

# SECTION **EC**

## ENGINE CONTROL SYSTEM

### CONTENTS

<b>SERVICE INFORMATION</b> .....	9	<b>ON BOARD REFUELING VAPOR RECOVERY (ORVR)</b> .....	40
<b>INDEX FOR DTC</b> .....	9	System Description .....	40
DTC No. Index .....	9	Diagnosis Procedure .....	40
Alphabetical Index .....	12	Component Inspection .....	42
<b>PRECAUTIONS</b> .....	17	<b>POSITIVE CRANKCASE VENTILATION</b> .....	45
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	17	Description .....	45
On Board Diagnosis (OBD) System of Engine and A/T .....	17	Component Inspection .....	45
Precaution .....	17	<b>IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)</b> .....	47
<b>PREPARATION</b> .....	21	Description .....	47
Special Service Tool .....	21	<b>ON BOARD DIAGNOSTIC (OBD) SYSTEM</b> ....	48
Commercial Service Tool .....	22	Introduction .....	48
<b>ENGINE CONTROL SYSTEM</b> .....	24	Two Trip Detection Logic .....	48
Schematic .....	24	Emission-related Diagnostic Information .....	49
Multipoint Fuel Injection (MFI) System .....	24	Malfunction Indicator Lamp (MIL) .....	63
Electronic Ignition (EI) System .....	27	OBD System Operation Chart .....	65
Fuel Cut Control (at No Load and High Engine Speed) .....	27	<b>BASIC SERVICE PROCEDURE</b> .....	71
<b>AIR CONDITIONING CUT CONTROL</b> .....	29	Basic Inspection .....	71
Input/Output Signal Chart .....	29	Idle Speed and Ignition Timing Check .....	75
System Description .....	29	Procedure After Replacing ECM .....	77
<b>AUTOMATIC SPEED CONTROL DEVICE (ASCD)</b> .....	30	VIN Registration .....	77
System Description .....	30	Accelerator Pedal Released Position Learning .....	77
Component Description .....	31	Throttle Valve Closed Position Learning .....	77
<b>CAN COMMUNICATION</b> .....	32	Idle Air Volume Learning .....	78
System Description .....	32	Fuel Pressure Check .....	80
<b>EVAPORATIVE EMISSION SYSTEM</b> .....	33	<b>TROUBLE DIAGNOSIS</b> .....	82
Description .....	33	Trouble Diagnosis Introduction .....	82
Component Inspection .....	35	DTC Inspection Priority Chart .....	87
Removal and Installation .....	37	Fail-Safe Chart .....	88
How to Detect Fuel Vapor Leakage .....	37	Symptom Matrix Chart .....	90
		Engine Control Component Parts Location .....	94
		Vacuum Hose Drawing .....	100
		Circuit Diagram .....	101
		ECM Harness Connector Terminal Layout .....	103
		ECM Terminal and Reference Value .....	103

CONSULT-II Function (ENGINE) .....	111
Generic Scan Tool (GST) Function .....	122
CONSULT-II Reference Value in Data Monitor Mode .....	124
Major Sensor Reference Graph in Data Monitor Mode .....	127

**TROUBLE DIAGNOSIS - SPECIFICATION**

<b>VALUE .....</b>	<b>129</b>
Description .....	129
Testing Condition .....	129
Inspection Procedure .....	129
Diagnosis Procedure .....	130

**TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT .....**

<b>138</b>	Description .....	138
	Diagnosis Procedure .....	138

**POWER SUPPLY AND GROUND CIRCUIT ..**

<b>139</b>	Wiring Diagram .....	139
	Diagnosis Procedure .....	140
	Ground Inspection .....	143

**DTC U1000, U1001 CAN COMMUNICATION**

<b>LINE .....</b>	<b>145</b>
Description .....	145
On Board Diagnosis Logic .....	145
DTC Confirmation Procedure .....	145
Wiring Diagram .....	146
Diagnosis Procedure .....	146

**DTC U1010 CAN COMMUNICATION .....**

<b>147</b>	Description .....	147
	On Board Diagnosis Logic .....	147
	DTC Confirmation Procedure .....	147
	Diagnosis Procedure .....	147

**DTC P0011, P0021 IVT CONTROL .....**

<b>149</b>	Description .....	149
	CONSULT-II Reference Value in Data Monitor Mode .....	150
	On Board Diagnosis Logic .....	150
	DTC Confirmation Procedure .....	150
	Wiring Diagram .....	152
	Diagnosis Procedure .....	155
	Component Inspection .....	159
	Removal and Installation .....	160

**DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER .....**

<b>163</b>	Description .....	163
	CONSULT-II Reference Value in Data Monitor Mode .....	163
	On Board Diagnosis Logic .....	163
	DTC Confirmation Procedure .....	163
	Wiring Diagram .....	164
	Diagnosis Procedure .....	167
	Component Inspection .....	168
	Removal and Installation .....	169

**DTC P0037, P0038, P0057, P0058 HO2S2**

<b>HEATER .....</b>	<b>170</b>
Description .....	170
CONSULT-II Reference Value in Data Monitor Mode .....	170
On Board Diagnosis Logic .....	170
DTC Confirmation Procedure .....	170
Wiring Diagram .....	172
Diagnosis Procedure .....	175
Component Inspection .....	176
Removal and Installation .....	177

**DTC P0075, P0081 IVT CONTROL SOLENOID VALVE .....**

<b>178</b>	Component Description .....	178
	CONSULT-II Reference Value in Data Monitor Mode .....	178
	On Board Diagnosis Logic .....	178
	DTC Confirmation Procedure .....	178
	Wiring Diagram .....	179
	Diagnosis Procedure .....	182
	Component Inspection .....	183
	Removal and Installation .....	184

**DTC P0101 MAF SENSOR .....**

<b>186</b>	Component Description .....	186
	CONSULT-II Reference Value in Data Monitor Mode .....	186
	On Board Diagnosis Logic .....	186
	DTC Confirmation Procedure .....	186
	Overall Function Check .....	188
	Wiring Diagram .....	189
	Diagnosis Procedure .....	190
	Component Inspection .....	192
	Removal and Installation .....	193

**DTC P0102, P0103 MAF SENSOR .....**

<b>194</b>	Component Description .....	194
	CONSULT-II Reference Value in Data Monitor Mode .....	194
	On Board Diagnosis Logic .....	194
	DTC Confirmation Procedure .....	194
	Wiring Diagram .....	196
	Diagnosis Procedure .....	197
	Component Inspection .....	199
	Removal and Installation .....	200

**DTC P0112, P0113 IAT SENSOR .....**

<b>201</b>	Component Description .....	201
	On Board Diagnosis Logic .....	201
	DTC Confirmation Procedure .....	201
	Wiring Diagram .....	202
	Diagnosis Procedure .....	202
	Component Inspection .....	204
	Removal and Installation .....	204

**DTC P0117, P0118 ECT SENSOR .....**

<b>205</b>	Component Description .....	205
	On Board Diagnosis Logic .....	205
	DTC Confirmation Procedure .....	206

Wiring Diagram .....	207	<b>DTC P0132, P0152 A/F SENSOR 1 .....</b>	<b>242</b>	
Diagnosis Procedure .....	207	Component Description .....	242	A
Component Inspection .....	209	CONSULT-II Reference Value in Data Monitor		
Removal and Installation .....	209	Mode .....	242	
<b>DTC P0122, P0123 TP SENSOR .....</b>	<b>210</b>	On Board Diagnosis Logic .....	242	<b>EC</b>
Component Description .....	210	DTC Confirmation Procedure .....	242	
CONSULT-II Reference Value in Data Monitor		Wiring Diagram .....	244	
Mode .....	210	Diagnosis Procedure .....	247	C
On Board Diagnosis Logic .....	210	Removal and Installation .....	249	
DTC Confirmation Procedure .....	210	<b>DTC P0133, P0153 A/F SENSOR 1 .....</b>	<b>250</b>	
Wiring Diagram .....	212	Component Description .....	250	D
Diagnosis Procedure .....	213	CONSULT-II Reference Value in Data Monitor		
Component Inspection .....	215	Mode .....	250	
Removal and Installation .....	216	On Board Diagnosis Logic .....	250	E
<b>DTC P0125 ECT SENSOR .....</b>	<b>217</b>	DTC Confirmation Procedure .....	250	
Component Description .....	217	Wiring Diagram .....	253	
On Board Diagnosis Logic .....	217	Diagnosis Procedure .....	256	F
DTC Confirmation Procedure .....	217	Removal and Installation .....	259	
Diagnosis Procedure .....	218	<b>DTC P0137, P0157 HO2S2 .....</b>	<b>260</b>	
Component Inspection .....	218	Component Description .....	260	G
Removal and Installation .....	219	CONSULT-II Reference Value in Data Monitor		
<b>DTC P0127 IAT SENSOR .....</b>	<b>220</b>	Mode .....	260	
Component Description .....	220	On Board Diagnosis Logic .....	260	H
On Board Diagnosis Logic .....	220	DTC Confirmation Procedure .....	260	
DTC Confirmation Procedure .....	220	Overall Function Check .....	261	
Diagnosis Procedure .....	221	Wiring Diagram .....	262	I
Component Inspection .....	221	Diagnosis Procedure .....	265	
Removal and Installation .....	222	Component Inspection .....	267	J
<b>DTC P0128 THERMOSTAT FUNCTION .....</b>	<b>223</b>	Removal and Installation .....	269	
On Board Diagnosis Logic .....	223	<b>DTC P0138, P0158 HO2S2 .....</b>	<b>270</b>	
DTC Confirmation Procedure .....	223	Component Description .....	270	K
Diagnosis Procedure .....	223	CONSULT-II Reference Value in Data Monitor		
Component Inspection .....	223	Mode .....	270	
Removal and Installation .....	224	On Board Diagnosis Logic .....	270	
<b>DTC P0130, P0150 A/F SENSOR 1 .....</b>	<b>225</b>	DTC Confirmation Procedure .....	271	L
Component Description .....	225	Overall Function Check .....	272	
CONSULT-II Reference Value in Data Monitor		Wiring Diagram .....	273	
Mode .....	225	Diagnosis Procedure .....	276	M
On Board Diagnosis Logic .....	225	Component Inspection .....	280	
DTC Confirmation Procedure .....	225	Removal and Installation .....	281	
Overall Function Check .....	227	<b>DTC P0139, P0159 HO2S2 .....</b>	<b>282</b>	
Wiring Diagram .....	228	Component Description .....	282	N
Diagnosis Procedure .....	231	CONSULT-II Reference Value in Data Monitor		
Removal and Installation .....	233	Mode .....	282	
<b>DTC P0131, P0151 A/F SENSOR 1 .....</b>	<b>234</b>	On Board Diagnosis Logic .....	282	O
Component Description .....	234	DTC Confirmation Procedure .....	282	
CONSULT-II Reference Value in Data Monitor		Overall Function Check .....	283	
Mode .....	234	Wiring Diagram .....	284	P
On Board Diagnosis Logic .....	234	Diagnosis Procedure .....	287	
DTC Confirmation Procedure .....	234	Component Inspection .....	289	
Wiring Diagram .....	236	Removal and Installation .....	291	
Diagnosis Procedure .....	239	<b>DTC P0171, P0174 FUEL INJECTION SYS-</b>	<b>292</b>	
Removal and Installation .....	241	<b>TEM FUNCTION .....</b>	<b>292</b>	
		On Board Diagnosis Logic .....	292	
		DTC Confirmation Procedure .....	292	

Wiring Diagram .....	294	Wiring Diagram .....	338
Diagnosis Procedure .....	297	Diagnosis Procedure .....	339
<b>DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION .....</b>	<b>301</b>	<b>DTC P0340 CMP SENSOR (PHASE) .....</b>	<b>342</b>
On Board Diagnosis Logic .....	301	Component Description .....	342
DTC Confirmation Procedure .....	301	On Board Diagnosis Logic .....	342
Wiring Diagram .....	303	DTC Confirmation Procedure .....	342
Diagnosis Procedure .....	306	Wiring Diagram .....	344
<b>DTC P0181 FTT SENSOR .....</b>	<b>310</b>	Diagnosis Procedure .....	345
Component Description .....	310	Component Inspection .....	347
On Board Diagnosis Logic .....	310	Removal and Installation .....	348
DTC Confirmation Procedure .....	310	<b>DTC P0420, P0430 THREE WAY CATALYST FUNCTION .....</b>	<b>349</b>
Wiring Diagram .....	311	On Board Diagnosis Logic .....	349
Diagnosis Procedure .....	312	DTC Confirmation Procedure .....	349
Component Inspection .....	313	Overall Function Check .....	350
Removal and Installation .....	313	Diagnosis Procedure .....	351
<b>DTC P0182, P0183 FTT SENSOR .....</b>	<b>314</b>	<b>DTC P0441 EVAP CONTROL SYSTEM .....</b>	<b>354</b>
Component Description .....	314	System Description .....	354
On Board Diagnosis Logic .....	314	On Board Diagnosis Logic .....	354
DTC Confirmation Procedure .....	314	DTC Confirmation Procedure .....	354
Wiring Diagram .....	315	Overall Function Check .....	355
Diagnosis Procedure .....	315	Diagnosis Procedure .....	356
Component Inspection .....	317	<b>DTC P0442 EVAP CONTROL SYSTEM .....</b>	<b>359</b>
Removal and Installation .....	317	On Board Diagnosis Logic .....	359
<b>DTC P0222, P0223 TP SENSOR .....</b>	<b>318</b>	DTC Confirmation Procedure .....	359
Component Description .....	318	Diagnosis Procedure .....	360
CONSULT-II Reference Value in Data Monitor Mode .....	318	<b>DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE .....</b>	<b>366</b>
On Board Diagnosis Logic .....	318	Description .....	366
DTC Confirmation Procedure .....	318	CONSULT-II Reference Value in Data Monitor Mode .....	366
Wiring Diagram .....	320	On Board Diagnosis Logic .....	367
Diagnosis Procedure .....	321	DTC Confirmation Procedure .....	367
Component Inspection .....	323	Wiring Diagram .....	368
Removal and Installation .....	324	Diagnosis Procedure .....	369
<b>DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE .....</b>	<b>325</b>	Component Inspection .....	372
On Board Diagnosis Logic .....	325	Removal and Installation .....	372
DTC Confirmation Procedure .....	325	<b>DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE .....</b>	<b>373</b>
Diagnosis Procedure .....	326	Description .....	373
<b>DTC P0327, P0328, P0332, P0333 KS .....</b>	<b>332</b>	CONSULT-II Reference Value in Data Monitor Mode .....	373
Component Description .....	332	On Board Diagnosis Logic .....	374
On Board Diagnosis Logic .....	332	DTC Confirmation Procedure .....	374
DTC Confirmation Procedure .....	332	Wiring Diagram .....	375
Wiring Diagram .....	333	Diagnosis Procedure .....	376
Diagnosis Procedure .....	334	Component Inspection .....	378
Component Inspection .....	335	Removal and Installation .....	378
Removal and Installation .....	335	<b>DTC P0447 EVAP CANISTER VENT CONTROL VALVE .....</b>	<b>379</b>
<b>DTC P0335 CKP SENSOR (POS) .....</b>	<b>336</b>	Component Description .....	
Component Description .....	336		
CONSULT-II Reference Value in Data Monitor Mode .....	336		
On Board Diagnosis Logic .....	336		
DTC Confirmation Procedure .....	336		

