787988

ls	the	inspection	result	normal?	

Terminal

2

Ground

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

ator

Connector

F7

I

(Approx.)

5.0 V

INFOID:000000012787987

А

EC

С

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

$\overline{2}$.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.

	+		_	
	e control actu- tor	E	CM	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.

$\mathbf{3}$.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.

	+	-	_	
	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 2 INPUT SIGNAL CIRCUIT

1. 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	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-205. "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "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-143. "Description".
- 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	ninal				
	77			Fully released	Less than 4.75 V	
E25	F25 78	70	Accelerator	Fully depressed	More than 0.36 V	
1-20		pedal	Fully released	More than 0.36 V		
	79	79	Fully depressed	Less than 4.75 V		

Is the inspection result normal?

YES >> INSPECTION END

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

Κ

L

Μ

Ν

Ο

Ρ

[MRA8DE]

INFOID:0000000012787989

А

EC

С

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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-199, "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-201, "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

(I) 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-206, "Diagnosis Procedure".

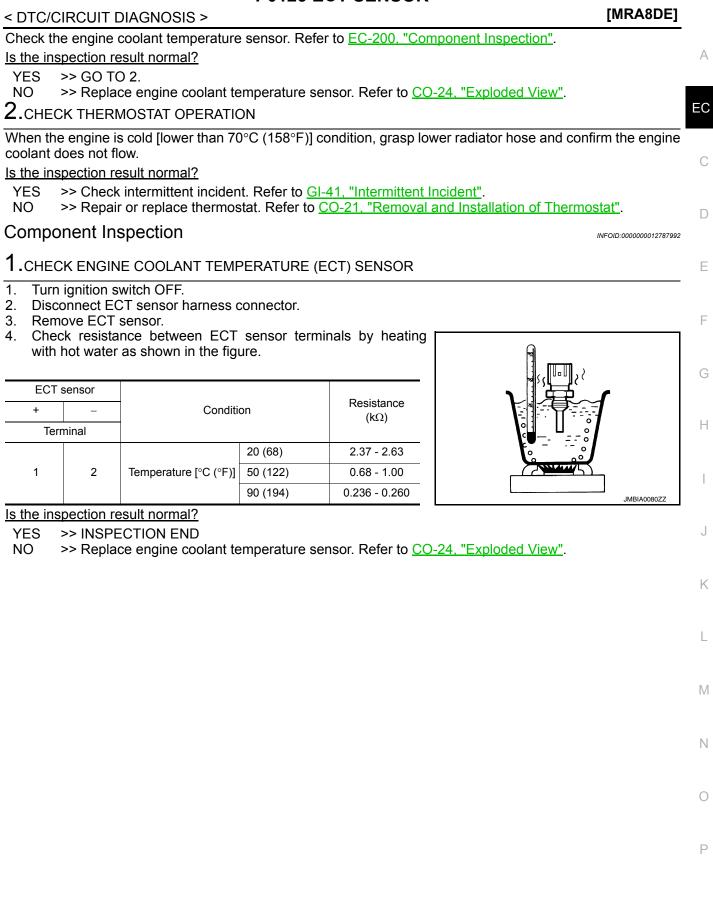
NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

INFOID:000000012787991

P0125 ECT SENSOR



< DTC/CIRCUIT DIAGNOSIS >

P0127 IAT SENSOR

DTC Logic

INFOID:000000012787993

[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-208, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012787994

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Check the intake air temperature sensor. Refer to EC-209, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-25</u>, "<u>Exploded</u> <u>View</u>".

EC-208

P0127 IAT SENSOR

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > **Component Inspection** INFOID:000000012787995 А 1. CHECK INTAKE AIR TEMPERATURE SENSOR Turn ignition switch OFF. 1. 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". Ε F Н

Μ

J

Κ

L

Ν

0

Ρ

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-271, "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

- 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:

COOLANT TEMP/S	–10°C – 58°C (14 – 136°F)

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-1

(I) With CONSULT

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

Always drive vehicle at safe speed.

- STEP 1

P0128 THERMOSTAT FUNCTION

	PU120 INERMUSIAI FUN	CTION	
< DTC/CIRCUIT DIAGNOSIS	S >	[MRA8DE]	
	conditions instructed below until the comes at least 26°C (47°F).	difference between "COOLANT TEMP/S"	А
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	-	D
60°C (140°F)	34°C (93°F) or less	-	
- STEP 2		-	Ε

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between "COOLANT TEMP/S" and "FUEL T/TMP SE" maintained at 26°C (47°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

STEP 3

Drive the vehicle at 50 km/h (32 MPH) or more until "COOLANT TEMP/S" increases by 6°C (11°F). NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4. NO >> GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

(P)With CONSULT

Drive the vehicle until the following condition is satisfied. 1.

COOLANT TEMP/S	67°C (153°F) or more
CAUTION: Always drive vehicle 2. Check 1st trip DTC.	at safe speed.
<u>Is 1st trip DTC detected?</u>	
YES >> Proceed to EC	-211, "Diagnosis Procedure".

roceed to EC-2NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012787997 Μ

Ν

Ο

Ρ

F

Н

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-211, "Component Inspection".

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

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

2. CHECK THERMOSTAT

Check the thermostat. Refer to CO-21, "Removal and Installation of Thermostat".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat.

Component Inspection

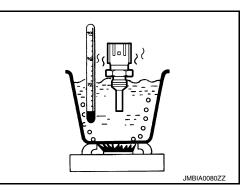
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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	oolant tem- e sensor			-
+	_	Condition		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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "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) (O2 sensor circuit bank 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	Harness or connectors (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	
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING (ducting the next test. gnition switch OFF and v gnition switch ON. gnition switch OFF and v CONDITION:	vait : vait :		
~	> GO TO 2. RM DTC CONFIRMATI	ON I	PROCEDURE FOR MALFUNCTION A	
2. Let it id		nori	nal operating temperature.	
	DTC detected?			
	> Proceed to <u>EC-214, "E</u> With CONSULT)>>GO T			
	Without CONSULT)>>G			
3.снеск	AIR FUEL RATIO (A/F)	SE	NSOR 1 FUNCTION	
2. Check	"A/F SEN1 (B1)" indica	tion.		NSULT.
	<u>ndication fluctuates arou</u> > GO TO 4.	nd 2	<u>2.2 V?</u>	
	Proceed to <u>EC-214</u> , "E	Diag	nosis Procedure".	
4. PERFO	RM DTC CONFIRMATI	ON I	PROCEDURE FOR MALFUNCTION B-1	
SULT.	"A/F SEN1 (B1) P1276' "START".	of "	A/F SEN1" in "DTC WORK SUPPORT" m	node of "ENGINE" using CON-
		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:000000012787999

А

EC

< 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. $\mathbf{6}$.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-214, "Diagnosis Procedure". **1.**PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B Perform Component Function Check, Refer to EC-214, "Component Function Check". NOTE: Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a

1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to EC-214, "Diagnosis Procedure".

Component Function Check

INFOID:000000012788000

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-214, "Diagnosis Procedure". YES
- NO >> INSPECTION END

Diagnosis Procedure

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

Turn ignition switch OFF.

P0130 A/F SENSOR 1

A/F sensor 1

+

2.

3.

4.

 Connector
 Terminal

 F12^{*1}
 4

 F42^{*2}
 4

 Ground
 Battery voltage

*1: Except California

< DTC/CIRCUIT DIAGNOSIS >

Turn ignition switch ON.

Disconnect A/F sensor 1 harness connector.

*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

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

Voltage

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	IPDN	/IE/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	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F12 ^{*1} F42 ^{*2}	1	F24	41	Existed
F42 ^{*2}	2	127	45	LAISted

*1: Except California

*2: For California

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

А

EC

D

Ε

0

Ρ

Κ

L

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

+			
A/F sensor 1		_	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2		

*1: Except California

*2: For California

+			
ECM		-	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
	45		

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-41, "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.

U				
DTC No.	CONSULT scre (Trouble diagnosi		DTC detecting condition	Possible cause
P0131	A/F SENSOR1 (E (O2 sensor circuit age bank 1 senso	t 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 F	PROCED	URE	
1.PRECO	NDITIONING			
before cond 1. Turn ig 2. Turn ig 3. Turn ig TESTING	ducting the next inition switch Ol inition switch Ol inition switch Ol CONDITION:	t test. FF and wa N. FF and wa	as been previously conducted, always ait at least 10 seconds. ait at least 10 seconds. procedure, confirm that battery voltage	
-	> GO TO 2.			
2.CHECK	A/F SENSOR I	FUNCTIO	Ν	
 Select Check With GS 	ngine and warm "A/F SEN1 (B1 "A/F SEN1 (B1)" in "DAT)" indication		CONSULT.
	ation constantly			
YES >> NO >>	 Proceed to EC GO TO 3. 	<u>C-218, "Di</u>	agnosis Procedure". N PROCEDURE	
With CO 1. Turn ig	NSULT Inition switch Ol and accelerate v	FF, wait a	t least 10 seconds and then restart engin more than 40 km/h (25 MPH) within 20 s	
Alway	s drive vehicle		e speed. s for about 20 consecutive seconds.	
ENG SPEE	D 1	1,000 - 3,20	0 rpm	
		loro there 4	$0 \ln(h)$ (25 mph)	

Selector lever	Suitable position
B/FUEL SCHDL	1.5 - 9.0 msec
VHCL SPEED SE	More than 40 km/h (25 mph)

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

Ρ

INFOID:000000012788002

EC

А

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-218, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788003

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	IPDN	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	LAISted

*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 se	ensor 1	-	Continuity
Connector	Terminal		
F12 ^{*1}	1	Ground	Not existed
F42 ^{*2}	2	Ground	NOT EXISTED
*2: For (ept California California	3	
	+		
	CM To reaction of	_	Continuity
Connector	Terminal 41		
F24	41	Ground	Ground Not existed
5. Also che	-	for short to p	ower.
Is the inspec			
YES >>	GO TO 4.		
-	-	-	etected parts.
4.CHECKI	NTERMITTE	ENT INCIDE	NT
			GI-41, "Intermit
Is the inspec			
YES >> NO >>	Replace air	fuel ratio (A/l	F) sensor 1. Re letected parts.
			elected parts.

Μ

Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0132 A/F SENSOR 1

DTC Logic

INFOID:000000012788004

[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

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-221, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

() With CONSULT

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

Always drive vehicle at a safe speed.

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

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

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step

1.

4. Check 1st trip DTC.

P0132 A/F SENSOR 1

			FUIJZ	A/F SENSUR	ίΙ
< DTC/CIR		NOSIS >			[MRA8DE]
Follow the p	orocedure "W	ith CONSUL	T" above.		
<u>Is 1st trip D</u>	TC is detecte	ed?			
	Proceed to		agnosis Proc	<u>edure"</u> .	_
	INSPECTIO				
Diagnosis	s Procedu	re			INFOID:000000012788005
1.CHECK	AIR FUEL R	ATIO (A/F) S	SENSOR 1 P	OWER SUPPLY	
	nition switch				<u></u>
2. Disconr	nect A/F sens	sor 1 harnes	s connector.		
	nition switch				
4. Check t	ne voltage b	etween A/F	sensor 1 nar	ness connector a	na grouna.
	+				
A/F se	ensor 1	_	Voltage		
Connector	Terminal	-	, enaige		
F12 ^{*1}					
F42 ^{*2}	4	Ground	Battery volta	ge	
*1: Exce	ept California	a			
	Ċalifornia				
	ction result n	ormal?			
	GO TO 3. GO TO 2.				
				OWER SUPPLY	
			DENSOR I F	OWER SUFFLI	
	nition switch nect IPDM E/		onnector.		
				arness connector	r and IPDM E/R harness connector.
		I			
	+		_		
	ensor 1		ME/R	Continuity	
Connector	Terminal	Connector	Terminal		
F12 ^{*1}	4	E45	26	Existed	
F42 ^{*2}					
	ept California California	3			
	eck harness	for short to g	ground.		
	<u>ction result n</u>				
				wer supply circuit.	
-	Repair or re	•	•		
	A/F SENSOF		GNAL CIR	TIUC	
	nition switch		otor		
	nect ECM ha			arness connector	r and ECM harness connector.
	· · · · · · · · · · · · · · · · · · ·				
	+		-		
A/F se	ensor 1	E	СМ	Continuity	
		+	1	1	

A/F sensor 1ECMContinuityConnectorTerminalConnectorTerminalF12*11F2441ExistedF42*224545

*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	-	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-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace air fuel ratio (A/F) sensor 1. Refer to <u>EM-30, "Exploded View"</u>.
- 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.

				E
			JSBIA0545GB	
				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	Heated oxy/den sensor 2	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-223

2016 Sentra NAM

А

EC

D

Κ

L

Μ

Ν

Ο

Ρ

NG

OK

Fuel injectorIntake air leaks

1V

Λ١/

0.73V

< 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-225, "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-224, "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-225, "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	+	_	Condition	Voltage	
	Terminal				
F24	22	23	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 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
	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:000000012788007

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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

	J			5 1	5
	ECM				
Connector + –		-	Condition	Voltage	
Connector		Terminal			
F24	22	2:		sting from 80 km/h (50 MPH) in D ition (CVT), 5th gear position (6MT)	The voltage should be above 0.72 V at least once during this procedure.
	NSPECTIO		anosis Pro	odure"	
Diagnosis			<u>gri0313 i 100</u>	<u>.</u> .	INFOID:000000012788008
.CLEAR TH	HE MIXTUF	RE RATIO SE	ELF-LEARN	IING VALUE	
				efer to EC-146, "Description"	n _*
-		ast 10 minute 1 detected? I		eed. to start engine?	
YES >> F	Perform trou			20171. Refer to <u>EC-248, "DT</u>	<u>C Logic"</u> .
•	30 TO 2.	UND CIRCU	Шт		
	tion switch		/1 1		
2. Disconne	ect heated o	oxygen senso		2) harness connector.	
		rness conneo v between HC		ss connector and ECM harne	ess connector
	e contantanty	500000000000000000000000000000000000000			
+		-	_		
HO2	S2	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
F43	1	F24	23	Existed	
		for short to p	ower.		
s the inspect		ormal?			
-	GO TO 3. Repair or re	place error-d	etected par	ts.	
-		JT SIGNAL C	•		
				ss connector and ECM harn	ess connector
i. Oncor th	C Continuity	Setween IIC			
+		-	-		
HO2	S2	EC	M	Continuity	
Connector	Terminal	Connector	Terminal	1	
F43	2	F24	22	Existed	
2. Check th ground.	e continuit	y between H	O2S2 harr	ess connector and ground,	or ECM harness connector and
+					
HO2	S2	-	Continuit	ý	

НО	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-226, "Component Inspection (HO2S2)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "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?

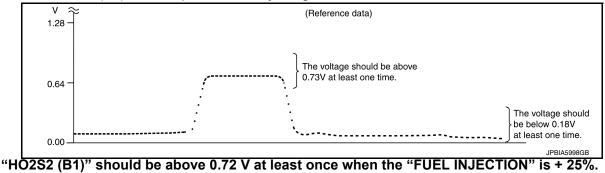
YES >> GO TO 2. NO >> GO TO 3.

NU >> GU IU 3

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

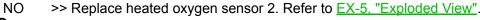
- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute 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 0.18 V at least once when the "FUEL INJECTION" is – 25%. Is the inspection result normal?

YES >> INSPECTION END

YES >> INSPECTION END



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.

INFOID:000000012788009

< DTC/CIRCUIT DIAGNOSIS >

	ECM					
Connector	+	_	Condition	Voltage	ge	
Connoctor	Terr	ninal				
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.		
the inspec	ction result n	ormal?				
	INSPECTIO	N END				
	GO TO 4.					
+.CHECK	HEATED OX	YGEN SEN	SOR 2-2			
Check the v	oltage betwe	en ECM ha	rness connector and ground	as per the following condition.		
			1			
	ECM					
Connector	+ –		Condition	Voltage		
	lerr	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.		
	ction result n					
	INSPECTIO	N END				
	GO TO 5. HEATED OX					
Check the v	oltage betwe	en ECM hai	rness connector and ground	as per the following condition.		
	FCM					
	ECM		Condition	Voltage		
Connector	+		Condition	Voltage		
Connector F24	+	– ninal 23	Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 5th position (6MT)	Voltage 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.		
F24	+ Terr 22	23	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th	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		
F24 s the inspec	+ Terr	23 ormal?	Coasting from 80 km/h (50 MPH) in D position (CVT), 5th	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		

Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0138 HO2S2

DTC Logic

INFOID:000000012788010

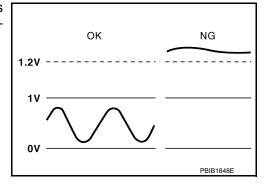
[MRA8DE]

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.

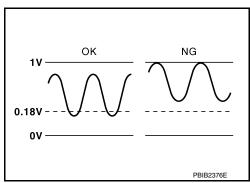
MALFUNCTION A

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
	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) P0138 (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.

FRA	D A	ОГ	
	RA	\AI	DE1
L			

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A	
 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 u Let engine idle for 2 minutes. Check 1st trip DTC. 	nder no load.
<u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-230, "Diagnosis Procedure"</u> .	
NO-1 (With CONSULT)>>GO TO 3.	
NO-2 (\textcircled Without CONSULT)>>GO TO 5. 3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	
NOTE:	
 For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86 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. 	° F).
 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 u Let engine idle for 1 minute. 	nder no load.
 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 Open engine hood.)°C (158°F).
 Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" usin Follow the instruction of CONSULT. NOTE: 	g CONSULT.
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 <u>EC-230, "Diagnosis Procedure"</u> . CAN NOT BE DIAGNOSED>>GO TO 4.	
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. 	
>> GO TO 3.	
5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B	
Perform component function check. Refer to <u>EC-229</u> , "Component Function Check".	
NOTE: Use component function check to check the overall function of the heated oxygen sensor 2 circuit check, a 1st trip DTC might not be confirmed.	it. During this
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-230, "Diagnosis Procedure"</u> .	
Component Function Check	INFOID:0000000012788011
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 u 	nder no load.

- 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	
	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	Connector + -		Condition	Voltage	
Connector	Terminal				
F24	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-230, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000012788012

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-228, "DTC Logic".

Which malfunction is detected?

- A >> GO TO 2.
- B >> GO TO 6.

2.check H02S2 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.

	ł			
HO2S2		ECM		Continuity
Connector	Terminal	Connector Terminal		
F43	1	F24 23		Existed

Also check harness for short to power. 3.

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.

	+			
HO2S2		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	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-232, "Component Inspection (HO2S2)".

Is the inspection result normal?

>> Check intermittent incident. Refer to GI-41, "Intermittent Incident". YES NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

$\mathfrak{O}.$ CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-146, "Description". 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-252, "DTC Logic".

NO >> GO TO 7.

I.CHECK HO2S2 GROUND CIRCUIT

Turn ignition switch OFF. 1.

2. Disconnect heated oxygen sensor 2 harness connector. 3.

Disconnect ECM harness connector.

А

EC

D

Е

Н

Κ

Μ

Ν

Ρ

< DTC/CIRCUIT DIAGNOSIS >

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

	+			
HO	HO2S2		ECM	
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.

	+			
НО	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	Connector Terminal		
F43	F43 2		Not existed

	+		
E	CM	_	Continuity
Connector	Terminal		
F24	F24 22		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-232, "Component Inspection (HO2S2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

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

Component Inspection (HO2S2)

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

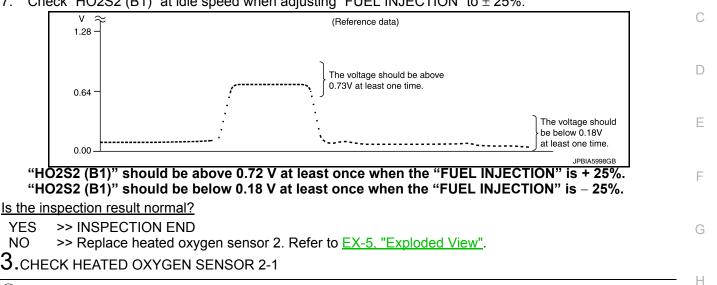
2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

INFOID:000000012788013

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 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.
- Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 7.



Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.

- Let engine idle for 1 minute. 4.
- Check the voltage between ECM harness connector and ground as per the following condition. 5.

	ECM				
Connector	+	-	Condition	Voltage	
	Terr	minal			
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
Connector	Ter	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.

Ν

Ο

А

< 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		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 >

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.

~			EC
e /- er or	ОК	NG	С
s h		\frown	D
	0V	SEF302U	E

DTC No.	CONSULT screen terms (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

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

- 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.
- 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 éngine hood.

Revision: December 2015

EC-235



А

F

Κ

L

M

Ν

Ρ

< 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-237, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-236, "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-237, "Diagnosis Procedure".

Component Function Check

INFOID:000000012788015

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
Connector	Terr	minal		
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 Е + _ Condition Voltage Connector Terminal 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-237, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000012788016 Н 1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE 1. Clear the mixture ratio self-learning value. Refer to EC-146. "Description". 2. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine? YES >> • Perform trouble diagnosis for DTC P0171. Refer to EC-248, "DTC Logic". Perform trouble diagnosis for DTC P0172. Refer to EC-252, "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. 3. Disconnect ECM harness connector. Check the continuity between HO2S2 harness connector and ECM harness connector. 4 M + _ HO2S2 ECM Continuity Connector Terminal Connector Terminal Ν F43 F24 23 1 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. Ρ 3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

< DTC/CIRCUIT DIAGNOSIS >

+			_	
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

	+		
EC	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 4.

NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-238, "Component Inspection (HO2S2)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

Component Inspection (HO2S2)

INFOID:000000012788017

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

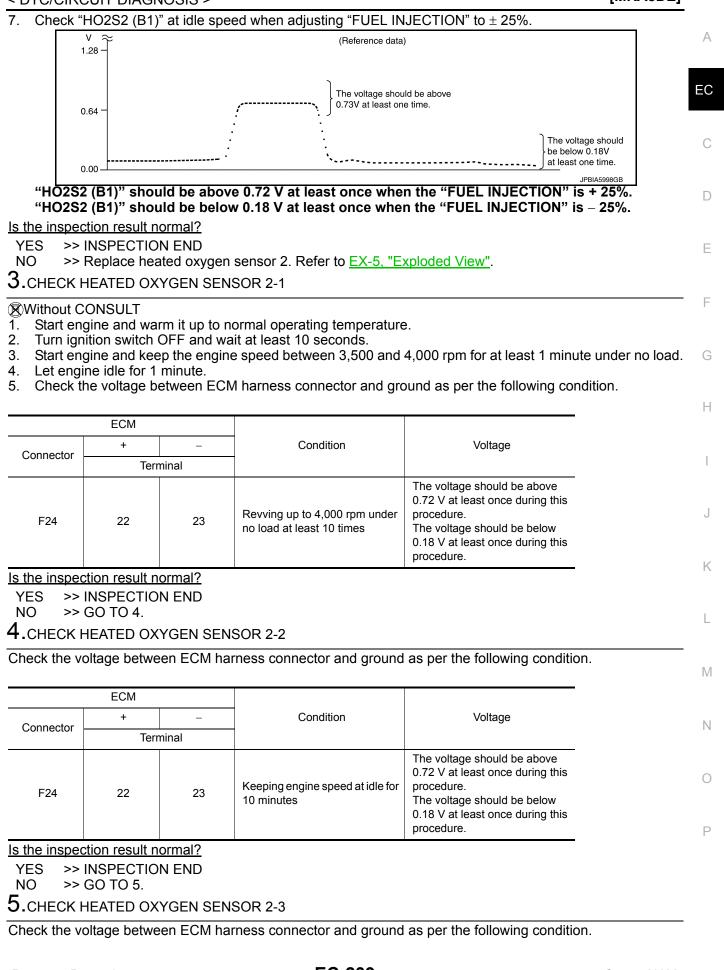
2. CHECK HEATED OXYGEN SENSOR 2

()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)	The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	 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)		 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.
- 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. Restart 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 8. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 9. 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-214, "Component Function Check".

Is "PRSNT" displayed on CONSULT screen?

YES >> GO TO 4

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

Perform DTC confirmation procedure-1 again.

INFOID:000000012788018

EC

D

Ε

Н

Κ

L

Μ

Ρ

А

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Is "PRSNT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> Proceed to EC-214, "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-214, "Component Function Check"</u>.

Is "CMPLT" displayed on CONSULT screen?

- YES >> GO TO 5.
- NO >> Refer to EC-214, "Component Function Check".

5.PERFORM SELF-DIAGNOSIS

With CONSULT

Check the "SELF-DIAG RESULT".

Is any DTC detected?

YES >> Proceed to EC-243. "Diagnosis Procedure".

NO >> INSPECTION END

6.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

- T. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.
- Is the total percentage within ±15%?

YES >> GO TO 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-243, "Diagnosis Procedure".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[MRA8DE]

INFOID:000000012788019

А

EC

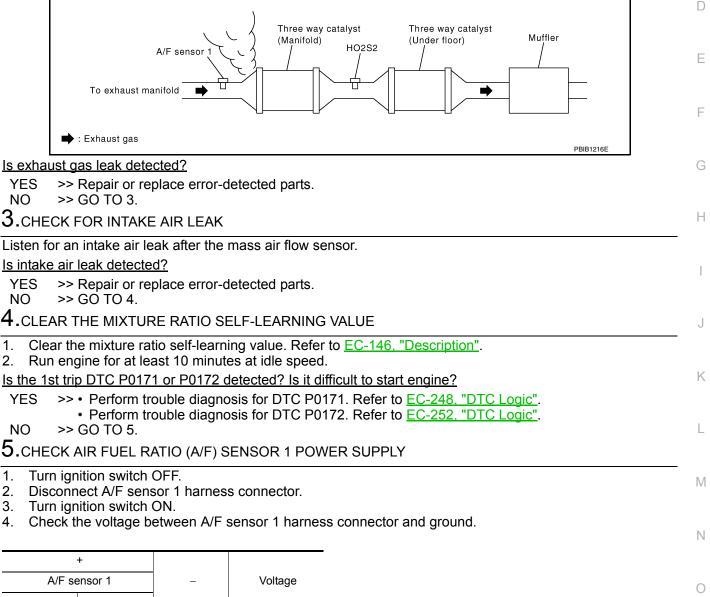
1.RETIGHTEN A/F SENSOR 1

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

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 11. Ρ

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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 sensor 1		ECM		Continuity
-	Connector	Terminal	Connector	Terminal	
-	F12 ^{*1}	1	F24	41	Existed
_	F42 ^{*2}	2	1 24	45	LAISIEU

*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	Ground	NOT EXISTED

*1: Except California

*2: For California

	+			
E	CM	_	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 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 EC-245, "Component Inspection (A/F Sensor 1 Heater)".

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-245. "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-500, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

		P014C, P	014D, P0 ⁻	15A, P	015	5B A/I	FSE	ENSO)R 1			
< DTC/CIRC			<u></u>								[MRA8DE]	
		replace P Parts Locat		Refer	to	<u>EC-15</u>	5 <u>, "E</u>	ENGIN	<u>E</u> C	ONTRO	L SYSTEM :	А
		TENT INCID										~
Check interr	mittent incide	ent. Refer to	GI-41, "Inter	mittent I	ncide	ent".						EC
•	<u>ction result n</u>											LU
		fuel ratio (A/l place error-d			EM-	<u>-30, "E</u> >	kplod	ed Viev	<u>w"</u> .			
-		RATIO (A/F)			2 511			шт				С
	nition switch			TOWER				011				
2. Disconn	nect IPDM E/	R harness c										D
3. Check t	he continuity	between A/	F sensor 1 h	arness o	conn	ector a	nd IP	DM E/	R ha	rness cor	nnector.	
	+	-	_									Е
A/F se	ensor 1	IPDN	I E/R	Conti	nuity							
Connector	Terminal	Connector	Terminal									F
F12 ^{*1} F42 ^{*2}	4	E45	26	Exis	sted							F
	ept California	3										G
*2: For (Ċalifornia											0
		for short to g	fround.									
· · · ·	<u>ction result n</u> Perform the	trouble diag	nosis for nov	ver sunn	ly ci	cuit						Н
		place error-d			iy on	oun.						
Compone	ent Inspec	tion (A/F S	Sensor 1	Heater	·)						INFOID:0000000012788020	I
1. снески	· AIR FUEL R/	` ATIO (A/F) S	ENSOR 1		,							
	nition switch											J
2. Disconn	nect A/F sens	sor 1 harnes				41a a £a 11.						
3. Check r	esistance de	etween A/F s	ensor 1 term	linais as	per	the folio	owing].				K
+	_											
A/F se	ensor 1	R	esistance									I
Terr	minal											L
	4	1.8 - 2.44	Ω [at 20°C (68°	°F)]								
3	1											M
	2		$\Omega \propto$									
4	1	(Continuit	y should not ex	tist)								Ν
	2											
	ction result n											
	INSPECTIO Replace air	N END fuel ratio (A/I	F) sensor 1	Refer to	FM	-30 "Ex	knlod	ed Viev	w"			0
		tion (MAF	•			<u></u> /			<u></u> .		INFOID:000000012788021	
		LOW SENS									INI GID.000000012188021	Ρ
		LOW SEINS										

- With CONSULT1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Start engine and warm it up to normal operating temperature. 3.
- Connect CONSULT and select "DATA MONITOR" mode of "ENGINE". 4.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

5. Select "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 frequency between ECM harness connector and ground.

	ECM				
Connector	Connector + – Terminal		Condition	Frequency (Hz)	
Connector					
			Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz	
F24	35	34	Idle (Engine is warmed-up to normal oper- ating temperature.)	5,100 – 5,500 Hz	
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*	

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

Is the inspection result normal?

YES >> INSPECTION END

2. Check for the cause of uneven air flow through mass air flow sensor

- 1. Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Intake valve deposits
- Improper specification of intake air system parts

Is the inspection result normal?

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

 $\sim 00103.$

3.CHECK MASS AIR FLOW SENSOR-2

(I) 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 "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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.

< DTC/CIRCUIT DIAGNOSIS >

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

	ECM				
Connector	+	-	Condition	Frequency (Hz)	
Connector Terminal		minal			
			Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz	
F24	35	34	Idle (Engine is warmed-up to normal op- erating temperature.)	5,100 – 5,500 Hz	
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*	

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-3

(D)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 "MASS AIR FLOW SENSOR (Hz)" and check indication.

Monitor item	Condition	Indication (Hz)	ŀ
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz	
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz	1
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*	

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

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 frequency between ECM harness connector and ground.

	ECM				
Connector	+	_	Condition	Frequency (Hz)	
Connector	Terr	minal			
			Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz	N
F24	35	34	Idle (Engine is warmed-up to normal oper- ating temperature.)	5,100 – 5,500 Hz	
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*	

*: Check for linear frequency 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>.

Ρ

Ο

[MRA8DE]

А

Ε

F

J

Κ

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000012788022

[MRA8DE]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
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

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-146, "Description".

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-249, "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.

P0171 FUEL INJECTION SYSTEM FUNCTION < DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Is 1st trip DTC detected?	[
YES >> Proceed to <u>EC-249, "Diagnosis Procedure"</u> . NO >> GO TO 5.	
5. PERFORM DTC CONFIRMATION PROCEDURE-3	
1. Turn ignition switch OFF and wait at least 10 seconds.	I
 Start engine. 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-249, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000012788023
1.CHECK EXHAUST GAS LEAK	
 Start engine and run it at idle. Listen for an exhaust gas leak before three way catalyst (manifold). 	
A/F sensor 1 Three way catalyst (Manifold) HO2S2 To exhaust manifold	-
➡ : Exhaust gas	
Is exhaust gas leak detected?	B1216E
YES >> Repair or replace error-detected parts. NO >> GO TO 2.	
2. CHECK FOR INTAKE AIR LEAK	
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	
 Turn ignition switch OFF. Disconnect corresponding A/F sensor 1 harness connector. Disconnect ECM harness connector. Check the continuity between A/F sensor 1 harness connector and ECM harness connector. 	
	7 1.

	+		_		
A/F se	A/F sensor 1		CM	Continuity	
Connector	Terminal	Connector	Terminal		
F12 ^{*1}	1	F24	41	Existed	
F42 ^{*2}	2	1 24	45	Existed	

*1: Except California

< DTC/CIRCUIT DIAGNOSIS >

*2: For California

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

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

*1: Except California

*2: For California

+			
ECM		-	Continuity
Connector	Terminal		
F24	41	Ground	Not existed
	45		

6. 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 FUEL PRESSURE

Check fuel pressure. Refer to EC-147, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-40, "Exploded View".

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-7, "Removal and Installation".
- NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

(B) With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 frequency between ECM harness connector terminals under the following conditions.

P0171 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

А ECM + Condition Frequency (Hz) _ Connector Terminal EC Ignition switch ON (Engine stopped.) Approx. 3,700 Hz Idle (Engine is warmed-up to normal operating F24 35 34 5,100 - 5,500 Hz temperature.) Idle to about 4,000 rpm 5,100 - 5,500 to Approx. 7,000 Hz*

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

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-190, "DTC Logic".

I.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT

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

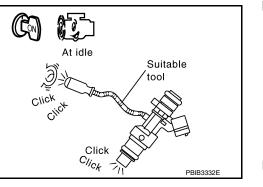
Without CONSULT

- Ĩ. 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 EC-466, "Component Function Check".



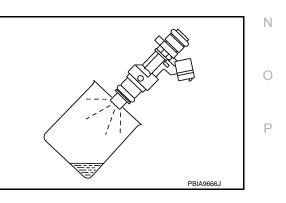
8. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2.
- Disconnect all fuel injector harness connectors. 3.
- Remove fuel tube assembly. Refer to EM-40, "Removal and Installation". 4. Keep fuel hose and all fuel injectors connected to fuel tube.
- Disconnect all ignition coil harness connectors. 5.
- 6. Prepare pans or saucers under each fuel injector.
- Crank engine for about 3 seconds. 7.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- 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".



Н

[MRA8DE]

D

Е

Μ

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000012788024

[MRA8DE]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause
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

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-146, "Description".
- 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-253, "Diagnosis Procedure".
- NO >> Check exhaust and intake air leak visually.

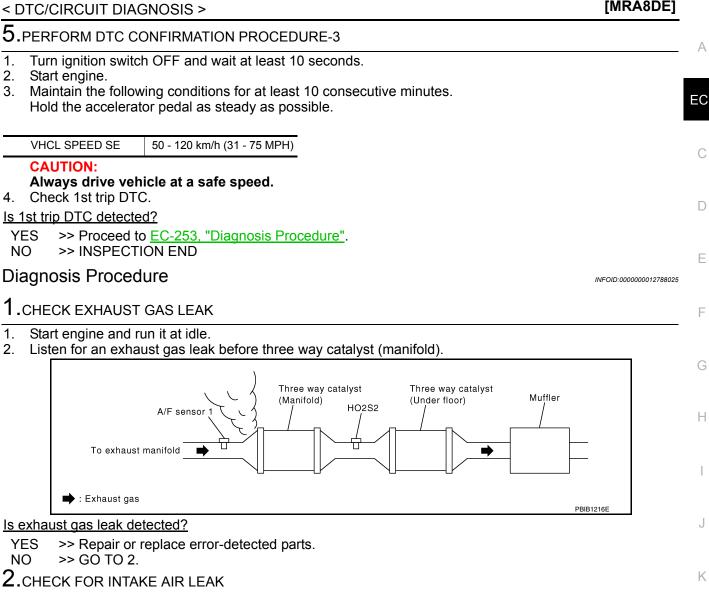
4.PERFORM DTC CONFIRMATION PROCEDURE-2

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

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-253, "Diagnosis Procedure"</u>. NO >> GO TO 5.

P0172 FUEL INJECTION SYSTEM FUNCTION



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.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

	+		_	
A/F se	ensor 1	E	Continuity	
Connector	Terminal	Connector Terminal		
F12 ^{*1}	1	F24	41	Existed
F42 ^{*2}	2	1 24	45	LAISted

*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.