CONSULT-II Reference Value in Data Monitor Mode .....	379	Diagnosis Procedure .....	417
On Board Diagnosis Logic .....	379	<b>DTC P0460 FUEL LEVEL SENSOR .....</b>	<b>423</b>
DTC Confirmation Procedure .....	379	Component Description .....	423
Wiring Diagram .....	381	On Board Diagnosis Logic .....	423
Diagnosis Procedure .....	382	DTC Confirmation Procedure .....	423
Component Inspection .....	384	Diagnosis Procedure .....	424
<b>DTC P0448 EVAP CANISTER VENT CONTROL VALVE .....</b>	<b>386</b>	Removal and Installation .....	424
Component Description .....	386	<b>DTC P0461 FUEL LEVEL SENSOR .....</b>	<b>425</b>
CONSULT-II Reference Value in Data Monitor Mode .....	386	Component Description .....	425
On Board Diagnosis Logic .....	386	On Board Diagnosis Logic .....	425
DTC Confirmation Procedure .....	386	Overall Function Check .....	425
Wiring Diagram .....	388	Diagnosis Procedure .....	426
Diagnosis Procedure .....	389	Removal and Installation .....	426
Component Inspection .....	390	<b>DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT .....</b>	<b>427</b>
<b>DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR .....</b>	<b>392</b>	Component Description .....	427
Component Description .....	392	On Board Diagnosis Logic .....	427
CONSULT-II Reference Value in Data Monitor Mode .....	392	DTC Confirmation Procedure .....	427
On Board Diagnosis Logic .....	392	Diagnosis Procedure .....	428
DTC Confirmation Procedure .....	392	Removal and Installation .....	428
Diagnosis Procedure .....	393	<b>DTC P0500 VSS .....</b>	<b>429</b>
Component Inspection .....	394	Description .....	429
<b>DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR .....</b>	<b>395</b>	On Board Diagnosis Logic .....	429
Component Description .....	395	DTC Confirmation Procedure .....	429
CONSULT-II Reference Value in Data Monitor Mode .....	395	Overall Function Check .....	430
On Board Diagnosis Logic .....	395	Diagnosis Procedure .....	430
DTC Confirmation Procedure .....	395	<b>DTC P0506 ISC SYSTEM .....</b>	<b>431</b>
Wiring Diagram .....	397	Description .....	431
Diagnosis Procedure .....	398	On Board Diagnosis Logic .....	431
Component Inspection .....	400	DTC Confirmation Procedure .....	431
<b>DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR .....</b>	<b>401</b>	Diagnosis Procedure .....	431
Component Description .....	401	<b>DTC P0507 ISC SYSTEM .....</b>	<b>433</b>
CONSULT-II Reference Value in Data Monitor Mode .....	401	Description .....	433
On Board Diagnosis Logic .....	401	On Board Diagnosis Logic .....	433
DTC Confirmation Procedure .....	401	DTC Confirmation Procedure .....	433
Wiring Diagram .....	403	Diagnosis Procedure .....	433
Diagnosis Procedure .....	404	<b>DTC P0550 PSP SENSOR .....</b>	<b>435</b>
Component Inspection .....	407	Component Description .....	435
<b>DTC P0455 EVAP CONTROL SYSTEM .....</b>	<b>408</b>	CONSULT-II Reference Value in Data Monitor Mode .....	435
On Board Diagnosis Logic .....	408	On Board Diagnosis Logic .....	435
DTC Confirmation Procedure .....	408	DTC Confirmation Procedure .....	435
Diagnosis Procedure .....	410	Wiring Diagram .....	436
<b>DTC P0456 EVAP CONTROL SYSTEM .....</b>	<b>415</b>	Diagnosis Procedure .....	437
On Board Diagnosis Logic .....	415	Component Inspection .....	438
DTC Confirmation Procedure .....	416	Removal and Installation .....	439
Overall Function Check .....	416	<b>DTC P0603 ECM POWER SUPPLY .....</b>	<b>440</b>
		Component Description .....	440
		On Board Diagnosis Logic .....	440
		DTC Confirmation Procedure .....	440
		Wiring Diagram .....	441
		Diagnosis Procedure .....	442

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

<b>DTC P0605 ECM</b> .....	<b>444</b>	<b>DTC P1225 TP SENSOR</b> .....	<b>477</b>
Component Description .....	444	Component Description .....	477
On Board Diagnosis Logic .....	444	On Board Diagnosis Logic .....	477
DTC Confirmation Procedure .....	444	DTC Confirmation Procedure .....	477
Diagnosis Procedure .....	445	Diagnosis Procedure .....	477
		Removal and Installation .....	478
<b>DTC P0643 SENSOR POWER SUPPLY</b> .....	<b>447</b>	<b>DTC P1226 TP SENSOR</b> .....	<b>479</b>
On Board Diagnosis Logic .....	447	Component Description .....	479
DTC Confirmation Procedure .....	447	On Board Diagnosis Logic .....	479
Wiring Diagram .....	448	DTC Confirmation Procedure .....	479
Diagnosis Procedure .....	449	Diagnosis Procedure .....	479
		Removal and Installation .....	480
<b>DTC P0850 PNP SWITCH</b> .....	<b>452</b>	<b>DTC P1421 COLD START CONTROL</b> .....	<b>481</b>
Component Description .....	452	Description .....	481
CONSULT-II Reference Value in Data Monitor		On Board Diagnosis Logic .....	481
Mode .....	452	DTC Confirmation Procedure .....	481
On Board Diagnosis Logic .....	452	Diagnosis Procedure .....	481
DTC Confirmation Procedure .....	452	<b>DTC P1550 BATTERY CURRENT SENSOR</b> ..	<b>483</b>
Overall Function Check .....	453	Component Description .....	483
Wiring Diagram .....	454	CONSULT-II Reference Value in Data Monitor	
Diagnosis Procedure .....	455	Mode .....	483
<b>DTC P1140, P1145 IVT CONTROL POSITION</b>		On Board Diagnosis Logic .....	483
<b>SENSOR</b> .....	<b>457</b>	DTC Confirmation Procedure .....	483
Component Description .....	457	Wiring Diagram .....	485
CONSULT-II Reference Value in Data Monitor		Diagnosis Procedure .....	486
Mode .....	457	Component Inspection .....	488
On Board Diagnosis Logic .....	457	<b>DTC P1551, P1552 BATTERY CURRENT</b>	
DTC Confirmation Procedure .....	457	<b>SENSOR</b> .....	<b>489</b>
Wiring Diagram .....	458	Component Description .....	489
Diagnosis Procedure .....	461	CONSULT-II Reference Value in Data Monitor	
Component Inspection .....	463	Mode .....	489
Removal and Installation .....	464	On Board Diagnosis Logic .....	489
<b>DTC P1148, P1168 CLOSED LOOP CON-</b>		DTC Confirmation Procedure .....	489
<b>TROL</b> .....	<b>466</b>	Wiring Diagram .....	491
On Board Diagnosis Logic .....	466	Diagnosis Procedure .....	492
<b>DTC P1211 TCS CONTROL UNIT</b> .....	<b>467</b>	Component Inspection .....	494
Description .....	467	<b>DTC P1553 BATTERY CURRENT SENSOR</b> ..	<b>495</b>
On Board Diagnosis Logic .....	467	Component Description .....	495
DTC Confirmation Procedure .....	467	CONSULT-II Reference Value in Data Monitor	
Diagnosis Procedure .....	467	Mode .....	495
<b>DTC P1212 TCS COMMUNICATION LINE</b> ....	<b>468</b>	On Board Diagnosis Logic .....	495
Description .....	468	DTC Confirmation Procedure .....	495
On Board Diagnosis Logic .....	468	Wiring Diagram .....	497
DTC Confirmation Procedure .....	468	Diagnosis Procedure .....	498
Diagnosis Procedure .....	468	Component Inspection .....	500
<b>DTC P1217 ENGINE OVER TEMPERATURE.</b>	<b>469</b>	<b>DTC P1554 BATTERY CURRENT SENSOR</b> ..	<b>501</b>
Description .....	469	Component Description .....	501
CONSULT-II Reference Value in Data Monitor		CONSULT-II Reference Value in Data Monitor	
Mode .....	469	Mode .....	501
On Board Diagnosis Logic .....	470	On Board Diagnosis Logic .....	501
Overall Function Check .....	470	Overall Function Check .....	501
Wiring Diagram .....	472	Wiring Diagram .....	503
Diagnosis Procedure .....	473	Diagnosis Procedure .....	504
Main 13 Causes of Overheating .....	476	Component Inspection .....	506
Component Inspection .....	476		

<b>DTC P1564 ICC STEERING SWITCH</b> .....	<b>507</b>	CONSULT-II Reference Value in Data Monitor	
Component Description .....	507	Mode .....	539
CONSULT-II Reference Value in Data Monitor		On Board Diagnosis Logic .....	539
Mode .....	507	DTC Confirmation Procedure .....	539
On Board Diagnosis Logic .....	507	Wiring Diagram .....	540
DTC Confirmation Procedure .....	507	Diagnosis Procedure .....	541
Wiring Diagram .....	509	Component Inspection .....	542
Diagnosis Procedure .....	510		
Component Inspection .....	512		
<b>DTC P1564 ASCD STEERING SWITCH</b> .....	<b>513</b>	<b>DTC P2100, P2103 THROTTLE CONTROL</b>	<b>C</b>
Component Description .....	513	<b>MOTOR RELAY</b> .....	<b>543</b>
CONSULT-II Reference Value in Data Monitor		Component Description .....	543
Mode .....	513	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic .....	513	Mode .....	543
DTC Confirmation Procedure .....	513	On Board Diagnosis Logic .....	543
Wiring Diagram .....	515	DTC Confirmation Procedure .....	543
Diagnosis Procedure .....	516	Wiring Diagram .....	545
Component Inspection .....	518	Diagnosis Procedure .....	546
<b>DTC P1568 ICC FUNCTION</b> .....	<b>519</b>	<b>DTC P2101 ELECTRIC THROTTLE CON-</b>	<b>F</b>
On Board Diagnosis Logic .....	519	<b>TROL FUNCTION</b> .....	<b>548</b>
DTC Confirmation Procedure .....	519	Description .....	548
Diagnosis Procedure .....	519	On Board Diagnosis Logic .....	548
<b>DTC P1572 ICC BRAKE SWITCH</b> .....	<b>520</b>	DTC Confirmation Procedure .....	548
Component Description .....	520	Wiring Diagram .....	549
CONSULT-II Reference Value in Data Monitor		Diagnosis Procedure .....	550
Mode .....	520	Component Inspection .....	553
On Board Diagnosis Logic .....	520	Removal and Installation .....	553
DTC Confirmation Procedure .....	520	<b>DTC P2118 THROTTLE CONTROL MOTOR</b> .	<b>554</b>
Wiring Diagram .....	522	Component Description .....	554
Diagnosis Procedure .....	523	On Board Diagnosis Logic .....	554
Component Inspection .....	526	DTC Confirmation Procedure .....	554
<b>DTC P1572 ASCD BRAKE SWITCH</b> .....	<b>528</b>	Wiring Diagram .....	555
Component Description .....	528	Diagnosis Procedure .....	556
CONSULT-II Reference Value in Data Monitor		Component Inspection .....	557
Mode .....	528	Removal and Installation .....	557
On Board Diagnosis Logic .....	528	<b>DTC P2119 ELECTRIC THROTTLE CON-</b>	<b>L</b>
DTC Confirmation Procedure .....	528	<b>TROL ACTUATOR</b> .....	<b>559</b>
Wiring Diagram .....	530	Component Description .....	559
Diagnosis Procedure .....	531	On Board Diagnosis Logic .....	559
Component Inspection .....	534	DTC Confirmation Procedure .....	559
<b>DTC P1574 ICC VEHICLE SPEED SENSOR</b> ..	<b>535</b>	Diagnosis Procedure .....	560
Component Description .....	535	<b>DTC P2122, P2123 APP SENSOR</b> .....	<b>561</b>
On Board Diagnosis Logic .....	535	Component Description .....	561
DTC Confirmation Procedure .....	535	CONSULT-II Reference Value in Data Monitor	
Diagnosis Procedure .....	536	Mode .....	561
<b>DTC P1574 ASCD VEHICLE SPEED SEN-</b>		On Board Diagnosis Logic .....	561
<b>SOR</b> .....	<b>537</b>	DTC Confirmation Procedure .....	561
Component Description .....	537	Wiring Diagram .....	563
On Board Diagnosis Logic .....	537	Diagnosis Procedure .....	564
DTC Confirmation Procedure .....	537	Component Inspection .....	566
Diagnosis Procedure .....	538	Removal and Installation .....	566
<b>DTC P1805 BRAKE SWITCH</b> .....	<b>539</b>	<b>DTC P2127, P2128 APP SENSOR</b> .....	<b>567</b>
Description .....	539	Component Description .....	567
		CONSULT-II Reference Value in Data Monitor	
		Mode .....	567
		On Board Diagnosis Logic .....	567

DTC Confirmation Procedure .....	567	<b>FUEL INJECTOR .....</b>	<b>608</b>
Wiring Diagram .....	569	Component Description .....	608
Diagnosis Procedure .....	570	CONSULT-II Reference Value in Data Monitor	
Component Inspection .....	572	Mode .....	608
Removal and Installation .....	573	Wiring Diagram .....	609
<b>DTC P2135 TP SENSOR .....</b>	<b>574</b>	Diagnosis Procedure .....	610
Component Description .....	574	Component Inspection .....	612
CONSULT-II Reference Value in Data Monitor		Removal and Installation .....	612
Mode .....	574	<b>FUEL PUMP .....</b>	<b>613</b>
On Board Diagnosis Logic .....	574	Description .....	613
DTC Confirmation Procedure .....	574	CONSULT-II Reference Value in Data Monitor	
Wiring Diagram .....	576	Mode .....	613
Diagnosis Procedure .....	577	Wiring Diagram .....	614
Component Inspection .....	579	Diagnosis Procedure .....	615
Removal and Installation .....	580	Component Inspection .....	617
<b>DTC P2138 APP SENSOR .....</b>	<b>581</b>	Removal and Installation .....	618
Component Description .....	581	<b>ICC BRAKE SWITCH .....</b>	<b>619</b>
CONSULT-II Reference Value in Data Monitor		Component Description .....	619
Mode .....	581	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic .....	581	Mode .....	619
DTC Confirmation Procedure .....	582	Wiring Diagram .....	620
Wiring Diagram .....	583	Diagnosis Procedure .....	621
Diagnosis Procedure .....	584	Component Inspection .....	624
Component Inspection .....	587	<b>IGNITION SIGNAL .....</b>	<b>626</b>
Removal and Installation .....	587	Component Description .....	626
<b>DTC P2A00, P2A03 A/F SENSOR 1 .....</b>	<b>588</b>	Wiring Diagram .....	627
Component Description .....	588	Diagnosis Procedure .....	632
CONSULT-II Reference Value in Data Monitor		Component Inspection .....	635
Mode .....	588	Removal and Installation .....	637
On Board Diagnosis Logic .....	588	<b>REFRIGERANT PRESSURE SENSOR .....</b>	<b>638</b>
DTC Confirmation Procedure .....	588	Component Description .....	638
Wiring Diagram .....	590	Wiring Diagram .....	639
Diagnosis Procedure .....	593	Diagnosis Procedure .....	640
Removal and Installation .....	596	Removal and Installation .....	642
<b>ASCD BRAKE SWITCH .....</b>	<b>597</b>	<b>MIL AND DATA LINK CONNECTOR .....</b>	<b>643</b>
Component Description .....	597	Wiring Diagram .....	643
CONSULT-II Reference Value in Data Monitor		<b>SERVICE DATA AND SPECIFICATIONS</b>	
Mode .....	597	<b>(SDS) .....</b>	<b>645</b>
Wiring Diagram .....	598	Fuel Pressure .....	645
Diagnosis Procedure .....	599	Idle Speed and Ignition Timing .....	645
Component Inspection .....	602	Calculated Load Value .....	645
<b>ASCD INDICATOR .....</b>	<b>603</b>	Mass Air Flow Sensor .....	645
Component Description .....	603	Intake Air Temperature Sensor .....	645
CONSULT-II Reference Value in Data Monitor		Engine Coolant Temperature Sensor .....	645
Mode .....	603	A/F Sensor 1 Heater .....	645
Wiring Diagram .....	604	Heated Oxygen sensor 2 Heater .....	645
Diagnosis Procedure .....	604	Crankshaft Position Sensor (POS) .....	646
<b>ELECTRICAL LOAD SIGNAL .....</b>	<b>606</b>	Camshaft Position Sensor (PHASE) .....	646
Description .....	606	Throttle Control Motor .....	646
CONSULT-II Reference Value in Data Monitor		Fuel Injector .....	646
Mode .....	606	Fuel Pump .....	646
Diagnosis Procedure .....	606		



# INDEX FOR DTC

< SERVICE INFORMATION >

## SERVICE INFORMATION

### INDEX FOR DTC

DTC No. Index

INFOID:000000003531578

**NOTE:**

- If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC U1010 is displayed with other DTC, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	<a href="#">EC-145</a>
U1001	1001*4	CAN COMM CIRCUIT	<a href="#">EC-145</a>
U1010	1010	CONTROL UNIT(CAN)	<a href="#">EC-147</a>
<b>P0000</b>	<b>0000</b>	<b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b>	—
P0011	0011	INT/V TIM CONT-B1	<a href="#">EC-149</a>
P0021	0021	INT/V TIM CONT-B2	<a href="#">EC-149</a>
P0031	0031	A/F SEN1 HTR (B1)	<a href="#">EC-163</a>
P0032	0032	A/F SEN1 HTR (B1)	<a href="#">EC-163</a>
P0037	0037	HO2S2 HTR (B1)	<a href="#">EC-170</a>
P0038	0038	HO2S2 HTR (B1)	<a href="#">EC-170</a>
P0051	0051	A/F SEN1 HTR (B2)	<a href="#">EC-163</a>
P0052	0052	A/F SEN1 HTR (B2)	<a href="#">EC-163</a>
P0057	0057	HO2S2 HTR (B2)	<a href="#">EC-170</a>
P0058	0058	HO2S2 HTR (B2)	<a href="#">EC-170</a>
P0075	0075	INT/V TIM V/CIR-B1	<a href="#">EC-178</a>
P0081	0081	INT/V TIM V/CIR-B2	<a href="#">EC-178</a>
P0101	0101	MAF SEN/CIRCUIT	<a href="#">EC-186</a>
P0102	0102	MAF SEN/CIRCUIT	<a href="#">EC-194</a>
P0103	0103	MAF SEN/CIRCUIT	<a href="#">EC-194</a>
P0112	0112	IAT SEN/CIRCUIT	<a href="#">EC-201</a>
P0113	0113	IAT SEN/CIRCUIT	<a href="#">EC-201</a>
P0117	0117	ECT SEN/CIRC	<a href="#">EC-205</a>
P0118	0118	ECT SEN/CIRC	<a href="#">EC-205</a>
P0122	0122	TP SEN 2/CIRC	<a href="#">EC-210</a>
P0123	0123	TP SEN 2/CIRC	<a href="#">EC-210</a>
P0125	0125	ECT SENSOR	<a href="#">EC-217</a>
P0127	0127	IAT SENSOR	<a href="#">EC-220</a>
P0128	0128	THERMSTAT FNCTN	<a href="#">EC-223</a>
P0130	0130	A/F SENSOR1 (B1)	<a href="#">EC-225</a>
P0131	0131	A/F SENSOR1 (B1)	<a href="#">EC-234</a>
P0132	0132	A/F SENSOR1 (B1)	<a href="#">EC-242</a>
P0133	0133	A/F SENSOR1 (B1)	<a href="#">EC-250</a>

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# INDEX FOR DTC

## < SERVICE INFORMATION >

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0137	0137	HO2S2 (B1)	<a href="#">EC-260</a>
P0138	0138	HO2S2 (B1)	<a href="#">EC-270</a>
P0139	0139	HO2S2 (B1)	<a href="#">EC-282</a>
P0150	0150	A/F SENSOR1 (B2)	<a href="#">EC-225</a>
P0151	0151	A/F SENSOR1 (B2)	<a href="#">EC-234</a>
P0152	0152	A/F SENSOR1 (B2)	<a href="#">EC-242</a>
P0153	0153	A/F SENSOR1 (B2)	<a href="#">EC-250</a>
P0157	0157	HO2S2 (B2)	<a href="#">EC-260</a>
P0158	0158	HO2S2 (B2)	<a href="#">EC-270</a>
P0159	0159	HO2S2 (B2)	<a href="#">EC-282</a>
P0171	0171	FUEL SYS-LEAN-B1	<a href="#">EC-292</a>
P0172	0172	FUEL SYS-RICH-B1	<a href="#">EC-301</a>
P0174	0174	FUEL SYS-LEAN-B2	<a href="#">EC-292</a>
P0175	0175	FUEL SYS-RICH-B2	<a href="#">EC-301</a>
P0181	0181	FTT SENSOR	<a href="#">EC-310</a>
P0182	0182	FTT SEN/CIRCUIT	<a href="#">EC-314</a>
P0183	0183	FTT SEN/CIRCUIT	<a href="#">EC-314</a>
P0222	0222	TP SEN 1/CIRC	<a href="#">EC-318</a>
P0223	0223	TP SEN 1/CIRC	<a href="#">EC-318</a>
P0300	0300	MULTI CYL MISFIRE	<a href="#">EC-325</a>
P0301	0301	CYL 1 MISFIRE	<a href="#">EC-325</a>
P0302	0302	CYL 2 MISFIRE	<a href="#">EC-325</a>
P0303	0303	CYL 3 MISFIRE	<a href="#">EC-325</a>
P0304	0304	CYL 4 MISFIRE	<a href="#">EC-325</a>
P0305	0305	CYL 5 MISFIRE	<a href="#">EC-325</a>
P0306	0306	CYL 6 MISFIRE	<a href="#">EC-325</a>
P0307	0307	CYL 7 MISFIRE	<a href="#">EC-325</a>
P0308	0308	CYL 8 MISFIRE	<a href="#">EC-325</a>
P0327	0327	KNOCK SEN/CIRC-B1	<a href="#">EC-332</a>
P0328	0328	KNOCK SEN/CIRC-B1	<a href="#">EC-332</a>
P0332	0332	KNOCK SEN/CIRC-B2	<a href="#">EC-332</a>
P0333	0333	KNOCK SEN/CIRC-B2	<a href="#">EC-332</a>
P0335	0335	CKP SEN/CIRCUIT	<a href="#">EC-336</a>
P0340	0340	CMP SEN/CIRC-B1	<a href="#">EC-342</a>
P0420	0420	TW CATALYST SYS-B1	<a href="#">EC-349</a>
P0430	0430	TW CATALYST SYS-B2	<a href="#">EC-349</a>
P0441	0441	EVAP PURG FLOW/MON	<a href="#">EC-354</a>
P0442	0442	EVAP SMALL LEAK	<a href="#">EC-359</a>
P0443	0443	PURG VOLUME CONT/V	<a href="#">EC-366</a>
P0444	0444	PURG VOLUME CONT/V	<a href="#">EC-373</a>
P0445	0445	PURG VOLUME CONT/V	<a href="#">EC-373</a>
P0447	0447	VENT CONTROL VALVE	<a href="#">EC-379</a>

# INDEX FOR DTC

## < SERVICE INFORMATION >

DTC*1		Items (CONSULT-II screen terms)	Reference page	
CONSULT-II GST*2	ECM*3			
P0448	0448	VENT CONTROL VALVE	<a href="#">EC-386</a>	A
P0451	0451	EVAP SYS PRES SEN	<a href="#">EC-392</a>	EC
P0452	0452	EVAP SYS PRES SEN	<a href="#">EC-395</a>	
P0453	0453	EVAP SYS PRES SEN	<a href="#">EC-401</a>	C
P0455	0455	EVAP GROSS LEAK	<a href="#">EC-408</a>	
P0456	0456	EVAP VERY SML LEAK	<a href="#">EC-415</a>	D
P0460	0460	FUEL LEV SEN SLOSH	<a href="#">EC-423</a>	
P0461	0461	FUEL LEVEL SENSOR	<a href="#">EC-425</a>	
P0462	0462	FUEL LEVL SEN/CIRC	<a href="#">EC-427</a>	E
P0463	0463	FUEL LEVL SEN/CIRC	<a href="#">EC-427</a>	
P0500	0500	VEH SPEED SEN/CIRC*5	<a href="#">EC-429</a>	F
P0506	0506	ISC SYSTEM	<a href="#">EC-431</a>	
P0507	0507	ISC SYSTEM	<a href="#">EC-433</a>	
P0550	0550	PW ST P SEN/CIRC	<a href="#">EC-435</a>	G
P0603	0603	ECM BACK UP/CIRCUIT	<a href="#">EC-440</a>	
P0605	0605	ECM	<a href="#">EC-444</a>	H
P0643	0643	SENSOR POWER/CIRC	<a href="#">EC-447</a>	
P0700	0700	TCM	<a href="#">AT-98</a>	
P0705	0705	PNP SW/CIRC	<a href="#">AT-99</a>	I
P0710	0710	ATF TEMP SEN/CIRC	<a href="#">AT-119</a>	
P0720	0720	VEH SPD SEN/CIR AT*5	<a href="#">AT-105</a>	J
P0740	0740	TCC SOLENOID/CIRC	<a href="#">AT-111</a>	
P0744	0744	A/T TCC S/V FNCTN	<a href="#">AT-113</a>	
P0745	0745	L/PRESS SOL/CIRC	<a href="#">AT-115</a>	K
P0850	0850	P-N POS SW/CIRCUIT	<a href="#">EC-452</a>	
P1140	1140	INTK TIM S/CIRC-B1	<a href="#">EC-457</a>	L
P1145	1145	INTK TIM S/CIRC-B2	<a href="#">EC-457</a>	
P1148	1148	CLOSED LOOP-B1	<a href="#">EC-466</a>	
P1168	1168	CLOSED LOOP-B2	<a href="#">EC-466</a>	M
P1211	1211	TCS C/U FUNCTN	<a href="#">EC-467</a>	
P1212	1212	TCS/CIRC	<a href="#">EC-468</a>	
P1217	1217	ENG OVER TEMP	<a href="#">EC-469</a>	N
P1225	1225	CTP LEARNING	<a href="#">EC-477</a>	
P1226	1226	CTP LEARNING	<a href="#">EC-479</a>	O
P1421	1421	COLD START CONTROL	<a href="#">EC-481</a>	
P1550	1550	BAT CURRENT SENSOR	<a href="#">EC-483</a>	
P1551	1551	BAT CURRENT SENSOR	<a href="#">EC-489</a>	P
P1552	1552	BAT CURRENT SENSOR	<a href="#">EC-489</a>	
P1553	1553	BAT CURRENT SENSOR	<a href="#">EC-495</a>	
P1554	1554	BAT CURRENT SENSOR	<a href="#">EC-501</a>	
P1564	1564	ASCD SW	<a href="#">EC-507</a> (Models with ICC) <a href="#">EC-513</a> (Models with ASCD)	

# INDEX FOR DTC

## < SERVICE INFORMATION >

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P1568	1568	ICC COMMAND VALUE*7	<a href="#">EC-519</a>
P1572	1572	ASCD BRAKE SW	<a href="#">EC-520</a> (Models with ICC) <a href="#">EC-528</a> (Models with ASCD)
P1574	1574	ASCD VHL SPD SEN*6	<a href="#">EC-535</a> (Models with ICC) <a href="#">EC-537</a> (Models with ASCD)
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	<a href="#">BL-116</a>
P1710	1710	ATF TEMP SEN/CIRC	<a href="#">AT-119</a>
P1730	1730	A/T INTERLOCK	<a href="#">AT-126</a>
P1752	1752	I/C SOLENOID/CIRC	<a href="#">AT-130</a>
P1754	1754	I/C SOLENOID FNCTN	<a href="#">AT-132</a>
P1757	1757	FR/B SOLENOID/CIRC	<a href="#">AT-134</a>
P1759	1759	FR/B SOLENOID FNCT	<a href="#">AT-136</a>
P1762	1762	D/C SOLENOID/CIRC	<a href="#">AT-138</a>
P1764	1764	D/C SOLENOID FNCTN	<a href="#">AT-140</a>
P1767	1767	HLR/C SOL/CIRC	<a href="#">AT-142</a>
P1769	1769	HLR/C SOL FNCTN	<a href="#">AT-144</a>
P1772	1772	LC/B SOLENOID/CIRC	<a href="#">AT-146</a>
P1774	1774	LC/B SOLENOID FNCT	<a href="#">AT-148</a>
P1805	1805	BRAKE SW/CIRCUIT	<a href="#">EC-539</a>
P2100	2100	ETC MOT PWR	<a href="#">EC-543</a>
P2101	2101	ETC FUNCTION/CIRC	<a href="#">EC-548</a>
P2103	2103	ETC MOT PWR	<a href="#">EC-543</a>
P2118	2118	ETC MOT	<a href="#">EC-554</a>
P2119	2119	ETC ACTR	<a href="#">EC-559</a>
P2122	2122	APP SEN 1/CIRC	<a href="#">EC-561</a>
P2123	2123	APP SEN 1/CIRC	<a href="#">EC-561</a>
P2127	2127	APP SEN 2/CIRC	<a href="#">EC-567</a>
P2128	2128	APP SEN 2/CIRC	<a href="#">EC-567</a>
P2135	2135	TP SENSOR	<a href="#">EC-574</a>
P2138	2138	APP SENSOR	<a href="#">EC-581</a>
P2A00	2A00	A/F SENSOR1 (B1)	<a href="#">EC-588</a>
P2A03	2A03	A/F SENSOR1 (B2)	<a href="#">EC-588</a>

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

\*2: This number is prescribed by SAE J2012.

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

\*4: The troubleshooting for this DTC needs CONSULT-II.

\*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

\*6: 2WD models

\*7: Models with ICC

## Alphabetical Index

INFOID:000000003531579

### NOTE:

- If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).