L

Μ

Ν

Ρ

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

	-	~ -	
IM	RA	80	DET.
L			_

	+		
A/F se	ensor 1	_	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

6. 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 FUEL PRESSURE

Check fuel pressure. Refer to EC-147, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-40, "Exploded View".

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-7, "Removal and Installation".

NO >> Repair or replace error-detected parts.

6.CHECK MASS AIR FLOW SENSOR

(I) With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 frequency between ECM harness connector terminals under the following conditions.

P0172 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

А ECM + Condition Frequency (Hz) _ Connector Terminal EC Ignition switch ON (Engine stopped.) Approx. 3,700 Hz Idle (Engine is warmed-up to normal operating F24 35 34 5,100 - 5,500 Hz temperature.) Idle to about 4,000 rpm 5,100 - 5,500 to Approx. 7,000 Hz*

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

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-190, "DTC Logic"</u>.

7. CHECK FUNCTION OF FUEL INJECTOR

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.

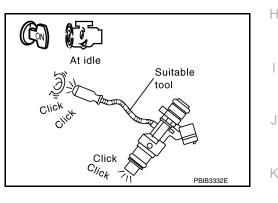
Without CONSULT

- 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-466</u>, "Component Function Check".



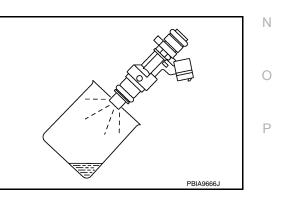
8. CHECK FUEL INJECTOR

- 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-41</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 <u>EM-40, "Removal and Installation"</u>.



D

Е

Μ

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

DTC Logic

INFOID:000000012788026

[MRA8DE]

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 CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7. 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.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-1

- 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-258, "Diagnosis Procedure".
- NO >> GO TO 4.
- **4.**CHECK ENGINE COOLANT TEMPERATURE

With CONSULT

i. Select "COOLANT TEMP/S" in "DATA MONITOR" of "ENGINE" using CONSULT.

2. Check "COOLANT TEMP/S" value.

With GST

Follow the procedure "With CONSULT" above.

"COOLANT TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-2

With CONSULT

1. Cool engine down until "COOLANT TEMP/S" is less than 60°C (140°F).

P0181 FTT SENSOR

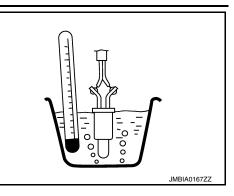
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
2. Wait at least 10 seconds.	
3. Check 1st trip DTC.	A
Follow the procedure "With CONSULT" above.	
Is 1st trip DTC detected?	EQ
YES >> Proceed to <u>EC-258, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
6. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	C
Perform component function check. Refer to <u>EC-257, "Component Function Check"</u> . NOTE:	
Use the component function check to check the overall function of the FTT sensor circuit. Durin 1st trip DTC might not be confirmed.	ng this check, a \Box
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to EC-258, "Diagnosis Procedure".	E
7.PRECONDITIONING	-
If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the for	ollowing proce-
dure before conducting the next test. 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. 	F
• 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	e at luie.
>> GO TO 8.	I
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°C (14°F) and 3	35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.	k (((((((((((((((((((
CAUTION: Never turn ignition switch ON during this procedure.	
NOTE:	1
The vehicle must be cooled with the hood open.	-
 Start engine and let it idle for 5 minutes or more. CAUTION: 	
Never turn ignition switch OFF during idling.4. Check 1st trip DTC.	N
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-258, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Component Function Check	INFOID:000000012788027
1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR	
1. Turn ignition switch OFF.	
2. Disconnect fuel level sensor unit and fuel pump harness connector.	F
Remove fuel level sensor unit. Refer to <u>FL-7</u>, "Removal and Installation".	

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.

Fuel level sensor unit and fuel pump				
+	-	Condi	Resistance (k Ω)	
Terr	minal			
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-41, "Intermittent Incident"</u>.

NO >> Proceed to EC-258, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000012788028

[MRA8DE]

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-256, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 6.

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to <u>MWI-51</u>, "COMBINATION METER : Diagnosis Procedure".

 $\mathbf{3}$.check fuel tank temperature (FTT) sensor power

1. Turn ignition switch OFF.

2. Disconnect fuel level sensor unit and fuel pump harness connector.

3. Turn ignition switch ON.

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

+		N / 14	
unit and fuel pump	-	Voltage (Approx.)	
Terminal			
4	Ground	5 V	
		Terminal	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY 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.

	+		-	
	ensor unit and pump	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
B48	4	E16	125	Existed

			P0181	I FTT SEN		
< DTC/CIR					[MRA8DE]	
			ground and t	to power.		Δ
Is the inspec						А
			detected par	wer supply cire ts.	cuit.	
_	•	OR GROUN				EC
	nition switc					
 Disconr Check t 	hect ECM	harness conn		sor unit and fu	el pump harness connector and ECM harness	С
connect	ior.					
	+		-			D
Fuel level se		d	ECM	Continuity		
Connector	pump Terminal	Connector	Terminal	-		Е
B48	5	E16	124	Existed		
4. Also che		ss for short to	power.			F
Is the inspec			P =			-
	GO TO 6.					
~	•	•	-detected par			G
D. CHECK	FUEL TAN	IK TEMPERA	TURE (FTT)	SENSOR		
			-259, "Compo	onent Inspecti	<u>on"</u> .	Н
Is the inspec			lant Defende	CL 44 Western		
					nittent Incident". er to FL-7, "Removal and Installation".	I
Compone	•				INFOID:000000012788029	I
	-				IN 012.00000012100223	
1.CHECK	FUEL TAN	IK TEMPERA	TURE (FTT)	SENSOR		J
	nition swite		the second fit was a second			
				mp harness c . "Removal ar	id Installation".	Κ
4. Check r	resistance	between fue	l level sensor	unit and fuel	pump	
terminal	ls by heati	ng with hot w	ater as showi	n in the figure.		I
Fuel level se	ensor unit				— I II II II II	L
and fuel						
+	-	Conc	lition	Resistance (k		M
Termi	nal		1			
4		Temperature	20 (68)	2.3 – 2.7		Ν
		[°C (°F)]	50 (122)	0.79 – 0.90	JMBIA0167ZZ	
Is the inspec						
	INSPECT Replace f		or unit and fu	iel pump. Refe	er to FL-7, "Removal and Installation".	0
		-	-			
						P

Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:000000012788030

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel temperature sensor "A" circuit low)	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The FTT sensor circuit is open or shorted.)
P0183	FTT SEN/CIRCUIT (Fuel temperature sensor "A" circuit high)	An excessively high voltage from the sensor is sent to ECM.	 Fuel tank temperature sensor Combination meter

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

Is 1st trip DTC detected?

- YES >> Proceed to EC-260, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788031

1.CHECK DTC WITH COMBINATION METER

Refer to <u>MWI-18</u>, "CONSULT Function (METER/M&A)" (TYPE A) or <u>MWI-92</u>, "CONSULT Function (METER/ <u>M&A)</u>" (TYPE B).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Proceed to <u>MWI-56, "Diagnosis Procedure"</u> (TYPE A) or <u>MWI-132, "Diagnosis Procedure"</u> (TYPE B).
- 2. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY
- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

	+		
	sor unit and fuel mp	_	Voltage (Approx.)
Connector	Terminal		
B48	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

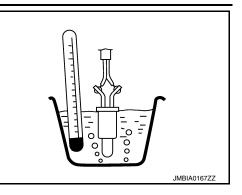
NO >> GO TO 3. **3.**CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT А 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. EC Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness 3. connector. + _ Fuel level sensor unit and ECM Continuity fuel pump D Connector Terminal Connector Terminal 4 B48 E16 125 Existed Also check harness for short to ground and to power. Ε 4 Is the inspection result normal? YES >> Perform the trouble diagnosis for power supply circuit. NO >> Repair or replace error-detected parts. ${f 4}$. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR GROUND CIRCUIT 1. Turn ignition switch OFF. Disconnect ECM connector. 2. 3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector. Н + Fuel level sensor unit and ECM Continuity fuel pump Connector Connector Terminal Terminal B48 5 E16 124 Existed Also check harness for short to power. Is the inspection result normal? Κ YES >> GO TO 5. NO >> Repair or replace error-detected parts. ${f 5.}$ CHECK FUEL TANK TEMPERATURE (FTT) SENSOR Check the FTT sensor. Refer to EC-261, "Component Inspection". Is the inspection result normal? YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". Μ NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-7, "Removal and Installation". Component Inspection INFOID:000000012788032 Ν 1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR 1. Turn ignition switch OFF. Ο 2. Disconnect fuel level sensor unit and fuel pump harness connector. Remove fuel level sensor unit. Refer to FL-7, "Removal and Installation". 3. Ρ

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			
+	-	Cond	lition	Resistance (kΩ)
Terr	ninal			
4	5	Temperature	20 (68)	2.3 – 2.7
4	5	[°C (°F)]	50 (122)	0.79 – 0.90



[MRA8DE]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel level sensor unit and fuel pump. Refer to <u>FL-7, "Removal and Installation"</u>.

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0196 EOT SENSOR

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-266, "DTC Logic"</u>.

P0196 EOT SENSOR (Engine oil temperature sensor range/performance) The comparison result of signals trans- mitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT) • EOT sensor	nantara
P0196 (Engine oil temperature sensor range/performance) 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 higher/lower than that of other temperature sensor when the engine is started with • Harness or ccr (High or low n sensor circuit) 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 1 dure before conducting the next test. 1. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. 2. PRECONDITION: Before performing the following procedure, confirm that battery voltage is 11 V or m >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-1 1. Start engine and warm it up to normal operating temperature. 2. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. 3. Turn ignition switch OFF and wait at least 10 seconds. 1. 4. Start engine and warm it up to normal operating temperature. 2. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. 3. Turn ignition switch OFF and wait at least	nectors rcuit is open or short-
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 to dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 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 m >> 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 OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch OFF and wait at least 10 seconds. 3. 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.	nectors sistance in the EOT
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 to dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 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 m >> 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 OFF and wait at least 10 seconds. 3. 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.	
 YES >> GO TO 6. NO >> GO TO 2. 2.PRECONDITIONING If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform to dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch OFF and wait at least 10 seconds. 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 m >> 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 OFF and wait at least 10 seconds. 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. 	
 PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-1 Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. Check 1st trip DTC. 	
 Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. Check 1st trip DTC. 	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and let it idle for 5 minutes and 10 seconds. Check 1st trip DTC. 	
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-265, "Diagnosis Procedure"</u> . NO >> GO TO 4.	
4 . PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-2	

If it is above 80°C (176°F), go to the following steps.

EC-263

INFOID:000000012788033

А

С

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

If it is below 80°C (176°F), warm engine up until "COOLANT TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.

3. Turn ignition switch OFF and soak the vehicle in a cool place.

4. Turn ignition switch ON. NOTE:

Do not turn ignition switch OFF until step 8.

- 5. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 6. Check the following.

COOLANT TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLANT TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

• Do not turn ignition switch OFF.

- If it is supposed to need a long period of time, do not deplete the battery.
- 7. Start engine and let it idle for 5 minutes.
- 8. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-265, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-265. "Component Function Check".

NOTE:

Use the component function check to check the overall function of the EOT 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-265, "Diagnosis Procedure".

6.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 7.

/.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°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 hood open.
- 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?

YES >> Proceed to EC-265, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOT sensor harness connector.
- 3. Remove EOT sensor. Refer to EM-94, "Exploded View".
- 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 <u>GI-41, "Intermittent Incident"</u>.

NO >> Proceed to EC-265, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-265, "Component Inspection".

Is the inspection result normal?

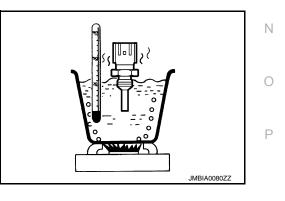
- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace EOT sensor. Refer to <u>EM-94, "Exploded View"</u>.

Component Inspection

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

0	temperature nsor	0	• • •	
+	-	Condit	ion	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

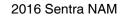


Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-94. "Exploded View".





INFOID:000000012788034

EC

D

Ε

А

G

Н

INFOID:0000000012788035

JMBIA0080ZZ

J

Κ

M

INFOID:0000000012788036

< DTC/CIRCUIT DIAGNOSIS >

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:000000012788037

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	Harness or connectors (EOT sensor circuit is open or shorted.)
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	Engine oil 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-266, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature (EOT) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EOT sensor harness connector and ground.

	+		
EOT	sensor	_	Voltage (Approx.)
Connector	Terminal		
F48	1	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.check engine oil temperature sensor power supply circuit

1. Turn ignition switch OFF.

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

INFOID:000000012788038

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

		1				
	+	-				Α
	sensor	ECI		Continuity		
Connector	Terminal	Connector	Terminal			E
F48	1	F24	25	Existed		
	eck harness ction result r	for short to gr	ound.			(
			asis for nov	ver supply circui	t	
		place error-de			•	
3.снеск	EOT SENSO	OR GROUND	CIRCUIT			[
1. Turn ig	nition switch	OFF.				
		arness connec		rnaaa aannaata	r and ECM barrage connector	E
3. Check		y between EO	i sensor na	amess connecto	r and ECM harness connector.	
	+	_				_
EOT	sensor	EC	M	Continuity		F
Connector	Terminal	Connector	Terminal	Continuity		
F48	2	F24	26	Existed		0
4. Also ch	eck harness	for short to po	ower.			
•	ction result r	normal?				ŀ
	GO TO 4. Repair or re	place error-de	tected nart	e		
4		_ TEMPERATI				
					ponent Inspection (EOT Sensor)".	
	ction result r			<u> </u>		
			nt. Refer to	GI-41, "Intermitte	ent Incident".	
NO >>	Replace en	gine oil tempe	rature sens	or. Refer to <u>EM-</u>	94, "Exploded View".	
Compone	ent Inspec	tion (EOT	Sensor)		INFOID:000000012788039	ŀ
				OR		
	nition switch					
			e sensor ha	rness connector		L
		temperature s		atura appaar tar	mi	
		hot water as		ature sensor ter e figure.		ľ
				-	, [], [], [], (), (), (, (), (), (, (), (), (), (), (), (), (, (), (
Engine oil te	-					Γ
ture sen +	501	Conditio	on	Resistance		1
Termin	al					
	~.		20 (6	8) 2.37 - 2.63 kg		(
1	2 Temp	erature [°C (°F)]	50 (12			
		- · / ·	90 (19		IMBIA008077	P
Is the inspe	ction result r	normal?		1	—	

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-94, "Exploded View".

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-355, "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 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 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-268</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788041

1.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

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

	+		
	e control actu- tor	_	Voltage (Approx.)
Connector	Terminal		
F7	2	Ground	5.0 V
	the second second second		

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000012788040

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

А

EC

Ε

Н

Κ

L

Ρ

$\overline{2}$. 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	EC	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.

	Ŧ			
	e control actu- tor	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 1 INPUT SIGNAL CIRCUIT

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

-	+	-	-	
	e control actu- tor	EC	ECM	
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-270, "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "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)

INFOID:000000012788042

[MRA8DE]

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-143. "Description".
- 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	Voltage		
tor	Terr	ninal				
	77 79	- 78		Fully released	Less than 4.75 V	
F25			Accelerator	Fully depressed	More than 0.36 V	
FZD		70	pedal	Fully released	More than 0.36 V	
				Fully depressed	Less than 4.75 V	

Is the inspection result normal?

YES >> INSPECTION END

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

< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000012788043

[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	0
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 plug Insufficient compression	J
P0301	CYL 1 MISFIRE (Cylinder 1 misfire detected)	No. 1 cylinder misfires.	 Incorrect fuel pressure Fuel Injector circuit is open or shorted Fuel injector 	K
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	L
P0304	CYL 4 MISFIRE (Cylinder 4 misfire detected)	No. 4 cylinder misfires.	Incorrect PCV hose connection	N/I

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?

EC

D

Ε

F

Н

Ν

Ο

Ρ

< DTC/CIRCUIT DIAGNOSIS >

YES >> Proceed to EC-272, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and drive the vehicle as per the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

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

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
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).
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

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

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-272, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Check the following

- Connection condition of the ground F16 and F9
- Connection condition of the ground harness between engine assembly and vehicle body (If equipped)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.

2. Listen for the sound of the intake air leak.

3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3. CHECK FOR EXHAUST SYSTEM CLOGGING

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

Is the inspection result normal?

YES-1 (With CONSULT)>>GO TO 4. YES-2 (Without CONSULT)>>GO TO 5. NO >> Repair or replace it.

Revision: December 2015

INFOID:000000012788044

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

А

EC

4.PERFORM POWER BALANCE TEST

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 10.

NO >> GO TO 5.

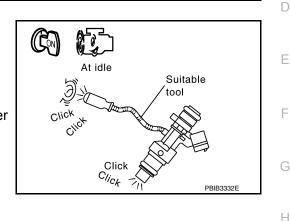
5.CHECK FUNCTION OF FUEL INJECTOR

- 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 6.
- NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to <u>EC-466</u>, "Diagnosis Procedure".



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.

- 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 10.
NO	>> GO TO 7.

13 - 17 mm

(0.52-0.66 in)

JMBIA0066GB

mmmh

(Cylinder head, cylinder block, etc.)

Grounded metal portion



N

Κ

L

M

< DTC/CIRCUIT DIAGNOSIS >

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.

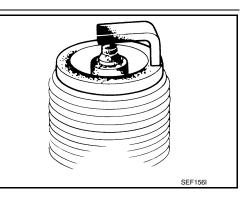
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-472. "Diagnosis Procedure".

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to <u>EM-12</u>, "<u>Removal and Installation</u>".

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118, "Spark Plug"</u>.
 NO >> 1. Repair or clean spark plug.
 - >> 1. Repair or clean spark plug.2. GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-3

- 1. Reconnect the initial spark plugs. Refer to EM-12, "Removal and Installation".
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to <u>EM-118, "Spark</u> <u>Plug"</u>.

10.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-23. "Inspection".

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. Refer to <u>EM-112</u>. <u>"Description"</u>, <u>EM-79</u>, "Inspection" and <u>EM-103</u>, "Inspection".

11.CHECK FUEL PRESSURE

- 1. Install all removed parts.
- 2. Release fuel pressure to zero. Refer to <u>EC-147, "Work Procedure"</u>.
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-147, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. 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-7, "Removal and Installation".
- NO >> Repair or replace error-detected parts.

13. CHECK IGNITION TIMING

< DTC/CIRC		•	301, P03	02, P0303, P0304 MISFIRE [MRA8DE]	
		efer to EC-49	6 "Inspectio	• •	
Is the inspec	-			<u></u> .	А
	GO TO 14.				
				er to <u>EC-135, "Work Procedure"</u> .	
14.снеск	A/F SENS	OR 1 INPUT	SIGNAL CI	RCUIT	EC
	ition switch				
		sor 1 harness			С
				arness connector and ECM harness connector.	
	-				
+	-	-	-		D
A/F se	nsor 1	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		Е
F12 ^{*1}	1	F24	41	Existed	
F42 ^{*2}	2	124	45		_
	pt California	a			F
	California	, hetween Δ/F	sensor 1 h	arness connector or ECM harness connector and ground.	
o. oncor i			3011301 1 11		G
+	+			_	
A/F se	nsor 1	_	Continuity		
Connector	Terminal	-			Н
F12 ^{*1}	1	0	Net a fated		
F42 ^{*2}	2	Ground	Not existed		I
*1: Exce	pt California	a			
*2: For C	California				
					J
+		-	Orationity		
EC Connector	Terminal	-	Continuity		K
Connector	41				
F24	41	Ground	Not existed		
6. Also che		for short to p	ower	_	L
Is the inspec		•			
-	<u>GO TO 15.</u>				\mathbb{N}
NO >> F	Repair or re	place error-de	-	S.	
15.снеск	A/F SENS	OR 1 HEATE	R		Ν
Check the A/	/F sensor 1	heater. Refer	to <u>EC-181</u> ,	"Component Inspection (A/F Sensor 1 Heater)".	IN
Is the inspec	tion result n	ormal?			
	GO TO 16.				0
	•			0, "Exploded View".	
IU.CHECK	MASS AIF	R FLOW SEN	SOR		D
With CON					Г
	ition switch ect all harne	OFF. ess connector	s disconnec	ted	
				ing temperature.	

Connect CONSULT and select "DATA MONITOR" mode.
 Select "MASS AIR FLOW SENSOR (Hz)" and check the indication.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Monitor item	Condition	Indication (Hz)
	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
MASS AIR FLOW SENSOR (Hz)	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 frequency between ECM harness connector terminals under the following conditions.

	ECM + -			Frequency (Hz)	
Connector			Condition		
Connector	Terr	ninal			
			Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz	
F24	35	34 Idle (Engine is warmed-up to normal operating temperature.)		5,100 – 5,500 Hz	
			Idle to about 4,000 rpm		5,100 – 5,500 to Approx. 7,000 Hz*

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

Is the inspection result normal?

YES >> GO TO 17.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-190, "DTC Logic"</u>.

17.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-489, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace error-detected parts.

18.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-55. "Diagnosis Descrip-</u>tion".

>> GO TO 19.

19.CHECK INTERMITTENT INCIDENT

Perform <u>GI-41, "Intermittent Incident"</u>.

>> INSPECTION END

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328 KS

DTC Logic

А

INFOID:000000012788045

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scre (Trouble diagno tent)				Possible cause	
P0327	KNOCK SEN/Cl (Knock sensor 1 low bank 1)	-	An excessively lo sor is sent to ECM	w voltage from the knocl /I.	k sen-	 Harness or connectors (Knock sensor circuit is open or short-
P0328	KNOCK SEN/Cl (Knock sensor 1 high bank 1)		An excessively hi sensor is sent to	gh voltage from the kno ECM.	ock	ed.) • Knock sensor
DTC CON	FIRMATION	PROCE	DURE			
1.PRECC	NDITIONING					
before con 1. Turn ig 2. Turn ig 3. Turn ig TESTING	ducting the neg prition switch (prition switch (prition switch (CONDITION:	xt test.)FF and v)N.)FF and v	vait at least 10 vait at least 10	seconds. seconds.		s perform the following procedure age is more than 10 V at idle.
>	> GO TO 2.					
~		FIRMATI	ON PROCEDU	IRE		
			ast 5 seconds			
	1st trip DTC.					
	DTC detected?					
	Proceed to <a <="" href="https://www.edu/ecealize-communication-communicatio
communication-communication-communication-communication-communication-communication-communication-communication-communicatio-communicatio-communicatio-communicatio-communicatio-commu communicatio-communicatio-commu communicati-communic</td><td></td><td>Diagnosis Proc</td><td><u>edure" u="">.					
	is Procedur					INFOID:000000012788046
			OUND CIRCUI	Ŧ		
				1		
 Discor Discor 	nect ECM har	nsor harn ness coni			and E	CM harness connector.
	+		_			
Knoo	ck sensor		ECM	Continuity		
Connector		Connecto		,		
F8	2	F24	8	Existed		
5. Also c	heck harness f	or short to	o power.			
Is the inspe	ection result no	ormal?				
	> GO TO 2.			_		
-			r-detected part			
∠. CHECK	KNOCK SEN	SOR INP	UT SIGNAL CI	RCUIT		

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

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

+		-	_			
Knock	sensor	ECM		ECM C		Continuity
Connector	Terminal	Connector Terminal				
F8	1	F24	4	Existed		

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

Is the inspection result normal?

YES >> GO TO 3.

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

3. CHECK KNOCK SENSOR

Check knock sensor. Refer to EC-278, "Component Inspection (KS)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> Replace knock sensor. Refer to EM-94, "Exploded View".

Component Inspection (KS)

INFOID:000000012788047

1.CHECK KNOCK SENSOR

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

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

Knock	sensor		Desistance		
+	_	Condition	Resistance (Approx.)		
Terminals				(-)	
1	2	Temperature °C (°F)	20 (68)	532 - 588 kΩ	

CAUTION:

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

YES >> INSPECTION END

NO >> Replace knock sensor. Refer to <u>EM-94, "Exploded View"</u>.

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-</u><u>355, "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
	NFIRMATION PROCE	DURE	
	ONDITIONING		
before co 1. Turn	nducting the next test. ignition switch OFF and	has been previously conducted, alway wait at least 10 seconds.	s perform the following procedure
	ignition switch ON. ignition switch OFF and	wait at least 10 seconds.	
TESTING	CONDITION:		
tion swite		g procedure, confirm that battery volt	age is more than 10.5 v with igni-
-	>> GO TO 2. ORM DTC CONFIRMAT		
	engine and let it idle for		
lf eng	jine does not start, crank	a least o seconds.	
	k 1st trip DTC.		
-	<u>DTC detected?</u> >> Proceed to <u>EC-279.</u> "	Diagnosis Procedure"	
	>> INSPECTION END		
Diagnos	sis Procedure		INFOID:000000012788049
1. CHEC	K CRANKSHAFT POSIT	TION (CKP) SENSOR (POS) POWER S	UPPLY
		n (CKP) sensor (POS) harness connecto	
1. Disco			
2. Turn	ignition switch ON.		
2. Turn	ignition switch ON. k the voltage between C	KP sensor (POS) harness connector an	
2. Turn	ignition switch ON. k the voltage between C		

+ CKP sensor (POS)		_	Voltage (Approx.)	
	Connector	Terminal		(FF -)
_	F22	3	Ground	5.0 V

Is the inspection result normal?

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

INFOID:000000012788048

А

EC

С

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{2.}$ 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.

$\mathbf{3}$.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.

5.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to <u>EC-281, "Component Inspection [CKP Sensor (POS)]"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 6.

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

Ó.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-33. "Exploded View".

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

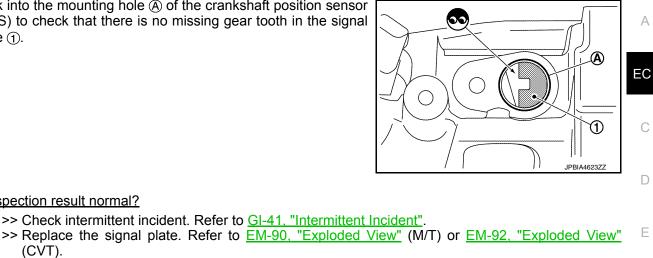
[MRA8DE]

INFOID:000000012788050

F

Ρ

2. Look into the mounting hole (A) of the crankshaft position sensor (POS) to check that there is no missing gear tooth in the signal plate 1.



Component Inspection [CKP Sensor (POS)]

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-1

1. Turn ignition switch OFF.

Is the inspection result normal?

(CVT).

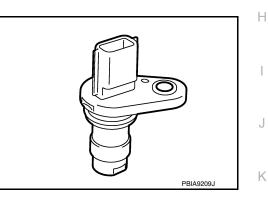
YES

NO

- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS). Refer to EM-33, "Exploded View".



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 (77)	Except 0 or ∞ Ω
2	3			
Is the ins	pection re	esult normal?		
YES	>> INSPE	CTION END		

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

< DTC/CIRCUIT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

DTC Logic

[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

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-282, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

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

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-282, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

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

- YES >> GO TO 2.
- NO >> Check starting system. Refer to <u>STR-20, "Work Flow (With GR8-1200 NI)"</u> or <u>STR-24, "Work Flow (Without GR8-1200 NI)"</u>.
- 2.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY

EC-282

INFOID:000000012788052

P0340 CMP SENSOR (PHASE)

< DTC/CIR	CUIT DIAGN		1340 CIVIF	SENSOR (PHASE) [MRA8DE]	
1. Turn igr 2. Disconr	nition switch	OFF. ft position (C	MP) sensor	(PHASE) harness connector.	A
			ensor (PH	IASE) harness connector and ground.	
					EC
	+ or (PHASE)		Voltage		
Connector	Terminal	_	(Approx.)		С
F39	1	Ground	5.0 V	<u> </u>	0
	ction result n		0.0 1		_
	GO TO 4.	<u></u>			D
~	GO TO 3.				
3. CHECK	SENSOR PC	WER SUPP	LY 2 CIRCL	ЛТ	Ε
			Refer to EC	C-460, "Diagnosis Procedure".	
	<u>n result norm</u>				F
	Repair or re			wer supply circuit. s.	
4	CMP SENSC	•	•		
	nition switch				G
2. Disconr	nect ECM ha	rness conne			
3. Check t	the continuity	between Cl	VIP sensor (I	PHASE) harness connector and ECM harness connector.	Н
	+		_		
CMP sens	or (PHASE)	E	CM	Continuity	1
Connector	Terminal	Connector	Terminal		I
F39	2	F24	30	Existed	
4. Also ch	eck harness	for short to p	ower.		J
Is the inspe	<u>ction result n</u>	ormal?			
	GO TO 5. Repair or re	nlaco orror d	latacted part		Κ
-	•		•	s. NAL CIRCUIT	
	nect ECM ha				1
				PHASE) harness connector and ECM harness connector.	
	-		-		
	+	-	_		M
CMP sens	or (PHASE)	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal		Ν
F39	3	F24	31	Existed	
	eck harness	-	fround and t	o power.	0
	<u>ction result n</u> GO TO 6.	<u>ormar</u>			0
	Repair or re	place error-d	etected part	S.	
6. снеск	CAMSHAFT	POSITION S	SENSOR (P	HASE)	Ρ
				Refer to EC-284, "Component Inspection [CMP Sensor	
<u>(PHASE)]"</u> .			. ,	· · · · · · · · · · · · · · · · · · ·	
	ction result n	ormal?			
	GO TO 7.	nchaft naciti	on concor (D	PHASE) Bofor to EM 60 "Exploded View"	

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

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:000000012788053

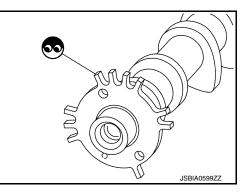
7.CHECK CAMSHAFT (INT)

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-41, "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>.



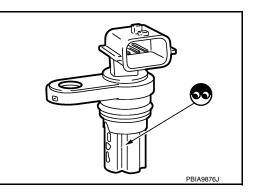
Component Inspection [CMP Sensor (PHASE)]

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 <u>EM-60, "Exploded View"</u>.



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE) + –		Condition		Resistance
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 camshaft position sensor (PHASE). Refer to EM-60, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0420 THREE WAY CATALYST FUNCTION

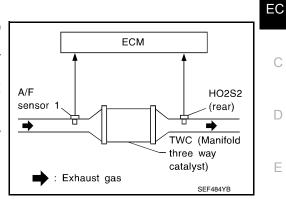
DTC Logic

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	G
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 	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.

Will CONSULT be used?

	ES >> GO TO 2.	L
N		
2.	PERFORM DTC CONFIRMATION PROCEDURE-1	M
	With CONSULT	
	STING CONDITION:	
Do	not hold engine speed for more than the specified minutes below.	Ν
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.	\sim
4.	Turn ignition switch OFF and wait at least 10 seconds.	0
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.	Р
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.

INFOID:000000012788054



Κ

< DTC/CIRCUIT DIAGNOSIS >

11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

12. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

CMPLT>> GO TO 5.

INCMP >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Wait 5 seconds at idle.

 Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 5.

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).

2. Perform DTC confirmation procedure again.

>> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-287, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-286. "Component Function Check".

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-287, "Diagnosis Procedure"</u>.

Component Function Check

INFOID:000000012788055

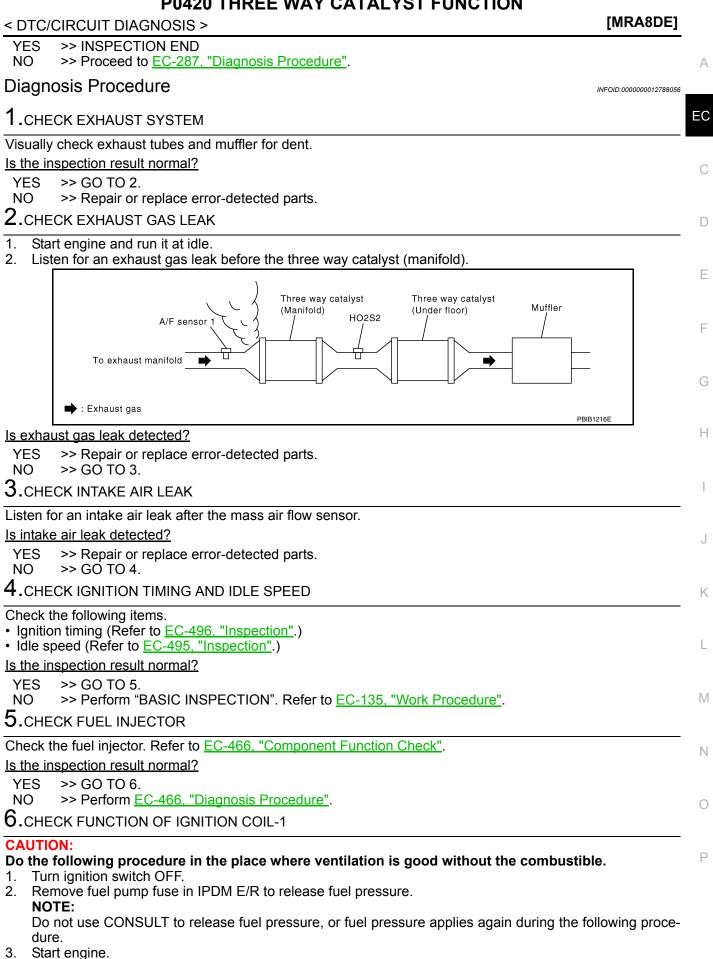
1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

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

ECM						
Connector	+	_	Condition	Voltage (V)		
Connector	Terminal					
F24	22	23	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cy- cle takes more than 5 sec- onds. • 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3$ $\rightarrow 0.6 - 1.0$		





4. After engine stalls, crank it two or three times to release all fuel pressure.

< 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 mal-functioning.

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.

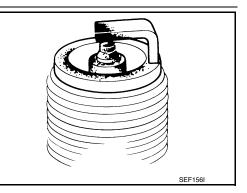
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-472, "Diagnosis Procedure".

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-12</u>. "Removal and Installation".
 - 2. GO TO 9.

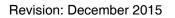


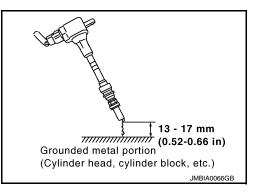
9. CHECK FUNCTION OF IGNITION COIL-3

- 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.

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





P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-118</u> , " <u>Spark</u> <u>Plug</u> ".	А
10. CHECK FUEL INJECTOR	7.
Keep fuel hose and all fuel injectors connected to fuel tube.	EC
 Disconnect all ignition coil harness connectors. Reconnect all fuel injector harness connectors disconnected. Turn ignition switch ON. 	С
Does fuel drip from fuel injector? YES >> GO TO 11. NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-40, "Removal and Installa- tion".	D
11.CHECK INTERMITTENT INCIDENT	Е
Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u> . <u>Is the trouble fixed?</u>	F
YES >> INSPECTION END NO >> Replace three way catalyst assembly. Refer to <u>EM-30, "Exploded View"</u> .	
	G
	Н
	I
	J
	K

L

M

Ν

Ο

Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

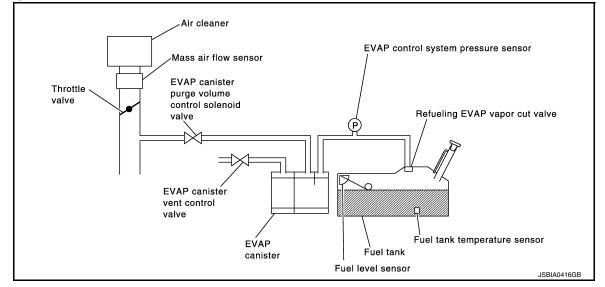
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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

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:000000012788057

< DTC/CIRCUIT DIAGNOSIS >	
---------------------------	--

$\overline{2}$.PERFORM DTC CONFIRMATION PROCEDURE-1

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	G
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)	-
ENG SPEED	500 - 3,800 rpm	H
B/FUEL SCHDL	1.0 - 10.0 msec	
COOLANT TEMP/S	More than 0°C (32°F)	-
CALITION		-

CAUTION:

Always drive vehicle at a safe speed.

NOTE: 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 <u>EC-292, "Diagnosis Procedure"</u>.

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST

Perform component function check. Refer to <u>EC-291, "Component Function Check"</u>. **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-292, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

1. Lift up drive wheels.

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.

А

EC

D

Ε



Κ

L

Μ

Ν

Ο

INFOID:000000012788058

< DTC/CIRCUIT DIAGNOSIS >

- 4. Start engine and wait at least 70 seconds.
- 5. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM			
Connector	+	-	
Connector	Terr	ninal	
E16	114	124	
*1: Except for California			

*1: Except for California

*2: For California

6. Check EVAP control system pressure sensor value at idle speed and note it.

7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-292, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000012788059

1.CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

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 FL-17, "Removal and Installation".

2. CHECK PURGE FLOW

WITH CONSULT

- 1. Disconnect vacuum hose connected 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.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.

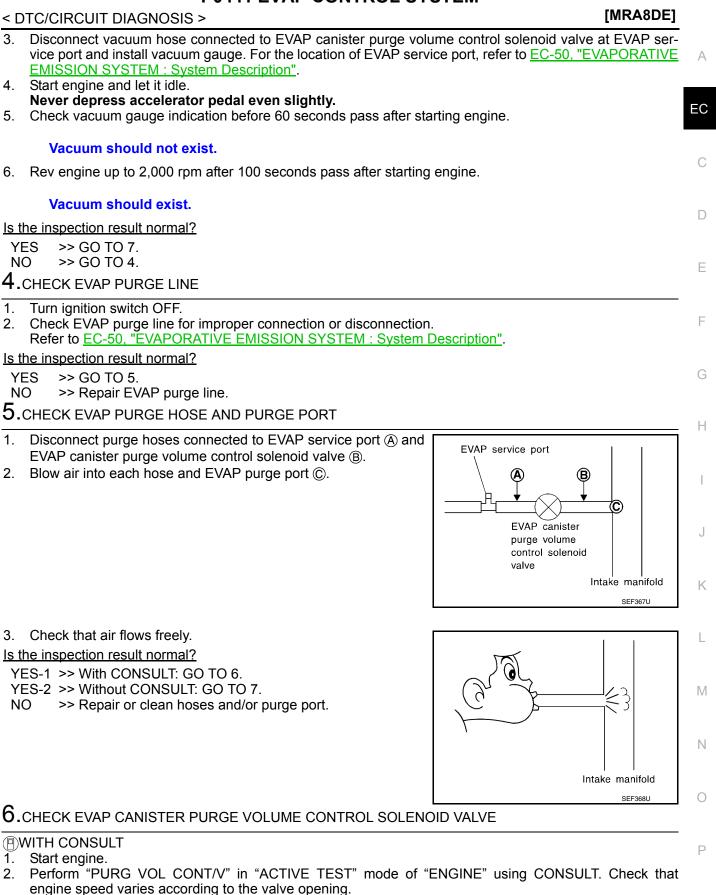
NO >> GO TO 4.

3.CHECK PURGE FLOW

WITHOUT CONSULT

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

2. Stop engine.



Does engine speed vary according to the valve opening?

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

< DTC/CIRCUIT DIAGNOSIS >

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-298</u>, "Component Inspection". Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-17, "Removal and Installation"</u>.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-315, "DTC Logic" for DTC P0452, EC-318, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor. Refer to FL-17, "Removal and Installation".

10.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-305, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-17, "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-498, "Inspection"</u>. Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

13.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Perform <u>GI-41, "Intermittent Incident"</u>.

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000012788060

DTC DETECTION LOGIC

_	~
F	(;
	~

А

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting co	ndition	Possible cause
P0443	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit)	The canister purge flow the vehicle is stopped w running, even when EV/ volume control solenoid pletely closed. The canister purge flow the specified driving cor when EVAP canister pur solenoid valve is completed	hile the engine is AP canister purge valve is com- is detected during nditions, even ge volume control	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve EVAP canister Hoses (Hoses are connected incorrectly or clogged.)
	NFIRMATION PROCED	RE		
1.PREC	ONDITIONING			
before co 1. Turn 2. Turn 3. Turn TESTING • Perforn placed • Always	nducting the next test. ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa CONDITION: n DTC CONFIRMATION F on flat level surface.	at least 10 seconds. at least 10 seconds. OCEDURE when the ure of 5 to 60°C (41 t	fuel is between o 140°F).	perform the following procedure 1 1/4 and 3/4 full, and vehicle is evel as ambient temperature.
	ave CONSULT		scomes same ie	ever as ambient temperature.
YES >	>> GO TO 2.			
~	>> GO TO 4. ORM DTC CONFIRMATIO			
		RUCEDURE A		
2. Selec 3. Chec FUEL 4. Start 5. Chec Is 1st trip YES	ignition switch ON. ct "DATA MONITOR" mode k that the following condition T/TMP SE: 0 - 35°C (32 - engine and wait at least 60 k 1st trip DTC. <u>DTC detected?</u> >> Proceed to <u>EC-296, "Di</u> >> GO TO 3.	are met. ^a °F) econds. <u>nosis Procedure"</u> .	ISULT.	
3.PERF	ORM DTC CONFIRMATIO	PROCEDURE B		
With C 1. Start 2. Turn 3. Turn 4. Selec "ENC 5. Toucl 6. Start mate	ONSULT engine and warm it up to r ignition switch OFF and wa ignition switch ON. et "PURG VOL CN/V P14 GINE" using CONSULT. h "START".	nal operating tempera at least 10 seconds. of "EVAPORATIVE STING" on CONSULT	SYSTEM" in "D 「changes to "CC	TC WORK SUPPORT" mode of DMPLETED". (It will take approxi-

7. Touch "SELF-DIAG RESULT".

EC-295

< DTC/CIRCUIT DIAGNOSIS >

Which is displayed on CONSULT?

OK >> INSPECTION END

NG >> Proceed to EC-296. "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE A

With GST

1. Turn ignition switch ON.

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

+			
ECM		_	Voltage
Connector	Terminal		
E16	125	Ground	3.1 - 4.0 V

3. Start engine and wait at least 60 seconds.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-296, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 20 seconds.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-296, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788061

[MRA8DE]

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+			
EVAP canister purge volume control solenoid valve		_	Voltage
Connector Terminal			
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

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.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

		1			
		-	_		
	r purge volume enoid valve	IPDN	1 E/R	Continuity	
Connector	Terminal	Connector	Terminal		
F13	1	E45	25	Existed	
	ck harness fo	-	round.		
-	tion result nor				
	Perform the tr			ower supply cil rts	
-	• •				NOID VALVE GROUND CIRCUIT
	tion switch O				
	ect ECM harn		ctor.		
			AP caniste	er purge volum	trol solenoid valve harness connector and
ECMINA	mess connec	tor.			
	+	-	-		
EVAP canister	r purge volume				
	enoid valve	EC	M	Continuity	
Connector	Terminal	Connector	Terminal		
F13	2	F24	17	Existed	
4. Also che	ck harness fo	or short to p	ower.		
	tion result nor	rmal?			
	GO TO 4. Repair or repl	ace error-d	atactad na	rte	
4	• •			URE SENSOF	INECTOR
				sensor harnes	
	onnectors for		pressures		
		• •			
	r should not				
	tion result nor	rmal?			
YES >> (NO >> F		Control sv	stem press	sure sensor R	p FL-17, "Removal and Installation".
-	-	-	-	URE SENSOF	
					"Component Inspection".
	tion result noi				<u>component inspection</u> .
· · · ·	With CONSUL		6.		
YES-2 >> \	Without CONS	SULT: GO 1	07.	_	
^	•	-	•		o <u>FL-17, "Removal and Installation"</u> .
	VAP CANIST	ER PURG	E VOLUME	E CONTROL S	
With CON					
With CON 1. Turn igni	tion switch O		isconnecte	۶d	
With CON 1. Turn igni 2. Reconne 3. Start eng	tion switch O ect harness co jine.	onnectors d			
With CON 1. Turn igni 2. Reconne 3. Start eng 4. Perform	tion switch O ect harness co jine. "PURG VOL	onnectors d	in "ACTI∖	/E TEST" mo	"ENGINE" using CONSULT. Check that
 With CON Turn igni Reconne Start eng Perform engine s 	tion switch O ect harness co jine. "PURG VOL peed varies a	onnectors d . CONT/V" according to	in "ACTI∖	/E TEST" mo	"ENGINE" using CONSULT. Check that
 With CON Turn igni Reconne Start eng Perform engine s Is the inspect 	tion switch O ect harness co jine. "PURG VOL peed varies a tion result nor	onnectors d . CONT/V" according to	in "ACTI∖	/E TEST" mo	"ENGINE" using CONSULT. Check that
 With CON Turn igni Reconne Start eng Perform engine s Is the inspect YES >> 0 	tion switch O ect harness co jine. "PURG VOL peed varies a	onnectors d . CONT/V" according to	in "ACTI∖	/E TEST" mo	"ENGINE" using CONSULT. Check that

< DTC/CIRCUIT DIAGNOSIS >

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-298</u>, "<u>Component Inspection</u>". Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-27, "Exploded View"</u>.

8.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean the rubber tube using an air blower.

9.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-305, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

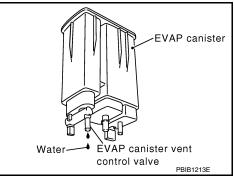
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

- YES >> GO TO 11.
- NO >> Check intermittent incident. Refer to <u>GI-41, "Intermittent</u> <u>Incident"</u>.



11.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

- NO >> GO TO 12.
- 12. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-17, "Removal and Installation".

Component Inspection

INFOID:000000012788062

[MRA8DE]

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

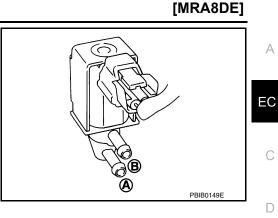
- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Start engine.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.



< 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



С

Ε

F

J

Κ

L

Μ

Ν

Ο

Ρ

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.
- 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
the inspection result normal?	

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:000000012788063

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 shorted.) 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

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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 let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-300</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788064

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	+		
	ter purge vol- solenoid valve	_	Voltage
Connector Terminal			
F13 1		Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

-	GO TO 2. EVAP CANIS			CONTROL SO	LENOID VALVE POWER SUPPLY CIRCUIT
 Turn ign Disconn Check the 	ition switch (ect IPDM E/	OFF. R harness co v between E\	onnector.		control solenoid valve harness connector and
				1	-
	+ er purge vol-	-		-	
	solenoid valve	IPDN	1 E/R	Continuity	ſ
Connector	Terminal	Connector	Terminal	-	-
F13	1	E45	25	Existed	
4. Also che Is the inspec		-	rouna.		E
•		<u>JLT)>>GO T(</u>	D 4.		
YES-2	Nithout CON	ISULT)>>GC	TO 5.	1 -	F
~		place error-d			LENOID VALVE GROUND CIRCUIT
				CONTROL 30	
2. Disconn		rness conne			
	he continuity rness conne		AP canister	r purge volume	control solenoid valve harness connector and
ECIMINA					
	+	-	-		
	er purge vol- solenoid valve	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal	-	
F13	2	F24	17	Existed	
4. Also che	eck harness	for short to p	ower.		
Is the inspec	tion result n	ormal?			ł
		ILT)>>GO T(
		ISULT)>>GC place error-d		ts.	I
4	• •		•		LENOID VALVE OPERATION
(P)With CON	ISULT				Ν
1. Reconne	ect all harne	ss connector	s disconneo	cted.	
 Start eng Perform 		L CONT/V" ir	ו ACTIVE"	FEST" mode of	"ENGINE" using CONSULT.
	-		-	the valve oper	ling.
Does engine YES >>	•			· •	tont Incident"
	GO TO 5.			<u>GI-41, "Intermit</u>	
5. снеск е	EVAP CANIS		E VOLUME	CONTROL SO	LENOID VALVE
Check the E	EVAP canist	er purge vol	ume contro	l solenoid valv	e. Refer to EC-302, "Component Inspection
(EVAP Canis			ol Solenoid	<u>Valve)"</u> .	
Is the inspec YES >>			nt Referto	GI-41, "Intermit	tent Incident"
					bid valve. Refer to <u>EM-27, "Exploded View"</u> .

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Component Inspection (EVAP Canister Purge Volume Control Solenoid Valve)

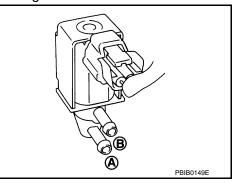
, INFOID:000000012788065

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. Start engine.
- 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 EM-27. "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:000000012788066

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE (Evaporative emission system vent control circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	 Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) EVAP canister vent control valve
DTC CON	FIRMATION PROCEDURE		
1.PRECO	NDITIONING		
Defore conc 1. Turn igi 2. Turn igi 3. Turn igi TESTING C Before per	Jucting the next test. nition switch OFF and wait at lea nition switch ON. nition switch OFF and wait at lea CONDITION: forming the following procedu		
~	GO TO 2.		
	RM DTC CONFIRMATION PRO		
	ngine and wait at least 8 second 1st trip DTC.	δ.	
	TC detected?		
	Proceed to <u>EC-303</u> , "Diagnosis INSPECTION END	<u>s Procedure"</u> .	
Diagnosis	s Procedure		INFOID:000000012788067
1.INSPEC	TION START		
-	e CONSULT?		
-	e CONSULT?		
	GO TO 2. GO TO 3.		
`	EVAP CANISTER VENT CONT	ROL VALVE CIRCUIT	
With COI 1. Turn igi 2. Select ' 3. Touch "	NSULT nition switch OFF and then turn	ON. E TEST" mode of "ENGINE" using	CONSULT.
Clic	king sound should be heard.		
	ction result normal?		
YES >>	GO TO 7.		
NO	GO TO 3.		
-	EVAP CANISTER VENT CONT		

- Disconnect EVAP canister vent control valve harness connector.
 Turn ignition switch ON.
- Revision: December 2015

EC

А

< DTC/CIRCUIT DIAGNOSIS >

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.
- 3. Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

+				
EVAP canister vent control valve		IPDM 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.

+		_		
EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B17	2	E16	97	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 RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 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-305, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation"

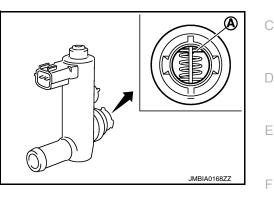
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-1

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.

Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>17. "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 \textcircled{B} and \textcircled{B}
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed
Operation takes less than 1 second	l.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

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.

[MRA8DE]

Н

K

L

Ν

Ο

Ρ

JMBIA0169ZZ

А

< 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

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. **Make sure new O-ring is installed properly.**

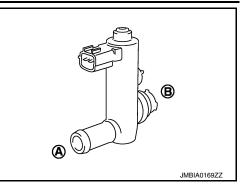
Condition	Air passage continuity between \textcircled{A} and \textcircled{B}
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-17, "Removal and Installation"</u>.



[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

A

EC

INFOID:000000012788069

[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 CON	FIRMATION PROCEDU	RE	
1.PRECO	NDITIONING		
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	t at least 10 seconds.	ys perform the following procedure
~	GO TO 2.		
	RM DTC CONFIRMATION	PROCEDURE	
 Turn iğ Turn ig Turn ig Start ei Repea 	nition switch ON and wait inition switch OFF and wait inition switch ON and selec ngine and let it idle for at le t next procedures three tim	t at least 10 seconds. et "DATA MONITOR" mode of "ENG east 1 minute. nes.	NE" using CONSULT. 2 minutes and 50 seconds to 3 min-
	ceed 3 minutes.		
6. Repea - Quickly	t next procedure 20 times. y increase the engine spee	and keep engine idle for about 5 sec d up to 4,000 to 4,500 rpm or more and keep engine idle for at least 35 s	and keep it for 25 to 30 seconds.
	Engine speed 4,000 rpm 3,000 rpm	Never exceed 3 minutes	3 20
	ldle		
	1 mi Engine start	nute 2 minutes and 50 seconds 35 seconds seconds 35 seconds	S PBIB0972E
With GS			
	procedure "With CONSULT <u>OTC detected?</u>	i abuve.	
	Proceed to EC-308 "Diag	anosis Procedure"	

- YES >> Proceed to EC-308, "Diagnosis Procedure".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[MRA8DE]

1.CHECK RUBBER TUBE

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve.
- 3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-309, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

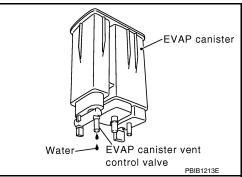
NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

3.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 the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

EVAP canister for damage

EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-17, "Removal and Installation".

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-17</u>, "<u>Removal and Installation</u>".

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-313, "Component Inspection".

Revision: December 2015

EC-308

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

INFOID:000000012788071

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Replace EVAP control system pressure sensor. Refer to FL-17, "Removal and Installation".

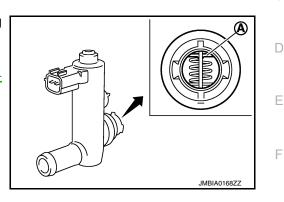
Component Inspection

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 FL-17, "Removal and Installation".
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-2

(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- Turn ignition switch ON. 2.
- 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 $ar{\mathbb{A}}$ and $ar{\mathbb{B}}$
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 (Å) 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-17, "Removal and Installation".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-3

(P)With CONSULT

Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower. 1.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 2.

EC

F

Н

Κ

Ο

P

JMBIA0169ZZ

< 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

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions. **Make sure new O-ring is installed properly.**

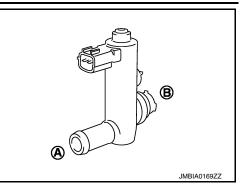
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-17, "Removal and Installation"</u>.



[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000012788072

[MRA8DE]

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
NOTE:	NFIRMATION PROCEDU	RE DTC confirmation procedure.	
	ONDITIONING		
before con 1. Turn i 2. Turn i 3. Turn i	onfirmation Procedure has nducting the next test. ignition switch OFF and wait ignition switch ON. ignition switch OFF and wait	at least 10 seconds.	ays perform the following procedure
	ut CONSULT>>GO TO 5.		
2.PERF	ORM DTC CONFIRMATION	PROCEDURE-1	
NOTE Do no	engine and let it idle for leas		
	DTC detected?		
	Proceed to <u>EC-312, "Diac</u> >> GO TO 3.	<u>nosis Procedure"</u> .	
3.PERF	ORM DTC CONFIRMATION	PROCEDURE-2	
	t "EVAP DIAG READY" in "I idle until "OFF" of "EVAP DI	DATA MONITOR" mode of "ENGIN AG READY" changes to "ON".	Ε".
3. Turn i NOTE	ignition switch OFF and wait		changes to "ON".
4. Turn i 5. Selec	ignition switch ON.	TA MONITOR" mode of "ENGINE"	
CMPLT>	displayed on CONSULT? >> GO TO 4. >> 1. Perform DTC CONFI 2. GO TO 1.	RMATION PROCEDURE again.	
4.PERF	ORM DTC CONFIRMATION	PROCEDURE-3	
With Co			

(P)With CONSULT Check 1st trip DTC. Is 1st trip DTC detected?

EC

С

D

Е

F

G

Н

J

Κ

L

Μ

Ν

Ο

Ρ

< DTC/CIRCUIT DIAGNOSIS >

YES >> Proceed to EC-312, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM DTC CONFIRMATION PROCEDURE-4

With GST

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 <u>EC-312</u>, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-5

With GST

- 1. Let it 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-312, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788073

[MRA8DE]

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP control system pressure sensor harness connector.
- 3. Check sensor harness connector for water.

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.

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.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	l system pres-	EC	СМ	Continuity				
sure s	sensor Terminal	Connector	Terminal					
B47	3	E16	113	Existed				
	-	for short to g	-					
	ction result n	•						
		trouble diagr			rcuit.			
		place error-de	•					
CHECK E	EVAP CONT	ROL SYSTE	M PRESSU	JRE SENSO	२ GROUND	CIRCUIT		
	ition switch	OFF. rness connec	rtor					
				l system pre	ssure sensc	or harness	connector	and ECM har
ness co	nnector.							
	+	_	_					
	- I system pres-	_		_				
	sensor	EC	M	Continuity				
Connector	Terminal	Connector	Terminal					
B47	1	E16	124	Existed				
YES >> NO >>		place error-de	-		3 SIGNAL C			
YES >> NO >> D.CHECK E	GO TO 5. Repair or re EVAP CONT he continuity	place error-de ROL SYSTE	M PRESSU	JRE SENSO			connector	and ECM har
YES >> NO >> D.CHECK F . Check t ness co	GO TO 5. Repair or re EVAP CONT he continuity	place error-de ROL SYSTE	M PRESSU	JRE SENSO			connector	and ECM har
YES >> NO >> D.CHECK I Check t ness co	GO TO 5. Repair or re EVAP CONT he continuity nnector.	place error-do ROL SYSTE y between E ^v	M PRESSU	JRE SENSOI			connector	and ECM har
YES >> NO >> D.CHECK F Check t ness co	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor	place error-de ROL SYSTE y between E ^v EC	M PRESSU VAP contro	JRE SENSO			connector	and ECM har
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal	place error-de ROL SYSTE y between E ^v EC Connector	M PRESSU VAP contro	JRE SENSOI			connector	and ECM har
YES >> NO >> D.CHECK I . Check t ness co EVAP contro sure s Connector B47	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2	place error-de ROL SYSTE y between E EC Connector E16	M PRESSU VAP contro	IRE SENSOI			connector	and ECM har
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che	GO TO 5. Repair or rep EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness	place error-de ROL SYSTE y between E EC Connector E16 for short to g	M PRESSU VAP contro	IRE SENSOI			connector	and ECM har
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n	place error-de ROL SYSTE y between E EC Connector E16 for short to g	M PRESSU VAP contro	IRE SENSOI			connector	and ECM har
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >>	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6.	place error-de ROL SYSTE y between E EC Connector E16 for short to g	M PRESSU VAP contro	IRE SENSO I system pre Continuity Existed to power.			connector	and ECM har
YES >> NO >> O.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >> NO >>	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or re	place error-de ROL SYSTE y between E between E EC Connector E16 for short to g ormal?	M PRESSU VAP contro	JRE SENSOI I system pre Continuity Existed to power.	ssure senso		connector	and ECM har
YES >> NO >> O.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >> NO >> O.CHECK I	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or re EVAP CONT	place error-de ROL SYSTE y between E Connector E16 for short to g ormal? place error-de	M PRESSU VAP contro	JRE SENSO I system pre Continuity Existed to power. ts. JRE SENSO	ssure senso	or harness		and ECM har
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >> NO >> D.CHECK I Check the E	GO TO 5. Repair or re EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or re EVAP CONT	place error-de ROL SYSTE y between E between E EC Connector E16 for short to g ormal? place error-de ROL SYSTE system press	M PRESSU VAP contro	JRE SENSO I system pre Continuity Existed to power. ts. JRE SENSO	ssure senso	or harness		and ECM har
YES >> NO >> O.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >> O.CHECK I Check the E s the inspec YES >>	GO TO 5. Repair or rep EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or rep EVAP CONT VAP control ction result n Check interr	place error-de ROL SYSTE y between E between E EC Connector E16 for short to g ormal? place error-de ROL SYSTE system press	M PRESSU VAP contro	JRE SENSO I system pre Continuity Existed to power. ts. JRE SENSO T. Refer to EC GI-41, "Inter	ssure senso R 2-313, "Com mittent Incid	pr harness	spection".	
YES >> NO >> D.CHECK I Check t ness co EVAP contro sure s Connector B47 2. Also che s the inspec YES >> NO >> D.CHECK I Check the E s the inspec YES >> NO >>	GO TO 5. Repair or rep EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or rep EVAP CONT VAP control ction result n Check interr	place error-de ROL SYSTE y between Ev error- EC Connector E16 for short to g ormal? place error-de ROL SYSTE system press ormal? nittent incider AP control sy	M PRESSU VAP contro	JRE SENSO I system pre Continuity Existed to power. ts. JRE SENSO T. Refer to EC GI-41, "Inter	ssure senso R 2-313, "Com mittent Incid	pr harness	spection".	
YES >> NO >> O.CHECK I Check t ness co EVAP contro sure s Connector B47 Connector B47 Connector B47 S. Also che s the inspec YES >> NO >> O.CHECK I Check the E s the inspec YES >> NO >> O.CHECK I Check the E	GO TO 5. Repair or rep EVAP CONT he continuity nnector. + I system pres- sensor Terminal 2 eck harness ction result n GO TO 6. Repair or rep EVAP CONT VAP control ction result n Check interr Replace EV/ ent Inspect	place error-de ROL SYSTE y between Ev error- EC Connector E16 for short to g ormal? place error-de ROL SYSTE system press ormal? nittent incider AP control sy	M PRESSU VAP contro	JRE SENSOI I system pre Continuity Existed to power. ts. JRE SENSOI r. Refer to EC GI-41, "Inter ure sensor. F	R C-313, "Com mittent Incid Refer to <u>FL-1</u>	pr harness	spection".	<u>allation"</u> .

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

- 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	Terminal				
E16	114	124	Not applied	0.5 - 4.6 V	
L 10	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-17, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000012788075

[MRA8DE]

EC

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
	NFIRMATION PROCEDUR	RE	
	CONDITIONING		
efore co . Turn . Turn . Turn . Turn . ESTIN (Confirmation Procedure has I onducting the next test. ignition switch OFF and wait a ignition switch ON. ignition switch OFF and wait a G CONDITION: perform test at a temperatur	at least 10 seconds. at least 10 seconds.	ays perform the following procedure
	>> GO TO 2.		
PERF	ORM DTC CONFIRMATION I	PROCEDURE	
. Start . Turn . Turn . Sele . Mak . Start . Che With C . Start	: engine and wait at least 20 se ck 1st trip DTC. SST : engine and warm it up to norr	at least 10 seconds. "ENGINE" using CONSULT. indication is more than 0°C (32°F econds.	
	ECM		
Connec	tor +	Voltage	
E16	114 124	Less than 4.2 V	
. Turn . Start	e sure that the voltage is less t ignition switch OFF and wait a engine and wait at least 20 se ck 1st trip DTC.	at least 10 seconds.	
	DTC detected?		
	>> Proceed to <u>EC-315, "Diagr</u> >> INSPECTION END	nosis Procedure".	
iagno	sis Procedure		INFOID:000000012788076
.CHEC	CK EVAP CONTROL SYSTEM	PRESSURE SENSOR CONNEC	CTOR FOR WATER
. Turn	ignition switch OFF.	pressure sensor harness connecto	

EC-315

< 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.

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.

	+		_	
	l system pres- sensor	ECM		Continuity
Connector	Connector Terminal		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]

	+		_					
EVAP contro	l system pres- sensor	E	CM	Continuity				
Connector	Terminal	Connector	Terminal	-				1
B47	2	E16	114	Existed	_			
. Also ch	eck harness	for short to g	ground and t	o power.	-			
the inspec	ction result r	ormal?						
	GO TO 6.	place error-c	latacted part					
	-	ROL SYSTE	-		D			
						nnonont Ino	nantion"	
	ction result n	system pres	sule sensor	. Relei lo <u>c</u>	<u>C-313, COI</u>	<u>nponent ins</u>	<u>pection</u> .	
		mittent incide	ent. Refer to	GI-41, "Inte	rmittent Inci	dent".		
							al and Install	ation".
Compone	ent Inspec	tion					11	NFOID:0000000012788077
	EVAP CONT	ROL SYSTE	M PRESSU	IRE SENSC)R			
	i vacuum pui	ring with a r mp to EVAP ON and cher	control syste					
. Turn igr	i vacuum pui	mp to EVAP ON and chee	control syste ck output vol	tage betwee	e sensor.			nd under the
. Turn igr followin	i vacuum pur nition switch g conditions	mp to EVAP ON and cheo	control syste ck output vol Conditior	tage betwee	e sensor.			
. Turn igr	e vacuum pur hition switch g conditions ECM	mp to EVAP ON and cheo 	control syste ck output vol	tage betwee	e sensor.	ness conne		
. Turn igr followin Connector	ECM + Termina	mp to EVAP ON and cheo 	control syste ck output vol Conditior d vacuum kPa	tage betwee	e sensor. en ECM har	ness conne		
Connector	ECM + Termina	mp to EVAP ON and cheo 	control syste ck output vol Conditior d vacuum kPa	tage betwee	e sensor. en ECM har	ness conne Voltage	ctor and grou	
Connector E16 CAUTIO • Alway • Do no cm ² , s the inspec YES >>	ECM + Termina 114 DN: ys calibrate ot apply bel 14.69 psi). ction result resul	mp to EVAP ON and cheo 	control syste ck output vol Conditior d vacuum kPa olied 0.272, -3.87) pump gaug Pa (-0.952 kg	(kg/cm ² , psi)] ge when us	e sensor. en ECM har 2.1 to 2.5 V I sing it. 53 psi) or	Voltage 0.5 - 4.6 V ower than abor	ver 101.3 kP	nd under the
Connector E16 CAUTIO • Alway • Do no cm ² , s the inspec YES >>	ECM + Termina 114 DN: ys calibrate ot apply bel 14.69 psi). ction result resul	mp to EVAP ON and cheo 	control syste ck output vol Conditior d vacuum kPa olied 0.272, -3.87) pump gaug Pa (-0.952 kg	(kg/cm ² , psi)] ge when us	e sensor. en ECM har 2.1 to 2.5 V I sing it. 53 psi) or	Voltage 0.5 - 4.6 V ower than abor	ctor and grou	nd under the

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:000000012788078

[MRA8DE]

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 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:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- T. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode 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	Tern	ninal	
E16	114	Less than 4.2 V	

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-318, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788079

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.

2. Disconnect EVAP control system pressure sensor harness connector.

3. Check sensor harness connector for water.

EC-318

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Water should not exist. Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace harness connector.	A
YES >> GO TO 2. NO >> Repair or replace harness connector.	
NO >> Repair or replace harness connector.	
	EC
2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY	
 Turn ignition switch ON. Check the voltage between EVAP control system pressure sensor harness connector and ground. 	С
+	D
EVAP control system pressure sen-	
sor (Approx.)	_
Connector Terminal	E
B47 3 Ground 5 V	
Is the inspection result normal?	F
YES >> GO TO 4. NO >> GO TO 3.	
3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
	G
 Turn ignition switch OFF. Disconnect ECM harness connector. 	
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM har-	Н
ness connector.	П
+ –	1
EVAP control system pres- sure sensor ECM Continuity	
Connector Terminal Connector Terminal	1
B47 3 E16 113 Existed	J
4. Also check harness for short to ground and to power.	
is the inspection result normal?	K
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	L
1. Turn ignition switch OFF.	
2. Disconnect ECM harness connector.	M
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM har-	IV
ness connector.	
	Ν
+ –	
EVAP control system pres- ECM Continuity	
sure sensor	0
Connector Terminal Connector Terminal	
B47 1 E16 124 Existed	
4. Also check harness for short to power.	Ρ
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	

ness connector.

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	+		_	
	l system pres- sensor	E	СМ	Continuity
Connector	Connector Terminal		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 RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-305, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister vent control valve. Refer to FL-17, "Removal and Installation".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

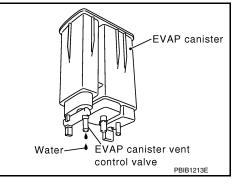
NO >> Replace EVAP control system pressure sensor. Refer to FL-17, "Removal and Installation".

9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 10.
- NO >> Check intermittent incident. Refer to <u>GI-41. "Intermittent</u> <u>Incident"</u>.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

· EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

>>	Repair h	ose or re	eplace EVAP canister. Refer to	FL-17, "Removal and Installation".	А
Compone	ent Insp	ection		INFOID:000000012788080	
1. CHECK	EVAP CC	NTROL	SYSTEM PRESSURE SENSC	R	EC
 Remove Always Install a 	replace	ontrol sy O-ring v pump to	vstem pressure sensor with its h with a new one. • EVAP control system pressure		С
	nition swif g conditio		ind check output voltage betwee	en ECM harness connector and ground under the	D
	ECM				_
Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage	E
	Tern	ninal			
E16	114	124	Not applied	0.5 - 4.6 V	F
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value	
• Alway		ate the v	/acuum pump gauge when us	sina it.	G
	-			53 psi) or pressure over 101.3 kPa (1.033 kg/	
	14.69 psi				Н
Is the inspe					11
	INSPEC Replace			Refer to <u>FL-17, "Removal and Installation"</u> .	I
					J
					K
					L
					M
					Ν
					0
					Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0456 EVAP CONTROL SYSTEM

DTC Logic

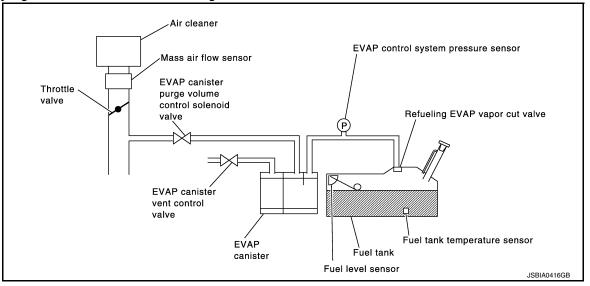
INFOID:000000012788081

[MRA8DE]

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 solenoid valve Toreign matter sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may 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

< DTC/CIRCUIT DIAGNOSIS >

1.PRECONDITIONING	А
If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct- ing the next test.	A
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	EC
3. Turn ignition switch OFF and wait at least 10 seconds.	
Do you have CONSULT?	С
YES >> GO TO 2. NO >> GO TO 4.	
2. PERFORM DTC CONFIRMATION PROCEDURE-1	D
WITH CONSULT	
 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: 	E
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:	F
 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. 	G
5. Check that "EVAP LEAK DIAG" indication.	
Which is displayed on CONSULT?	Н
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?	J
YES >> Proceed to <u>EC-323, "Diagnosis Procedure"</u> . NO >> INSPECTION END.	0
4.PERFORM DTC CONFIRMATION PROCEDURE	
	Κ
 WITH GST Start engine and wait engine idle for at least 2 hours. 	
2. Turn ignition switch OFF and wait at least 90 minutes.	L
NOTE: Never turn ignition switch ON during 90 minutes.	
3. Turn ignition switch ON.	
4. Check 1st trip DTC.	M
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-323, "Diagnosis Procedure"</u> . NO >> INSPECTION END.	Ν
Diagnosis Procedure	_
1.CHECK FUEL FILLER CAP DESIGN	0
1. Turn ignition switch OFF.	

Ρ

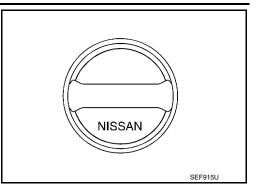
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

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-327, "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-498, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

 $\mathbf{6}$.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>FL-16</u>, "<u>Exploded View</u>".
- EVAP canister vent control valve. Refer to <u>FL-17, "Removal and Installation"</u>.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to <u>FL-17, "Removal and</u> <u>Installation"</u>.