# INDEX FOR DTC

## < SERVICE INFORMATION >

- If DTC U1010 is displayed with other DTC, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
A/F SEN1 HTR (B1)	P0031	0031	<a href="#">EC-163</a>
A/F SEN1 HTR (B1)	P0032	0032	<a href="#">EC-163</a>
A/F SEN1 HTR (B2)	P0051	0051	<a href="#">EC-163</a>
A/F SEN1 HTR (B2)	P0052	0052	<a href="#">EC-163</a>
A/F SENSOR1 (B1)	P0130	0130	<a href="#">EC-225</a>
A/F SENSOR1 (B1)	P0131	0131	<a href="#">EC-234</a>
A/F SENSOR1 (B1)	P0132	0132	<a href="#">EC-242</a>
A/F SENSOR1 (B1)	P0133	0133	<a href="#">EC-250</a>
A/F SENSOR1 (B1)	P2A00	2A00	<a href="#">EC-588</a>
A/F SENSOR1 (B2)	P0150	0150	<a href="#">EC-225</a>
A/F SENSOR1 (B2)	P0151	0151	<a href="#">EC-234</a>
A/F SENSOR1 (B2)	P0152	0152	<a href="#">EC-242</a>
A/F SENSOR1 (B2)	P0153	0153	<a href="#">EC-250</a>
A/F SENSOR1 (B2)	P2A03	2A03	<a href="#">EC-588</a>
A/T INTERLOCK	P1730	1730	<a href="#">AT-126</a>
A/T TCC S/V FNCTN	P0744	0744	<a href="#">AT-113</a>
APP SEN 1/CIRC	P2122	2122	<a href="#">EC-561</a>
APP SEN 1/CIRC	P2123	2123	<a href="#">EC-561</a>
APP SEN 2/CIRC	P2127	2127	<a href="#">EC-567</a>
APP SEN 2/CIRC	P2128	2128	<a href="#">EC-567</a>
APP SENSOR	P2138	2138	<a href="#">EC-581</a>
ASCD BRAKE SW	P1572	1572	<a href="#">EC-520</a> (Models with ICC) <a href="#">EC-528</a> (Models with ASCD)
ASCD SW	P1564	1564	<a href="#">EC-507</a> (Models with ICC) <a href="#">EC-513</a> (Models with ASCD)
ASCD VHL SPD SEN*6	P1574	1574	<a href="#">EC-535</a> (Models with ICC) <a href="#">EC-537</a> (Models with ASCD)
BAT CURRENT SENSOR	P1550	1550	<a href="#">EC-483</a>
BAT CURRENT SENSOR	P1551	1551	<a href="#">EC-489</a>
BAT CURRENT SENSOR	P1552	1552	<a href="#">EC-489</a>
BAT CURRENT SENSOR	P1553	1553	<a href="#">EC-495</a>
BAT CURRENT SENSOR	P1554	1554	<a href="#">EC-501</a>
ATF TEMP SEN/CIRC	P0710	0710	<a href="#">AT-119</a>
BRAKE SW/CIRCUIT	P1805	1805	<a href="#">EC-539</a>
CAN COMM CIRCUIT	U1000	1000*4	<a href="#">EC-145</a>
CAN COMM CIRCUIT	U1001	1001*4	<a href="#">EC-145</a>
CKP SEN/CIRCUIT	P0335	0335	<a href="#">EC-336</a>
CLOSED LOOP-B1	P1148	1148	<a href="#">EC-466</a>
CLOSED LOOP-B2	P1168	1168	<a href="#">EC-466</a>
CMP SEN/CIRC-B1	P0340	0340	<a href="#">EC-342</a>
COLD START CONTROL	P1421	1421	<a href="#">EC-481</a>

# INDEX FOR DTC

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
CONTROL UNIT(CAN)	U1010	1010	<a href="#">EC-147</a>
CTP LEARNING	P1225	1225	<a href="#">EC-477</a>
CTP LEARNING	P1226	1226	<a href="#">EC-479</a>
CYL 1 MISFIRE	P0301	0301	<a href="#">EC-325</a>
CYL 2 MISFIRE	P0302	0302	<a href="#">EC-325</a>
CYL 3 MISFIRE	P0303	0303	<a href="#">EC-325</a>
CYL 4 MISFIRE	P0304	0304	<a href="#">EC-325</a>
CYL 5 MISFIRE	P0305	0305	<a href="#">EC-325</a>
CYL 6 MISFIRE	P0306	0306	<a href="#">EC-325</a>
CYL 7 MISFIRE	P0307	0307	<a href="#">EC-325</a>
CYL 8 MISFIRE	P0308	0308	<a href="#">EC-325</a>
D/C SOLENOID FNCTN	P1764	1764	<a href="#">AT-140</a>
D/C SOLENOID/CIRC	P1762	1762	<a href="#">AT-138</a>
ECM	P0605	0605	<a href="#">EC-444</a>
ECM BACK UP/CIRCUIT	P0603	0603	<a href="#">EC-440</a>
ECT SEN/CIRC	P0117	0117	<a href="#">EC-205</a>
ECT SEN/CIRC	P0118	0118	<a href="#">EC-205</a>
ECT SENSOR	P0125	0125	<a href="#">EC-217</a>
ENG OVER TEMP	P1217	1217	<a href="#">EC-469</a>
ETC ACTR	P2119	2119	<a href="#">EC-559</a>
ETC FUNCTION/CIRC	P2101	2101	<a href="#">EC-548</a>
ETC MOT	P2118	2118	<a href="#">EC-554</a>
ETC MOT PWR	P2100	2100	<a href="#">EC-543</a>
ETC MOT PWR	P2103	2103	<a href="#">EC-543</a>
EVAP GROSS LEAK	P0455	0455	<a href="#">EC-408</a>
EVAP PURG FLOW/MON	P0441	0441	<a href="#">EC-354</a>
EVAP SMALL LEAK	P0442	0442	<a href="#">EC-359</a>
EVAP SYS PRES SEN	P0451	0451	<a href="#">EC-392</a>
EVAP SYS PRES SEN	P0452	0452	<a href="#">EC-395</a>
EVAP SYS PRES SEN	P0453	0453	<a href="#">EC-401</a>
EVAP VERY SML LEAK	P0456	0456	<a href="#">EC-415</a>
FR/B SOLENOID FNCT	P1759	1759	<a href="#">AT-136</a>
FR/B SOLENOID/CIRC	P1757	1757	<a href="#">AT-134</a>
FTT SEN/CIRCUIT	P0182	0182	<a href="#">EC-314</a>
FTT SEN/CIRCUIT	P0183	0183	<a href="#">EC-314</a>
FTT SENSOR	P0181	0181	<a href="#">EC-310</a>
FUEL LEV SEN SLOSH	P0460	0460	<a href="#">EC-423</a>
FUEL LEVEL SENSOR	P0461	0461	<a href="#">EC-425</a>
FUEL LEVL SEN/CIRC	P0462	0462	<a href="#">EC-427</a>
FUEL LEVL SEN/CIRC	P0463	0463	<a href="#">EC-427</a>
FUEL SYS-LEAN-B1	P0171	0171	<a href="#">EC-292</a>
FUEL SYS-LEAN-B2	P0174	0174	<a href="#">EC-292</a>

# INDEX FOR DTC

< SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		Reference page	
	CONSULT-II GST*2	ECM*3		
FUEL SYS-RICH-B1	P0172	0172	<a href="#">EC-301</a>	EC
FUEL SYS-RICH-B2	P0175	0175	<a href="#">EC-301</a>	
HLR/C SOL FNCTN	P1769	1769	<a href="#">AT-144</a>	
HLR/C SOL/CIRC	P1767	1767	<a href="#">AT-142</a>	C
HO2S2 (B1)	P0137	0137	<a href="#">EC-260</a>	
HO2S2 (B1)	P0138	0138	<a href="#">EC-270</a>	D
HO2S2 (B1)	P0139	0139	<a href="#">EC-282</a>	
HO2S2 (B2)	P0157	0157	<a href="#">EC-260</a>	
HO2S2 (B2)	P0158	0158	<a href="#">EC-270</a>	E
HO2S2 (B2)	P0159	0159	<a href="#">EC-282</a>	
HO2S2 HTR (B1)	P0037	0037	<a href="#">EC-170</a>	
HO2S2 HTR (B1)	P0038	0038	<a href="#">EC-170</a>	F
HO2S2 HTR (B2)	P0057	0057	<a href="#">EC-170</a>	
HO2S2 HTR (B2)	P0058	0058	<a href="#">EC-170</a>	G
I/C SOLENOID FNCTN	P1754	1754	<a href="#">AT-132</a>	
I/C SOLENOID/CIRC	P1752	1752	<a href="#">AT-130</a>	
IAT SEN/CIRCUIT	P0112	0112	<a href="#">EC-201</a>	H
IAT SEN/CIRCUIT	P0113	0113	<a href="#">EC-201</a>	
IAT SENSOR	P0127	0127	<a href="#">EC-220</a>	I
ICC COMMAND VALUE*7	P1568	1568	<a href="#">EC-519</a>	
INT/V TIM CONT-B1	P0011	0011	<a href="#">EC-149</a>	J
INT/V TIM CONT-B2	P0021	0021	<a href="#">EC-149</a>	
INT/V TIM V/CIR-B1	P0075	0075	<a href="#">EC-178</a>	
INT/V TIM V/CIR-B2	P0081	0081	<a href="#">EC-178</a>	K
INTK TIM S/CIRC-B1	P1140	1140	<a href="#">EC-457</a>	
INTK TIM S/CIRC-B2	P1145	1145	<a href="#">EC-457</a>	
ISC SYSTEM	P0506	0506	<a href="#">EC-431</a>	L
ISC SYSTEM	P0507	0507	<a href="#">EC-433</a>	
KNOCK SEN/CIRC-B1	P0327	0327	<a href="#">EC-332</a>	M
KNOCK SEN/CIRC-B1	P0328	0328	<a href="#">EC-332</a>	
KNOCK SEN/CIRC-B2	P0332	0332	<a href="#">EC-332</a>	
KNOCK SEN/CIRC-B2	P0333	0333	<a href="#">EC-332</a>	N
L/PRESS SOL/CIRC	P0745	0745	<a href="#">AT-115</a>	
LC/B SOLENOID FNCT	P1774	1774	<a href="#">AT-148</a>	O
LC/B SOLENOID/CIRC	P1772	1772	<a href="#">AT-146</a>	
MAF SEN/CIRCUIT	P0101	0101	<a href="#">EC-186</a>	
MAF SEN/CIRCUIT	P0102	0102	<a href="#">EC-194</a>	P
MAF SEN/CIRCUIT	P0103	0103	<a href="#">EC-194</a>	
MULTI CYL MISFIRE	P0300	0300	<a href="#">EC-325</a>	
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	<a href="#">BL-116</a>	
<b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b>	<b>P0000</b>	<b>0000</b>	—	

# INDEX FOR DTC

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
P-N POS SW/CIRCUIT	P0850	0850	<a href="#">EC-452</a>
PNP SW/CIRC	P0705	0705	<a href="#">AT-99</a>
PURG VOLUME CONT/V	P0443	0443	<a href="#">EC-366</a>
PURG VOLUME CONT/V	P0444	0444	<a href="#">EC-373</a>
PURG VOLUME CONT/V	P0445	0445	<a href="#">EC-373</a>
PW ST P SEN/CIRC	P0550	0550	<a href="#">EC-435</a>
SENSOR POWER/CIRC	P0643	0643	<a href="#">EC-447</a>
TCC SOLENOID/CIRC	P0740	0740	<a href="#">AT-111</a>
TCM	P0700	0700	<a href="#">AT-98</a>
TCS C/U FUNCTN	P1211	1211	<a href="#">EC-467</a>
TCS/CIRC	P1212	1212	<a href="#">EC-468</a>
THERMSTAT FNCTN	P0128	0128	<a href="#">EC-223</a>
TP SEN 1/CIRC	P0222	0222	<a href="#">EC-318</a>
TP SEN 1/CIRC	P0223	0223	<a href="#">EC-318</a>
TP SEN 2/CIRC	P0122	0122	<a href="#">EC-210</a>
TP SEN 2/CIRC	P0123	0123	<a href="#">EC-210</a>
TP SENSOR	P2135	2135	<a href="#">EC-574</a>
TW CATALYST SYS-B1	P0420	0420	<a href="#">EC-349</a>
TW CATALYST SYS-B2	P0430	0430	<a href="#">EC-349</a>
VEH SPD SEN/CIR AT*5	P0720	0720	<a href="#">AT-105</a>
VEH SPEED SEN/CIRC*5	P0500	0500	<a href="#">EC-429</a>
VENT CONTROL VALVE	P0447	0447	<a href="#">EC-379</a>
VENT CONTROL VALVE	P0448	0448	<a href="#">EC-386</a>

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

\*2: This number is prescribed by SAE J2012.

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

\*4: The troubleshooting for this DTC needs CONSULT-II.

\*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

\*6: 2WD models

\*7: Models with ICC



# PRECAUTIONS

< SERVICE INFORMATION >

## PRECAUTIONS

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

INFOID:000000003531580

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS 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, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS 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.

### On Board Diagnosis (OBD) System of Engine and A/T

INFOID:000000003531581

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

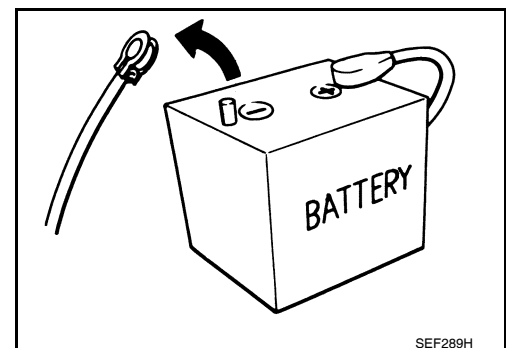
#### **CAUTION:**

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to [PG-66](#).
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

### Precaution

INFOID:000000003531582

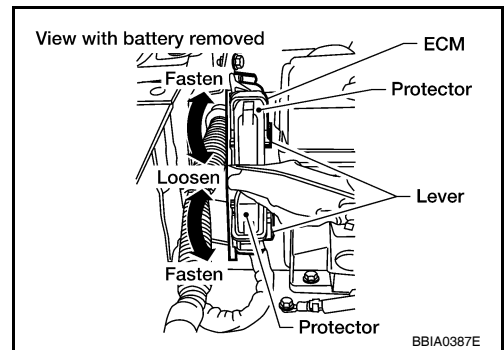
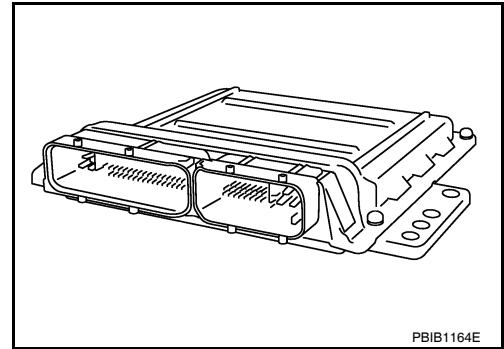
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage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



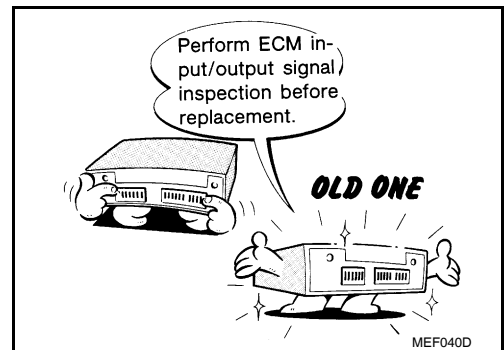
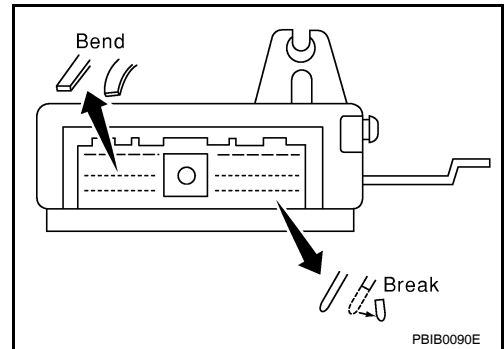
# PRECAUTIONS

## < SERVICE INFORMATION >

- 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 ECM harness connector, fasten it securely with a lever as far as it will go as shown in the figure.