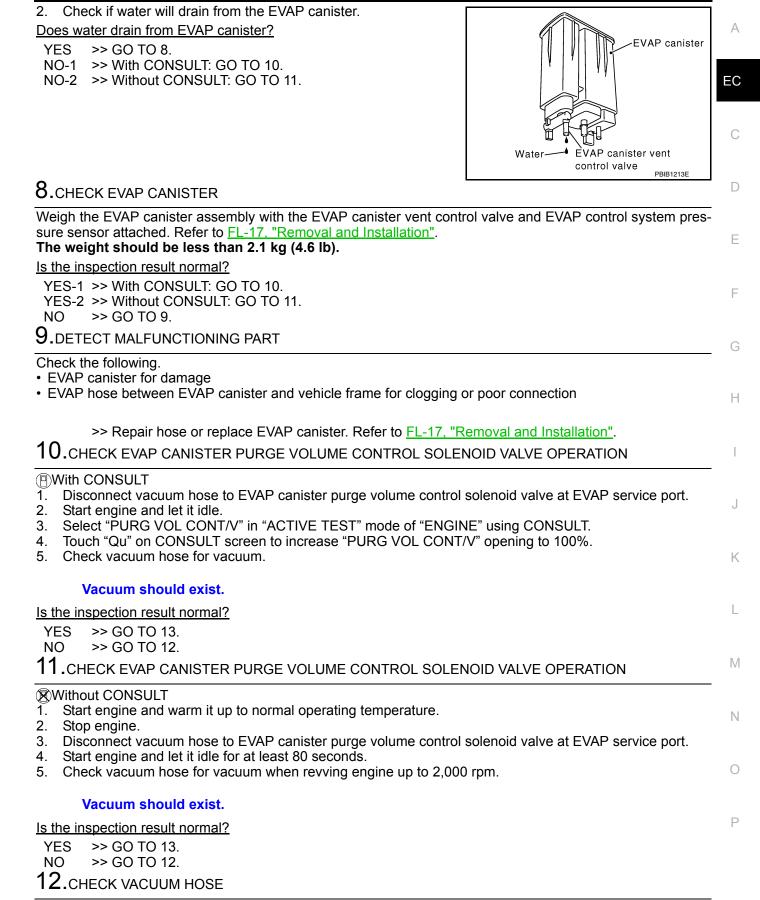
7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



Check vacuum hoses for clogging or disconnection. <u>Is the inspection result normal?</u>

P0456 EVAP CONTROL SYSTEM

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to <u>EC-298</u>, "<u>Component Inspection</u>". <u>Is the inspection result normal?</u>

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-27, "Exploded View".

14.CHECK FUEL TANK TEMPERATURE SENSOR

Check the fuel tank temperature sensor. Refer to EC-259, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit. Refer to <u>FL-7</u>, "Removal and Installation".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to FL-17, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-17, "Removal and Installation"</u>.

16.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-50, "EVAPORATIVE EMISSION SYSTEM : System Description"</u>.

Is the inspection result normal?

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.

>> GO TO 18.

18.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-50</u>, "EVAPORATIVE EMISSION SYSTEM : System Description".

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hoses and tubes.

19.CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hose, tube or fuel filler tube. Refer to <u>FL-11, "Exploded View"</u>.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Check the refueling EVAP vapor cut valve. Refer to FL-15, "Inspection".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-12, "Removal and Installation"</u>.

21.CHECK FUEL LEVEL SENSOR

Check the fuel level sensor. Refer to <u>MWI-57, "Component Inspection"</u> (TYPR A) or <u>MWI-133, "Component Inspection"</u> (TYPE B).

Is the inspection result normal?

Revision: December 2015

P0456 EVAP CONTROL SYSTEM

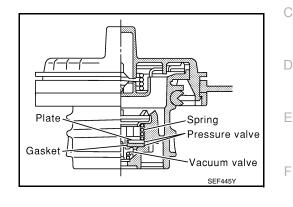
< DTC/CIRCUIT DIAGNOSIS >

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Replace fuel level sensor unit. Refer to FL-7, "Removal and Installation".

Component Inspection

1.CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



Vacuum/Pressure gauge

One-way

valve

Fuel filler

L Fuel filler cap adapter

cap

1

- Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
 Check value opening pressure and vacuum
- 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,
 - -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

А

EC

Н

J

Κ

L

Μ

Ν

Ο

Vacuum/

Pressure pump

SEF943S

P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0460 FUEL LEVEL SENSOR

DTC Logic

[MRA8DE1

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 EC-352, "DTC Logic".

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
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

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 wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-328</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788085

1.CHECK COMBINATION METER FUNCTION

Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Refer to <u>MWI-56, "Diagnosis Procedure"</u> (TYPE A) or <u>MWI-132, "Diagnosis Procedure"</u> (TYPE B).

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 EC-352, "DTC Logic".

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	E
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 	F

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK	Н
Perform component function check. Refer to <u>EC-329</u> , " <u>Component Function Check</u> ". Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.	I
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-330, "Diagnosis Procedure"</u> .	J
Component Function Check	K
1.preconditioning	TX.
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:	L
Before starting component function check, preparation of draining fuel and refilling fuel is required.	M
Do you have CONSULT?	
YES >> GO TO 2. NO >> GO TO 3.	Ν
2.PERFORM COMPONENT FUNCTION CHECK	
With CONSULT	0
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.	Р
1. Prepare a fuel container and a spare hose.	Г
2. Release fuel pressure from fuel line, refer to <u>EC-147, "Work Procedure"</u> .	
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 OFF and wait at least 10 seconds then turn ON. 5.
- Select "FUEL LEVEL SE" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 6.
- Check "FUEL LEVEL SE" output voltage and note it. 7.
- Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode of "ENGINE" using CONSULT. 8.

EC-329

INFOID:000000012788086

А

EC

С

D

P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 10. Check "FUEL LEVEL SE" output voltage and note it.
- 11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.

13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-330, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

NOTE:

Start from step 8, 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-147, "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 ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Proceed to <u>EC-330, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000012788088

1.CHECK COMBINATION METER FUNCTION

Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Refer to <u>MWI-56, "Diagnosis Procedure"</u> (TYPE A) or <u>MWI-132, "Diagnosis Procedure"</u> (TYPE B).

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-352, "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 sen- sor 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 CO	NFIRMATION PROCEDUF	RE	
1.PREC	ONDITIONING		
		een previously conducted, always tu	Irn ignition switch OFF and wait at
	seconds before conducting the CONDITION:	e next test.	
		ocedure, confirm that battery volt	age is between 11 V and 16 V at
ignition s	switch ON.		
:	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION	PROCEDURE	
	ignition switch ON and wait a	t least 5 seconds.	
	k 1st trip DTC. DTC detected?		
	>> Proceed to <u>EC-331, "Diagr</u>	aosis Procedure"	
	>> INSPECTION END	<u>losio i roccure</u> .	
Diagnos	sis Procedure		INFOID:000000012788090
1. CHEC	K COMBINATION METER FL	JNCTION	
		(METER/M&A)" (TYPE A) or MWI-	92, "CONSULT Function (METER/
<u>M&A)"</u> (T	YPE B).		

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Proceed to <u>MWI-56, "Component Function Check"</u> (TYPE A) or <u>MWI-132, "Component Function</u> O <u>Check"</u> (TYPE B).

Р

INFOID:000000012788089

А

EC

С

D

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

INFOID:000000012788092

INFOID:000000012788091

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-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
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

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 EC-332. "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-109, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.

INFOID:000000012788093

P0500 VSS

P0500 VSS	
< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>TM-127, "DTC Index"</u> .	
2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)	А
Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-38, "CONSULT Function"</u> (without ICC) or <u>BRC-202, "CONSULT Function"</u> (with ICC).	EC
Is the inspection result normal?	20
YES >> GO TO 3. NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-49, "DTC Index"</u> (without ICC) or <u>BRC-217, "DTC Index"</u> (with ICC).	С
3. CHECK DTC WITH COMBINATION METER	
Check DTC with combination meter. Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).	D
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> (TYPE A) or <u>MWI-100, "DTC Index"</u> (TYPE B). 	E
4.CHECK OUTPUT SPEED SENSOR	F
Check output speed sensor. Refer to TM-182, "Diagnosis Procedure".	
Is the inspection result normal?	G
YES >> GO TO 5.	G
NO >> Replace or replace error-detected parts.	
5.CHECK WHEEL SENSOR	Н
Check wheel sensor. Refer to <u>BRC-92</u> , " <u>Diagnosis Procedure</u> " (without ICC) or <u>BRC-278</u> , " <u>Diagnosis Procedure</u> " (with ICC).	
Is the inspection result normal?	Ι
YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u> .	
NO >> Replace or replace error-detected parts.	
M/T MODELS	J
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.	K
M/T MODELS : DTC Logic	L
DTC DETECTION LOGIC NOTE:	M
 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-352, "DTC Logic"</u>. 	Ν

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	0
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) 	Ρ

DTC CONFIRMATION PROCEDURE

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.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

NOTE:

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

With CONSULT

- 1. Start engine.
- 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode of "ENGINE" using CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Proceed to EC-335, "M/T MODELS : Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- 2. Warm engine up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	2,100 - 6,000 rpm
COOLANT TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.0 - 19.0 msec
Selector lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-335, "M/T MODELS : Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-335, "M/T MODELS : Component Function Check"</u>. Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-335, "M/T MODELS : Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
M/T MODELS : Component Function Check	
1.PERFORM COMPONENT FUNCTION CHECK	A
 With GST 1. Lift up drive wheels. 2. Start engine. 	EC
 Read vehicle speed signal in Service \$01 with GST. The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. 	С
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-335, "M/T MODELS : Diagnosis Procedure"</u> .	D
M/T MODELS : Diagnosis Procedure	E
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-38, "CONSULT Function"</u> (without ICC) or <u>BRC-202, "CONSULT Function"</u> (with ICC).	F
<u>Is the inspection result normal?</u> YES >> GO TO 2.	0
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>BRC-49, "DTC Index"</u> (without ICC) or <u>BRC-217, "DTC Index"</u> (with ICC).	G
2. CHECK DTC WITH COMBINATION METER	Н
Check DTC with combination meter. Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).	,
<u>Is the inspection result normal?</u> YES >> INSPECTION END	
NO >> Perform trouble shooting relevant to DTC indicated. Refer to <u>MWI-26, "DTC Index"</u> (TYPE A) or <u>MWI-100, "DTC Index"</u> (TYPE B).	J
	K
	L
	M
	Ν

0

Р

P0506 ISC SYSTEM

Description

INFOID:000000012788098

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:000000012788099

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 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.

If the target idle speed is out of the specified value, perform<u>EC-144, "Description"</u>, before conducting DTC Confirmation Procedure.

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 -10°C (14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 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 run it for at least 1 minute at idle speed.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-336, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.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.

INFOID:000000012788100

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace ECM. Refer to <u>EC-501, "Removal and Installation"</u>.

А

EC

С

D

Ε

F

G

Н

J

Κ

L

Μ

Ν

Ο

Ρ

P0507 ISC SYSTEM

Description

INFOID:000000012788101

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:000000012788102

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 actuatorIntake air leakPCV system

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.

If the target idle speed is out of the specified value, perform <u>EC-144, "Description"</u>, before conducting DTC Confirmation Procedure.

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 –10°C (14°F).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 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 run it for at least 1 minute at idle speed.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-338, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

INFOID:000000012788103

[MRA8DE]

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK INTAKE AIR LEAK	/-
 Start engine and let it idle. Listen for an intake air leak after the mass air flow sensor. 	
Is intake air leak detected?	E
YES >> Discover air leak location and repair. NO >> Replace ECM. Refer to <u>EC-501, "Removal and Installation"</u> .	
	C
	E
	E
	F
	0
	ŀ
	I
	ŀ
	L
	Ν
	Ν
	ľ
	C
	F

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

INFOID:000000012788105

INFOID:000000012788104

[MRA8DE1

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
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.	
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 volumeFuel injection systemECM
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.	

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

- 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.

P050A, P050B, P050E COLD START CONTROL

FUSUA, FUSUE, FUSUE COLD START CONTROL		
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
With GST Follow the procedure "With CONSULT" above.		А
<u>Is 1st trip DTC detected?</u> YES >> Proceed to <u>EC-341, "Diagnosis Procedure"</u> . NO >> INSPECTION END		EC
Diagnosis Procedure	INFOID:000000012788106	
1. PERFORM IDLE AIR VOLUME LEARNING		С
Perform <u>EC-144. "Description"</u> . <u>Is Idle Air Volume Learning carried out successfully?</u> YES >> GO TO 2. NO >> Follow the instruction of Idle Air Volume Learning.		D
2.CHECK INTAKE SYSTEM		Е
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 		F
Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace malfunctioning part		G
3. CHECK FUEL INJECTION SYSTEM FUNCTION		Н
Perform DTC Confirmation Procedure for DTC P0171. Refer to <u>EC-248, "DTC Logic"</u> . <u>Is the inspection result normal?</u>		
YES >> GO TO 4. NO >> Proceed to <u>EC-249, "Diagnosis Procedure"</u> for DTC P0171.		I
4. PERFORM DTC CONFIRMATION PROCEDURE		
 Turn ignition switch ON. Erase DTC. Perform DTC Confirmation Procedure. 		J
See EC-340. "DTC Logic".		Κ
<u>Is the 1st trip DTC P050A, P050B or P050E displayed again?</u> YES >> Replace ECM. Refer to <u>EC-501, "Removal and Installation"</u> .		
NO >> INSPECTION END		L
		M
		Ν
		0

Ρ

P0520 EOP SENSOR

DTC Logic

INFOID:000000012788107

[MRA8DE]

DTC DETECTION LOGIC

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

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 OIL LEVEL

- 1. Turn ignition switch OFF.
- 2. Check engine oil level. Refer to LU-7, "Inspection".
- Is inspection result normal?

YES >> GO TO 3.

NO >> Check engine oil leak. Refer to <u>LU-6, "Engine Lubrication System Schematic"</u>.

3. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-342, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788108

1.CHECK EOP SENSOR POWER SUPPLY CIRCUIT-1

- 1. Turn ignition switch OFF.
- 2. Disconnect EOP sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EOP sensor harness connector terminals.

	EOP sensor			
Connector	+	_	Voltage (Approx.)	
Connector	Terr			
F2	3	1	5.0 V	

Is the inspection result normal?

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

P0520 EOP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	OP SENSC	R SIGNAL (•	<u> </u>
1. Turn igniti 2. Disconne	ion switch ct ECM ha	OFF. rness conne	ctors.	arness connector and ECM harness connector.	A
	,				EC
+		-	-	_	
EOP se	nsor	EC		Continuity	С
Connector	Terminal	Connector	Terminal		
F2	2	F24	39	Existed	D
		-	round and s	short to power.	
Is the inspecti YES >> G	ion result n O TO 3.	<u>ormal ?</u>			
		place error-d	etected part	ts.	E
3. CHECK EC			•		
			"Compone	ent Inspection (EOP Sensor)".	F
Is the inspecti			Compone		
			nt. Refer to	GI-41, "Intermittent Incident".	
				04, "Exploded View".	G
4.CHECK EC	OP SENSC	R POWER S		RCUIT-2	
Check the vol	tage betwe	en EOP sen	sor harness	s connector terminal and ground.	H
	-			2	
+					
EOP se	nsor	-	Voltage (Approx.)		
Connector	Terminal		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
F2	3	Ground	5.0 V		1
Is the inspecti	on result n	ormal?			0
	O TO 6.				
_	O TO 5.				K
5.CHECK SE	ENSOR PC	WER SUPP	LY 2 CIRCL	JI	
			Refer to EC	C-460, "Diagnosis Procedure".	1
Is inspection r					L
		trouble diagi place error-d		wer supply circuit.	
6.CHECK EC	•				\mathbb{N}
	ion switch (ct ECM ha	OFF.	ctor.		N
				arness connector and ECM harness connector.	Ν
+		-	-		0
EOP se	nsor	EC	М	Continuity	
Connector	Terminal	Connector	Terminal		
F2	1	F24	38	Existed	Р
Is the inspecti	on result n	ormal?		· · · · · · · · · · · · · · · · · · ·	
YES >> G	O TO 7.				
_		place error-d	•	ts.	
7.CHECK EC	CM GROUI	ND CIRCUIT			

Check the continuity between ECM harness connector and ground.

P0520 EOP SENSOR

	+			
ECM		_	Continuity	
Connector Terminal				
F24	12			
1 27	16			
F25	52	Ground	Existed	
E16	123			
L 10	128			

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> 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)	
Terr	minal		
1	2	4 – 10	
I	3	2 – 8	
2	1	4 – 10	
2	3	1 – 3	
3	1	2 – 8	
5	2	1 – 3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to <u>EM-94, "Exploded View"</u>.

INFOID:000000012788109

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

P0524 ENGINE OIL PRESSURE

DTC Logic

А

INFOID:000000012788110

[MRA8DE]

DTC DE	TECTION LOGIC			EC
DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	С
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified v continuously for 10 seconds or more wh the engine speed is 1,000 rpm ore more	alue en EOP sensor	D
CAUTION If "Diagn		JRE shed, be sure to perform Step 3	and 4.	E
before co 1. Turn 2. Turn 3. Turn	nducting the next test. ignition switch OFF and wa ignition switch ON. ignition switch OFF and wa	it at least 10 seconds.	vays perform the following procedure	G
	ONDITION: erforming the following p	rocedure, confirm that battery v	oltage is 11 V or more at idle.	Н
•	>> go to 2. Onditioning-2			I
-	osis Procedure" of DTC P0	524 finished?		J
NO :	>> GO TO 5. >> GO TO 3. K ENGINE OIL LEVEL			K
<u>Is the ins</u> YES	igine oil level. Refer to <u>LU-7</u> pection result normal? >> GO TO 4. >> Proceed to <u>EC-346, "Dia</u>			L
	K ENGINE OIL PRESSURE	-		M
2. Selec	ignition switch ON. ct "DATA MONITOR" mode	of "ENGINE" using CONSULT. 'EOP SENSOR" changes, accordii	ng to engine speeds.	Ν
Monito	ritem	Condition	Value	0

Monitor item	Condition		Value (Approx.)
	 Engine oil temperature: 80°C (176°F) Selector lever: P or N (CVT), Neutral 	Engine speed: Idle	1,450 mV or more
EOP SENSOR	(M/T) Air conditioner switch: OFF No load 	Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT

Check engine oil pressure. Refer to LU-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

Revision: December 2015

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to EC-346. "Diagnosis Procedure".

5. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N (CVT), Neutral (M/T)	
Engine coolant temperature	70°C (158°F) or more	
Engine speed	1,000 rpm or more	

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-346</u>, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ENGINE OIL LEVEL

- 1. Turn ignition switch OFF.
- 2. Check engine oil level. Refer to LU-7, "Inspection".

Is the inspection result normal?

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

NU -> GU 104

2.CHECK ENGINE OIL PRESSURE

(B) 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 	Engine speed: Idle	1,450 mV or more
EOP SENSOR	(M/T) Air conditioner switch: OFF No load 	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 3.

NO >> Check oil pump. Refer to <u>LU-15, "Removal and Installation"</u>.

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-344, "Component Inspection (EOP Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to LU-7. "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

INFOID:000000012788111

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

А

F

Н

J

Κ

L

INFOID:000000012788112

5. Check cause of engine oil consumption

Check the following item.

Step	Inspection item	Equipment	Standard	Reference	
1	PCV valve	EC-500, "Inspection	EC-500, "Inspection"		
2	Exhaust front tube	Visual	No blockingNo abnormal sounds	_	
3	Oil pump	LU-16, "Inspection"	LU-16, "Inspection"		
4	PistonPiston pinPiston ring	Piston ring side cl	Piston ring side clearance		
5	Cylinder block		Cylinder block top surface distortion Piston to cylinder bore clearance		

>> 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 s	sensor	
+	-	Resistance (k Ω)
Tern	ninal	
1	2	4 – 10
1	3	2 – 8
2	1	4 – 10
2	3	1 – 3
3	1	2 – 8
3	2	1 – 3

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOP sensor. Refer to EM-94, "Exploded View".

Ν

Μ

0

< DTC/CIRCUIT DIAGNOSIS > P0603 ECM

DTC Logic

INFOID:000000012788113

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 CONFIRMATION PROCEDURE

1.PRECONDITIONING

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 and wait at least 1 second. 1.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Repeat step 1 and 2 for 10 times. 3.
- Turn ignition switch ON. 4.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- >> Proceed to EC-348, "Diagnosis Procedure". YES
- >> INSPECTION END NO

Diagnosis Procedure

INFOID:000000012788114

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to EC-168, "Diagnosis Procedure". Is the inspection result normal?

YES >> GO TO 2.

- NO >> Repair or replace error-detected parts.
- 2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 3.
- >> Repair or replace error-detected parts. NO

3. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Erase DTC. 2.
- Perform DTC confirmation procedure. Refer to EC-348, "DTC Logic". 3.
- Is the 1st trip DTC P0603 displayed again?
- >> Replace ECM. Refer to EC-501, "Removal and Installation". YES
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0604 ECM

DTC Logic

INFOID:000000012788115

А

EC

D

Е

F

Н

Κ

L

M

Ν

DTC DETECTION LOGIC CONSULT screen terms DTC No. DTC detecting condition Possible cause (Trouble diagnosis content) ECM [Internal control module P0604 ECM Malfunction in the internal RAM of ECM. random access memory (RAM) error] 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. 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-349, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000012788116 1.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC confirmation procedure. Refer to EC-349, "DTC Logic".

Is the 1st trip DTC P0604 displayed again?

YES >> Replace ECM. Refer to <u>EC-501, "Removal and Installation"</u>.

NO >> INSPECTION END

0

< DTC/CIRCUIT DIAGNOSIS > P0605 ECM

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM 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-350, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788118

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC confirmation procedure. Refer to <u>EC-350, "DTC Logic"</u>.
- Is the 1st trip DTC P0605 displayed again?
- YES >> Replace ECM. Refer to EC-501, "Removal and Installation".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS > P0606 ECM

INFOID:000000012788119

А

EC

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 CON	IFIRMATION PROCE	DURE	
1.PRECC	NDITIONING		
2. Turn iç 3. Turn iç F ESTING	gnition switch ON. gnition switch OFF and v CONDITION: rforming the following	vait at least 10 seconds. vait at least 10 seconds. procedure, confirm that battery vo	oltage is 11 V or more with ignition
>	> GO TO 2.		
2.PERFC	RM DTC CONFIRMATI	ON PROCEDURE-1	
CAUT Never 2. Turn iq 3. Turn iq	ION: start engine during th	e stopped) and wait at least 10 secon is procedure. vait at least 10 seconds.	ds.
	DTC detected?		
	> Proceed to <u>EC-351, "[</u> > GO TO 3.	Diagnosis Procedure".	
3.PERFC	RM DTC CONFIRMATI	ON PROCEDURE-2	
the ac 3. Let the 4. Turn iq 5. Turn iq	p the engine quickly to a celerator pedal. e engine idle and wait at		ded condition and completely release
	DTC detected?		
	Proceed to <u>EC-351, "E</u> INSPECTION END	Diagnosis Procedure".	
Diagnos	is Procedure		INFOID:000000012788120
1.PERFC	RM DTC CONFIRMATI	ON PROCEDURE	
2. Erase 3. Perfor <u>s the 1st t</u> YES >	m DTC confirmation pro rip DTC P0606 displaye	cedure for 3 times. Refer to <u>EC-351, '</u> <u>d again?</u> o <u>EC-501, "Removal and Installation"</u> .	-

< DTC/CIRCUIT DIAGNOSIS > P0607 ECM

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (Control module perfor- mance)	ECM internal communication system is malfunc- tioning.	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. 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.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-352, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788122

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-352, "DTC Logic"</u>.
- Is the 1st trip DTC P0607 displayed again?
- YES >> Replace ECM. Refer to EC-501, "Removal and Installation".
- NO >> INSPECTION END

DTC detecting condition

ECM internal monitoring processor is malfunction-

< DTC/CIRCUIT DIAGNOSIS > P060A ECM

CONSULT screen terms

(Trouble diagnosis content) CONTROL MODULE (Internal control module

monitoring processor per-

ing.

DTC Logic

DTC No.

P060A

Revision: December 2015

EC-353

2016 Sentra NAM

INFOID:000000012788123

Possible cause

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. Repeat step 1 and 2 for 5 times. 3. Turn ignition switch ON. 4. Check 1st trip DTC. 5. Is 1st trip DTC detected? YES >> Proceed to EC-353, "Diagnosis Procedure". >> INSPECTION END NO **Diagnosis** Procedure INFOID:000000012788124 1.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. Erase DTC. 2. 3. Perform DTC confirmation procedure. Refer to EC-353, "DTC Logic". Is the 1st trip DTC P060A displayed again? YES >> Replace ECM. Refer to EC-501, "Removal and Installation". NO >> INSPECTION END

DTC DETECTION LOGIC

formance)

EC

D

Е

F

Н

Κ

L

Μ

Ν

Ρ

А

< DTC/CIRCUIT DIAGNOSIS > P060B ECM

INFOID:000000012788125

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	CONTROL MODULE (Internal control module A/ D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.	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. 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.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-354, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788126

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC confirmation procedure. Refer to <u>EC-354. "DTC Logic"</u>.
- Is the 1st trip DTC P060B displayed again?
- YES >> Replace ECM. Refer to EC-501, "Removal and Installation".
- NO >> INSPECTION END

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 • Creake the fit position (CKD) concert (DOS)	С
 Crankshaft position (CKP) sensor (POS) Throttle position (TP) sensor Accelerator pedal position (APP) sensor 1 NOTE: 	D
If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.	E
 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 	F
	G
DTC Logic	INFOID:000000012788128

- - 0 -

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	I
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 	J K L

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.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

YES >> Refer to <u>EC-356. "Diagnosis Procedure"</u>.

INFOID:000000012788127

А

EC

Ν

Ο

Ρ

Н

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788129

[MRA8DE]

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.

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

+				
APP sensor		-	Voltage (Approx.)	
Connector Terminal			(FF - 7	
E12	4	Ground	5.0 V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

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
	72	CKP sensor (POS)	F22	3
F25	64	Battery current sensor	F54	1
	80	Electric throttle control actuator	F7	2
E16	122	APP sensor 1	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

Check the following.

Sensor	Reference
Battery current sensor	EC-372, "Component Inspection (Battery Current Sensor)"
CKP sensor	EC-281, "Component Inspection [CKP Sensor (POS)]"
Refrigerant pressure sensor	EC-481, "Diagnosis Procedure"
TP sensor	EC-205, "Component Inspection (TP Sensor)"

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning component.

4.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-41, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

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:000000012788131

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 transmis sion 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. 	 open or shorted. (CVT models)] [Park/neutral position (PNP) switch circuit is open or shorted. (M/T models)] Transmission range switch (CVT mod-
4	IRMATION PROCE	DURE	
		as been previously conducted, alw	ays perform the following procedure
pefore cond	ucting the next test.	ait at least 10 seconds.	
2. Turn igr	nition switch ON.		
3. Turn igr	nition switch OFF and w	ait at least 10 seconds.	
>>	GO TO 2.		
2.PERFOR	M COMPONENT FUN	CTION CHECK	
erform con	nponent function check	. Refer to EC-358, "Component Fund	ction Check".
	ction result normal?		
-	GO TO 3. Proceed to EC-358, "D	izanosis Proceduro"	
•	M DTC CONFIRMATION	-	
_			
With CON Select "		e of "ENGINE" using CONSULT.	
		normal operating temperature. ns for at least 60 consecutive second	
			15.
Always	drive vehicle at a saf	e speed.	
ENG SPEED		00 - 6,375 rpm (CVT) 00 - 6,375 rpm (M/T)	
COOLANT T	EMP/S Moi	e than 70°C (158°F)	
B/FUEL SCH	DL 1.3	- 31.8 msec	
VHCL SPEED	D SE Moi	e than 64 km/h (40 mph)	
		able position	

INFOID:000000012788130

А

EC

D

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Follow the procedure "With CONSULT" above. Is 1st trip DTC detected?

- YES >> Proceed to EC-358, "Diagnosis Procedure".
- NO >> INSPECTION END

Component Function Check

INFOID:000000012788132

1.CHECK PNP SIGNAL FUNCTION

With CONSULT

- Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. Then check the "P/N POSI SW" signal as per the following conditions.

Selector lever position	Indication	
N or P position (CVT) Neutral position (M/T)	ON	
Except above position	OFF	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-358. "Diagnosis Procedure".

2. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Mallana		
Connector	+	-	Condition		Voltage (Approx.)	
Connector	Terr	ninal				
E16	117 128	128	Selector lever	P or N (CVT)Neutral (M/T)	Battery voltage	
			Except above	0 V		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-358, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

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.
- 3. Turn ignition switch ON.
- 4. Check the voltage between transmission range switch harness connector and ground.

INFOID:000000012788133

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	÷			
	range switch	_	Voltage	
Connector	Terminal	O sa sa l	Dallas alla	
F26	7	Ground	Battery volta	age
<u>ls the inspec</u> YES >>	<u>GO TO 4.</u>	<u>ormal?</u>		
-	GO TO 4. GO TO 3.			
3.снеск т	RANSMISS	ION RANGE	E SWITCH P	POWER SUPPLY CIRCUIT
1. Turn ign 2. Disconn	ition switch ect IPDM E/	OFF. 'R harness c	onnector.	range switch harness connector and IPDM E/R harness cor
	+		_	
Transmission	range switch	IPDN	/I E/R	Continuity
Connector	Terminal	Connector	Terminal	
F26	7	E43	14	Existed
3. Check tl		rness conne v between tra		range switch harness connector and ECM harness connecto
	range switch		 CM	Continuity
Connector	Terminal	Connector	Terminal	
F26	10	E16	117	Existed
-		for short to g		
<u>Is the inspec</u> YES >>	<u>ction result n</u> GO TO 5. Repair or re	ormal? place error-c	letected part	
-				M-169, "Component Inspection".
Is the inspec		-		
				GI-41. "Intermittent Incident".
~	•		-	to <u>TM-292, "Removal and Installation"</u> .
O .CHECK F	PARK/NEUT	RAL POSITI	ON (PNP) S	SWITCH POWER SUPPLY
2. Disconn	ition switch	itch harness ON.		pess connector and ground

4. Check the voltage between PNP switch harness connector and ground.

P0850 PNP SWITCH

	+		Voltage	
PNP	switch	_		
Connector	Terminal			
F52	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

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

+					
PNP	PNP switch		ECM		
Connector	Terminal	Connector	Terminal		
F52	3	E16	117	Existed	

4. 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 PNP SWITCH

Check the PNP switch. Refer to <u>TM-17, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspec-</u> tion".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

NO >> Replace PNP switch. Refer to <u>TM-21. "Removal and Installation"</u>.

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

А

EC

INFOID:000000012788134

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT sc (Trouble diagno		DTC detecting condition	Possible cause
P1078	EXH TIM SEN// (Exhaust valve trol position ser bank 1)	timing con-	An excessively high or low voltage from the sensor is sent to ECM.	 Harness or connectors (Exhaust valve timing control position sen- sor circuit is open or shorted) Accumulation of debris to the signal pick-up portion of the camshaft Exhaust valve timing control position sen- sor Sensor power supply 2 circuit
4	IFIRMATION	PROCED	URE	
1.PRECO	NDITIONING			
before con 1. Turn ig 2. Turn ig 3. Turn ig	ducting the ne gnition switch (gnition switch (gnition switch (ext test. OFF and wa ON.	ait at least 10 seconds. ait at least 10 seconds.	ways perform the following procedure
~	> GO TO 2. RM DTC CON	IFIRMATIC	N PROCEDURE	
2. Check Is 1st trip E YES >>	ngine and let i 1st trip DTC. <u>OTC detected?</u> > Proceed to <u>E</u> > INSPECTIOI	<u>-</u> EC-361, "Di) seconds. agnosis Procedure".	
Diagnosi	is Procedur	re		INFOID:000000012788135
1.снеск	EXHAUST VA	ALVE TIMI	NG (EVT) CONTROL POSITION S	ENSOR POWER SUPPLY
 Discor Turn ig 	nition switch (valve timing ON.	g (EVT) control position sensor har T control position sensor harness c	
	+			
EVT control	position sensor	_	Voltage (Approx.)	
Connector				
F57	1	Ground	5.0 V	
YES >>	<u>ection result no</u> > GO TO 3. > GO TO 2.	ormal?		
•		WER SUP	PLY 2 CIRCUIT	
			t. Refer to EC-460, "Diagnosis Prod	cedure".
	on result norma			
YFS >>	> Perform the	trouble dia	anosis for power supply circuit.	

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

NO >> Repair or replace error-detected parts.

EC-361

P1078 EVT CONTROL POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{\mathbf{3}}$. CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between EVT control position sensor harness connector and ECM harness connector.

	+			
EVT control p	osition sensor	ECM		Continuity
Connector Terminal		Connector	Terminal	
F57	2	F24	42	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 EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

Check the continuity between EVT control position sensor harness connector and ECM harness connector.

	+	-		
EVT control p	osition sensor	ECM		Continuity
Connector Terminal		Connector	Terminal	
F57	3	F24	43	Existed

3. 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 EVT CONTROL POSITION SENSOR

Check the EVT control position sensor. Refer to <u>EC-362</u>, "Component Inspection (EVT Control Position Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVT control position sensor. Refer to <u>EM-60, "Exploded View"</u>.

6.CHECK CAMSHAFT (EXT)

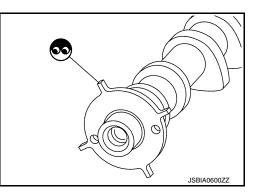
Check the following.

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-41, "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 (EVT Control Position Sensor)

INFOID:000000012788136

1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

1. Turn ignition switch OFF.

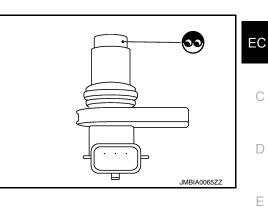
P1078 EVT CONTROL POSITION SENSOR

< 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>"Exploded View"</u>.



$2.{\tt EVT} \ {\tt CONTROL} \ {\tt POSITION} \ {\tt SENSOR-2}$

Check resistance EVT control position sensor terminals as shown below.

EVT control position sensor
+ _ Condition Resistance
Terminal
1 2
$\begin{array}{c c} \hline & 3 \\ \hline & 3$
2 3

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVT control position sensor. Refer to EM-60, "Exploded View".

Κ

L

Μ

Ν

Ο

Ρ

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
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

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-95. "DTC Index"</u>.

INFOID:000000012788137

INFOID:000000012788138

[MRA8DE]

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-173, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352, "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 	

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. M Is 1st trip DTC detected? >> Proceed to EC-365, "Diagnosis Procedure". YES NO >> INSPECTION END Ν Diagnosis Procedure INFOID:000000012788141 Perform the trouble diagnosis for TCS. Refer to BRC-62, "Work Flow" (without ICC) or BRC-236, "Work Flow" (with ICC). NOTE:

If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.

Trouble diagnosis for DTC UXXXX Refer to <u>EC-95, "DTC Index"</u>.

Trouble diagnosis for DTC P0607 Refer to EC-352, "DTC Logic".

INFOID:000000012788139

INFOID:000000012788140

EC

D

E

Κ

Ρ

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-352</u>, "DTC Logic".

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

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	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-13, "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-366. "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-367, "Diagnosis Procedure".

Component Function Check

INFOID:000000012788143

1.PERFORM COMPONENT FUNCTION CHECK-1

WARNING:

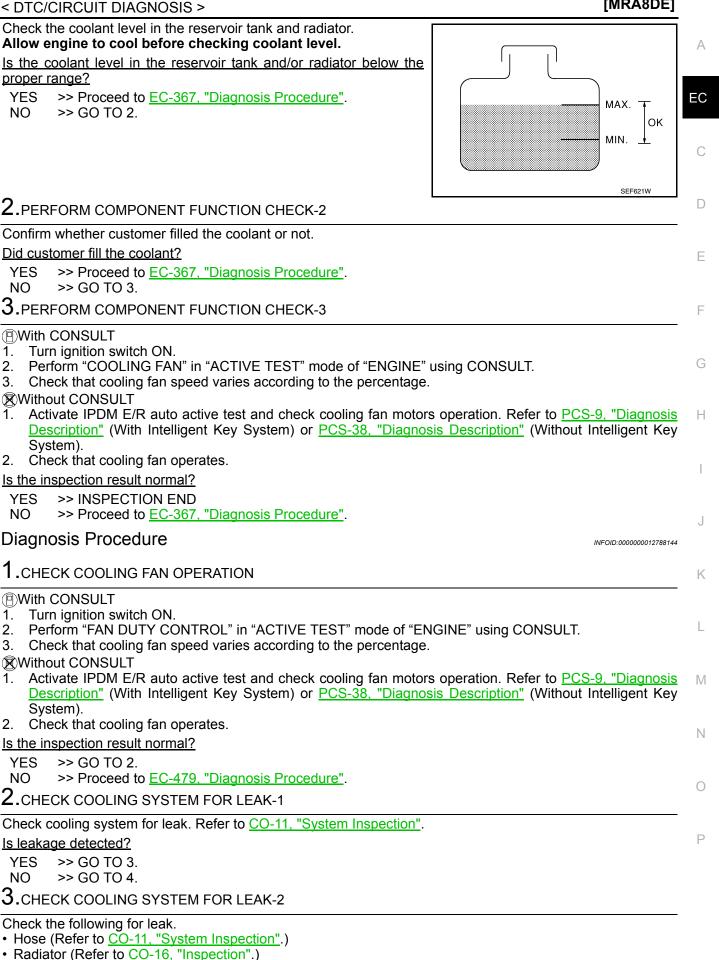
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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:000000012788142

P1217 ENGINE OVER TEMPERATURE

[MRA8DE]



Revision: December 2015

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-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to <u>CO-21, "Removal and Installation of Thermostat"</u>.

6.CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-25, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve. Refer to <u>CO-25</u>, "Removal and Installation".

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-202, "Component Inspection (ECT Sensor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-9. "Troubleshooting Chart".

>> INSPECTION END

P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1225 TP SENSOR

DTC Logic

А

INFOID:000000012788145

[MRA8DE]

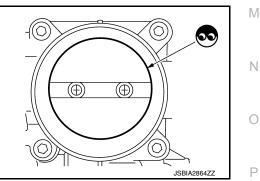
DTC DETECTION LOGIC

tent) Constitution 11225 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) TC CONFIRMATION PROCEDURE							
1225 Closed throttle position learning value is excessively low. Electric throttle control actuator (TP sensor 1 and 2) 1226 Closed throttle position learning value is excessively low. Electric throttle control actuator (TP sensor 1 and 2) 1227 Closed throttle position learning value is excessively low. Electric throttle control actuator (TP sensor 1 and 2) 1228 PRECONDITIONING DTC Confirmation Procedure has been previously conducted, always perform the following procedure fore conducting the next test. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. ESTING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. .PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch ON. Turn ignition switch ON. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". Volume 2000 >> INSPECTION END iagnosis Procedure CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY . . Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View". .	DTC No.	(Trouble diagnosis con-	DTC detecting condition	Possible cause			
.PRECONDITIONING DTC Confirmation Procedure has been previously conducted, always perform the following procedure fore conducting the next test. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. STING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. .PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? YES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure	P1225	(Closed throttle position learning value is excessively Electric throttle control actuator (TP sensor 1 and 2)					
DTC Confirmation Procedure has been previously conducted, always perform the following procedure fore conducting the next test. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. SSTING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. .PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to <u>EC-369</u> , "Diagnosis Procedure". VO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25</u> , "Exploded View".		NFIRMATION PROC	CEDURE				
sfore conducting the next test. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch OFF and wait at least 10 seconds. ESTING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2. .PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch ON. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to <u>EC-369</u> , "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25</u> , "Exploded View".	1.PREC	ONDITIONING					
Turn ignition switch OFF and wait at least 10 seconds. STING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10 V at idle. >> GO TO 2PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. Ist trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".	oefore cor 1. Turn i	nducting the next test. gnition switch OFF an		perform the following procedure			
>> GO TO 2PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".	3. Turn i FESTING	gnition switch OFF an CONDITION:		e is more than 10 V at idle.			
.PERFORM DTC CONFIRMATION PROCEDURE Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".	-	-	5 · · · · · · · · · · · · · · · · · ·				
Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".	~						
Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Check 1st trip DTC. 1st trip DTC detected? (ES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".			ATION PROCEDURE				
Check 1st trip DTC. <u>1st trip DTC detected?</u> (ES >> Proceed to <u>EC-369, "Diagnosis Procedure"</u> . NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25, "Exploded View"</u> .	2. Turn i	gnition switch OFF an	d wait at least 10 seconds.				
1st trip DTC detected? YES >> Proceed to EC-369, "Diagnosis Procedure". NO >> INSPECTION END iagnosis Procedure INFOID:000000012788146 .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Infoinition switch OFF. Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".							
NO >> INSPECTION END iagnosis Procedure .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25. "Exploded View".		•					
CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. Remove the intake air duct. Refer to EM-25, "Exploded View".			, "Diagnosis Procedure".				
Turn ignition switch OFF. Remove the intake air duct. Refer to <u>EM-25, "Exploded View"</u> .	Diagnos	is Procedure		INFOID:000000012788146			
Remove the intake air duct. Refer to EM-25, "Exploded View".	1. CHEC	KELECTRIC THROT	TLE CONTROL ACTUATOR VISUALLY				

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-143</u>, "<u>Description</u>".



< DTC/CIRCUIT DIAGNOSIS >

P1226 TP SENSOR

DTC Logic

INFOID:000000012788147

[MRA8DE]

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-370, "Diagnosis Procedure".

NO >> INSPECTION END

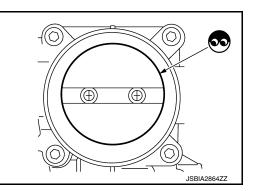
Diagnosis Procedure

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-143</u>, "<u>Description</u>".



INFOID:000000012788148

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000012788149

[MRA8DE]

А

DTC DETECTION LOGIC

DTC No.		screen terms gnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURREN (Battery currer		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
4	IRMATION	PROCEDUR	E	
ing the next 1. Turn ign 2. Turn ign 3. Turn ign TESTING C Before perf 2. PERFOR 1. Start en 2. Check 1 <u>Is 1st trip DT</u> YES >>	test. iition switch C iition switch C ONDITION: orming the f GO TO 2. M DTC CON gine and wait st trip DTC. <u>IC detected?</u>	DFF and wait a DN. DFF and wait a ollowing prod FIRMATION F at least 10 se <u>C-371, "Diagr</u>	at least 10 seconds. at least 10 seconds. cedure, confirm that battery volta PROCEDURE	erform the following before conduct-
Diagnosis	Procedur	е		INFOID:000000012788150
1.снеске	BATTERY CU	IRRENT SEN	SOR POWER SUPPLY	
 Disconn Turn igr 	ition switch C	urrent sensor)N.	harness connector.	and ground.
	+ rent sensor Terminal	-	Voltage (Approx.)	
F54	1	Ground	5.0 V	
YES >> NO >>	Ction result no GO TO 3. GO TO 2.	wer SUPPL		

Z.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-460, "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.

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	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 CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		_		
Battery cur	rent sensor	ECM		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-372, "Component Inspection (Battery Current Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

NO >> Replace battery current sensor. Refer to <u>PG-77, "Removal and Installation"</u>.

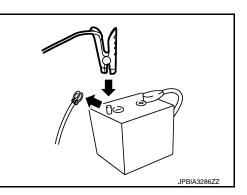
Component Inspection (Battery Current Sensor)

INFOID:000000012788151

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.)
Connector	Terr	(
F25	63	2.5 V	

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-65</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to PG-77, "Removal and Installation".

EC

С

D

Е

F

Н

J

Κ

Μ

Ν

Ο

Ρ

[MRA8DE]

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000012788152

[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-374, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788153

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 cur	rent sensor	-	Voltage (Approx.)
Connector	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 DIAGN	•	552 BAT	TERY CUR	RENT SENSOR	[MRA8DE]
Check sensor power sup		Refer to FC	-460 "Diagnosi	is Procedure"	<u> </u>
Is the inspection result n					A
YES >> Perform the NO >> Repair or re	trouble diagr			it.	
3. CHECK BATTERY C	URRENT SE	NSOR GRO	UND CIRCUIT		EC
1. Turn ignition switch					
2. Disconnect ECM ha	rness conneo		sensor harness	s connector and ECM harness	connector.
+	-	-			D
Battery current sensor	EC	M	Continuity		D
Connector Terminal	Connector	Terminal			
F54 3	F25	62	Existed		Е
4. Also check harness	for short to p	ower.			
Is the inspection result n	ormal?				-
YES >> GO TO 4. NO >> Repair or re	place error-d	etected parts	5.		F
4.CHECK BATTERY C	URRENT SE	NSOR INPU	IT SIGNAL CIR	CUIT	G
1. Check the continuity	between ba	ttery current	sensor harness	s connector and ECM harness	
+	-	-			Н
Battery current sensor	EC	M	Continuity		
Connector Terminal	Connector	Terminal			1
F54 4	F25	63	Existed		I
2. Also check harness	for short to g	round and to	o power.		
Is the inspection result n	ormal?				J
YES >> GO TO 5.					
NO >> Repair or re		-	6		V
5. CHECK BATTERY C					K
•		er to EC-37	5, "Component	Inspection (Battery Current Se	<u>nsor)"</u> .
Is the inspection result n					L
YES >> Check interr NO >> Replace bat				tent Incident". moval and Installation".	
Component Inspec	tion (Batte	ry Curren	t Sensor)		INFOID:000000012788154
1.CHECK BATTERY C	URRENT SE	NSOR			
 Turn ignition switch Reconnect harness Disconnect battery r Install jumper cable ground. 	connectors d negative cable	e.		body	N O P
					JPBIA3286ZZ

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

5. Turn ignition switch ON.

6. Check the voltage between ECM harness connector terminals.

	N / 14		
Connector	+	-	Voltage (Approx.)
Connector	Terr		
F25	63	2.5 V	

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-65</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to <u>PG-77, "Removal and Installation"</u>.

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012788155

[MRA8DE]

0012100100

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content	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 PROCEDU	RE	
	DITIONING		
		een previously conducted, always pe	rform the following before conduct-
	nition switch OFF and wai	t at least 10 seconds.	
	nition switch ON. nition switch OFF and wai	t at least 10 seconds	
FESTING C	ONDITION:		
Sefore perf	orming the following pr	ocedure, confirm that battery volta	ge is more than 8 V at idle.
-	GO TO 2.	ocedure, confirm that battery volta	ge is more than 8 V at idle.
>>			ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en	GO TO 2. M DTC CONFIRMATION gine and wait at least 10	PROCEDURE	ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en 2. Check 1	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC.	PROCEDURE	ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en 2. Check 1 s 1st trip D	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. IC detected?	PROCEDURE seconds.	ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en 2. Check 1 <u>s 1st trip D</u> YES >>	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC.	PROCEDURE seconds.	ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip DT YES >> NO >>	GO TO 2. M DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. IC detected? Proceed to EC-377, "Dia	PROCEDURE seconds.	ge is more than 8 V at idle.
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. IC detected? Proceed to EC-377, "Dia INSPECTION END S Procedure	PROCEDURE seconds.	
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK F	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. IC detected? Proceed to EC-377, "Dia INSPECTION END S Procedure	PROCEDURE seconds.	
>> 2.PERFOR 1. Start en 2. Check 1 Is 1st trip DT YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current senso	PROCEDURE seconds. gnosis Procedure".	
>> 2.PERFOR 1. Start en 2. Check 1 3 1st trip D YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn 3. Turn ign	GO TO 2. AM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. hect battery current senso nition switch ON.	PROCEDURE seconds. gnosis Procedure". NSOR POWER SUPPLY r harness connector.	- INFOID:000000012788156
>> 2.PERFOR 1. Start en 2. Check 1 s 1st trip D YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn 3. Turn ign	GO TO 2. AM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. hect battery current senso nition switch ON.	PROCEDURE seconds. gnosis Procedure".	- INFOID:000000012788156
>> 2.PERFOR 1. Start en 2. Check 1 YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn 3. Turn ign 4. Check t	GO TO 2. AM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. hect battery current senso nition switch ON.	PROCEDURE seconds. gnosis Procedure". NSOR POWER SUPPLY r harness connector. ry current sensor harness connector a	- INFOID:000000012788156
>> 2.PERFOR 1. Start en 2. Check 1 3. 1st trip DT YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn 3. Turn ign 4. Check t	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current senso nition switch ON. he voltage between batter	PROCEDURE seconds. gnosis Procedure". NSOR POWER SUPPLY r harness connector.	- INFOID:000000012788156
>> 2.PERFOR 1. Start en 2. Check 1 3. 1st trip DT YES >> NO >> Diagnosis 1.CHECK E 1. Turn ign 2. Disconn 3. Turn ign 4. Check t	GO TO 2. RM DTC CONFIRMATION gine and wait at least 10 Ist trip DTC. <u>IC detected?</u> Proceed to <u>EC-377, "Dia</u> INSPECTION END S Procedure BATTERY CURRENT SE nition switch OFF. nect battery current senso nition switch ON. he voltage between batter +	PROCEDURE seconds. cnosis Procedure". NSOR POWER SUPPLY r harness connector. ry current sensor harness connector a Voltage	- INFOID:000000012788156

2. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Check sensor power supply 2 circuit. Refer to EC-460, "Diagnosis Procedure".

EC

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.

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	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 CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		_		
Battery cur	rent sensor	ECM		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-378, "Component Inspection (Battery Current Sensor)"</u>. Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

NO >> Replace battery current sensor. Refer to <u>PG-77, "Removal and Installation"</u>.

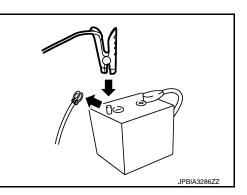
Component Inspection (Battery Current Sensor)

INFOID:000000012788157

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.

Connector	+	-	Voltage (Approx.)
Connector	Terr	(
F25	63	2.5 V	

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-65</u>, "How to <u>Handle Battery</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to PG-77. "Removal and Installation".

С

D

Е

F

Н

J

Κ

Μ

Ν

Ο

Ρ

А

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:000000012788158

[MRA8DE]

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-380, "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-381, "Diagnosis Procedure".

Component Function Check

INFOID:000000012788159

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.

Connector	+	-	Voltage
Connector	Terr	ninal	
F25	63	62	Above 2.3 V at least once

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGN				[MRA8DE]
Is the inspection result n	ormal?			
YES >> INSPECTIO				
NO >> Proceed to E	<u> EC-381, "Dia</u>	ignosis Proc	<u>edure"</u> .	
Diagnosis Procedu	re			INFOID:000000012788160
1.CHECK BATTERY C	URRENT SE	NSOR POV	VER SUPPLY	
1. Turn ignition switch				
 Disconnect battery of Turn ignition switch 		or harness c	onnector.	
		erv current s	ensor harness connector and g	round.
		,	5	
+			_	
Battery current sensor	_	Voltage (Approx.)		
Connector Terminal		(Approx.)		
F54 1	Ground	5.0 V		
s the inspection result n	ormal?			
YES >> GO TO 3.	<u></u>			
NO >> GO TO 2.				
2. CHECK SENSOR PC	WER SUPF	LY 2 CIRCU	ЛТ	
			-460, "Diagnosis Procedure".	
s the inspection result n			- Haghosis - Hoceare .	
		nosis for pov	ver supply circuit.	
NO >> Repair or re				
3. CHECK BATTERY C	URRENT SE	NSOR GRO	OUND CIRCUIT	
1. Turn ignition switch				
2. Disconnect ECM ha		ctor.		
Check the continuity	between ba	ttery current	sensor harness connector and	ECM harness connector.
+				
Battery current sensor	E	CM	Continuity	
Connector Terminal	Connector	Terminal	Continuity	
F54 3	F25		Evicted	
		62	Existed	
Also check harness	•	oower.		
s the inspection result n				
YES >> GO TO 4. NO >> Repair or re	place error-c	letected nar	S.	
1. CHECK BATTERY C		•		
. Check the continuity	between ba	ittery current	sensor harness connector and	ECM harness connector.
+		_		
			Operationsity	
Battery current sensor		CM	Continuity	
Connector Terminal	Connector	Terminal		
F54 4	F25	63	Existed	
2. Also check harness	-	ground and t	o power.	
s the inspection result n	ormal?			
YES >> GO TO 5.	nlago orror -	lataatad aard	c	
NO >> Repair or re	place error-0	letected part	5	

 $5. {\sf CHECK} {\sf BATTERY} {\sf CURRENT} {\sf SENSOR}$

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Check the battery current sensor. Refer to EC-382. "Component Inspection (Battery Current Sensor)".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".
- NO >> Replace battery current sensor. Refer to PG-77, "Removal and Installation".

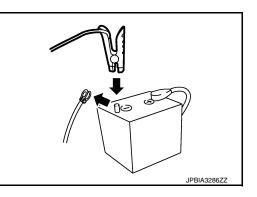
Component Inspection (Battery Current Sensor)

INFOID:000000012788161

[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.

Connector	+	-	Voltage (Approx.)		
Connector	Terminal				
F25	63	62	2.5 V		

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-65</u>, "How to <u>Handle Battery"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor. Refer to <u>PG-77, "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-355, "DTC Logic"</u>.

DTC No.	CONSULT scree (Trouble diagnosi		DTC detecting condition		Possible cause
P1556	BAT TMP SEN/CIR (BAT TMP SEN/CIF		Signal voltage from Battery tempera sensor remains 0.16V or less for 5 s onds or more.		 Harness or connectors [Battery current sensor (Battery tem- perature sensor) circuit is shorted.]
P1557	BAT TMP SEN/CIR (BAT TMP SEN/CIF	-	Signal voltage from Battery tempera sensor remains 4.84V or more for 5 onds or more.		 Battery current sensor (Battery temperature sensor)
	IRMATION PRO	DCEDURE			
1.PRECON	DITIONING				
	ition switch OFF a ition switch ON.	and wait at	least 10 seconds.		
3. Turn ign	ition switch OFF	and wait at	least 10 seconds.		
TESTING CO Before perfo		wing proce	edure, confirm that battery v	voltad	e is 10 V or more at idle.
	g		, communat sation, s		
~	GO TO 2.				
2.PERFOR	M DTC CONFIRM	MATION PF	ROCEDURE		
	engine and let it st trip DTC.	idle at leas	t 10 seconds.		
	<u>C detected?</u>				
YES >>	Proceed to EC-38		sis Procedure".		
NO >>	INSPECTION EN	D			
Diagnosis	Procedure				INFOID:000000012788163
1. снеск е	BATTERY TEMPE	RATURE	SENSOR POWER SUPPLY		
1. Turn ign	ition switch OFF.				
	ect battery currer ition switch ON.	nt sensor ha	arness connector.		
		en battery o	current sensor harness conne	ctor a	nd ground.
	+		Voltage		
	current sensor	-	(Approx.)		
Connector	Terminal	Cround	5.1/		
F54	2	Ground	5 V		
	<u>ition result norma</u> GO TO 3.	<u>1 f</u>			
	GO TO 2.				
2 СНЕСК Б	BATTERY TEMPE	RATURE	SENSOR POWER SUPPLY C	CIRCL	ИТ

- 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-383

INFOID:000000012788162

EC

С

А

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 curr	Battery current sensor		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 TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EC-384, "Component Inspection".

Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:000000012788164

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 cur	rrent sensor		
	+ –		Resistance	
	Terminal			
2 3		3	Continuity with the resistance value 100 $\boldsymbol{\Omega}$ 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-350, "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	
	ONDITIONING		
	onfirmation Procedure hand	as been previously conducted, always	perform the following procedure
1. Turn i	gnition switch OFF and wa	ait at least 10 seconds.	
	gnition switch ON. gnition switch OFF and w	ait at least 10 seconds.	
	-		
~	> GO TO 2.		
	ORM DTC CONFIRMATIC	IN PROCEDURE	
	gnition switch ON. at least 10 seconds.		
		10 seconds, then release it and wait at I ast 10 seconds, then release it and wait	
5. Press	ACCEL/RES switch for a	t least 10 seconds, then release it and v	vait at least 10 seconds.
	COAST/SET switch for a CDTC.	t least 10 seconds, then release it and v	vait at least 10 seconds.
<u>Is DTC de</u>			
	Proceed to <u>EC-385, "Di</u> > INSPECTION END	agnosis Procedure".	
-			
	is Procedure		INFOID:000000012788166
	ASCD STEERING SWIT		
With C			
	gnition switch ON. t "CANCEL SW", "RESU	ME/ACC SW" and "SET SW" in "DAT	A MONITOR" mode of "ENGINE"
using	CONSULT.		

- using CONSULT.
- 3. Check each item indication as per the following conditions.

Monitor item	Condition	Indication	
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW		Released	OFF

Ρ

[MRA8DE]

А

EC

С

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
SET SW		Released	OFF

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

	ECM) <i>(</i> - 1)	
Connector	+	-	Condition	Voltage (Approx.)	
Connector	Terr	ninal		([]]	
			MAIN switch: Pressed	0 V	
			CANCEL switch: Pressed	1 V	
E16	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 <u>GI-41, "Intermittent Incident"</u>.

NO >> GO TO 2.

 $\mathbf{2}.\mathsf{CHECK}\,\mathsf{ASCD}\,\mathsf{STEERING}\,\mathsf{SWITCH}\,\mathsf{GROUND}\,\mathsf{CIRCUIT}$

- 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.

+				
Combination switch (Spiral cable)		ECM		Continuity
Connector	Terminal	Connector Terminal		
M80	22 ^{*1} 32 ^{*2}	E16	111	Existed

*1: Without intelligent key system

*2: With intelligent key system

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.

 $\mathbf{3}$. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

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

+				
Combination switch (Spiral cable)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M80	27 ^{*1}	E16	110	Existed
	25 ^{*2}			

P1564 ASCD STEERING SWITCH

			F1504 ASCD STEERING	Зинсп			
< DTC/CIR		AGNOSIS	\$>		[MRA8DE]		
	-	it key syster	n				
	ntelligent ke		ort to ground and to power.				
Is the inspe			-				
	GO TO 4		<u>.</u>				
			error-detected parts.				
4.CHECK	ASCD ST	TEERING	SWITCH				
Refer to EC	-387, "Co	mponent	Inspection".				
Is the inspe							
YES >>	Check in	itermittent	incident. Refer to <u>GI-41, "Intermitte</u>	nt Incident".			
	Replace	ASCD	steering switch. Refer to EC		<u>CONTROL SYSTEM :</u>		
	<u>Compon</u>	ent Parts	Location".				
Compone	ent Insp	ection			INFOID:000000012788167		
1. СНЕСК			SWITCH				
			witch (spiral cable) harness connect een combination switch harness co		e per the following condi-		
tions.			een combination switch hamess co		s per the following condi-		
Without in	itelligent key	system					
	bination swi	-					
	Spiral cable)			Resistance			
Connector	+	-	Condition	(Approx.)			
Connector	Tern	ninals					
			MAIN switch: Pressed	0 Ω			
			CANCEL switch: Pressed	250 Ω			
M108	1	3	COAST/SET switch: Pressed	660 Ω			
					ACCEL/RES switch: Pressed	1,480 Ω	
			All ASCD steering switches: Released	4,000 Ω	-		
With intell	igent key sys	stem					
Com	bination swi	itch					
(8	Spiral cable)			Resistance			
Connector	+	-	Condition	(Approx.)			
Connector	Tern	ninals					
			MAIN switch: Pressed	0 Ω			
			CANCEL switch: Pressed	250 Ω			
M79	13	16	COAST/SET switch: Pressed	660 Ω			
	ACCEL/RES switch: Pressed 1,480 Ω						
			All ASCD steering switches: Released	4,000 Ω			
Is the inspe	ction resu	ult normal	?	<u>.</u>			
-		TION ENI					
NO >>			steering switch. Refer to EC	<u>-15, "ENGINE (</u>	<u>CONTROL SYSTEM :</u>		
	<u>Compon</u>	ent Parts	Location".				

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

P1564 ICC 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 <u>EC-350, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ICC SW)	 An excessively high voltage signal from the ICC steering switch is sent to ECM. ECM detects that input signal from the ICC steering switch is out of the specified range. ECM detects that the ICC steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ICC steering switch 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. Turn ignition switch ON and wait at least 10 seconds.
- 2. Press ICC MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Check DTC.

Is DTC detected?

- YES >> Go to EC-388, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9 and E15. Refer to Ground Inspection in <u>GI-43, "Circuit Inspection"</u>. Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ICC STEERING SWITCH CIRCUIT

Check the voltage between ECM harness connector terminals under the following conditions.

INFOID:000000013475530

INFOID:000000013475531

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

	ECM					
Connotor	+		-	Con	ndition	Voltage
Connector Terminal		Ter	rminal			
				MAIN switch: Pressed	b	Approx. 0
			-	CANCEL switch: Pres	ssed	Approx. 1.3 V
F 40	440			DISTANCE switch: Pr	ressed	Approx. 2.2 V
E16	110		111 -	SET/COAST switch: I	Pressed	Approx. 3.0 V
			-	RESUME/ACCELER/	ATE switch: Pressed	Approx. 3.7 V
			-	All ICC steering switc	hes: Released	Approx. 4.3 V
NO >: CHECK Turn iç Discor Discor	 > GO TO 8. > GO TO 3. (ICC STEERING SV gnition switch OFF. anect ECM harness anect combination sv the continuity between 	connector. vitch (spiral	cable) ha	arness connector.		onnector.
Combinat	ion switch (spiral cable)	E	СМ			
Combiniat		_	1	- Continuity		
Connect	or Terminal	Connector	Terminal	Continuity		
Connect M80	or Terminal 22*1 32*2 out intelligent key system	– E16	Terminal	Existed		
Connect M80 *1: With *2: With Also c s the inspo YES >: NO >: DETEC Check the Combina	22 ^{*1} 32 ^{*2}	E16 Dert to groun C IG PART	111 d and sho	Existed	(spiral cable)	
Connect M80 *1: With *2: With Also c Sthe inspo YES >: NO >: DETEC Check the Combina Harness >: O.CHECK	22 ^{*1} 32 ^{*2} out intelligent key system heck harness for sho ection result normal? > GO TO 5. > GO TO 4. T MALFUNCTIONIN following. tion switch (spiral ca for open and short b > Repair open circuit CICC STEERING SV	E16 E16 IG PART IG PART Ible) Detween EC	111 d and sho M and co round or s UT SIGN/	Existed ort to power. mbination switch (short to power in h AL CIRCUIT FOR	arness or connecto	Т
Connect M80 *1: With *2: With Also c Sthe inspo YES >: NO >: DETEC Check the Combina Harness >: O.CHECK	22 ^{*1} 32 ^{*2} out intelligent key system heck harness for sho ection result normal? > GO TO 5. > GO TO 5. > GO TO 4. T MALFUNCTIONIN following. tion switch (spiral ca for open and short b > Repair open circuit	E16 E16 IG PART IG PART Ible) Detween EC	111 d and sho M and co round or s UT SIGN/	Existed ort to power. mbination switch (short to power in h AL CIRCUIT FOR	arness or connecto	Т
Connect M80 *1: With *2: With . Also c sthe inspore YES >: NO >: .DETEC Check the Combina Harness >: .CHECK . Check	22 ^{*1} 32 ^{*2} out intelligent key system heck harness for sho ection result normal? > GO TO 5. > GO TO 4. T MALFUNCTIONIN following. tion switch (spiral ca for open and short b > Repair open circuit CICC STEERING SV	E16 E16 IG PART IG PART Ible) Detween EC	111 d and sho CM and co round or s UT SIGN/ ation swit	Existed ort to power. mbination switch (short to power in h AL CIRCUIT FOR ch (spiral cable) ar	arness or connecto	Т
Connect M80 *1: With *2: With . Also c sthe inspore YES >: NO >: .DETEC Check the Combina Harness >: .CHECK . Check	22*1 32*2 out intelligent key system intelligent key system heck harness for shore heck harness for shore cection result normal? > GO TO 5. > GO TO 4. T MALFUNCTIONING. following. tion switch (spiral calls) > Repair open circuit? C STEERING SV the continuity between on switch (spiral cable)	E16 E16 E16 E16 IG PART IG PART Ible) Detween EC I, short to g VITCH INP Een combin	111 d and sho CM and co round or s UT SIGN/ ation swit	Existed ort to power. mbination switch (short to power in h AL CIRCUIT FOR	arness or connecto	Т
Connect M80 *1: With *2: With Also c the insport YES >: NO >: •DETEC Combination Harness >: •CHECK	22*1 32*2 out intelligent key system intelligent key system heck harness for shore heck harness for shore cection result normal? > GO TO 5. > GO TO 4. T MALFUNCTIONING. following. tion switch (spiral calls) > Repair open circuit? C STEERING SV the continuity between on switch (spiral cable)	E16 E16 E16 IG PART IG PART Ible) between EC I, short to g VITCH INP Een combin	111 d and sho CM and co round or s UT SIGN/ ation swit	Existed ort to power. mbination switch (short to power in h AL CIRCUIT FOR ch (spiral cable) ar	arness or connecto	Т

*2: With intelligent key system

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

Is the inspection result normal?

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

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

6.DETECT MALFUNCTIONING PART

Check the following.

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

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

7. CHECK ICC STEERING SWITCH

Refer to EC-390, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Replace ICC steering switch. Refer to <u>EC-15, "ENGINE CONTROL SYSTEM :</u> <u>Component Parts Location"</u>.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000013475532

1. CHECK ICC STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector.
- Check resistance between combination switch harness connector terminals under the following conditions.

Without intelligent key system

Combination switch		Condition	Pesistance (O)	
Connector	Terminals	Condition	Resistance (Ω)	
		MAIN switch: Pressed	Approx. 0	
M108 1 and 3	CANCEL switch: Pressed	Approx. 310		
	1 and 3	DISTANCE switch: Pressed	Approx. 740	
		SET/COAST switch: Pressed	Approx. 1,410	
		RESUME/ACCELERATE switch: Pressed	Approx. 2,590	
		All ICC steering switches: Released	Approx. 5,460	

With intelligent key system

Combination switch		Condition	Resistance (Ω)	
Connector	Terminals	Condition		
		MAIN switch: Pressed	Approx. 0	
M79 13 and 16	CANCEL switch: Pressed	Approx. 310		
	13 and 16	DISTANCE switch: Pressed	Approx. 740	
	SET/COAST switch: Pressed	Approx. 1,410		
		RESUME/ACCELERATE switch: Pressed	Approx. 2,590	
		All ICC steering switches: Released	Approx. 5,460	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch. Refer to <u>EC-15. "ENGINE CONTROL SYSTEM :</u> <u>Component Parts Location"</u>.

P1568 ICC FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P1568 ICC FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1568 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1568 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-350, "DTC Logic"</u>.
 If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Defer
- If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352, "DTC Logic"</u>.

to <u>EC-</u>	<u>352, "DIC Logic"</u> .			D
DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	
P1568	ICC function	ECM detects a difference between signals from ADAS control unit is out of specified range.	 Harness or connectors (The CAN communication line is open or shorted.) ADAS control unit ECM 	E
DTC CC	NFIRMATION PROCI	EDURE		F
1.PREC	CONDITIONING			
before co 1. Turn	onducting the next test.	has been previously conducte wait at least 10 seconds.	d, always perform the following procedure	(
		wait at least 10 seconds.		
TESTING	G CONDITION:		nop or by driving the vehicle. If a road test	
		nnecessary to lift the vehicle.	top of by driving the venicle. If a road test	
0	>> GO TO 2.			
Z .PERF	ORM DTC CONFIRMAT	TION PROCEDURE		
2. Pres 3. Drive CAL	i ignition switch ON. is MAIN switch on ICC s is the vehicle at more tha ITION:	n 40 km/h (25 MPH).		ŀ
4. Pres 5. Che	ays drive vehicle at a s s SET/COAST switch. ck DTC.	afe speed.		
YES	<u>letected?</u> >> Go to <u>EC-391, "Diag</u> >> INSPECTION END	nosis Procedure".		ſ
Diagno	sis Procedure		INFOID:000000013464460	
1.REPL	ACE ADAS CONTROL	UNIT		1
2. Perf	lace ADAS control unit. orm <u>DAS-33, "Descriptio</u> ck DTC of ADAS control			(
	>> INSPECTION END			

INFOID:000000013464459

А

EC

С

< DTC/CIRCUIT DIAGNOSIS >

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:000000012788168

[MRA8DE1

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-350, "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
P1572	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
	(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 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?

YES >> Proceed to <u>EC-404</u>, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

< DTC/CIR		GNOSIS	>				[MRA8DE]	
CAUTI	<mark>ON:</mark> s drive ve		st 5 consecut safe speed		onds as per	the following cor	iditions.	/
						s lifted in the sh to lift the vehic	op or by driving the vehicle. le.	E
Vehicle spee	ed		More than 30 l	km/h (19 ı	mph)			(
Selector leve	er		Suitable positi	on				
Driving locat	ion		Depress the bit than five secor off from the ab cle speed.	nds so as i	not to come			
2. Check								
<u>s DTC dete</u> YES >>		to EC 404	. "Diagnosis	Proced	luro"			
		TION END		FIUCEU	<u>ure</u> .			F
Diagnosi	s Proce	dure					INFOID:000000012788169	
I.CHECK								
		LFUNCT	ON-1					(
)With COI . Turn ia	NSULT nition swit	ch ON						
. Select	BRAKE	SW1" in "D				INE" using CONS	SULT.	
6. Check	BRAKE	SW1" indic	ation as per	the follo	owing condi	tions.		
Monito	r item		Condition		Indication			
			Slightly de	pressed	OFF			
BRAKE	SW1	Brake peda	al Fully relea	-	ON			
Without (CONSULT	-			<u> </u>			
	nition swit						lleuine	
. Check	the voltag	e betweer	I ECIM name	ss conn		nals as per the fo	llowing.	
	ECM					N / 1/		
Connector	+	-		Condition		Voltage (Approx.)		
	Terr	ninal						
E16	116	128	Brake pedal		/ depressed	0 V		
				Fully re	eleased	Battery voltage		
<u>s the inspe</u> YES >>	· GO TO 2		-					
NO >>	MT mode	els: GO TO						
•		dels: GO T						
CHECK	OVERAL	L FUNCTI	ON-2					
With CO		" opd chr -	k indianting	00 00 - 1	ha fallauir -	anditions		
elect "BRA	ARE SVV2	and chec	k indication	as per t	ne tollowing	conditions.		
Monitor if	tem	C	ondition		Indication			
			Slightly depres		ON			

Monitor Item	C	Indication			
BRAKE SW2	Brake pedal	Slightly depressed	ON		
	Diake pedal	Fully released	OFF		

Without CONSULT

< DTC/CIRCUIT DIAGNOSIS >

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

ECM						
Connector	+	_	Condition		Voltage (Approx.)	
Connector	Tern	ninal				
E16	E16 115 129 Brake padal		Brake pedal	Slightly depressed	Battery voltage	
E16 115 128		Fully released		0 V		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "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	osition switch	-	Voltage
Connector	Terminal		
E32	E32 1		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 p	osition 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.
- 3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-		
Brake pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E36	2	E16	116	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

[MRA8DE]

NO >> Rep	pair or replace	error-detec	ted narts			
6.CHECK BRA	•		•			А
				EC 305	Component Inspection (Brake Pedal Position	
Switch)"	te peuai pusi	uon switch.		_0-030,		
Is the inspection	<u>n result norma</u>	<u>l?</u>				EC
					nittent Incident".	
-	-	-			- <u>23. "Exploded View"</u> . -	С
7.CHECK STO		ICH POWE	RSUPPLY	CIRCUI		
	n switch OFF. stop lamp swi	tch harness	connector			D
					nector and ground.	
						E
Stop lam			Voltag	ige		
Connector	Terminal					F
E60	1	Ground	Battery vo	voltage		
Is the inspection		<u>l?</u>				
YES >> GO NO >> Per	form the troub	le diagnosis	for power s	supply cir	cuit.	G
8.CHECK STO		-	-			
	n switch OFF.					Н
2. Disconnect	ECM harness					
3. Check the o	continuity betw	een stop la	mp switch ha	narness c	onnector and ECM harness connector.	1
+						I
Stop lamp sv	witch	ECM	Co	ontinuity		
			rminal	ontinuity		J
E60				Existed		
4. Also check	harness for sh			ower.		К
Is the inspection		-				
YES >> GO						
· · · · · · · · · · · · · · · · · · ·	pair or replace		ted parts.			L
9.CHECK STO						
			<u>396, "Comp</u>	ponent Ins	spection (Stop Lamp Switch)".	M
Is the inspection						
	eck intermitten place stop lam				nittent Incident". ded View"	
	•					Ν
Component	inspection	(DIAKE F			/ICII) INFOID:000000012788170	
1.CHECK BRA	AKE PEDAL P	OSITION S	WITCH-1			0
	n switch OFF.	osition harm	000 000000			
	brake pedal p continuity betw				terminals as per the following conditions.	Ρ
					· • • •	

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000012788171

Brake pedal position switch				
+	_	Condition		Continuity
Terminals				
			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 position switch				
+	-	Condition		Continuity
Terminals				
			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-23</u>, "Exploded View".