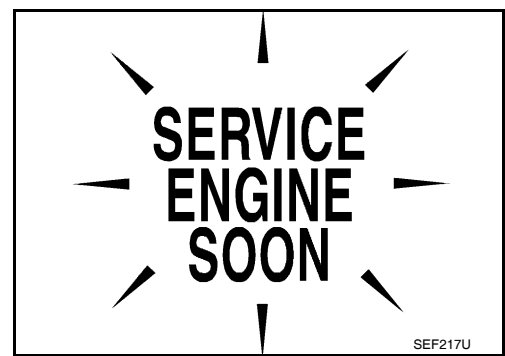
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).  
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.  
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to [EC-103, "ECM Terminal and Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- 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).



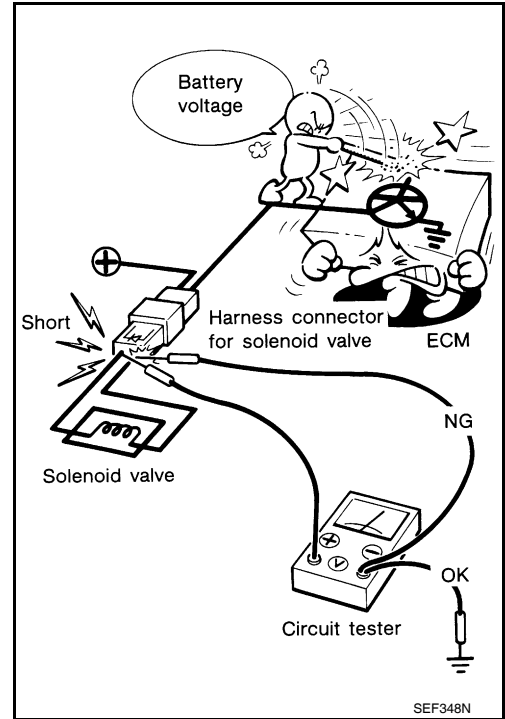
# PRECAUTIONS

## < SERVICE INFORMATION >

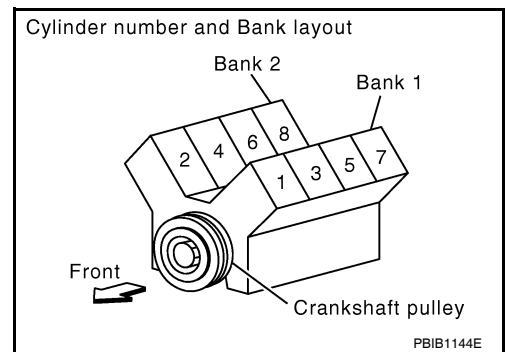
- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



- 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 use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



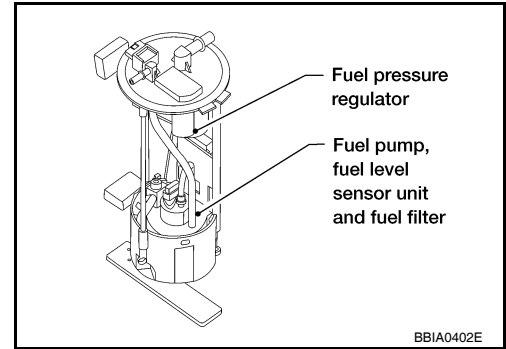
- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.



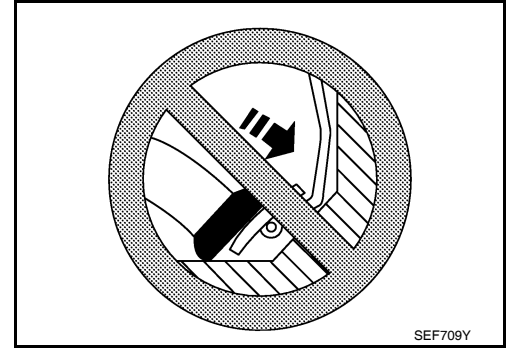
## PRECAUTIONS

### < SERVICE INFORMATION >

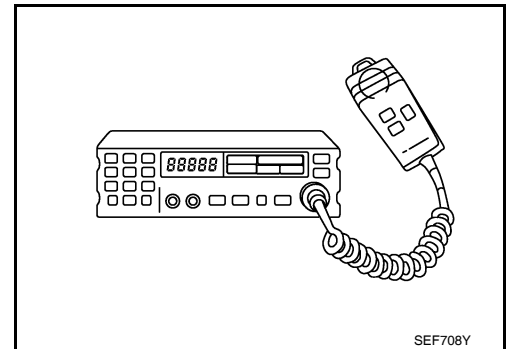
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



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



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



# PREPARATION

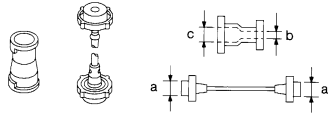
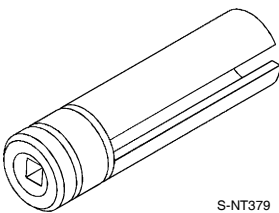
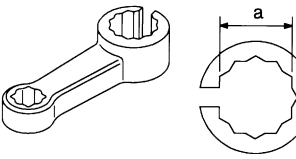
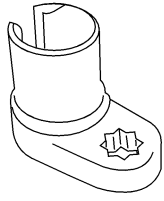
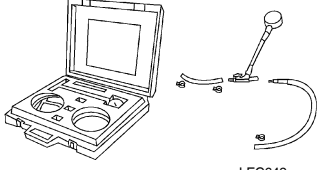
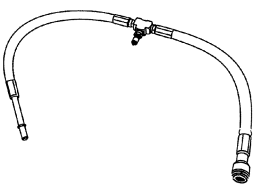
< SERVICE INFORMATION >

## PREPARATION

### Special Service Tool

INFOID:000000003531583

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
EG17650301 (J-33984-A) Radiator cap tester adapter	 <p style="text-align: center;">S-NT564</p>	Adapting radiator cap tester to radiator cap and radiator filler neck <b>a: 28 (1.10) dia.</b> <b>b: 31.4 (1.236) dia.</b> <b>c: 41.3 (1.626) dia.</b> Unit: mm (in)
KV10117100 (J-36471-A) Heated oxygen sensor wrench	 <p style="text-align: center;">S-NT379</p>	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 <p style="text-align: center;">S-NT636</p>	Loosening or tightening heated oxygen sensors <b>a: 22 mm (0.87 in)</b>
(J-44626) Air fuel ratio (A/F) sensor wrench	 <p style="text-align: center;">LEM054</p>	Loosening or tightening air fuel ratio (A/F) sensor 1
(J-44321) Fuel pressure gauge kit	 <p style="text-align: center;">LEC642</p>	Checking fuel pressure
(J-44321-6) Fuel pressure adapter	 <p style="text-align: center;">LBIA0376E</p>	Connecting fuel pressure gauge to quick connector type fuel lines.

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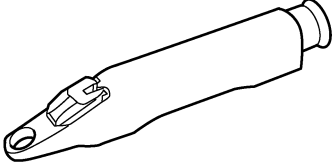
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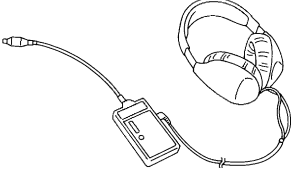
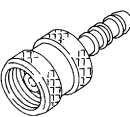

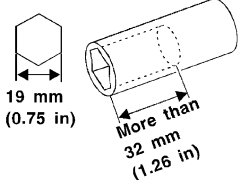
# PREPARATION

## < SERVICE INFORMATION >

Tool number (Kent-Moore No.) Tool name	Description	
(J-45488) Quick connector re- lease	 PBIC0198E	Remove fuel tube quick connectors in engine room.
(J-23688) Engine coolant refrac- tometer	 WBIA0539E	Checking concentration of ethylene glycol in engine coolant

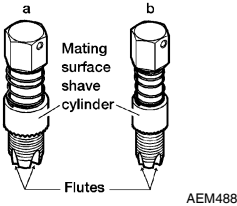

## Commercial Service Tool

INFOID:000000003531584

Tool name (Kent-Moore No.)	Description	
Leak detector i.e.: (J-41416)	 S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBID)	 S-NT704	Applying positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	 S-NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor

# PREPARATION

## < SERVICE INFORMATION >

Tool name (Kent-Moore No.)	Description	
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)		Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. <b>a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor</b> <b>b: 12 mm diameter with pitch 1.25 mm for Titanium Oxygen Sensor</b>
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

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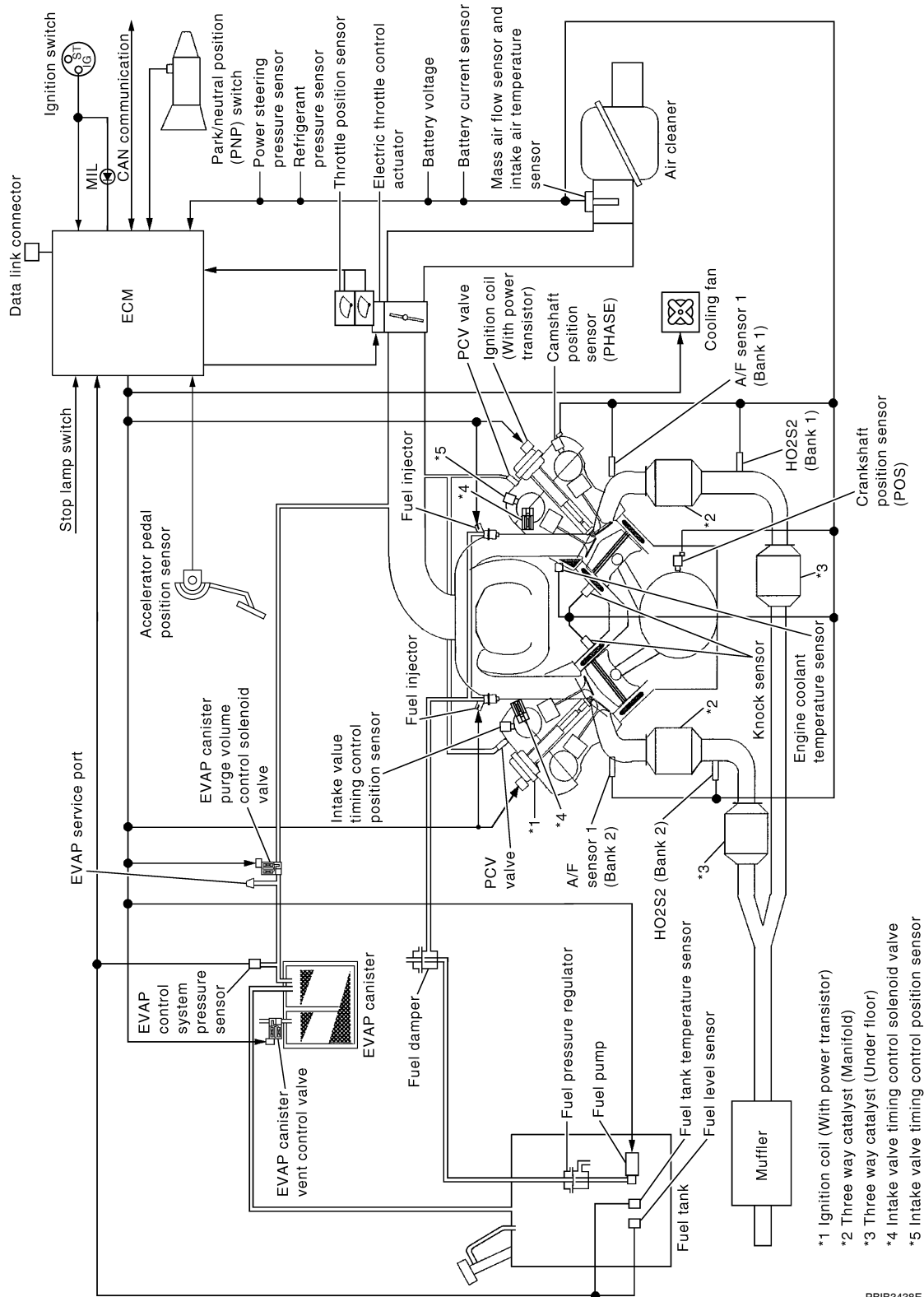
# ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

## ENGINE CONTROL SYSTEM

### Schematic

INFOID:000000003531585



PBIB3438E

### Multiport Fuel Injection (MFI) System

INFOID:000000003531586

### INPUT/OUTPUT SIGNAL CHART



# ENGINE CONTROL SYSTEM

## < SERVICE INFORMATION >

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
ABS actuator and electric unit (control unit)	VDC/TCS operation command*2		
Air conditioner switch	Air conditioner operation*2		
Wheel sensor	Vehicle speed*2		

\*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.