Component Inspection (Stop Lamp Switch)

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 lamp switch				
+	-	Condition		Continuity
Tern	Terminals		*	
			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 lamp switch				
+	-	Condition		Continuity
Term	Terminals		*	
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

P1572 ASCD BRAKE SWITCH

A8DE]
A
EC

F

G

Н

J

Κ

L

M

Ν

0

Ρ

С

D

< DTC/CIRCUIT DIAGNOSIS >

P1572 ICC BRAKE SWITCH

DTC Logic

[MRA8DE1

INFOID:000000013475537

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-350, "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
P1572	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
	(ICC 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 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?

YES >> Proceed to EC-406, "Diagnosis Procedure".

NO >> GO TO 3.

 ${\it 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

< DTC/CIR			_		BRAKE	SWIICH	[MRA8DE]	
1. Drive th	ne vehicle <mark>ON:</mark> s drive ve	for at leas			conds as per	the following cor		A
						ls lifted in the sh y to lift the vehic	op or by driving the vehicle. de.	EC
Vehicle spee	ed		More than 30 k	(19) mph)			С
Selector leve	er		Suitable position	on				0
Driving locat	ion		Depress the br than five secon off from the ab cle speed.	ids so as	s not to come			D
2. Check	DTC.							Е
Is DTC dete								
		to <u>EC-406</u> TION END	<u>), "Diagnosis</u>)	Proce	<u>dure"</u> .			
	_		,					F
Diagnosi	s Proce	dure					INFOID:000000013475538	r
1. CHECK	OVERAL	L FUNCTI	ON-1					G
(P)With CO	NSULT							
1. Turn ig	nition swit			0.0.1			N H T	ш
			ATA MONITO			INE" using CONS	SULT.	Η
o. oncor					iowing condi			
Monito	r item		Condition		Indication			
	0.044	Destaural	Slightly de	pressed	OFF			
BRAKE	5001	Brake peda	Fully relea	sed	ON			I
Without (CONSULT	_						J
•	nition swit						llaudaa	
2. Check	the voltag	e betweer	I ECM narne	ss con	inector termi	nals as per the fo	llowing.	K
	ECM							
	+	-	(Conditio	n	Voltage		
Connector	Terr	minal				(Approx.)		
		100	5	Slight	ly depressed	0 V		M
E16	116	128	Brake pedal	Fully	released	Battery voltage	-	
Is the inspe	ction resu	It normal?) -				•	Ν
	GO TO 2							1.4
		els: GO T(dels: GO T						
2.CHECK								0
			UN-Z					
With COl Select "BP/		" and abor	k indication		the following	conditions		Р
JEIECL BRA		and chec	k indication	as per		y conultons.		ſ
Monitor it	tem	C	ondition		Indication			
			Slightly depres	sed	ON			

Monitor item	C C	onation	Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
BIGARE SW2	Diake pedai	Fully released	OFF
-			

Without CONSULT

< DTC/CIRCUIT DIAGNOSIS >

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

ECM					х <i>а</i> и
Connector	+	-	C	Voltage (Approx.)	
Connector	Tern	ninal			(FF -)
E16	115	128	Brake pedal	Slightly depressed	Battery voltage
EIO	115	120	Diake peual	Fully released	0 V
s the inspe	ction resu	It normal?	-		

YES >> Check intermittent incident. Refer to <u>GI-41. "Intermittent Incident"</u>.

NO >> GO TO 7.

$\mathbf{3}$. 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	osition 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.

sition switch	-	Voltage
Terminal		
E86 3		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.
- 3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		-	_	
Brake pedal p	osition switch	EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E86	4	E16	116	Existed

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

Is the inspection result normal?

YES >> GO TO 6.



	• •	place error		•	S.				
CHECK BRA	AKE PED	AL POSIT	ION S	WITCH					
heck the bra	ke pedal	position a	witch.	Refer	to <u>EC-401</u> ,	, "Compon	ent Inspection	n <u>(Brake</u> P	edal Positic
<u>witch)"</u>		10							
the inspectio) of or to	CL 44	rmittant loc	oidopt"		
					GI-41, "Inte Refer to BI		loded View".		
.CHECK STO	•	• •							
. Turn ignitio			•=						
. Disconnect	t stop lam	np switch ha							
. Check the	voltage b	etween sto	p lamp	o switch	harness co	onnector an	id ground.		
						_			
	+				Voltage				
Connector	np switch Termi	nal	_		vollage				
E60	1	-	round	Ro#	tery voltage	_			
the inspectio			Junu	Dall	iery voliage	_			
•) TO 8.								
		trouble dia	ignosis	s for pov	wer supply o	circuit.			
			-						
			GROU	ND CIR	RCUIT				
CHECK STO	OP LAMP	SWITCH	GROU	ND CIR	RCUIT				
	OP LAMP	OFF.		ND CIR	RCUIT				
CHECK STO	OP LAMP	OFF.	ector.				and ECM har	ness conne	ector.
CHECK STO Turn ignitio Disconnect Check the	OP LAMP	OFF.	ector.				and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the	OP LAMP on switch (t ECM hai continuity	9 SWITCH (OFF. rness conn / between s	ector. stop lar		ch harness		and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the + Stop lamp s	OP LAMP on switch (t ECM hai continuity	9 SWITCH (OFF. rness conn 9 between s	ector. stop lar _ ECM	mp swit			and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the + Stop lamp s Connector	DP LAMP on switch (t ECM hai continuity witch	SWITCH (OFF. between s Connector	ector. stop lar _ ECM Te	mp swit	ch harness Continuity		and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the + Stop lamp s Connector E60	DP LAMP on switch (t ECM hai continuity witch Terminal 2	SWITCH (OFF. between s Connector E16	ECM	mp swite	ch harness Continuity Existed		and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the + Stop lamp s Connector E60 Also check	DP LAMP on switch (t ECM hai continuity witch Terminal 2 s harness	SWITCH (OFF. rness conn between s connector E16 for short to	ECM	mp swite	ch harness Continuity Existed		and ECM har	ness conne	ector.
CHECK STO Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio	DP LAMP on switch (t ECM hai continuity witch Terminal 2 t harness n result n	SWITCH (OFF. rness conn between s connector E16 for short to	ECM	mp swite	ch harness Continuity Existed		and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the + Stop lamp s Connector E60 Also check the inspectio YES >> GC	DP LAMP on switch (t ECM hai continuity witch Terminal 2 harness n result n D TO 9.	SWITCH (OFF. rness conn between s connector E16 for short to ormal?	ECM	mp swite erminal 115 nd and te	ch harness Continuity Existed o power.		and ECM har	ness conne	ector.
CHECK STC Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio YES >> GC	DP LAMP on switch (t ECM hai continuity witch Terminal 2 harness n result n D TO 9. pair or rej	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error	ECM	mp swite erminal 115 nd and te	ch harness Continuity Existed o power.		and ECM har	ness conne	ector.
CHECK STO Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio YES >> GO NO >> Re CHECK STO	DP LAMP on switch (t ECM hai continuity witch Terminal 2 harness <u>n result n</u> D TO 9. pair or rep DP LAMP	SWITCH (OFF. rness conn between s connector E16 for short to ormal? place error SWITCH	ECM	mp swite erminal 115 nd and to ted part	ch harness Continuity Existed o power.	connector			ector.
CHECK STO Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio YES >> GO NO >> Re CHECK STO	DP LAMP on switch of t ECM hai continuity witch Terminal 2 t harness <u>n result n</u> D TO 9. pair or rej DP LAMP lamp swi	SWITCH (OFF. rness conn between s connector E16 for short to ormal? place error SWITCH itch. Refer	ECM	mp swite erminal 115 nd and to ted part	ch harness Continuity Existed o power.	connector			ector.
CHECK STO Turn ignitio Disconnect Check the Stop lamp s Connector E60 Also check the inspectio YES >> GO NO >> Re CHECK STO heck the stop the inspectio	DP LAMP on switch (t ECM hai continuity witch Terminal 2 harness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi n result n	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error SWITCH itch. Refer ormal?	ector. stop lar ECM groun -detect	mp swite erminal 115 nd and to ted parts 402, "Co	ch harness Continuity Existed o power. s.	connector	(Stop Lamp Sv		ector.
CHECK STO Turn ignitio Disconnect Check the Stop lamp s Connector E60 Also check the inspectio YES >> GO NO >> Re CHECK STO heck the stop the inspectio YES >> Ch	DP LAMP on switch (t ECM hai continuity witch Terminal 2 harness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi <u>n result n</u> eck intern	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid	ector. stop lar ECM groun -detect to EC	mp swite erminal 115 nd and to ted parts 402, "Co Refer to	ch harness Continuity Existed o power. S. <u>omponent I</u> <u>GI-41, "Inte</u>	connector	(Stop Lamp Sv		ector.
CHECK STO Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio YES >> GC NO >> Re CHECK STO heck the stop the inspectio YES >> Ch CHECK STO	DP LAMP on switch (t ECM hai continuity witch Terminal 2 t harness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi <u>n result n</u> eck interri place stop	SWITCH (OFF. rness conn / between s / between s / Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid p lamp swi	ector. stop lar ECM groun -detect to EC- dent. Re	mp swite erminal 115 nd and te ted part 402, "Ce Refer to <u>B</u>	ch harness Continuity Existed o power. S. <u>omponent I</u> <u>GI-41, "Inte</u> <u>BR-23, "Exp</u>	connector	(Stop Lamp Sv	<u>witch)"</u> .	
CHECK STO Turn ignitio Disconnect Check the Stop lamp s Connector E60 Also check the inspectio YES >> GO NO >> Re CHECK STO heck the stop the inspectio YES >> Ch	DP LAMP on switch (t ECM hai continuity witch Terminal 2 t harness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi <u>n result n</u> eck interri place stop	SWITCH (OFF. rness conn / between s / between s / Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid p lamp swi	ector. stop lar ECM groun -detect to EC- dent. Re	mp swite erminal 115 nd and te ted part 402, "Ce Refer to <u>B</u>	ch harness Continuity Existed o power. S. <u>omponent I</u> <u>GI-41, "Inte</u> <u>BR-23, "Exp</u>	connector	(Stop Lamp Sv	<u>witch)"</u> .	ector.
CHECK STO Turn ignitio Disconnect Check the t Stop lamp s Connector E60 Also check the inspectio YES >> GC NO >> Re CHECK STO heck the stop the inspectio YES >> Ch CHECK STO	DP LAMP on switch of t ECM hai continuity witch Terminal 2 t harness n result n D TO 9. pair or rep DP LAMP lamp swi n result n eck interr place stop	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid p lamp swi tion (Bra	ector. stop lar ECM o groun -detect to EC dent. R tch. Re ke Pe	mp swite erminal 115 nd and to ted part 402, "Co Refer to B efer to B efer to B	ch harness Continuity Existed o power. s. <u>omponent I</u> <u>GI-41, "Inte</u> <u>BR-23, "Exp</u> Position S	connector	(Stop Lamp Sv	<u>witch)"</u> .	
CHECK STO Turn ignitio Disconnect Check the Check the Connector E60 Also check the inspectio YES >> GO CHECK STO heck the stop the inspectio YES >> Ch CHECK BRA	DP LAMP on switch (t ECM hai continuity witch Terminal 2 sharness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi <u>n result n</u> eck interr place stop Inspec AKE PED	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid p lamp swi tion (Bra PAL POSIT	ector. stop lar ECM o groun -detect to EC dent. R tch. Re ke Pe	mp swite erminal 115 nd and to ted part 402, "Co Refer to B efer to B efer to B	ch harness Continuity Existed o power. s. <u>omponent I</u> <u>GI-41, "Inte</u> <u>BR-23, "Exp</u> Position S	connector	(Stop Lamp Sv	<u>witch)"</u> .	
CHECK STO Turn ignitio Disconnect Check the Check the Connector E60 Also check the inspectio YES >> GO Also check the inspectio YES >> GO CHECK STO heck the stop CHECK STO STO Also >> Re CHECK BR/ CHECK BR/ Turn ignitio Disconnect	DP LAMP on switch of t ECM hai continuity witch Terminal 2 t harness <u>n result n</u> D TO 9. pair or rep DP LAMP lamp swi <u>n result n</u> eck interr place stop Inspec AKE PED on switch of t brake pe	SWITCH (OFF. rness conn between s between s Connector E16 for short to ormal? place error SWITCH itch. Refer ormal? mittent incid plamp swi tion (Bra OFF. edal positio	ector. stop lar ECM o groun -detect to EC- dent. R tch. Re ke Pe ION SV n harn	mp swite erminal 115 nd and to ted part 402, "Co efer to <u>B</u> efer to <u>B</u> edal P WITCH-	ch harness Continuity Existed o power. s. <u>omponent I</u> <u>GI-41, "Inte</u> <u>BR-23, "Exp</u> Position S -1	connector	(Stop Lamp Sv	<u>witch)"</u> .	INFOID:000000013475

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >

Brake pedal	position switch			
+	_	Con	dition	Continuity
Tern	ninals	*		
			Fully released	Existed
3	4	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	position switch				
+	_	Con	Condition		
Tern	ninals				
			Fully released	Existed	
3	4	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-23</u>, "Exploded View".

Component Inspection (Stop Lamp Switch)

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 lamp 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 lamp switch				
+	-	Condition		Continuity
Tern	ninals			
			Fully released	Not existed
1	2	Brake pedal	Slightly de- pressed	Existed

INFOID:000000013475540

< DTC/	CIRCUIT DIAGNOSIS >	[MRA8DE]
Is the ir	nspection result normal?	
YES	>> INSPECTION END	A
NO	>> Replace stop lamp switch. Refer to <u>BR-23, "Exploded View"</u> .	
		EC

G

Н

J

Κ

L

M

Ν

0

Ρ

< DTC/CIRCUIT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-51, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"</u> for ASCD functions.

DTC Logic

INFOID:000000012788173

[MRA8DE1

INFOID:000000012788172

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-172, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-332, "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-350, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ASCD VHL SPD SEN)	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (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-404, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to <u>TM-109, "CONSULT Function"</u>. Is DTC detected? INFOID:000000012788174

P1574 ASCD VEHICLE SPEED SENSOR

P1574 ASCD VEHICLE SPEED SENSOR	
< DTC/CIRCUIT DIAGNOSIS > [MRA	8DE]
 NO >> GO TO 2. YES >> Perform trouble shooting relevant to DTC indicated. 	٨
2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"	A
	ithout
Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-38, "CONSULT Function"</u> (w ICC) or <u>BRC-202, "CONSULT Function"</u> (with ICC).	EC
Is DTC detected?	
NO >> INSPECTION END	С
YES >> Perform trouble shooting relevant to DTC indicated.	
	D
	D
	E
	F
	G
	0
	Н
	J
	K
	Γ.
	L
	M
	Ν
	0
	Р

< DTC/CIRCUIT DIAGNOSIS >

P1574 ICC VEHICLE SPEED SENSOR

Description

INFOID:000000013475541

INFOID:000000013475542

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 ICC control. Refer to <u>CCS-14</u>, "INTELLIGENT CRUISE CONTROL : System Description" for ICC functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-172, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-332, "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-350, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ICC VHL SPD SEN)	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (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.

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.

3. Check DTC.

Is DTC detected?

- YES >> Proceed to <u>EC-406, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-109, "CONSULT Function".

Is DTC detected?

NO >> GO TO 2.

INFOID:000000013475543

[MRA8DE]

P1574 ICC VEHICLE SPEED SENSOR

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS > YES >> Perform trouble shooting relevant to DTC indicated. $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ "{\sf ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$ А Check DTC with ABS actuator and electric unit (control unit). Refer to <u>BRC-38</u>, "CONSULT Function" (without ICC) <u>BRC-202</u>, "CONSULT Function" (with ICC). EC Is DTC detected? NO >> INSPECTION END YES >> Perform trouble shooting relevant to DTC indicated. С D Ε F Н J Κ L Μ Ν Ο Ρ

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:000000012788176

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-173</u>, <u>"DTC Logic"</u>.
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352</u>.
 <u>"Diagnosis Procedure"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition		Possible cause
P1650 STR MTR RELAY 2 (Starter motor relay 2)	A	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 	
	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.

NOTE:

Before performing the following procedure, check that battery voltage is 12 V or more with ignition switch ON.

>> 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-409, "Diagnosis Procedure".

EC-408

INFOID:000000012788175

P1650 STARTER MOTOR RELAY 2

P1650 STARTER MOTOR RELAY 2	
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
NO >> GO TO 3.	
3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	A
With CONSULT	
CAUTION: Always drive at a safe speed.	EC
1. Start the engine.	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	С
 Turn ignition switch ON. Start the engine and warm it up to normal operating temperature. 	0
5. Turn ignition switch OFF.	
 6. Lift up drive wheels. 7. Turn ignition switch ON. 	D
8. Select "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.	
 Restart the engine and let it idle at least 10 seconds. Shift the selector lever to D position while depressing fully the brake pedal. 	E
11. Select 1 - 4 cylinders in "POWER BALANCE" and cut the fuel of all cylinders.	
12. Check 1st trip DTC. Without CONSULT	F
CAUTION:	F
Always drive at a safe speed.	
 Start the engine. Turn ignition switch OFF and wait at least 10 seconds. 	G
3. Turn ignition switch ON.	
 Start the engine and warm it up to normal operating temperature. Turn ignition switch OFF. 	Н
6. Lift up drive wheels.	
 Restart the engine and let it idle at least 10 seconds. 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.	.
 Disconnect vacuum hoses from intake manifold. Check 1st trip DTC. 	
<u>Is 1st trip DTC detected?</u>	J
YES >> Proceed to EC-409, "Diagnosis Procedure".	
NO >> INSPECTION END	K
Diagnosis Procedure	INFOID:000000012788177
1. CHECK SELF-DIAGNOSTIC RESULT IN BCM	
	L
Check self-diagnostic result in BCM.	
Are any DTC detected?	M
YES >> Check the DTC. Refer to <u>BCS-50, "DTC Index"</u> (with intelligent key), <u>BCS-115.</u>	"DTC Index"
(without intelligent key). NO >> GO TO 2.	Ν
2.CHECK SELF-DIAGNOSTIC RESULT IN IPDM E/R	
With CONSULT	
Check self-diagnostic result in IPDM E/R.	0
Are any DTC detected?	la de la culta de la
YES >> Check the DTC. Refer to <u>PCS-20, "DTC Index"</u> (with intelligent key), <u>PCS-48, "DTC</u> out intelligent key).	<u>Index"</u> (with-
NO >> GO TO 3.	
3. CHECK STARTER RELAY POWER SUPPLY CIRCUIT	
Check the starter motor relay power supply circuit. Refer to <u>PCS-30</u> , "Diagnosis Procedure" (w	vith intelligent
key), or <u>PCS-59, "Diagnosis Procedure"</u> (without intelligent key).	

Is the inspection result normal?

P1650 STARTER MOTOR RELAY 2

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.

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.

	+	-	_	
IPDN	/I 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-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to <u>PCS-31. "Removal and Installation"</u> (with intelligent key) or <u>PCS-60.</u> <u>"Removal and Installation"</u> (without intelligent key).
- 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:000000012788179

DTC DETECTION LOGIC

NOTE:

- If DTC P1651 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-173</u>, <u>"DTC Logic"</u>.
- If DTC P1651 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	ŀ
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.

NOTE:

Before performing the following procedure, check that battery voltage is 12 V or more with ignition switch ON.

>> 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 let it idle at least 30 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to <u>EC-411, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Check the starter motor operation. Is the starter motor operated?

YES >> GO TO 3.

INFOID:000000012788180

INFOID:000000012788178

А

EC

С

D

L

Μ

Ν

P1651 STARTER MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

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-39, "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	СМ	IPDM E/R		Continuity
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-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-31. "Removal and Installation"</u> (with intelligent key) or <u>PCS-60.</u> <u>"Removal and Installation"</u> (without intelligent key).

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:000000012788182

DTC DETECTION LOGIC

NOTE:

- If DTC P1652 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to <u>EC-173</u>, <u>"DTC Logic"</u>.
- If DTC P1652 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to <u>EC-352</u>, <u>"DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	Н
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	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following proc	edure
before conducting the next test.	
1. Turn ignition switch OFF and wait at least 10 seconds.	
2 Turn ignition switch ON	

- 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.

- Start the engine and wait at least 5 minutes.
 Repeat step 1 and 2 for 20 times.
- 4. Check DTC.

4. Check DTC.

Is DTC detected?

YES >> Proceed to <u>EC-413, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK SELF-DIAGNOSTIC RESULT IN BCM

With CONSULT

Check self-diagnostic result in BCM.

Are any DTC detected?

YES >> Check the DTC. Refer to <u>BCS-50, "DTC Index"</u> (with intelligent key), <u>BCS-115, "DTC Index"</u> (without intelligent key).

NO >> GO TO 2.

INFOID:000000012788183

INFOID:000000012788181

А

EC

С

D

M

Ν

Ρ

P1652 STARTER MOTOR SYSTEM COMM

< DTC/CIRCUIT DIAGNOSIS >

 $\overline{2.\text{check}}$ self-diagnostic result in IPDM e/R

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 <u>EC-413, "DTC Logic"</u>.
- 3. Check DTC.

Is the P1652 displayed again?

YES >> GO TO 4.

NO >> INSPECTION END

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to <u>PCS-31, "Removal and Installation"</u> (with Intelligent key) or <u>PCS-60,</u> <u>"Removal and Installation"</u> (without intelligent key).
- 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-279, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-282, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-350, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer F to EC-352, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause	G
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 	H

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-415, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-109, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

INFOID:000000012788186

INFOID:000000012788184

INFOID:000000012788185

D

Е

Κ

L

M

Ν

P

< DTC/CIRCUIT DIAGNOSIS >

2.REPLACE TCM

Replace TCM. Refer to TM-266, "Removal and Installation".

>> INSPECTION END

P1800 INTAKE MANIFOLD TUNING VALVE

< DTC/CIRCUIT DIAGNOSIS >

P1800 INTAKE MANIFOLD TUNING VALVE

DTC Logic

А

INFOID:000000012788187

[MRA8DE]

DTC No.		screen terms gnosis content)		DTC detecting condition	Possible cause
P1800	VIAS S/V-1 (Variable intak trol solenoid va	e air system con- alve-1)		ssively low or high voltage signal ECM through the intake manifold llve.	 Harness or connectors (The solenoid valve 1 circuit is open or shorted.) Intake manifold tuning valve
		N PROCEDU	RE		
	TIONING	andura han h		augly conducted always a	erform the following before conduct-
ng the nex	kt test.				
	gnition switch	OFF and wait ON.	t at least	10 seconds.	
	gnition switch	OFF and wait	t at least	10 seconds.	
			ocedure,	confirm battery voltage is	s more than 11 V at idle.
>	> GO TO 2.				
		NFIRMATION	PROCE	DURE	
				operating temperature. [mo	
	1st trip DTC		(engine s	speed: less than 1,000 rpm)
	DTC detected	<u>l?</u> _ <u>EC-417, "Diac</u>	nnocie Dr	acadura"	
		LU^{-4} 1 / . Uld		<u>JCedure</u> .	
	> INSPECTIO				
NO >		ON END			INFOID:000000012788188
NO >)iagnos	> INSPECTION is Procedu	DN END J re	ING VAL\	/E MOTOR POWER SUPP	
NO > Diagnos .CHECk	> INSPECTIC is Procedu (INTAKE MA gnition switch	ON END J re NIFOLD TUN ON.			
NO > Viagnos .CHECk	> INSPECTIC is Procedu (INTAKE MA gnition switch	ON END J re NIFOLD TUN			
NO >)iagnos .CHECk	> INSPECTION is Procedual (INTAKE MA gnition switch the voltage b	ON END J re NIFOLD TUN ON.			
NO > Diagnos .CHECk . Turn ię . Check	> INSPECTION is Procedu (INTAKE MA) (INTAKE MA) (INTAK	ON END JIE NIFOLD TUN ON. Detween ECM	harness		
NO > liagnos .CHECk . Turn ių . Check Connector	> INSPECTION is Procedual (INTAKE MA gnition switch the voltage b EC + Terminal	ON END JIE NIFOLD TUN ON. Detween ECM	harness Terminal	Connector. Voltage	
NO > iagnos .CHECk . Turn ių . Check Connector F24	> INSPECTION IS Procedu INTAKE MA IN	ON END JIE NIFOLD TUN ON. Detween ECM	harness	connector.	
NO > iagnos .CHECk . Turn ig Check Connector F24 the insp YES >	INSPECTION INSPECTION is Procedual (INTAKE MA (INTAKE	ON END JIE NIFOLD TUN ON. Detween ECM	harness Terminal	Connector. Voltage	
NO > Viagnos .CHECk . Turn ių . Check Connector F24 s the insp YES > NO >	> INSPECTION INSPECTION INTAKE MA Control Switch Contrel	ON END Jre NIFOLD TUN ON. Detween ECM CM Connector E16 normal?	harness Terminal 128	Connector. Voltage	LY

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

	+		_	
E	СМ	IPDN	ME/R	Continuity
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.

	+		_	
	ld tuning valve otor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
	1		5	Existed
F56	I	F24	7	Not existed
1 30	2	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-418</u>, "Component Inspection (Intake Manifold Tuning Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> Replace intake manifold assembly. Refer to <u>EM-27</u>, "Removal and Installation".

Component Inspection (Intake Manifold Tuning Valve)

INFOID:000000012788189

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.

r	
_	Resistance (Approx.)
2	3 - 8 Ω [at 25°C (77°F)]
	2

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

DTC DETECTION LOGIC

DTC Logic

А

EC

INFOID:000000013469625

[MRA8DE]

		screen terms gnosis content)	DTC detect	ting condition	Possi	ible cause
P1805	BRAKE SW (Brake swit		Stop lamp signal is not tremely long time while		 Harness or cont (Stop lamp switt shorted.) Stop lamp switt 	ch circuit is open or
		ON PROCED				
1. PERFOF	RM DTC C	ONFIRMATIC	N PROCEDURE			
NOTE: Since this D)TC is diffi	cult to be conf	irmed, check comp	onent function to it	idge the normality	/
>>	Proceed	o <u>EC-419, "Co</u>	omponent Function	<u>Check"</u> .		
Compone	ent Fund	tion Check				INFOID:000000013469626
1.снеск	BRAKE S	WITCH FUNC	TION			
9		- screen, seled	ct "ENGINE" >> "D/		"BRAKE SW 2".	
	OTODIA					
	"STOP LA	MP SW" indic	ation under the follo	owing conditions.		
			ation under the follo	owing conditions.		
2. Check ' Monitor i	tem	Co				
2. Check	tem		ndition	Indication		
2. Check ' Monitor i STOP LAMP	tem SW Br.	Co ake pedal	ndition Slightly depressed	Indication ON		
2. Check ' Monitor i STOP LAMP Without (1. Turn igi	tem SW Bra CONSULT nition swite	Co ake pedal ch ON.	ndition Slightly depressed	Indication ON OFF	the following cond	ditions.
2. Check ' Monitor i STOP LAMP Without (1. Turn igi	tem SW Bra CONSULT nition swite	Co ake pedal ch ON.	ndition Slightly depressed Fully released	Indication ON OFF	the following cond	ditions.
2. Check ' Monitor i STOP LAMP Without (1. Turn igi	tem SW Br CONSULT nition swite the voltage ECM	Co ake pedal ch ON.	ndition Slightly depressed Fully released M harness connect	Indication ON OFF	-	ditions.
2. Check ' Monitor i STOP LAMP Without (1. Turn igi	tem SW Brack CONSULT nition swite the voltage ECM +	Co ake pedal ch ON. e between EC	ndition Slightly depressed Fully released M harness connect	Indication ON OFF	the following cond	ditions.
2. Check Monitor i STOP LAMP Without C 1. Turn igi 2. Check	tem SW Br CONSULT nition swite the voltage ECM	Co ake pedal ch ON. e between EC	ndition Slightly depressed Fully released M harness connect	Indication ON OFF	Voltage (Approx.)	ditions.
2. Check Monitor i STOP LAMP Without C 1. Turn igi 2. Check	tem SW Brack CONSULT nition swite the voltage ECM +	Co ake pedal ch ON. e between EC	ndition Slightly depressed Fully released M harness connect	Indication ON OFF	Voltage	ditions.
2. Check Monitor i STOP LAMP Without C 1. Turn igi 2. Check Connector	tem SW Brite CONSULT nition swite the voltage ECM + Termina 115	Co ake pedal ch ON. e between EC - I Terminal 128	ndition Slightly depressed Fully released M harness connect Cor	Indication ON OFF For terminals under	Voltage (Approx.) Battery voltage	ditions.
2. Check Monitor i STOP LAMP Without C 1. Turn igi 2. Check f Connector E16 Sthe inspe YES >>	tem SW Brack CONSULT nition switce the voltage ECM + Termina 115 ction resulter INSPECT	Co ake pedal ch ON. between EC 	ndition Slightly depressed Fully released M harness connect Cor Brake pedal	Indication ON OFF For terminals under ndition Slightly depressed Fully released	Voltage (Approx.) Battery voltage	ditions.
2. Check Monitor i STOP LAMP Without C 1. Turn igi 2. Check f Connector E16 Sthe inspe YES >>	tem SW Brack CONSULT nition switce the voltage ECM + Termina 115 ction resulter INSPECT	Co ake pedal ch ON. between EC 	ndition Slightly depressed Fully released M harness connect Cor	Indication ON OFF For terminals under ndition Slightly depressed Fully released	Voltage (Approx.) Battery voltage	ditions.

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

Ρ

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	Stop lamp switch		Voltage
Connector	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 blowing.
- 3. Check the continuity between stop lamp switch harness connector and fuse terminal.

	+		
Stop lan	Stop lamp 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-421, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace stop lamp switch. Refer to <u>BR-23, "Exploded View"</u>.

5.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 I	amp switch	E	СМ	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 GI-41, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection (Stop Lamp Switch)

INFOID:000000013469628

[MRA8DE]

А

EC

F

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	Brake pedal	Fully released	Not existed	
1	2	Diake pedai	Slightly depressed	Existed	
o inenor	tion result r	ormal?			

Is the inspection result normal?

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

NU >> GU I

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			
+	+ – Condition			Continuity
Term	ninals			
1	2	Brake pedal	Fully released	Not existed
I	2	Brake pedal Slightly depressed		Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-23. "Exploded View"</u>.

J

Κ

L

Μ

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Logic

INFOID:000000012788194

[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 <u>EC-422</u>, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788195

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR POWER SUPPLY

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

+ -				Voltage
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/CIRC		NOSIS >			[MRAðDE]
2.снески	NTAKE MAN	NIFOLD RUN	INER CON	TROL VALVE	MOTOR POWER SUPPLY CIRCUIT
1. Turn igr 2. Disconn	nition switch lect ECM ha	OFF. rness conne	ctor.		
		R harness co between EC		connector a	nd IPDM E/R harness connector.
	+	-	_		
E	CM	IPDN	/IE/R	Continuity	
Connector	Terminal	Connector	Terminal	_	
F25	50	E45	26	Existed	
. Also che	eck harness	for short to g	round.		
	<u>ction result n</u>				
		trouble diagi place error-d		wer supply ci	rcuit.
•	•	•	•		MOTOR OUTPUT SIGNAL CIRCUIT
					irness connector.
					ontrol valve motor harness connector and ECM
harness	connector.	•			
	+	-	-	_	
	ld runner con- /e motor	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal	_	
	1	49	Not existed		
F1	I	F25	51	Existed	
	2		49	Existed	
	2		51	Not existed	
		for short to g	round and	to power.	
	ction result n	ormal?			
	GO TO 4. Repair or re	place error-d	etected par	ts	
	•	•	•	trol valve	MOTOR
					o EC-423, "Component Inspection".
	ction result n				<u>5 EC-423. Component inspection</u> .
			nt. Refer to	GI-41. "Inter	mittent Incident".
					27. "Removal and Installation".
ompone	nt Inspec	tion			INFOID:000000012788196
.CHECK I	NTAKE MAN		INER CON	TROL VALVE	
With CO	NSULT				
. Turn igr	ition switch			и т	
		TOR" mode v OLANT TEM			–7°C (19°F) to 60°C (140°F).
lf not, c	ool engine d	own or warm	n engine up	until "COOL	ANT TEMP/S" indicates between $-7^{\circ}C$ (19°F) to
		go to the foll rator pedal a			ABLE POS SEN" indicates between 2.8 V to 4.1
V.					
	s accelerator st trip DTC.	pedal and n	hake sure th	nat "TUMBLE	POS SEN" indicates between 0.2 V to 1.4 V.
6. Check 1					

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.)
Term	ninals	
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:000000012788197

А

EC

J

Κ

L

Ρ

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-355, "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 	G
P2018	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/ switch circuit intermittent bank 1)	sor is sent to ECM.		Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

 Start engine and let it idle for 10 seconds. Check 1st trip DTC. 	M
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-425, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Diagnosis Procedure	
1. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY	0

- 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.

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

Intake manifold			
Connector	+	-	Voltage (Approx.)
Connector	Terr		
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-460, "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	CM				
Connector	Terminal	1			
F24	12				
1 24	16	Ground	Existed		
F25	52	Giouna			
E16	128	-			

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "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.
- 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]

DTC/CIRC	UIT DIAGNO	OSIS >			[MRA8DE]
	L.	_		1	
take manifold	manifold runner control		Continuity		
Connector	Terminal	Connector	Terminal	-	
F29	3	F25	92	Existed	
	ck harness fo		wer.	<u>.</u>	
	GO TO 6. Repair or repla	ace error-det	octod narte		
					E POSITION SENSOR INPUT SIGNAL CIRCUIT
. Check the		etween intak			trol valve position sensor harness connector and
	ŀ	-			
Intake manifold valve posit		EC	М	Continuity	
Connector	Terminal	Connector	Terminal		
F29	2	F25	83	Existed	
YES >> G NO >> R	<u>ion result nor</u> GO TO 7. Repair or repla	ace error-det	•	S.	
	ITERMITTEN		Γ		
	1. "Intermitter ion result nor				
YES >> R	Replace intak	e manifold as			27, "Removal and Installation".
NO >> R	Repair or repla	ace error-det	ected parts	S.	

< DTC/CIRCUIT DIAGNOSIS >

P2096, P2097 A/F SENSOR 1

DTC Logic

INFOID:000000012788199

[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-146, "Description".
- 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-428, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788200

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> "Exploded View".

>> GO TO 3.

P2096, P2097 A/F SENSOR 1

< DTC/CIRC	UIT DIAGI		2000,17		[MRA8DE]
3. CHECK F	OR EXHAL	JST GAS LE	AK		
	ine and rur		oforo the th		vet 2
 Listen for s exhaust ga 		-		nree way catal	ysi 2.
YES >> F		place malfur	nctioning pa	arts.	
1. CHECK F		E AIR LEAK			
	ct A/F sensine and rur	sor 1 harness	s connecto	r.	
B. Listen fo	r an intake	air leak after	the mass a	air flow senso	r.
<u>s intake air le</u>				- 4.	
NO >> (GO TO 5.	place malfur	•		
				NING VALUE	
		tio self-learn ast 10 minut			46. "Description".
s the 1st trip	DTC P017	<u>'1 or P0172 c</u>	detected? Is	s it difficult to	start engine?
	Perform tro		is for DTC	; P0171 or P0	0172. Refer to <u>EC-248, "DTC Logic"</u> or <u>EC-252,</u>
	BO TO 6.				
.СНЕСКА	/F SENSO	R 1 POWER	SUPPLY		
. Turn igni	tion switch	OFF.			
2. Disconne	ect A/F sen	sor 1 harnes	s connecto	or.	
	tion switch e voltage b		sensor 1 ha	arness conneo	ctor and ground.
	_				
A (F	+				
-	sensor 1 Term	incl	-	Voltage	
Connector F12 ^{*1}	lenn				-
F12 ⁺ F42 ^{*2}	4	G	Ground	Battery voltage	
*1: Exce *2: For C	ot California	a			•
s the inspect		normal?			
	GO TO 8.				
_	GO TO 7.				
.CHECK A	/F SENSO	R 1 POWER	SUPPLY (CIRCUIT	
	tion switch		opporter		
		/R harness c y between A/		harness conr	nector and IPDM E/R harness connector.
+		-	-	0	
A/F ser		IPDN Connector	1	Continuity	
Connector	Terminal	Connector	Terminal		
F12 ^{*1} F42 ^{*2}	4	E45	26	Existed	
*1. Evco	ot Californi				

*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 sensor 1		ECM		Continuity
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	Ground	NOL EXISTED

*1: Except California

*2: For California

	+		
E	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 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-181, "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-226, "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-41, "Intermittent Incident".

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
YES >> GO TO 12.	
NO >> Repair or replace error-detected parts.	ŀ
12.REPLACE AIR FUEL RATIO (A/F) SENSOR 1	
Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".	E
CAUTION: • Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 i	
surface such as a concrete floor; use a new one.	n) onto a naru
 Before installing new sensor, clean exhaust system threads using Oxygen Sensor T [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricar service tool). 	
Do you have CONSULT?	Γ
YES >> GO TO 13.	
NO >> GO TO 14.	
13.CONFIRM A/F ADJUSTMENT DATA	E
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.	
Is "0.000" displayed?	
YES >> INSPECTION END	(
NO >> GO TO 14.	
14.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	ŀ
Clear the mixture ratio self-learning value. Refer to <u>EC-146, "Description"</u> .	
Do you have CONSULT?	
YES >> GO TO 15. NO >> INSPECTION END	
15.CONFIRM A/F ADJUSTMENT DATA	
With CONSULT	
1. Turn ignition switch ON.	
2. Select "A/F ADJ-B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.	1
3. Make sure that "0.000" is displayed on CONSULT screen.	ł
>> INSPECTION END	
	l
	Ν
	11
	١
	(
	F

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:000000012788201

[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.
- Check DTC.

Is DTC detected?

YES >> Proceed to EC-432, "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-432, "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.

		+	_		
-		Voltage			
-	Connector	Terminal	Connector	Terminal	
-	F24	21	E16	128	Battery voltage

INFOID:000000012788202

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRC		•	INKUI			[MRA8DE]
Is the inspec						
	GO TO 3.	<u>orman.</u>				A
	GO TO 2.					
2. CHECK T	HROTTLE		IOTOR RE	LAY POWER SUPPL	Y CIRCUIT	50
1. Disconn	ect ECM ha	rness conne	ctor.			EC
		R harness co				
3. Check the	ne continuity	between EC	IM harness	connector and IPDN	I E/R harness connector	C
	F		_	<u> </u>		
-	CM	IPDA	1 E/R	Continuity		_
Connector	Terminal	Connector	Terminal	Continuity		D
F24	21	E43	16	Existed		
		-	-	LAISteu		E
4. Also che ls the inspec		for short to g	rouna.			
-			nosis for no	wer supply circuit.		
		place error-d				F
•	•	•	•	LAY INPUT SIGNAL		
					er the following conditio	
	Shage betwe			cion ana ground as p		ns. G
	E	СМ				Н
	F	-	_	Condition	Voltage	
Connector	Terminal	Connector	Terminal		(Approx.)	
				Ignition switch: OFF	0 V	I
F24	2	E16	128	Ignition switch: ON	Battery voltage	
Is the inspec	tion result n	ormal?		Ŭ	, ,	J
			nt. Refer to	GI-41, "Intermittent I	ncident".	
	GO TO 4.					
4. CHECK T	HROTTLE		IOTOR RE	LAY INPUT SIGNAL	CIRCUIT	K
1. Turn ign	ition switch	OFF.				
2. Disconn	ect ECM ha	rness conne				I
		R harness co		connector and IPDM	1 E/R harness connector	
4. Check li	le continuity					•
	÷	_	_			M
EC	CM	IPDN	1 E/R	Continuity		
Connector	Terminal	Connector	Terminal			N
F24	2	E43	11	Existed		Ν
		for short to g				
Is the inspec		-				0
· · · · · · · · · · · · · · · · · · ·			nt. Refer to	GI-41, "Intermittent I	ncident".	
		place error-d			<u> </u>	
						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 <u>EC-432, "DTC Logic"</u>.
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to <u>EC-439, "DTC Logic"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		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.

- 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 when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Proceed to <u>EC-434, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788204

1. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

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

	E	СМ				
+		-		Condition	Voltage (Approx.)	
Connector	Terminal	Connector	Terminal			
F24	2	E16	128	Ignition switch: OFF	0 V	
1 24	2	2 E10	120	Ignition switch: ON	Battery voltage	

Is the inspection result normal?

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

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

-						
2.CHECK	THROTTLE		IOTOR REL	AY INPUT SIG	NAL CIRCUIT	А
 Disconn Disconn 	ect IPDM E	rness conne /R harness c	onnector.	connector and	PDM E/R harness connector.	EC
	+		_			
	CM	IPDN	I E/R	Continuity		С
Connector	Terminal	Connector	Terminal	e e r i i i i i i i i i i i i i i i i i		
F24	2	E43	11	Existed		D
5. Also che	eck harness	for short to g	round and t	o power.		
Is the inspec	ction result n	ormal?				F
	GO TO 3.					E
•	•	place error-d				
					JPPLY CIRCUIT	F
1. Check t	he continuity	between EC	CM harness	connector and	PDM E/R harness connector.	
	+		_			G
	CM	IPDN	I E/R	Continuity		0
Connector	Terminal	Connector	Terminal			
F24	21	E43	16	Existed		Н
2. Also che	eck harness	for short to g	round.	I		
Is the inspec	ction result n	ormal?				
				ver supply circu	it.	
	•	place error-d	•			1
				FPUT SIGNAL		0
	nition switch lect electric t		ol actuator h	arness connect	or.	
3. Disconn	ect ECM ha	rness conne	ctor.			Κ
4. Check t nector.	he continuity	/ between el	ectric throttle	e control actuat	or harness connector and ECM harness con-	
						L
	+	-	_			
	e control actu-	E	CM	Continuity		M
	tor To make al					IVI
Connector	Terminal	Connector	Terminal 3	Not existed		
	5		1	Existed		Ν
F7		F24	3	Existed		
	6		1	Not existed		0
5. Also che	eck harness	for short to g			•	<u> </u>
Is the inspec		-				_
	GO TO 5.					Ρ
_	•	place error-d				
-				CTUATOR VIS		
1. Remove	e the intake a	air duct. Refe	er to <u>EM-25,</u>	"Exploded Viev	<u>/"</u> .	

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

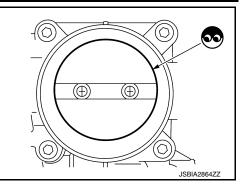
< DTC/CIRCUIT DIAGNOSIS >

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-143</u>, "<u>Description</u>".



6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to <u>EC-438</u>, "Component Inspection (Throttle Control Motor)". Is the inspection result normal?

- YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.
- NO >> Replace electric throttle control actuator. Refer to EM-27, "Removal and Installation".

Component Inspection (Throttle Control Motor)

INFOID:000000012788205

[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.)		
Term	ninals				
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

А

EC

INFOID:000000012788206

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT scree (Trouble diagnor 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.	een (T • Ele	arness or connectors hrottle control motor circuit is shorted.) ectric throttle control actuator hrottle control motor)
DTC CON	FIRMATION	PROCED	URE			
1.PRECO	NDITIONING					
before cond 1. Turn igi	nfirmation Pro lucting the ne nition switch (nition switch (ext test. OFF and wa	·		l, always p	erform the following procedure
U U	nition switch (ait at least 10	seconds.		
~~	GO TO 2.					
-	RM DTC CON	FIRMATIO	N PROCEDL	JRE		
	nition switch (
	ngine and let i					
Is DTC dete						
	Proceed to E		agnosis Proc	<u>edure"</u> .		
	s Procedur					
						INFOID:000000012788207
1.CHECK	THROTTLE (CONTROL	MOTOR OUT	FPUT SIGNAL CI	RCUIT	
	nition switch (nect electric tl		rol actuator h	arness connector		
3. Disconr	nect ECM har	ness conne	ector.			
4. Check the nector.	the continuity	Detween e		e control actuator	namess co	nnector and ECM harness con-
	+		_			
	tle control actu- ator	E	CM	Continuity		
Connector	Terminal	Connector	Terminal			
	5		3	Not existed		
F7		F24	1	Existed		
	6		3	Existed		
	1		1	Not existed		

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

1

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

Not existed

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

2. CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to <u>EC-438</u>, "Component Inspection (Throttle Control Motor)". Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

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

Component Inspection (Throttle Control Motor)

INFOID:000000012788208

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		Oradition		Resistance	
+	_	Condition	(Approx.)		
Term	ninals				
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:000000012788209

[MRA8DE]

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)		DTC detecting condition	Possible cause			
	ETC ACTR-B1	А	A 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.	Electric throttle control actuator			
C ECM detect the throttle valve is stuck open.							
1 .PRECON If DTC Cor before cond	ucting the next test.	has	JRE been previously conducted, always pe t at least 10 seconds.	rform the following procedure			
2. Turn igr	nition switch ON.		t at least 10 seconds.				
-	GO TO 2.						
			PROCEDURE FOR MALFUNCTION A	AND B			
2. Set sele) or 1	at least 1 second. 1st (M/T) position and wait at least 3 seco Neutral (M/T) position.	nds.			
4. Turn igr	nition switch OFF and	wai	t at least 10 seconds.				
6. Set sele) or 1	1st (M/T) position and wait at least 3 seco	nds.			
	nition switch OFF, wai		Neutral (M/T) position. least 10 seconds and then turn ON.				
Is DTC dete							
	Proceed to <u>EC-439,</u> GO TO 3.	"Dia	<u>gnosis Procedure"</u> .				
•		NOI	PROCEDURE FOR MALFUNCTION C				
 Set sele Set sele 	ector lever to P (CVT)	or î	1st (M/T) position and wait at least 3 seco Neutral (M/T) position.	nds.			
Is DTC dete							
YES >>	Proceed to <u>EC-439,</u> INSPECTION END	"Dia	gnosis Procedure".				
Diagnosis	s Procedure			INFOID:000000012788210			
1. CHECK	ELECTRIC THROTT	LE C	CONTROL ACTUATOR VISUALLY				
1. Remove	e the intake air duct. I	Refe	r to <u>EM-25, "Exploded View"</u> .				

А

EC

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

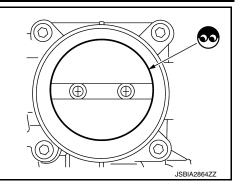
< DTC/CIRCUIT DIAGNOSIS >

[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 EC-143, "Description".



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 EC-355, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis con- tent)	DTC detecting condition	Possible cause			
P2122	APP SEN 1/CIRC (Throttle/Pedal position sensor/switch "D" circuit An excessively low voltage from the APP sensor 1 is sent to ECM. • Harness or connectors (APP sensor 1 circuit is open circuit)		 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 PROCEI	DURE				
1.PRECO	NDITIONING					
	nfirmation Procedure h ducting the next test.	as been previously conducted, alw	ays perform the following procedure			
I. Turn ig 2. Turn ig 3. Turn ig F ESTING (nition switch OFF and v nition switch ON. nition switch OFF and v CONDITION:	vait at least 10 seconds. vait at least 10 seconds.				
setore per	torming the following	procedure, confirm that battery vo	itage is more than 8 V at idle.			
~	• GO TO 2.					
	RM DTC CONFIRMATIO					
. Start er 2. Check	ngine and let it idle for 1 DTC.	secona.				
s DTC dete						
	Proceed to <u>EC-441, "E</u> INSPECTION END	Diagnosis Procedure".				
Diagnosis Procedure						
1.снеск	APP SENSOR 1 POW	ER SUPPLY				
	nition switch OFF.	position (APP) sensor harness conne				

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

	+		
APP	sensor	_	Voltage (Approx.)
Connector	Terminal		(
E12	4	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. А

С



Ο

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

$\overline{2.}$ 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	E	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 :	sensor	E	Continuity	
_	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-442, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "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.

^{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	Accelerator pedal	Fully released	0.6 - 0.9 V	
E16				Fully depressed	3.9 - 4.7 V	
E 10		120	Accelerator pedal	Fully released	0.3 - 0.6 V	
	119			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>.

EC

С

D

Е

F

G

Н

J

Κ

L

Μ

Ν

Ο

Ρ

А

[MRA8DE]

< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

DTC Logic

[MRA8DE]

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.	 ACCELETATO PEGAT 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-444, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788215

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	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-460, "Diagnosis Procedure".

EC-444

P2127, P2128 APP SENSOR

		Г	~~!~/, ГС	120 AFF	JENJUK			
< DTC/CIRC		NOSIS >					[MRA8DE]	
Is the inspec	ction result n	ormal?						
YES >>	Perform the	trouble diag	nosis for pov	ver supply ci	rcuit.			А
•	•		letected parts	S.				
3.CHECK A	APP SENSC	R 2 GROUN	ID CIRCUIT					EC
	nition switch							EC
		rness conne			otor and ECM h	arness connector		
J. CHECK I		Delween Ar					•	С
·	+		_					
APP s	sensor	E	СМ	Continuity				D
Connector	Terminal	Connector	Terminal	5				D
E12	1	E16	120	Existed				
4. Also che	eck harness	for short to r						Ε
Is the inspec								
-	GO TO 4.							_
NO >>	Repair or re	place error-c	letected parts	S.				F
4.CHECK A	APP SENSC	R 2 INPUT	SIGNAL CIR	CUIT				
1. Check tl	he continuity	v between Al	PP sensor ha	arness conne	ector and ECM h	arness connector		G
	+		-					
APP s	sensor	E	СМ	Continuity				Н
Connector	Terminal	Connector	Terminal					
E12	6	E16	119	Existed				1
2. Also che	eck harness	for short to g	ground and to	o power.				
Is the inspec		ormal?						
-	GO TO 5.			_				J
-	-	-	letected parts	S.				
5.CHECK								K
			<u>, "Componer</u>	nt Inspection	(APP Sensor)".			
Is the inspec								
					mittent Incident"	and Installation"		L
	•	•						
Compone	in inspec		Sensor)				INFOID:000000012788216	M
1.CHECK A	ACCELERAT	FOR PEDAL	POSITION S	SENSOR				IVI
	nition switch							
2. Reconn	ect all harne	ss connecto	rs disconnec	ted.				Ν
	he waltage h		l harmana an	nn a atar tarm	incle on parths	following conditio	2	
4. Check tl	ne voltage b		i namess co	nnector term	inais as per the	following conditio	n.	0
	ECM							0
	+	_		Condition		Voltage		
Connector		minal		Condition		Voltage		Ρ
Terminal Fully released 0.6 - 0.9 V								
	126	127			Fully released	3.9 - 4.7 V		
E16			Accelerator pe	edal	Fully depressed	3.9 - 4.7 V		

Is the inspection result normal?

119

120

E16

Fully released

Fully depressed

0.3 - 0.6 V

1.95 - 2.4 V

Accelerator pedal

< 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

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-355, "DTC Logic"</u>.

DTC No.	CONSULT scre (Trouble diagno tent)		DTC detecting condition	Possible cause	
P2135	TP SENSOR-B (Throttle/Pedal sensor/switch "/ voltage correlat	SOR-B1 /Pedal position witch "A" / "B" Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2			
TC CON	FIRMATION	PROCE	DURE		
1.PRECO	NDITIONING				
pefore cond 1. Turn ig 2. Turn ig	ducting the nex nition switch C nition switch C	xt test. DFF and DN.	has been previously conducted, al wait at least 10 seconds. wait at least 10 seconds.	ways perform the following procedure	
TESTING C	CONDITION:			roltage is more than 9 V at idle	
setore per	forming the f	ollowing	g procedure, confirm that battery v	voltage is more than 8 v at idle.	
-	• GO TO 2.				
_		IFIRMAT	ION PROCEDURE		
2.PERFOR	RM DTC CON				
2.PERFOR 1. Start er 2. Check <u>s DTC dete</u> YES >>	RM DTC CON ngine and let if DTC. <u>ected?</u>	t idle for			
2.PERFOR 1. Start er 2. Check <u>s DTC dete</u> YES >> NO >>	RM DTC CON ngine and let if DTC. ected? Proceed to <u>E</u>	t idle for <u>C-447, "</u> N END	1 second.	INFOID:000000012788218	
2.PERFOR 1. Start er 2. Check <u>s DTC dete</u> YES >> NO >> Diagnosi	RM DTC CON ngine and let if DTC. ected? Proceed to E INSPECTION s Procedur	t idle for <u>C-447, "</u> N END ' e	1 second. Diagnosis Procedure".	INFOID:000000012788218	
2.PERFOR 1. Start er 2. Check 1 <u>s DTC dete</u> YES >> NO >> Diagnosis 1.CHECK	RM DTC CON ngine and let if DTC. ected? Proceed to <u>E</u> INSPECTION S Procedur THROTTLE F	t idle for <u>C-447, "</u> N END r e POSITIO	1 second.	INFOID:000000012788218	
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon	RM DTC CON ngine and let if DTC. ected? Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc	1 second. Diagnosis Procedure".	INFOID:000000012788218	
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	RM DTC CON ngine and let if DTC. ected? Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th nition switch C	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc DN.	1 second. Diagnosis Procedure". N SENSOR POWER SUPPLY		
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig	RM DTC CON ngine and let it DTC. ected? Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th nition switch C the voltage be	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc DN.	1 second. Diagnosis Procedure". N SENSOR POWER SUPPLY ontrol actuator harness connector.		
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check	RM DTC CON ngine and let if DTC. ected? Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th nition switch C the voltage be +	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc DN.	1 second. Diagnosis Procedure". N SENSOR POWER SUPPLY ontrol actuator harness connector. lectric throttle control actuator harne		
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check Electric throt	RM DTC CON ngine and let it DTC. ected? Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th nition switch C the voltage be	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc DN.	1 second. Diagnosis Procedure". N SENSOR POWER SUPPLY ontrol actuator harness connector.		
2.PERFOR 1. Start er 2. Check Is DTC dete YES >> NO >> Diagnosis 1.CHECK 1. Turn ig 2. Discon 3. Turn ig 4. Check Electric throt	RM DTC CON ngine and let if DTC. ected? Proceed to E Proceed to E INSPECTION S Procedur THROTTLE F nition switch C nect electric th nition switch C the voltage be + ttle control actu-	t idle for <u>C-447, "</u> N END C POSITIO DFF. nrottle cc DN.	1 second. Diagnosis Procedure". N SENSOR POWER SUPPLY ontrol actuator harness connector. lectric throttle control actuator harnes Voltage		

2.check throttle position sensor power supply circuit

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

INFOID:000000012788217

А

EC

С

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		Continuity
Connector	Terminal	Connector 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

1. 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-448</u>, "Component Inspection (TP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

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

Component Inspection (TP Sensor)

INFOID:000000012788219

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-143, "Description".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ÉCM harness connector terminals as per the following conditions.

	ECM				Voltage
Connec-	+	-	Condition		
tor	Terminal				
	77	78	Accelerator pedal	Fully released	Less than 4.75 V
F25				Fully depressed	More than 0.36 V
F25	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".

А

EC

С

D

Ε

[MRA8DE]

G

- Н
- I

J

Κ

L

Μ

Ν

0

Ρ

< 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-355, "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-450, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000012788221

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	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	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 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-460, "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	sensor	or E	СМ	Continuity		
Connector	Terminal	erminal Connector	Terminal			
E12	1	1 E16	120	Existed		
L1Z	2		127			
4 Also che	eck harness	namess for short to	nower			

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

O.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

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

A

EC

D

Ε

Н

Κ

Ο

Ρ

P2138 APP SENSOR

+			_	
APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	126	Existed
	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-452, "Component Inspection (APP Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

Component Inspection (APP Sensor)

INFOID:000000012788222

$1. {\sf CHECK} \ {\sf ACCELERATOR} \ {\sf PEDAL} \ {\sf POSITION} \ {\sf SENSOR}$

- 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	6 127	127 Accelerator pedal	Fully released	0.6 - 0.9 V
E16	120			Fully depressed	3.9 - 4.7 V
E 10	119	100		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".

P219A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

P219A AIR FUEL RATIO

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P219A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to <u>EC-95, "DTC Index"</u>.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P219A	AIR FUEL RATIO IM- BARANCE B1 (Air fuel ratio imbarance bank 1)	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-146. "Description".

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:000000012788223

A

EC

Κ

L

Μ

Ν

Ο

Ρ

• Always drive vehicle at a safe speed.

ENG SPEED	1,000 – 2,400rpm
COOLANT TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	5 – 9 msec
Selector lever	D position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.
- 3. Check "SYSTEM 1 DIAGNOSIS A B1" indication.

Is "CMPLT" displayed?

YES >> GO TO 5.

NO >> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-454, "Diagnosis Procedure".
- NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

Without CONSULT

- 1. Start the engine and warm it up to normal operating temperature.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds.
 - CAUTION:

Always drive vehicle at a safe speed.

Engine speed	1,000 – 1,250 rpm
Calculated load value	26 – 46 %
Selector lever	D position

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-454</u>, "Diagnosis Procedure". NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK

- 1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
- 2. Start engine and let it idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 2.

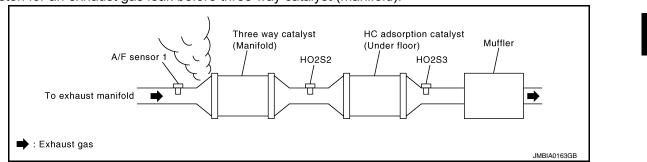
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

P219A AIR FUEL RATIO

< 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 <u>EC-147</u>, "Work Procedure".
- Check fuel pressure. Refer to <u>EC-147, "Work Procedure"</u>.

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 9.

4. CHECK MASS AIR FLOW SENSOR

(B)With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT. For specification, refer to <u>EC-502, "Mass Air Flow Sensor"</u>. @With GST

Check mass air flow sensor signal in Service \$01 using GST.

For specification, refer to EC-502, "Mass Air Flow Sensor".

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-191, "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

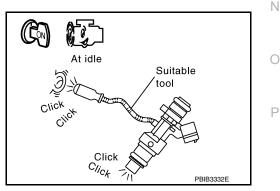
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

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>466, "Component Function Check"</u>.



6.CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION:

А

EC

D

Ε

Н

Κ

L

M

< DTC/CIRCUIT DIAGNOSIS >

Perform the following procedure in a place with no combustible objects and good ventilation.

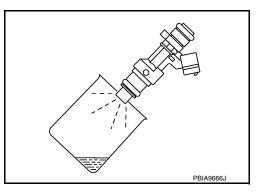
- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected 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</u>, "<u>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.
- 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:

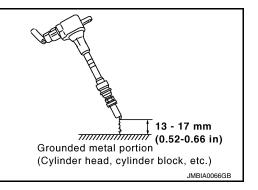
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

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>



P219A AIR FUEL RATIO

PZ19A AIR FUEL RATIO		
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]	
YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u> . NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.		А
9. DETECT MALFUNCTIONING PART		1
Check fuel hoses and fuel tubes for clogging.		EC
Is the inspection result normal?		LO
YES >> Replace fuel filter and fuel pump assembly. Refer to <u>FL-7</u> , " <u>Removal and Installation</u> " NO >> Repair or replace error-detected parts.	<u>.</u>	С
10. CHECK FUNCTION OF IGNITION COIL-2		0
 Turn ignition switch OFF. Disconnect spark plug and connect a non-malfunctioning spark plug. Crank engine for approximately 3 seconds, and recheck whether spark is generated betwe plug and the grounded metal portion. 	en the spark	D
Spark should be generated.		E
Is the inspection result normal?		
 YES >> GO TO 11. NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-472, "Compon</u> <u>Check"</u>. 	ent Function	F
11.CHECK SPARK PLUG		G
Check the initial spark plug for fouling, etc.		
<u>Is the inspection result normal?</u> YES >> 1. Repair or clean spark plug. Refer to <u>EM-12.</u>		Н
"Removal and Installation". 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> .		I
		J
12.CHECK FUNCTION OF IGNITION COIL-3	SEF156I	К
1. Reconnect the initial spark plugs.		
2. Crank engine for approximately 3 seconds, and recheck whether spark is generated betwe plug and the grounded portion.	en the spark	L
Spark should be generated.		
Is the inspection result normal?		M
YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u> . NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM</u>	1 118 "Spark	
Plug".	<u>1-110, Opark</u>	Ν
		0
		Ρ

< DTC/CIRCUIT DIAGNOSIS >

P2610 ECM INTERNAL TIMER

Description

This ECM contains a timer and measures time between an ignition switch OFF and the next ignition switch ON. This enables the judging of the state of engine cooling at an engine start.

DTC Logic

INFOID:000000012788226

INFOID:000000012788225

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2610	ECM/PCM INTERNAL ENG OFF TIMER (ECM/PCM internal engine off timer performance)	 ECM internal engine off timer is malfunction- ing. The time calculated by ECM based on a de- scent allowance of engine coolant tempera- tures during ignition switch OFF is extremely shorter than the time counted by the Engine internal OFF timer. 	ECM ECM power supply

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

It is necessary to erase permanent DTC?

YES >> GO TO 4.

NO >> GO TO 2.

2. 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 12 V or more under ignition switch OFF condition.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Turn ignition switch ON and wait at least 190 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Proceed to EC-459, "Diagnosis Procedure".
- NO >> INSPECTION END

4.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 12 V or more under ignition switch OFF condition.
- Before performing the following procedure, check that fuel level is between 2/8 and 7/8.

>> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 190 seconds.

P2610 ECM INTERNAL TIMER

P2610 ECM INTERNAL TIMER	
< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
2. Check 1st trip DTC.	
Is 1st trip DTC detected?	A
YES >> Proceed to <u>EC-459, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
6.PERFORM DTC CONFIRMATION PROCEDURE-II	EC
CAUTION: To start this self-diagnosis, the conditions listed bellow are required to be satisfied. Perform the fol- lowing steps to satisfy the conditions. • Engine coolant temperature decrease by 55°C (131°F) or more during the time between an ignition	С
 switch OFF (after engine warm-up) and the second ignition switch ON. A fuel temperature at the second ignition switch ON is -5°C (23°F) or more and less than 35°C (95°F). The temperature difference between engine coolant and fuel is 5°C (41°F) or more. NOTE: 	D
This self-diagnosis is not performed if the distance traveled is extremely short.	E
 Turn ignition switch ON. Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and soak the vehicle for at least 12 hours. CAUTION: 	F
 Never turn ON the ignition switch during soaking. Never open the fuel filler cap and perform refueling during soaking. Turn ignition switch ON and wait at least 190 seconds. Check 1st trip DTC. 	G
Is 1st trip DTC detected? YES >> Proceed to <u>EC-459, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Н
Diagnosis Procedure	
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	I
Check ECM power supply and ground circuit. Refer to <u>EC-168, "Diagnosis Procedure"</u> .	J
<u>Is the inspection result normal?</u> YES >> GO TO 2.	
NO >> Repair or replace error-detected parts.	
2.CHECK SELF-DIAGNOSTIC RESULT	K
Check that DTCs related to the fuel system and the cooling system are not detected.	
Is the inspection result normal?	L
YES >> Check the DTC. Refer to <u>EC-95, "DTC Index"</u> . NO >> GO TO 3.	
3. PERFORM DTC CONFIRMATION PROCEDURE	\mathbb{M}
1. Erase DTC.	
2. Perform DTC Confirmation Procedure again. Refer to <u>EC-458, "DTC Logic"</u> .	Ν
<u>Is the 1st trip DTC P2610 displayed again?</u> YES >> Replace ECM. Refer to <u>EC-501, "Removal and Installation"</u> .	
NO >> INSPECTION END	0
	-

Ρ

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.

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

Diagnosis Procedure

INFOID:000000012788229

1. CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-1

- 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.

	+	Voltage	
APP	sensor		
Connector	Terminal		V FF - 7
E12	5	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT-2

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

CVT models

	+		_	
APP	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	5	E16	118	Existed

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

 ${f 3}.$ CHECK SENSOR POWER SUPPLY CIRCUITS

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

SENSOR POWER SUPPLY 2 CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

ECM Sensor Terminal Terminal Connector Name Connector 32 CMP sensor (PHASE) F39 1 F24 40 EOP sensor F2 1 EVT control position sensor 44 F57 1 F25 1 36 MAF sensor F31

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-284, "Component Inspection [CMP Sensor (PHASE)]"
MAF sensor	EC-192. "Component Inspection (MAF Sensor)"
EOP sensor	EC-344. "Component Inspection (EOP Sensor)"
EVT control position sensor	EC-362, "Component Inspection (EVT Control Position Sensor)"
Is the inspection result norma	<u>1?</u>
YES >> GO TO 5. NO >> Repair or replace 5. CHECK APP SENSOR	malfunctioning component.
	EC-445, "Component Inspection
Uneuk App Sensol. Reief lo C	20-443, COMPONENT INSPECTION

Is the inspection result normal?

YES	>> Check int	ermittent ind	ident. R	efer to <u>GI-</u>	41, "I	ntermitte	nt Incic	<u>lent"</u> .		

NO >> Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.

А

[MRA8DE]

D

Е

Κ

L

Μ

Ν

0

Ρ

< DTC/CIRCUIT DIAGNOSIS >

BRAKE PEDAL POSITION SWITCH

Component Function Check

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "ENGINE" using CONSULT.
- 3. Select "BRAKE SW1" in "DATA MONITOR" mode.
- 4. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Con	dition	Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
DIVARE OWN	Diake pedal	Fully released	ON

Without CONSULT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	-	Condition Voltage (Approx.)		
Connector	Terminal	Terminal			
E16	116	127	Brake pedal	Slightly depressed	0 V
	110	121	Diake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-462, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000012788231

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}	1	Ground	Battery voltage		
E86 ^{*2}	3	Ground	Dattery voltage		

*1: Without ICC

*2: With ICC

Is the inspection result normal?

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 blowing.

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

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

-	+					
Brake pedal p	position switch	_	Continuit	y		r
Connector	Terminal					
E36 ^{*1}	1	#5 fuse ter-	Eviated			
E86 ^{*2}	3	minal	Existed			
*1: Withou	ut ICC					
*2: With IC		• • • • •				
		-	ground and	short to powe	ſ.	
•	ction result n		uit for 12\/ I	battery power	supply	
		place error-c			Supply.	
3. снеск е	BRAKE PED	AL POSITIC	N SWITCH	INPUT SIGN	AL CIRCUIT	
	nition switch					
2. Disconn	ect ECM ha	rness conne				
	he continuity	/ between br	ake pedal p	position switch	harness connector and E	CM harness connec-
tor.						
	+		_		—	
	position switch	E	СМ	Continuity		
Connector	Terminal	Connector	Terminal			
E36 ^{*1}	2				_	
E86 ^{*2}	4	E16	116	Existed		
±00 *1: Withou	-				_	
*2: With IC						
		for short to g	ground and	short to powe	r.	
Is the inspec	ction result n	ormal?				
-	GO TO 4.			4-		
4	•	place error-c				
		AL POSITIC			_	
			lefer to <u>EC-</u>	<u>463, "Compor</u>	nent Inspection (Brake Peda	al Position Switch)"
Is the inspec			nt Defende			
					nittent Incident". -23, "Exploded View".	
	•			Position Sw		
Compone	пі пэрес	lion (Diak	e r cuai r		non)	INFOID:000000012788232
1. CHECK E	BRAKE PED	AL POSITIC	N SWITCH	-1		
1. Turn ign	nition switch	OFF.				
				ess connecto		
3. Check tl	ne continuity	between br	ake pedal p	osition switch	terminals under the following	ng conditions.
Brake podel r	oosition switch					
втаке редагр +			Condition		Continuity	
	- ninals		Contraction		Continuity	
ieni	miais		Cully	released	Existed	
1	2	Brake pedal	Fully	released	EXISTEN	

Is the inspection result normal?

2

Brake pedal

YES >> INSPECTION END

1

Not existed

Slightly depressed

BRAKE PEDAL POSITION SWITCH

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH-II

- Adjust brake pedal position switch installation. Refer to <u>BR-15, "Adjustment"</u>.
 Check the continuity between brake pedal position switch terminals under the following conditions.

Brake pedal p	position switch				
+	-	Condition Continuit			
Term	ninals				
1	2	Brake pedal	Fully released	Existed	
	2	Blake pedal	Slightly depressed	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to <u>BR-23</u>, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

ASCD INDICATOR

Component Function Check

1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	COND	ITION	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 re	esult normal?		
	ed to <u>EC-465, "Diagnosis Procedure"</u>		
Diagnosis Proc	cedure		INFOID:00000001278823
1. СНЕСК ДТС			
Check that DTC U	XXXX is not displayed.		
Is the inspection re			
YES >> GO TO NO >> Perfor	C 2. m trouble diagnosis for DTC UXXXX.		
^	ITH COMBINATION METER		
(TYPE B).	combination meter. Refer to MWI-26	5, DTC Index (TYPE A) or MWI-	TOU, DTC Index
Is the inspection re	esult normal?		
YES >> GO TO			
• ·	r or replace error-detected parts.		
	MITTENT INCIDENT		
	incident. Refer to <u>GI-41, "Intermittent</u>	t Incident".	
Is the inspection re YES >> Replace	esuit normal? ce combination meter. Refer to <u>MWI-</u>	74 "Romoval and Installation" (TVE	PE A) or M/M/L 150
	oval and Installation" (TYPE B).	111 (111	L A) 01 <u>MWI-130</u>
NO >> Repair	r or replace error-detected parts.		

INFOID:000000012788233

А

EC

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-466, "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

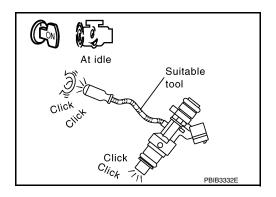
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-466, "Diagnosis Procedure".



Diagnosis Procedure

1.CHECK FUSE

- 1. Turn ignition switch OFF.
- 2. Pull out #52 fuse and check that the fuse is not blowing.

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

	+					
	Fuel injector		-	Voltage		
Cylinder	Connector	Terminal				
1	F18	1				
2	F19	1	Ground	Pattony voltago		
3	F20	1	Giounu	Battery voltage		
4	F21	1				

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. INFOID:000000012788235

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

А

EC

D

Ε

Н

L

M

Ν

Ρ

$\overline{\mathbf{3.}}$ 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	Existed	
2	F19	1				
3	F20	1				
4	F21	1				

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u>.

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		EC	CM	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F18	2		13	
2	F19	2	F24	14	Existed
3	F20	2	F24	10	Existed
4	F21	2		9	-

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

<u>Is the inspection result normal?</u> YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-467. "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident"

NO >> Replace malfunctioning fuel injector. Refer to EM-40, "Removal and Installation".

Component Inspection (Fuel Injector)

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 >

Fuel i	njector			
+	-	Conditio	Resistance	
Term	ninals			
1	2	Temperature °C (°F)	10 - 60 (50 - 140)	11.1 – 14.5 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to <u>EM-40. "Removal and Installation"</u>

< DTC/CIRCUIT DIAGNOSIS >

FUEL PUMP

Component Function Check

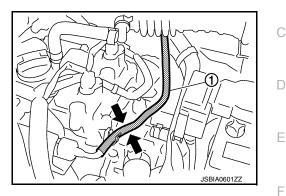
1. CHECK FUEL PUMP FUNCTION

- Turn ignition switch ON. 1.
- 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
- >> Proceed to EC-469, "Diagnosis Procedure". NO



Diagnosis Procedure

INFOID:000000012788239

1. СНЕСК Р	UEL PUMP	POWER SL		CUIT-1	G	
	ition switch ect ECM ha	OFF. rness connec	ctor.		6	1
	ition switch he voltage b		harness co	onnector and gro	und. H	1
	E	СМ			1	
	+	-	-	Voltage		
Connector	Terminal	Connector	Terminal	-		
F24	18	E16	128	Battery voltage	J	
Is the inspec	tion result n	ormal?				
-	GO TO 3.				K	r
	GO TO 2.					L.
		POWER SL		2011-2		
	ition switch	OFF. ′R harness co	nnootor		L	
				ness connector a	and ECM harness connector.	
					M	1
	+	-	-			
IPDN	/IE/R	EC	M	Continuity		
Connector	Terminal	Connector	Terminal		N	
E46	45	F24	18	Existed		
4. Also che	eck harness	for short to g	round and a	short to power.	0)
Is the inspec		ormal?			0	,
-	GO TO 8.		- 4 4 1	L_		
~	•	place error-d	•		P)
J.CHECK F	-UEL PUMP	POWER SL	IPPLY CIRC	2011-3		
1. Turn ign	ition switch	OFF.				

- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect fuel pump harness connector.
- Turn ignition switch ON. 4.
- Check the voltage between fuel pump harness connector and ground. 5.

EC-469

INFOID:000000012788238

EC

FUEL PUMP

		1						
+								
F	uel pump	_	Voltage					
Connecto	r Terminal							
B48 1		Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.					
Is the inspection result normal? YES >> GO TO 6. NO >> GO TO 4. 4.CHECK FUSE								
 Turn ignition switch OFF. Disconnect 15A fuse (No. 50) from IPDM E/R. Check 15A fuse. 								
Is the insp	ection result nor	rmal?						
	> GO TO 5. > Replace 15A :	fuse.						

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-4

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

	+			
IPDN	/I E/R	Fuel	Continuity	
Connector	Terminal	Connector	Terminal	
E43	10	B48	1	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between fuel pump harness connector and ground.

	+				
Fuel	pump	_	Continuity		
Connector	Terminal				
B48	3	Ground	Existed		

3. 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 FUEL PUMP

Check fuel pump. Refer to EC-471, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace fuel filter and fuel pump. Refer to <u>FL-7</u>, "<u>Removal and Installation</u>".

8.CHECK INTERMITTENT INCIDENT

FUEL PUMP

< DTC/CIRCUIT DI	AGNOSIS >			[MRA8DE]		
Check intermittent in	ncident.Refer to <u>C</u>	GI-41, "Intermittent Ir	ncident".			
Is the inspection res	<u>ult normal?</u>					
				ion" (With intelligent key) or PCS-60.		
	or replace error-de	" (Without intelligent etected parts.	кеу).	6		
Component Ins		•				
	,	unp)		INFOID:000000012788240		
1. CHECK FUEL P	JMP					
	level sensor unit a	and fuel pump harne Imp terminals as foll				
Fuel pump						
+ –		Condition	Resistance			
Terminals						
1 3	Temperature °C	C (°F) 25 (77)	0.2 - 5.0 Ω			
	TION END	Lauran Dafar ta El				
NO >> Replace	tuel niter and tue	I pump. Refer to <u>FL-</u>	7. Removal an	<u>a installation</u> .		

L

M

Ν

Ο

Ρ

< DTC/CIRCUIT DIAGNOSIS >

IGNITION SIGNAL

Component Function Check

1.INSPECTION START

- 1. Turn ignition switch OFF.
- 2. Start engine.

Does the engine start?

YES >> GO TO 2.

NO >> Proceed to EC-472, "Diagnosis Procedure".

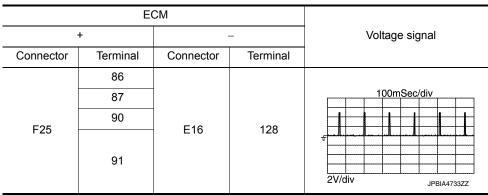
2. IGNITION SIGNAL FUNCTION

(I) 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.



NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-472, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK FUSE

1. Turn ignition switch OFF.

2. Pull out #51 fuse and check that the fuse is not blowing.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK IGNITION COIL POWER SUPPLY

- 1. Insert the fuse which pulled out.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

INFOID:000000012788242

INFOID:000000012788241

[MRA8DE]

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	+				_								
	Ignition coil		_	Voltage									
Cylinder	Connector	Terminal		, enage									
1	F34	3											
2	F35	3											
3	F36	3	Ground	Battery volta	ry voltage								
4	F37	3											
Is the inspec	ction result n	ormal?			—								
NO >> 3.CHECKI	GO TO 4. GO TO 3. GNITION CO		SUPPLY CI	RCUIT									
 Disconr Check t 	hition switch (hect IPDM E/ he continuity	R harness c		ness connect	or and ignition	n c	:0	oil ha	oil harnes	oil harness co	oil harness connec	oil harness connector.	
IPDI	M E/R		Ignition coil		Continuity								
Connector	Terminal	Cylinder	Connector	Terminal									
		1	F34	3	Existed	- Existed							
E43	17	2	F35	3									
L43	17	3	F36	3									
		4	F37	3									
Is the inspect YES >> NO >> 4. CHECK I	Repair or re GNITION COntinue	ormal? nittent incide place error-d DIL GROUN OFF.	ent. Refer to letected part D CIRCUIT	S.	nittent Incider								
2. Check t	he continuity	between igr	nition coil ha	rness connec	ctor and grour	nd.							
	+				_								
	+ Ignition coil			Continuity									
Cylinder	Connector	Terminal	_	Continuity									
	F34	2											
2													
2 3	F35	2	Ground	Existed									
	F36	2											
4	F37	2											
	eck harness	•	ower.										
	<u>ction result n</u> GO TO 5.	<u>ormal?</u>											
	Repair or re	olace error-d	letected part	S.									
5.CHECK			-										

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

	+				
	Ignition coil		E	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1		86	
2	F35	1	F25	87	Existed
3	F36	1	F20	90	Existed
4	F37	1		91	

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

6.CHECK IGNITION COIL WITH POWER TRANSISTOR

Check ignition coil with power transistor. Refer to EC-475, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-45</u>, "<u>Removal and Installa-</u> <u>tion</u>".

7. CHECK CONDENSER CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect condenser.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between IPDM E/R harness connector and condenser harness connector.

	+			
IPDN	ME/R	Conc	Continuity	
Connector	Terminal	Connector	Terminal	
E43	17	F11	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace error-detected parts.

8. CHECK CONDENSER GROUND CIRCUIT

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

	+		
Cond	enser	-	Continuity
Connector	Terminal		
F11 6		Ground	Existed

2. 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 CONDENSER

Check condenser. Refer to <u>EC-475, "Component Inspection (Condenser)"</u>. Is the inspection result normal?

YES >> INSPECTION END

	IGNI	HON 5	IGNAL	
< DTC/CIRCUIT DIAG	NOSIS >			[MRA8DE]
NO >> Replace co	ndenser.			
Component Inspec	tion (Condenser)			INFOID:000000012788243
1.CHECK CONDENSE	R			FO
	OFF. ser harness connector. etween condenser termin	als as pe	r the following.	EC C
Condenser				
+ –	Condition		Resistance	D
Terminal				
1 6	Temperature °C (°F)	25 (77)	Above 1 $M\Omega$	E
Is the inspection result rYES>> INSPECTIONNO>> Replace ControlComponent Inspection	ON END	ith Pow	er Transistor)	INFOID:000000012788244
1. CHECK IGNITION C	OIL WITH POWER TRA	NSISTOR	-1	G
1. Turn ignition switch	OFF.			0
2. Disconnect ignition	coil harness connector. etween ignition coil termin	nals as pe	er the following.	Н
Ignition coil with power tran- sistor + _ Terminal	Condition		Resistance	I
1 2			Except 0 or $\infty \Omega$	J
3	Temperature °C (°F)	25 (77)	Except 0 Ω	
2 3				K
2.CHECK IGNITION C		•		M-45. "Removal and Installa-
 Turn ignition switch Reconnect all harne Remove fuel pump NOTE: Do not use CONSU dure. Start engine. After engine stalls, of Turn ignition switch Remove all ignition to <u>EM-45, "Remova</u> Remove ignition coi 	ess connectors disconnec fuse in IPDM E/R to relea ILT to release fuel pressu crank it two or three times OFF. coil harness connectors <u>I and Installation"</u> .	cted. ase fuel p ure, or fue s to releas to avoid t	ressure. I pressure applies agai se all fuel pressure. he electrical discharge	
	seconds or more to remo and harness connector t			er.

IGNITION SIGNAL

< 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.
- 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.

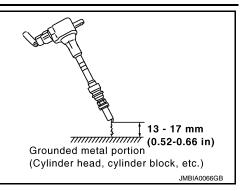
CAUTION:

- 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 elec-
- trical 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 >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-45</u>, "<u>Removal and Installa-</u> <u>tion</u>".



ELECTRICAL LOAD SIGNAL

[MRA8DE] < DTC/CIRCUIT DIAGNOSIS > ELECTRICAL LOAD SIGNAL А Description INFOID:000000012788245 The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via EC the CAN communication line. Component Function Check INFOID-000000012788246 1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION (P)With CONSULT D 1. Turn ignition switch ON. Select "DATA MONITOR" mode of "ENGINE" using CONSULT. 2. Select "LOAD SIGNAL" and check indication as per the following conditions. 3. Е Condition Monitor item Indication ON ON LOAD SIGNAL Rear window defogger switch OFF OFF Is the inspection result normal? YES >> GO TO 2. NO >> Proceed to EC-477, "Diagnosis Procedure". 2.CHECK LIGHTING SWITCH FUNCTION Н With CONSULT Check "LOAD SIGNAL" indication as per the following conditions. Monitor item Condition Indication ON at 2nd posi-ON tion LOAD SIGNAL Lighting switch OFF OFF Is the inspection result normal? YES >> GO TO 3. Κ NO >> Proceed to EC-477, "Diagnosis Procedure". $\mathbf{3}$.CHECK HEATER FAN CONTROL SWITCH FUNCTION With CONSULT Select "HEATER FAN SW" and check indication as per the following conditions. M Monitor item Condition Indication

ON ON HEATER FAN Heater fan control switch SW OFF OFF Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-477, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000012788247 **1.INSPECTION START** Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-477. "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2. Headlamp>>GO TO 3. Heater fan>>GO TO 4. Ν

Ρ

ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Check the rear window defogger system. Refer to <u>DEF-27. "Work Flow"</u>.

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check the headlamp system. Refer to EXL-88. "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Check the heater fan control system. Refer to HAC-51, "Work Flow".

>> INSPECTION END

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-38</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 <u>EC-479, "Diagnosis Procedure"</u>.

Diagnosis Procedure

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.

	+			
IPDN	/IE/R	Cooling	Continuity	
Connector	Terminal	Connector	Terminal	
E44	23		1	
C44	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.

3.CHECK COOLING FAN MOTOR

Check cooling fan motor. Refer to EC-480, "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>.

INFOID:000000012788248

INEOID-000000012788249

EC

Е

Н

Κ

L

M

Ν

Ρ

< DTC/CIRCUIT DIAGNOSIS >

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Check IPDM E/R. Refer to <u>PCS-10, "CONSULT Function (IPDM E/R)"</u> (With intelligent key system) or <u>PCS-39, "CONSULT Function (IPDM E/R)"</u> (Without intelligent key system).

NO >> Repair or replace error-detected parts.

Component Inspection (Cooling Fan Motor)

INFOID:000000012788250

1. CHECK COOLING FAN MOTOR

Supply cooling fan motor terminals with battery voltage and check operation.

	fan motor minal	Condition	Operation
+	-	Condition	operation
1	4	12 V direct current supply between terminals 1 and 2	Cooling fan operates.
		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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to <u>CO-17, "Removal and Installation"</u>.

		REFR	IGERAN 1	PRESSURE SENSOR		
< DTC/CIRC	CUIT DIAGN	IOSIS >			[MRA8DE]	
REFRIG	ERANT F	PRESSU	RE SEN	SOR	٨	
Compone	nt Functio	on Check			A	L.
1.CHECK F	REFRIGERA	NT PRESSU	IRE SENSO	R OVERALL FUNCTION	EC	C
2. Turn A/0	C switch and	blower fan s	witch ON.	ng temperature. nnector terminals.	С	~ /
	ECM				_	
Connector	+	-	Voltage		D)
		ninal				
E16	103	124	1.0 - 4.0 V	_	E	-
Is the inspect YES >>	tion result ne					
	Proceed to E		<u>anosis Proce</u>	edure".	F	
Diagnosis					INFOID:000000012788252	
1.CHECK F	REFRIGERA	NT PRESSU	JRE SENSO	R POWER SUPPLY	G	ì
 Disconn Turn ign Check the 	ition switch (ЭŃ.		ss connector. Ire sensor harness connector and ground	H I.	Num
	essure sensor	_	Voltage			
Connector	Terminal		(Approx.)		1	
E35	3	Ground	5.0 V		0	
NO >> 2.CHECK F 1. Turn ign 2. Disconn	GO TO 3. GO TO 2. REFRIGERA ition switch (ect ECM har	NT PRESSU OFF. mess connect	ctor.	R POWER SUPPLY CIRCUIT	K L M harness connec-	- 1
	+	-	-			
Refrigerant pr	essure sensor	EC	M	Continuity	Ν	
Connector	Terminal	Connector	Terminal			
E35	3	E16	104	Existed	0)
Is the inspect YES >> NO >> 3. CHECK F	Perform the Repair or rep REFRIGERA	ormal? trouble diagr blace error-d NT PRESSL	nosis for pow etected parts	ver supply circuit. S. R GROUND	Ρ	•
2. Disconn	ition switch (ect ECM har he continuity	mess connec		ssure sensor harness connector and EC	M harness connec-	

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

	+			
Refrigerant pr	essure sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E35	1	E16	124	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 REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

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

	+			
Refrigerant pr	essure sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	
E35	2	E16	103	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 INTERMITTENT INCIDENT.

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HAC-110, "Removal and Installation"</u> (For automatic air condittioner), or <u>HAC-192, "Removal and Installation"</u> (For manual air condittioner).

NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

MALFUNCTION INDICATOR LAMP	
< DTC/CIRCUIT DIAGNOSIS > [MRA8DE]	
MALFUNCTION INDICATOR LAMP	А
Component Function Check	
1.CHECK MIL FUNCTION	EC
 Turn ignition switch ON. Check that MIL lights up. Is the inspection result normal? YES >> INSPECTION END NO >> Proceed to EC-483. "Diagnosis Procedure". 	С
Diagnosis Procedure	D
1.снеск отс with есм	Е
Check that DTC UXXXX is not displayed. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX. Refer to <u>EC-95, "DTC Index"</u> . 2. CHECK DTC WITH COMBINATION METER	F
Check DTC with combination meter. Refer to <u>MWI-18, "CONSULT Function (METER/M&A)"</u> (TYPE A) or <u>MWI-92, "CONSULT Function (METER/M&A)"</u> (TYPE B).	G
Is the inspection result normal? YES >> GO TO 3. NO >> Perform trouble diagnosis for DTC indicated. Refer to <u>MWI-26. "DTC Index"</u> (TYPE A) or <u>MWI-100, "DTC Index"</u> (TYPE B).	Η
3. CHECK INTERMITTENT INCIDENT	
Check intermittent incident. Refer to <u>GI-41, "Intermittent Incident"</u> . <u>Is the inspection result normal?</u> YES >> Replace combination meter. Refer to <u>MWI-74, "Removal and Installation"</u> (TYPE A) or <u>MWI-150</u> ,	J
"Removal and Installation" (TYPE B). NO >> Repair or replace error-detected parts.	K
	L
	M

Ν

0

Ρ

< 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-484, "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>

A >> GO TO 2.

B >> GO TO 7.

2. CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-17. "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?

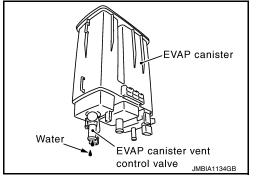
YES >> GO TO 3. NO >> GO TO 4.

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-17, "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 <u>FL-17, "Removal and Installation"</u>.

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Check refueling EVAP vapor cut valve. Refer to EC-486, "Component Inspection".

EC-484

INFOID:000000012788255

INEOID:000000012788256

< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]

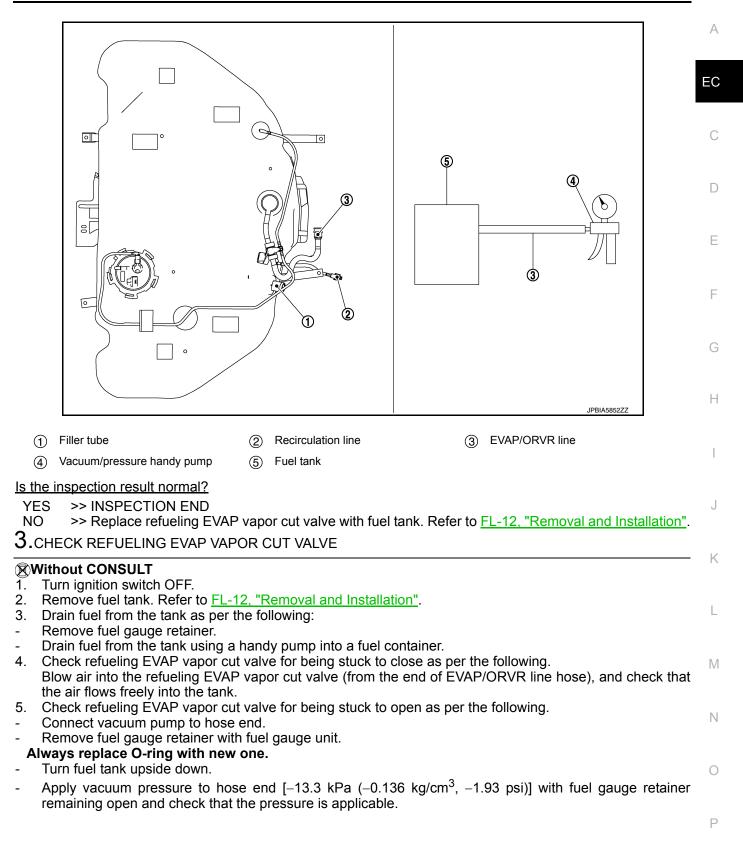
Is the inspection result normal?	
YES >> INSPECTION END	А
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-12</u> , " <u>Removal and Installation</u> ".	
7.CHECK EVAP CANISTER	F 0
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor	EC
 attached. Refer to <u>FL-17, "Removal and Installation"</u>. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor 	
attached.	С
The weight should be less than 2.1 kg (4.6 lb).	
Is the inspection result normal?	D
YES >> GO TO 8. NO >> GO TO 9.	D
8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
Check if water will drain from EVAP canister.	Е
Does water drain from the EVAP canister?	
YES >> GO TO 6.	F
NO >> GO TO 11.	I
	G
Water EVAP canister vent	Н
control valve JMBIA1134GB	
9.REPLACE EVAP CANISTER	
Replace EVAP canister with a new one. Refer to FL-17, "Removal and Installation".	
>> GO TO 10.	J
>> GO TO 10. 10.DETECT MALFUNCTIONING PART	J
	J
10.DETECT MALFUNCTIONING PART Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.	J K
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 FL-16. "Exploded View".	J K
10.DETECT MALFUNCTIONING PART Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.	J K L
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 FL-16. "Exploded View". 11.CHECK VENT HOSES AND VENT TUBES Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and	J K
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 FL-16. "Exploded View". 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.	L
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 FL-16. "Exploded View". 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?	J K L
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 FL-16. "Exploded View". 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.	L
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 FL-16. "Exploded View". 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.	L
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 FL-16. "Exploded View". 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	L
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 FL-16. "Exploded View". 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.	L M N
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 FL-16, "Exploded View". 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.	L
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 FL-16. "Exploded View". 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.	L M N
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 FL-16. "Exploded View". 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.	L M N
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 FL-16. "Exploded View". 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.	L M N
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 FL-16. "Exploded View". 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 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-486. "Component Inspection". Is the inspection result normal?	L M N
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 FL-16. "Exploded View". 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-486. "Component Inspection". 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-486. "Component Inspection". Is the inspection result normal? YES >> GO TO 14.	L M N
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 FL-16. "Exploded View". 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-486. "Component Inspection". 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-486. "Component Inspection". Is the inspection result normal? YES >> GO TO 14. NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-12. "Removal and Installation".	L M N
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 FL-16. "Exploded View". 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-486. "Component Inspection". 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-486. "Component Inspection". Is the inspection result normal? YES >> GO TO 14.	L M N

Revision: December 2015

ON BOARD REFUELING VAPOR REC	OVERY (ORVR)
< DTC/CIRCUIT DIAGNOSIS >	[MRA8DE]
Is the inspection result normal?	
YES >> GO TO 15. NO >> Replace fuel filler tube. Refer to <u>FL-11, "Exploded View"</u> .	
15. CHECK ONE-WAY FUEL VALVE-1	
Check one-way valve for clogging. Is the inspection result normal?	
YES $>>$ GO TO 16.	
NO >> Repair or replace one-way fuel valve with fuel tank. Refer	to FL-12, "Removal and Installation".
16.CHECK ONE-WAY FUEL VALVE-2	
1. Check that fuel is drained from the tank.	
2. Remove fuel filler tube and hose. Refer to <u>FL-11, "Exploded View</u>	
3. Check one-way fuel valve for operation as per the following. When a stick is inserted, the valve should open, when removing	After removing filler tube
stick it should close.	
Do not drop any material into the tank.	One-way fuel valve
Is the inspection result normal?	
YES >> INSPECTION END NO >> Replace fuel filler tube or replace one-way fuel valve	
with fuel tank. Refer to FL-12, "Removal and Installa-	
tion".	
	Fuel tank SEF665U
Component Inspection	INFOID:000000012788257
1.INSPECTION START	
Will CONSULT be used?	
<u>Will CONSULT be used?</u> YES >> GO TO 2.	
NO >> GO TO 3.	
2. CHECK REFUELING EVAP VAPOR CUT VALVE	
1. Turn ignition switch OFF.	
 Remove fuel tank. Refer to <u>FL-12, "Removal and Installation"</u>. Drain fuel from the tank as per the following: 	
 Remove fuel feed hose located on the fuel gauge retainer. 	
- Connect a spare fuel hose, one side to fuel gauge retainer when	e the hose was removed and the other
 side to a fuel container. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode view 	with CONSULT.
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 the air flows freely into the tank.	EVAP/ORVR line hose), and check that
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/cm	n^3 , -1.93 psi)] with fuel gauge retainer
remaining open and check that the pressure is applicable.	

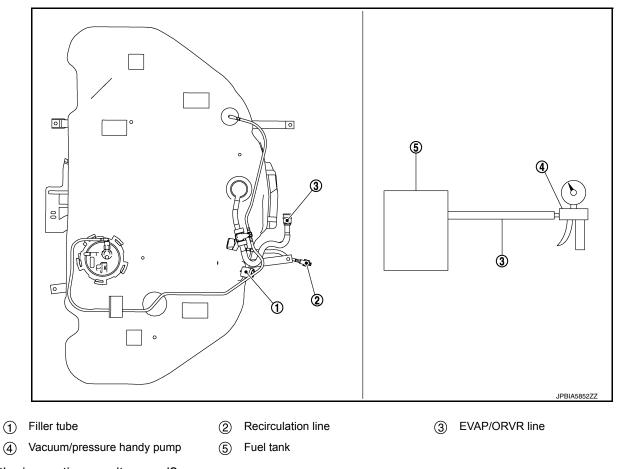
< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



< DTC/CIRCUIT DIAGNOSIS >

[MRA8DE]



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-12, "Removal and Installation".

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	YMPT	OM							С
						Z					HIGH					
		RT (EXCP. HA)		LAT SPOT	TION	POWER/POOR ACCELERATION				OLE	OVERHEATS/WATER TEMPERATURE HI	UMPTION	MPTION	CHARGE)		D
		START/RESTART		SURGING/F	K/DETONA	NER/POOR	ow Idle	/HUNTING	ATION	TURN TO II	WATER TEI	-UEL CONS	OIL CONSUMPTION	AD (UNDER	Reference page	F
		HARD/NO ST	ENGINE STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF POV	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE (BATTERY DEAD (UNDER CHARGE)		G
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		Η
Fuel	Fuel pump circuit	1	1	2	3	2		2	2	<u> </u>		3		2	<u>EC-469</u>	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-147</u>	
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-466</u>	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-50</u>	
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-30</u>	J
	Incorrect idle speed adjustment	1					1	1	1	1		1			<u>EC-495</u>	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-434,</u> <u>EC-437,</u> <u>EC-439</u>	IX
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-496</u>	L
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-472</u>	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-168</u>	M
Mass ai	r flow sensor circuit	4			2										<u>EC-191</u>	1 4 1
Engine	coolant temperature sensor circuit	1					3	İ		3					<u>EC-201</u>	
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			<u>EC-213,</u> <u>EC-217,</u> <u>EC-220</u>	Ν
Throttle	position sensor circuit						2			2					EC-203, EC-268, EC-369, EC-447	0
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-441,</u> <u>EC-444,</u> <u>EC-450</u>	Ρ
Knock s	ensor circuit			2								3			<u>EC-277</u>	
Cranksh	naft position sensor (POS) circuit	2	2												<u>EC-279</u>	
Camsha	aft position sensor (PHASE) circuit	3	2												<u>EC-282</u>	

INFOID:000000012788258

А

EC

< SYMPTOM DIAGNOSIS >

[MRA8DE]

						S١	MPT	ОМ						
	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 symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	-
Vehicle speed signal circuit		2	3		3						3			EC-332 (CVT mod- els), EC- <u>333</u> (M/T models)
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-348, EC-349, EC-350, EC-351, EC-352, EC-353, EC-354
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-184</u>
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			<u>EC-187</u>
Exhaust valve timing control position sensor circuit		3	2		1	3	2	2	3		3			<u>EC-361</u>
PNP signal circuit			3		3		3	3			3			<u>EC-357</u>
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-481</u>
Battery current sensor circuit						4	5	5					3	<u>EC-371,</u> <u>EC-374,</u> <u>EC-377,</u> <u>EC-380</u>
Starter relay circuit	3													<u>EC-408,</u> <u>EC-411</u>
Starter control relay circuit	3													<u>EC-408,</u> <u>EC-411</u>
Electrical load signal circuit							3							<u>EC-477</u>
Intake manifold runner control valve motor cir- cuit					4	4								<u>EC-422</u>
Intake manifold runner control valve position sensor circuit					4	4								<u>EC-425</u>
Intake manifold tuning valve circuit					1									<u>EC-417</u>

< SYMPTOM DIAGNOSIS >

[MRA8DE]

L

						S	YMPT	OM							^
	(EXCP. HA)		SPOT		ACCELERATION					ATURE HIGH	NOI	z	(GE)	1	A EC
	START/RESTART (E)		HESITATION/SURGING/FLAT S	SPARK KNOCK/DETONATION		JLE	TING	7	N TO IDLE	ER TEMPERATURE	CONSUMPTION	CONSUMPTION	(UNDER CHARGE)	Reference page	С
		STALL	IION/SURG	KNOCK/DE	OF POWER/POOR	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER	SIVE FUEL	OIL	DEAD		D
	HARD/NO	ENGINE	HESITAT	SPARK I	LACK OF	HIGH ID	ROUGH		SLOW/N	OVERHE	EXCESSIVE	EXCESSIVE	BATTERY		Е
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		_
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-51 (Auto A/C), HAC-157 (Manual air condition- ing)	F
ABS actuator and electric unit (control unit)			4											BRC-236	Н

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

							S	YMPT	ОМ							
		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	H I I
Warrant	y symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		(
Fuel	Fuel tank	5													<u>FL-15</u>	
	Fuel piping	- 5		5	5	5		5	5			5			<u>FL-5</u>	
	Vapor lock		5												_	F
	Valve deposit														_	
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_	

< SYMPTOM DIAGNOSIS >

[MRA8DE]

		SYMPTOM													
		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	
Air	Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Electric throttle control actuator Air leakage from intake manifold/ Collector/Gasket	5	5	5	5	5	5	5	5	5		5			EM-26 CHG-14 EM-26 EM-27
Cranking	Battery	1	4	1		1		1	1					1	<u>PG-65</u>
	Generator circuit		1	1										I	<u>CHG-14</u>
	Starter circuit	3													<u>STR-20,</u> <u>STR-24</u>
	Signal plate	6	_									1			<u>EM-103</u>
	PNP signal	4													<u>TM-169</u> (CVT mod- els), <u>TM-</u> <u>17</u> (6MT models)
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-79</u>
	Cylinder head gasket		Ŭ	Ŭ	Ŭ			Ľ	Ŭ		4	Ŭ	3		
	Cylinder block Piston Piston ring Connecting rod Bearing Crankshaft	6	6	6	6	6		6	6			6	4		<u>EM-103</u>
Valve	Timing chain														<u>EM-58</u>
mecha- nism	Camshaft	1													<u>EM-64</u>
	Intake valve timing control Exhaust valve timing control	5	5	5	5	5		5	5			5			<u>EM-58</u>
	Intake valve	-											3		<u>EM-79</u>
	Exhaust valve														

< SYMPTOM DIAGNOSIS >

[MRA8DE]

		SYMPTOM								Δ										
		A)				lion					HIGH					A				
		(EXCP. HA)		SPOT		ELERAI					RATURE	TION	NO	RGE)		EC				
		RESTART (E		HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	Щ	TING		1 TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	С				
		HARD/NO START/RESTART	STALL	TION/SURG	KNOCK/DE	F POWER/I	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	EATS/WATE	SIVE FUEL	OIL	Y DEAD (U	page	D				
		HARD/N	ENGINE STALL	HESITA	SPARK	LACK O	HIGH ID	ROUGH	IDLING	SLOW/N	OVERH	EXCES	EXCESSIVE	BATTER		E				
Warranty s	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА		F				
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EX-4, EX-</u> <u>8, EM-32</u>					
	Three way catalyst														<u>0</u> , <u>LIVI-52</u>	G				
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>LU-6, EM-</u> <u>35, EM-39,</u> <u>LU-11, LU-</u> <u>16, LU-14</u>	Н				
	Oil level (Low)/Filthy oil														<u>LU-7</u>					
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-16</u>	Ι				
	Thermostat									5					<u>CO-23</u>					
	Water pump																		<u>CO-19</u>	J
	Water gallery	5	5	5	5	5		5	5		2	5			<u>CO-6</u>	J				
	Cooling fan														<u>CO-17</u>					
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-11</u>	Κ				
NATS (Nissan Anti-Theft System)															<u>SEC-58</u> (With intel- ligent key system),	L				
		1	1												SEC-175 (Without in- telligent key sys- tem)	Μ				
1 - 6 [.] The n	umbers refer to the order of inspection	าท	1	1	1	I	I	I	I	1	1	I	1	I	<u> </u>	Ν				

1 - 6: The numbers refer to the order of inspection.

0

Ρ

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

INFOID:000000012788259

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>.

IDLE SPEED

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE **IDLE SPEED**

Inspection		INFOID:000000012788260	EC
1. CHECK IDLE SPEED			
With CONSULT Check idle speed in "DATA MONITO	R" mode of "ENGINE" using CONSULT.		С
Specification	: <u>EC-502, "Idle Speed"</u>		D
With GST Check idle speed with Service \$01 c	of GST.		E
Specification	: <u>EC-502, "Idle Speed"</u>		
>> INSPECTION END			F
			G
			Η
			1

Ν

Μ

Ο

Ρ

А

J

Κ

L

IGNITION TIMING

< PERIODIC MAINTENANCE >

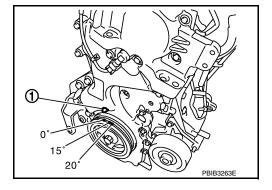
IGNITION TIMING

Inspection

- 1. CHECK IGNITION TIMING
- 1. Attach timing light to the ignition coil No.1 harness.
- 2. Check ignition timing.
 - () : Timing indicator

Specification

: EC-502, "Ignition Timing"



>> INSPECTION END

INFOID:000000012788261

< PERIODIC MAINTENANCE >

EVAPORATIVE EMISSION SYSTEM

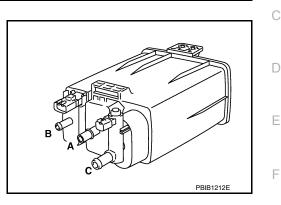
Inspection

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





EC

Н

J

Κ

L

Μ

Ν

Ο

Ρ

INFOID:000000012788262

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.

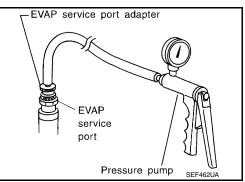
NOTE:

- 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.

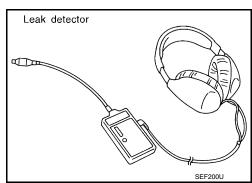
1.EVAP LEAK CHECK

() With CONSULT

 Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.

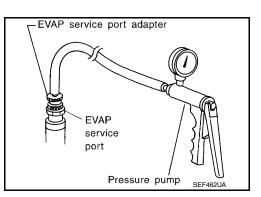


- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 6. 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-50</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.



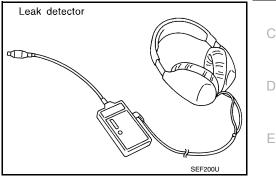
EVAP LEAK CHECK

< 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-50. "EVAPORATIVE EMISSION SYS-</u> <u>TEM : System Description"</u>.

>> INSPECTION END



[MRA8DE]

А

F

Н

Κ

L

Μ

Ν

0

Ρ

< PERIODIC MAINTENANCE >

POSITIVE CRANKCASE VENTILATION

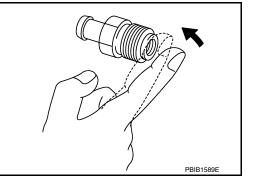
Inspection

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?

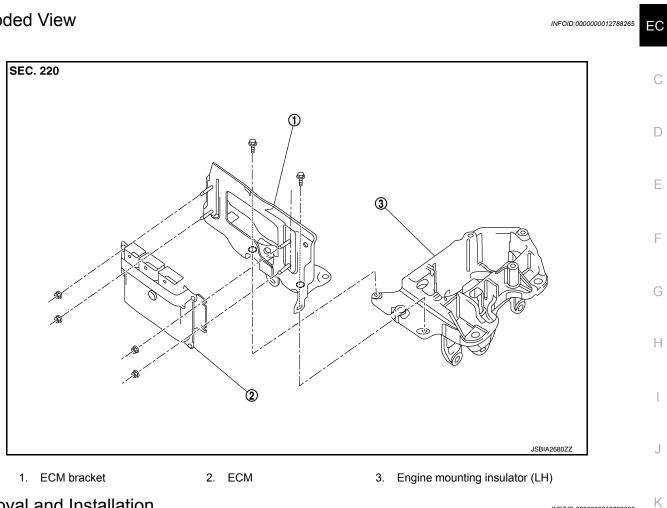
- YES >> INSPECTION END
- NO >> Replace PCV valve. Refer to <u>EC-15, "ENGINE CON-</u> <u>TROL SYSTEM : Component Parts Location"</u>.



INFOID:000000012788264

REMOVAL AND INSTALLATION ECM

Exploded View



ECM

Removal and Installation

CALITION

Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to <u>EC-139, "Description"</u> .	L
REMOVAL	
1. Remove battery. Refer to PG-74, "Removal and Installation (Battery)".	вл
Disconnect the harness connectors from ECM. Refer to <u>PG-9. "Harness Connector"</u>.	Μ
Remove the fuse box bracket from the ECM bracket.	
4. Remove the ECM bracket from the engine mounting insulator (LH), together with ECM.	Ν
5. Remove ECM nuts, and then remove ECM.	
INSTALLATION	
Installation is in the reverse order of removal.	0

[MRA8DE]

Ρ

INFOID:000000012788266

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:000000012788267

[MRA8DE]

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

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

· Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:000000012788268

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

INFOID:000000012788269

INFOID:000000012788270

Condition	Specification (Using CONSULT or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)
Output frequency at idle (in N position)	5,100 – 5,500 Hz*
Mass air flow (Using CONSULT or GST)	Approx 1.6 g/s at idle* Approx 5.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.