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

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

## SYSTEM DESCRIPTION

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

## VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

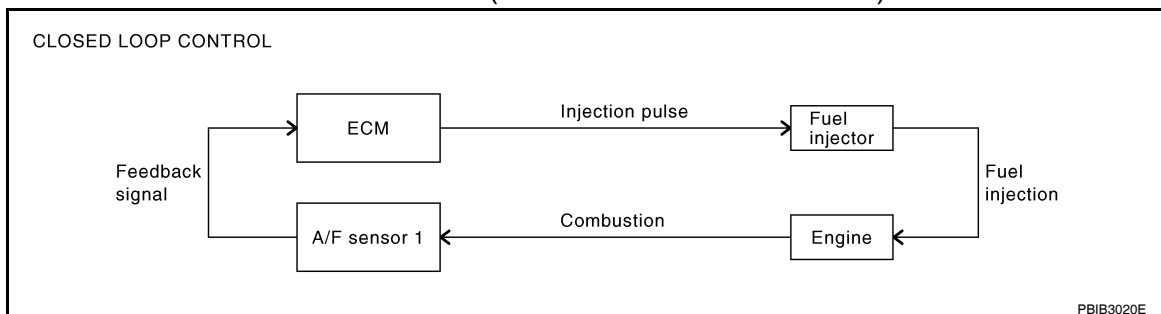
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

## MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



# ENGINE CONTROL SYSTEM

## < SERVICE INFORMATION >

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 air fuel ratio (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 air fuel ratio (A/F) sensor 1, refer to [EC-225](#). 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 air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

### Open Loop Control

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

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

### MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

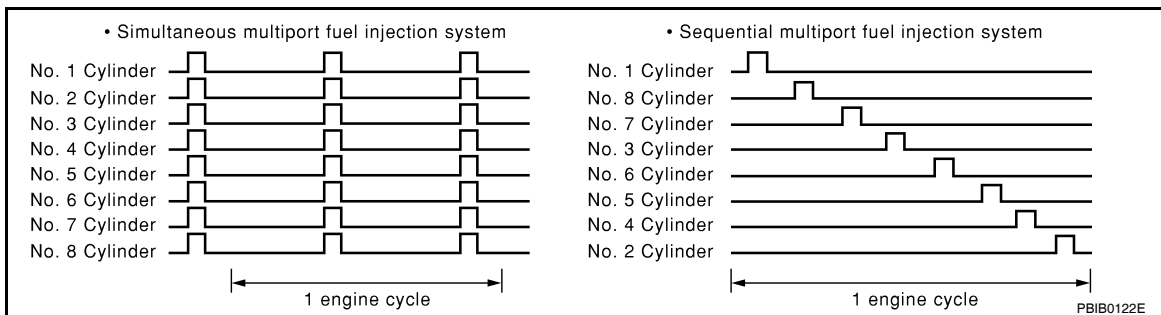
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

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

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

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

### FUEL INJECTION TIMING



Two types of systems are used.

#### Sequential Multiport Fuel Injection System

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

#### Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all eight cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The eight fuel injectors will then receive the signals two times for each engine cycle.

# ENGINE CONTROL SYSTEM

## < SERVICE INFORMATION >

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 speed.

### Electronic Ignition (EI) System

INFOID:000000003531587

### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

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

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

### SYSTEM DESCRIPTION

Firing order: 1 - 8 - 7 - 3 - 6 - 5 - 4 - 2

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

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

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

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

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

### Fuel Cut Control (at No Load and High Engine Speed)

INFOID:000000003531588

### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

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

## ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

---

### SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed over is 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

**NOTE:**

This function is different from deceleration control listed under [EC-24, "Multiport Fuel Injection \(MFI\) System"](#).

# AIR CONDITIONING CUT CONTROL

< SERVICE INFORMATION >

## AIR CONDITIONING CUT CONTROL

### Input/Output Signal Chart

INFOID:000000003531589

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

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

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

### System Description

INFOID:000000003531590

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned OFF.

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

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

## AUTOMATIC SPEED CONTROL DEVICE (ASCD)

### System Description

INFOID:000000003531591

### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch	Gear position		
Wheel sensor	Vehicle speed*		
TCM	Powertrain revolution*		

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

### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

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

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

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

#### NOTE:

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

### SET OPERATION

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

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

### ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.

And then ASCD will keep the new set speed.

### CANCEL OPERATION

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

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

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

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

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

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

If MAIN switch is turned to OFF 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

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

## < SERVICE INFORMATION >

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
- A/T 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)

## Component Description

INFOID:000000003531592

### ASCD STEERING SWITCH

Refer to [EC-513](#).

### ASCD BRAKE SWITCH

Refer to [EC-528](#), and [EC-597](#).

### STOP LAMP SWITCH

Refer to [EC-528](#), [EC-539](#) and [EC-597](#).

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EC-543](#), [EC-548](#), [EC-554](#) and [EC-559](#).

### ASCD INDICATOR

Refer to [EC-603](#).

A

EC

C

D

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F

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# CAN COMMUNICATION

< SERVICE INFORMATION >

---

## CAN COMMUNICATION

### System Description

INFOID:000000003531593

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

Refer to [LAN-44, "CAN System Specification Chart"](#), about CAN communication for detail.



# EVAPORATIVE EMISSION SYSTEM

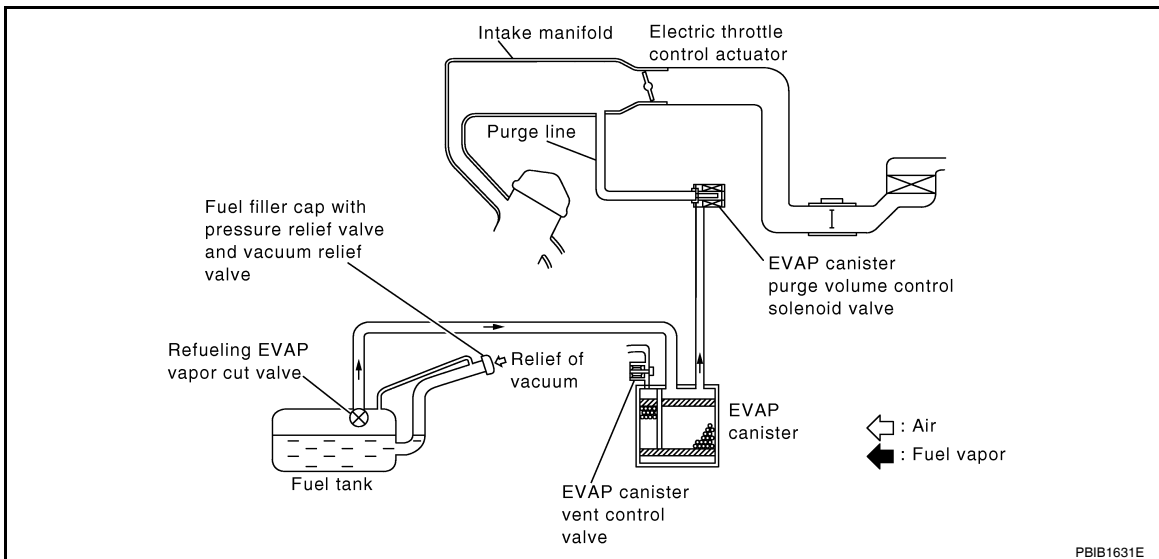
< SERVICE INFORMATION >

## EVAPORATIVE EMISSION SYSTEM

### Description

INFOID:000000003531594

### 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.

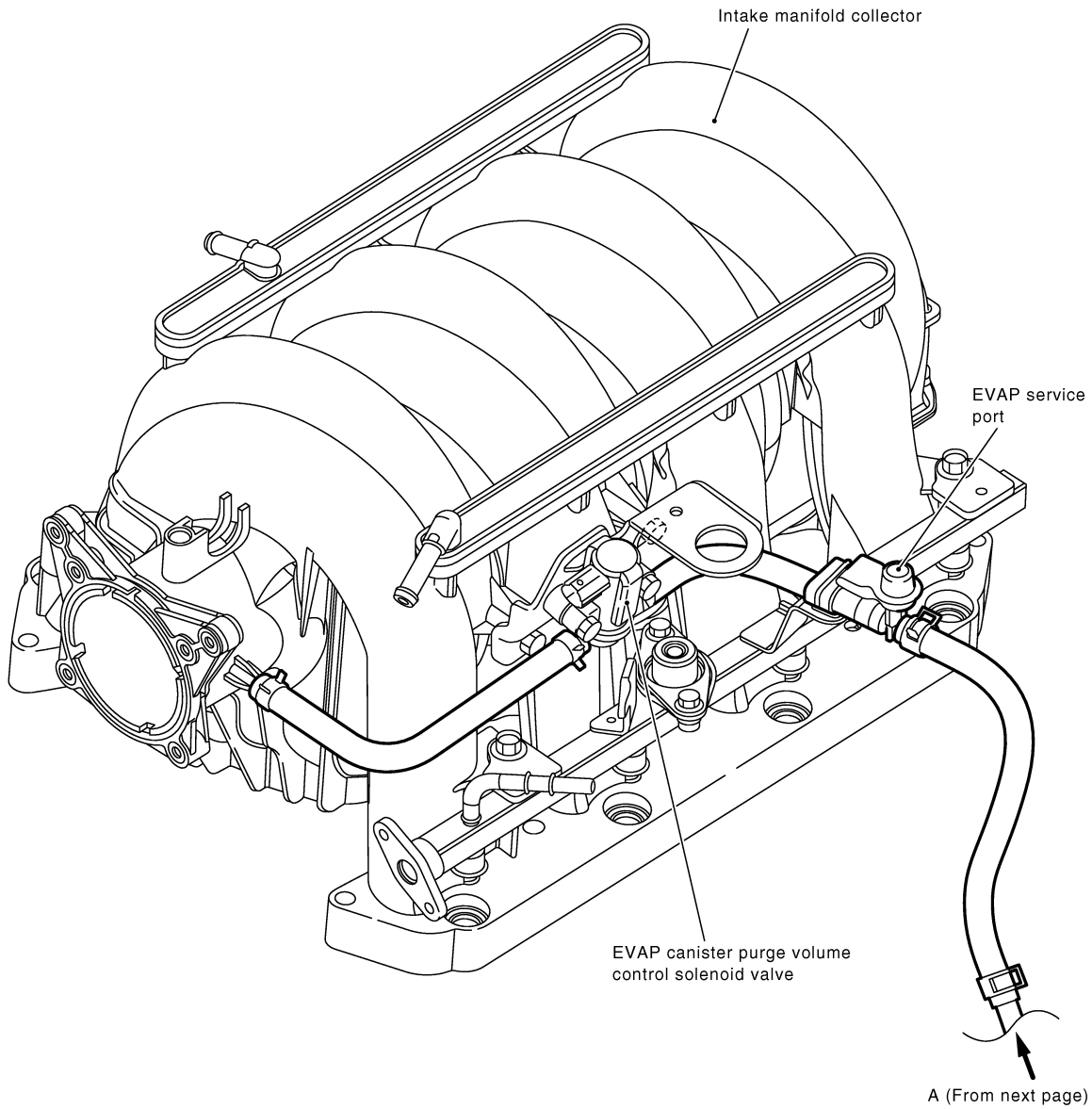
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

# EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >

## EVAPORATIVE EMISSION LINE DRAWING

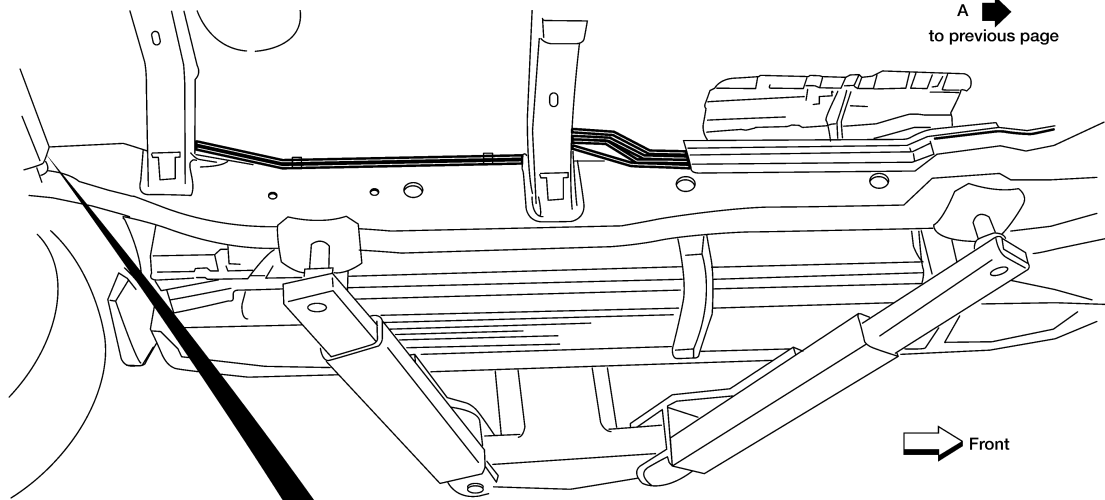


**NOTE:**  
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

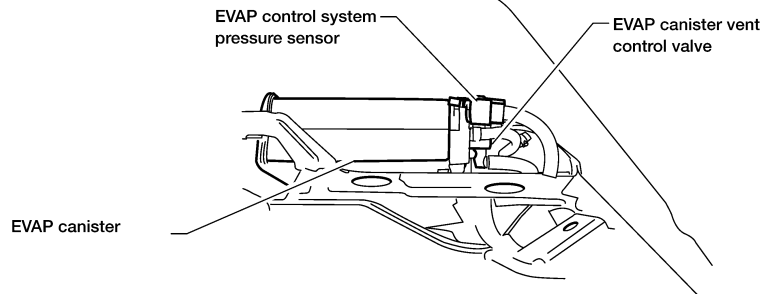
PBIB2053E

# EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >



View with fuel tank removed



Component Inspection

EVAP CANISTER

B8IA0444E

INFOID:000000003531595

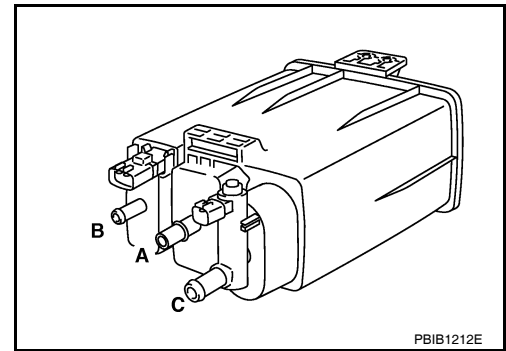
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# EVAPORATIVE EMISSION SYSTEM

## < SERVICE INFORMATION >

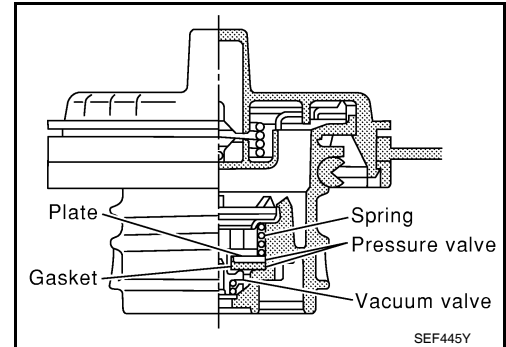
Check EVAP canister as follows:

1. Block port **B**.
2. Blow air into port **A** and check that it flows freely out of port **C**.
3. Release blocked port **B**.
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C**.
5. Block port **A** and **B**.
6. Apply pressure to port **C** and check that there is no leakage.



## FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

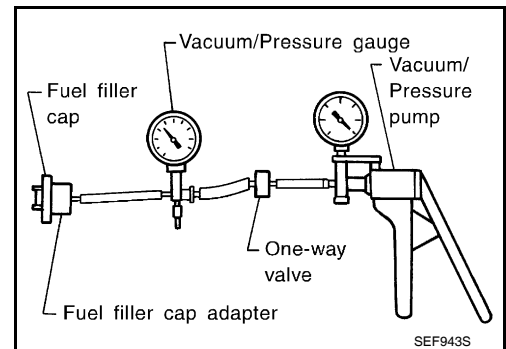
**Pressure:** 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 - 2.90 psi)

**Vacuum:** -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>, -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

### **CAUTION:**

**Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**



## EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-366](#) and [EC-373](#).

## FUEL TANK TEMPERATURE SENSOR

Refer to [EC-310](#) and [EC-314](#).

## EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-379](#) and [EC-386](#).

## EVAP CONTROL SYSTEM PRESSURE SENSOR

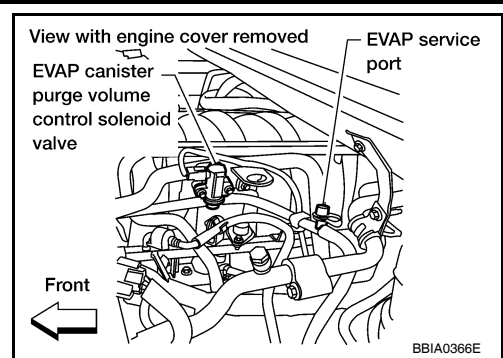
Refer to [EC-392](#), [EC-395](#) and [EC-401](#).

## EVAP SERVICE PORT

# EVAPORATIVE EMISSION SYSTEM

## < SERVICE INFORMATION >

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

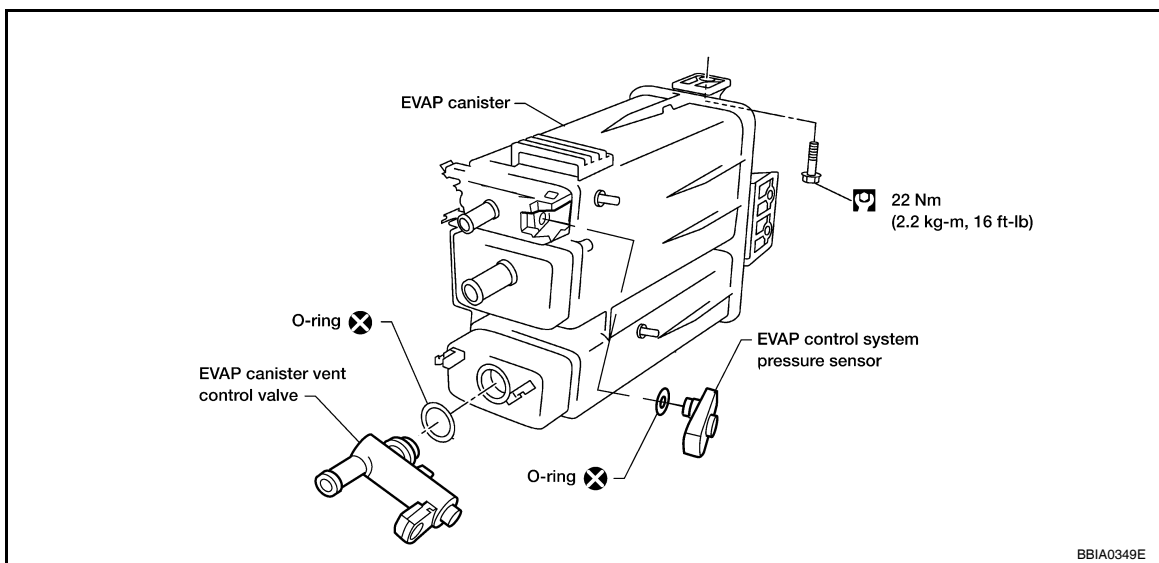


## Removal and Installation

INFOID:000000003531596

### EVAP CANISTER

Tighten EVAP canister as shown in the figure.

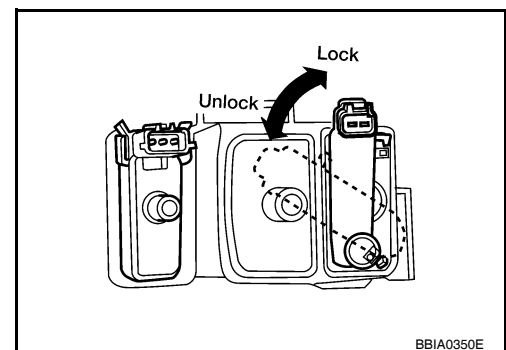


N-m (kg-m, in-lb)

### EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve counterclockwise.
2. Remove the EVAP canister vent control valve.

**Always replace O-ring with a new one.**



## How to Detect Fuel Vapor Leakage

INFOID:000000003531597

### CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in EVAP system.

### NOTE:

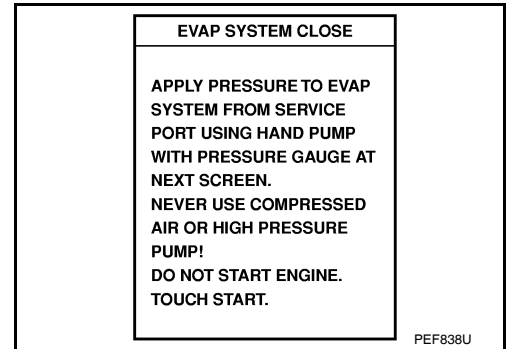
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

# EVAPORATIVE EMISSION SYSTEM

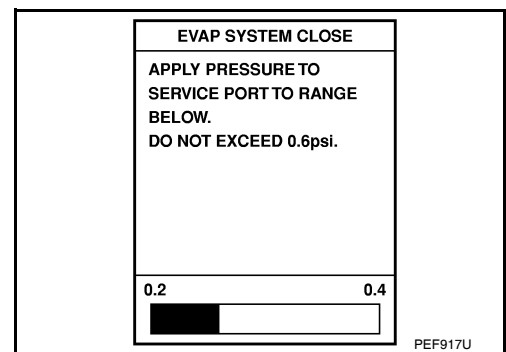
## < SERVICE INFORMATION >

### Ⓟ WITH CONSULT-II

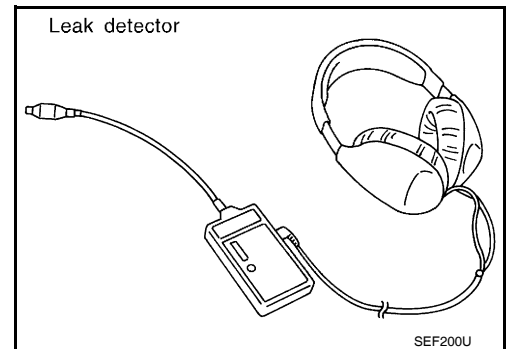
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.

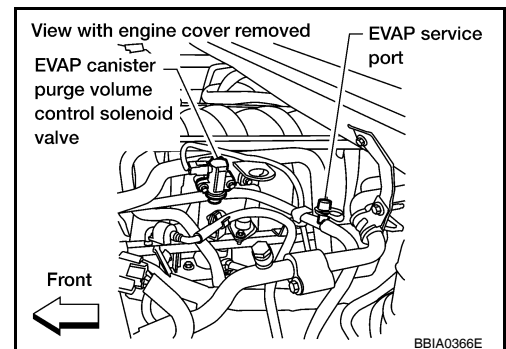


8. Locate the leak using a leak detector. Refer to [EC-33, "Description"](#).



### ⓧ WITHOUT CONSULT-II

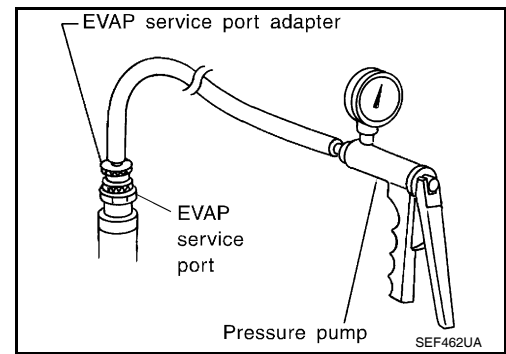
1. Attach the EVAP service port adapter securely to the EVAP service port.



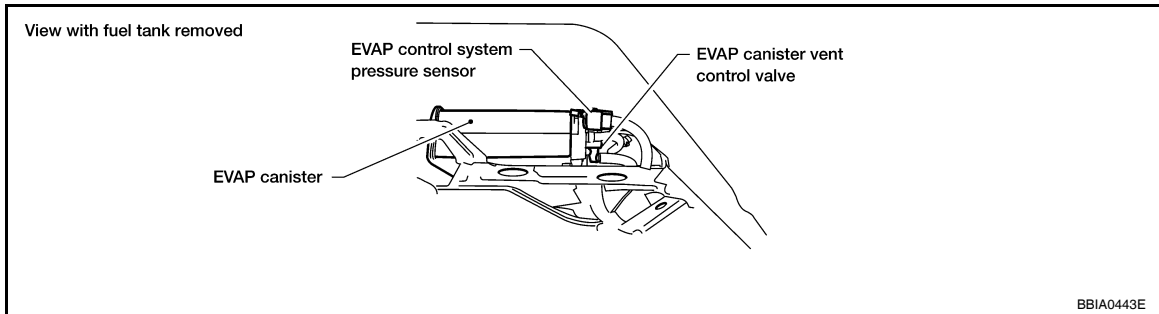
## EVAPORATIVE EMISSION SYSTEM

### < SERVICE INFORMATION >

2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.



4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to [EC-33. "Description"](#).

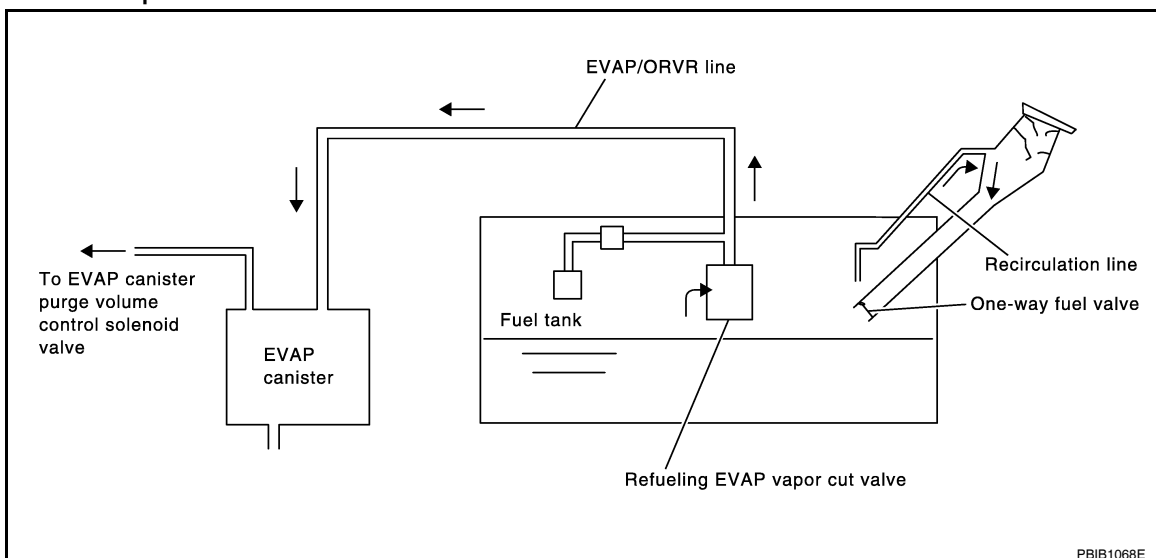
# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

### System Description

INFOID:000000003531598



PBIB1068E

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

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

#### **WARNING:**

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

- Put a “CAUTION: FLAMMABLE” sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO<sub>2</sub> 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-80, "Fuel Pressure Check"](#).
  - 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.

### Diagnosis Procedure

INFOID:000000003531599

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

#### 1. CHECK EVAP CANISTER

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

The weight should be less than 2.5 kg (5.5 lb).

#### OK or NG

- OK >> GO TO 2.
- NG >> GO TO 3.

#### 2. CHECK IF EVAP CANISTER SATURATED WITH WATER



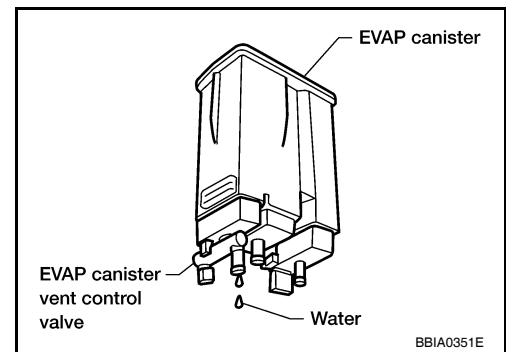
# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## < SERVICE INFORMATION >

Does water drain from the EVAP canister?

Yes or No

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



### 3.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

### 4.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

### 5.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-42. "Component Inspection"](#) .

OK or NG

- OK >> **INSPECTION END**
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

**SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.**

### 1.CHECK EVAP CANISTER

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

**The weight should be less than 2.5 kg (5.5 lb).**

OK or NG

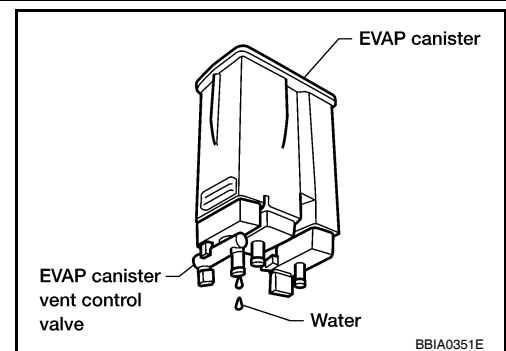
- OK >> GO TO 2.
- NG >> GO TO 3.

### 2.CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

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



### 3.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

## 4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

## 5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 6.

NG >> Repair or replace hoses and tubes.

## 6. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 7.

NG >> Replace filler neck tube.

## 7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-42, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 8. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 9.

NG >> Replace fuel filler tube.

## 9. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

OK >> GO TO 10.

NG >> Repair or replace one-way fuel valve with fuel tank.

## 10. CHECK ONE-WAY FUEL VALVE-II

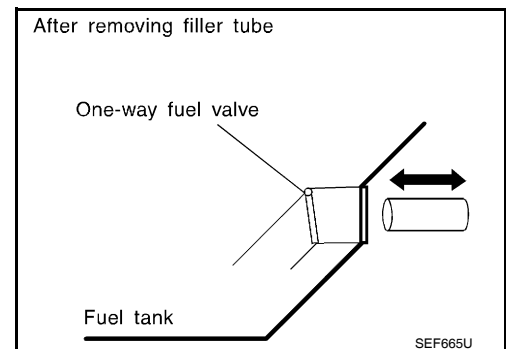
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.  
When a stick is inserted, the valve should open, when removing stick it should close.

**Do not drop any material into the tank.**

OK or NG

OK >> **INSPECTION END**

NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



## Component Inspection

### REFUELING EVAP VAPOR CUT VALVE

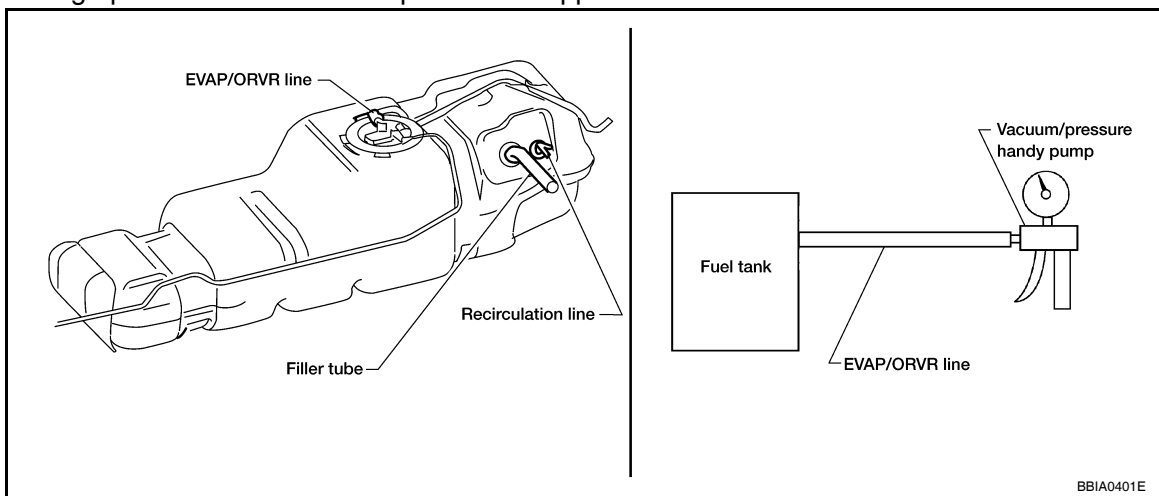
Ⓟ With CONSULT-II

1. Remove fuel tank. Refer to [FL-10](#).

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## < SERVICE INFORMATION >

2. Drain fuel from the tank as follows:
  - a. Remove fuel feed hose located on the fuel gauge retainer.
  - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
  - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.  
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.
  - a. Connect vacuum pump to hose end.
  - b. Remove fuel gauge retainer with fuel gauge unit.  
**Always replace O-ring with new one.**
  - c. Put fuel tank upside down.
  - d. Apply vacuum pressure to hose end [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



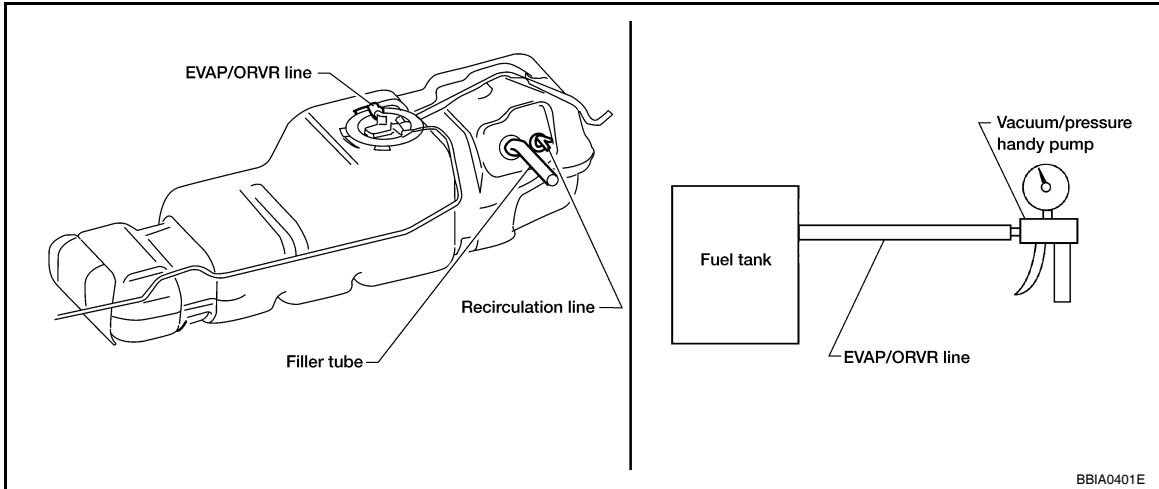
### ⊗ Without CONSULT-II

1. Remove fuel tank. Refer to [FL-10](#).
2. Drain fuel from the tank as follows:
  - a. Remove fuel gauge retainer.
  - b. Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.  
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.
  - a. Connect vacuum pump to hose end.
  - b. Remove fuel gauge retainer with fuel gauge unit.  
**Always replace O-ring with new one.**
  - c. Put fuel tank upside down.

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## < SERVICE INFORMATION >

- d. Apply vacuum pressure to hose end [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



# POSITIVE CRANKCASE VENTILATION

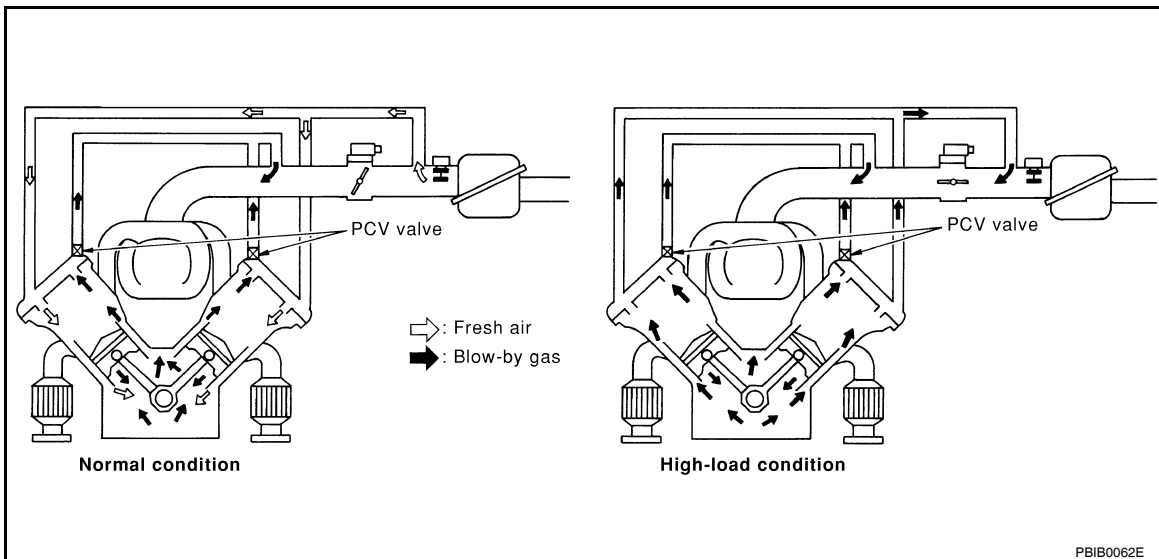
< SERVICE INFORMATION >

## POSITIVE CRANKCASE VENTILATION

### Description

INFOID:000000003531601

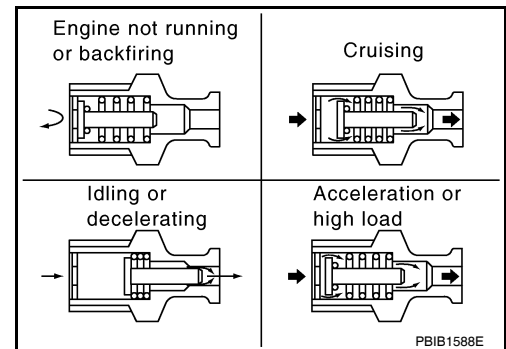
### SYSTEM DESCRIPTION



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.

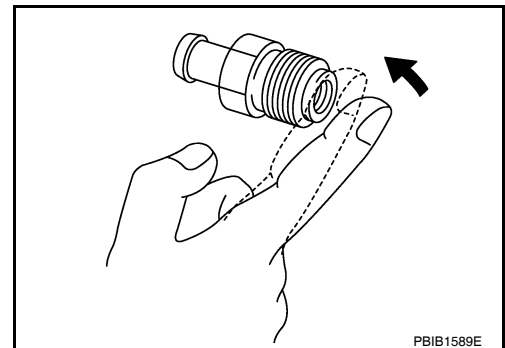


### Component Inspection

INFOID:000000003531602

#### PCV (POSITIVE CRANKCASE VENTILATION) 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.

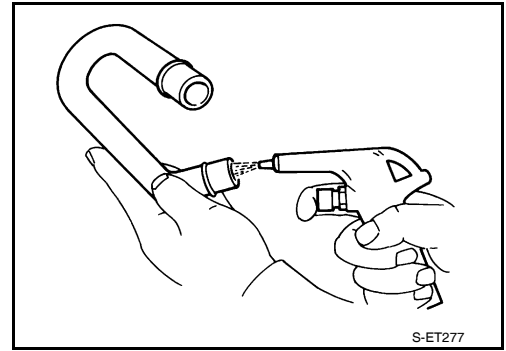


#### PCV VALVE VENTILATION HOSE

## POSITIVE CRANKCASE VENTILATION

### < SERVICE INFORMATION >

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



# IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)

< SERVICE INFORMATION >

## IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)

### Description

INFOID:000000003531603

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to [BL-116](#).
- Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.
- When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of IVIS (NATS) initialization and all IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

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# ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

### Introduction

INFOID:000000003531604

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

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

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to [EC-88, "Fail-Safe Chart"](#).)

### Two Trip Detection Logic

INFOID:000000003531605

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

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

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to <a href="#">EC-49, "Emission-related Diagnostic Information"</a> .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

## Emission-related Diagnostic Information

INFOID:000000003531606

### EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×:Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Refer- ence page
	CONSULT-II GST*2	ECM*3					
CAN COMM CIRCUIT	U1000	1000*5	—	—	1	×	<a href="#">EC-145</a>
CAN COMM CIRCUIT	U1001	1001*5	—	—	1 or 2 2*10	—	<a href="#">EC-145</a>
CONTROL UNIT(CAN)	U1010	1010	—	—	1	×	<a href="#">EC-147</a>
<b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b>	<b>P0000</b>	<b>0000</b>	—	—	—	<b>Flashing*7</b>	<a href="#">EC-63</a>
INT/V TIM CONT-B1	P0011	0011	—	—	2	×	<a href="#">EC-149</a>
INT/V TIM CONT-B2	P0021	0021	—	—	2	×	<a href="#">EC-149</a>
A/F SEN1 HTR (B1)	P0031	0031	—	×	2	×	<a href="#">EC-163</a>
A/F SEN1 HTR (B1)	P0032	0032	—	×	2	×	<a href="#">EC-163</a>
HO2S2 HTR (B1)	P0037	0037	—	×	2	×	<a href="#">EC-170</a>
HO2S2 HTR (B1)	P0038	0038	—	×	2	×	<a href="#">EC-170</a>
A/F SEN1 HTR (B2)	P0051	0051	—	×	2	×	<a href="#">EC-163</a>
A/F SEN1 HTR (B2)	P0052	0052	—	×	2	×	<a href="#">EC-163</a>
HO2S2 HTR (B2)	P0057	0057	—	×	2	×	<a href="#">EC-170</a>
HO2S2 HTR (B2)	P0058	0058	—	×	2	×	<a href="#">EC-170</a>
INT/V TIM V/CIR-B1	P0075	0075	—	—	2	×	<a href="#">EC-178</a>
INT/V TIM V/CIR-B2	P0081	0081	—	—	2	×	<a href="#">EC-178</a>
MAF SEN/CIRCUIT	P0101	0101	—	—	2	×	<a href="#">EC-186</a>
MAF SEN/CIRCUIT	P0102	0102	—	—	1	×	<a href="#">EC-194</a>
MAF SEN/CIRCUIT	P0103	0103	—	—	1	×	<a href="#">EC-194</a>
IAT SEN/CIRCUIT	P0112	0112	—	—	2	×	<a href="#">EC-201</a>
IAT SEN/CIRCUIT	P0113	0113	—	—	2	×	<a href="#">EC-201</a>
ECT SEN/CIRC	P0117	0117	—	—	1	×	<a href="#">EC-205</a>
ECT SEN/CIRC	P0118	0118	—	—	1	×	<a href="#">EC-205</a>
TP SEN 2/CIRC	P0122	0122	—	—	1	×	<a href="#">EC-210</a>
TP SEN 2/CIRC	P0123	0123	—	—	1	×	<a href="#">EC-210</a>
ECT SENSOR	P0125	0125	—	—	2	×	<a href="#">EC-217</a>
IAT SENSOR	P0127	0127	—	—	2	×	<a href="#">EC-220</a>
THERMSTAT FNCTN	P0128	0128	—	—	2	×	<a href="#">EC-223</a>
A/F SENSOR1 (B1)	P0130	0130	—	×	2	×	<a href="#">EC-225</a>
A/F SENSOR1 (B1)	P0131	0131	—	×	2	×	<a href="#">EC-234</a>
A/F SENSOR1 (B1)	P0132	0132	—	×	2	×	<a href="#">EC-242</a>

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Refer- ence page
	CONSULT-II GST*2	ECM*3					
A/F SENSOR1 (B1)	P0133	0133	×	×	2	×	<a href="#">EC-250</a>
HO2S2 (B1)	P0137	0137	×	×	2	×	<a href="#">EC-260</a>
HO2S2 (B1)	P0138	0138	×	×	2	×	<a href="#">EC-270</a>
HO2S2 (B1)	P0139	0139	×	×	2	×	<a href="#">EC-282</a>
A/F SENSOR1 (B2)	P0150	0150	—	×	2	×	<a href="#">EC-225</a>
A/F SENSOR1 (B2)	P0151	0151	—	×	2	×	<a href="#">EC-234</a>
A/F SENSOR1 (B2)	P0152	0152	—	×	2	×	<a href="#">EC-242</a>
A/F SENSOR1 (B2)	P0153	0153	×	×	2	×	<a href="#">EC-250</a>
HO2S2 (B2)	P0157	0157	×	×	2	×	<a href="#">EC-260</a>
HO2S2 (B2)	P0158	0158	×	×	2	×	<a href="#">EC-270</a>
HO2S2 (B2)	P0159	0159	×	×	2	×	<a href="#">EC-282</a>
FUEL SYS-LEAN-B1	P0171	0171	—	—	2	×	<a href="#">EC-292</a>
FUEL SYS-RICH-B1	P0172	0172	—	—	2	×	<a href="#">EC-301</a>
FUEL SYS-LEAN-B2	P0174	0174	—	—	2	×	<a href="#">EC-292</a>
FUEL SYS-RICH-B2	P0175	0175	—	—	2	×	<a href="#">EC-301</a>
FTT SENSOR	P0181	0181	—	—	2	×	<a href="#">EC-310</a>
FTT SEN/CIRCUIT	P0182	0182	—	—	2	×	<a href="#">EC-314</a>
FTT SEN/CIRCUIT	P0183	0183	—	—	2	×	<a href="#">EC-314</a>
TP SEN 1/CIRC	P0222	0222	—	—	1	×	<a href="#">EC-318</a>
TP SEN 1/CIRC	P0223	0223	—	—	1	×	<a href="#">EC-318</a>
MULTI CYL MISFIRE	P0300	0300	—	—	2	×	<a href="#">EC-325</a>
CYL 1 MISFIRE	P0301	0301	—	—	2	×	<a href="#">EC-325</a>
CYL 2 MISFIRE	P0302	0302	—	—	2	×	<a href="#">EC-325</a>
CYL 3 MISFIRE	P0303	0303	—	—	2	×	<a href="#">EC-325</a>
CYL 4 MISFIRE	P0304	0304	—	—	2	×	<a href="#">EC-325</a>
CYL 5 MISFIRE	P0305	0305	—	—	2	×	<a href="#">EC-325</a>
CYL 6 MISFIRE	P0306	0306	—	—	2	×	<a href="#">EC-325</a>
CYL 7 MISFIRE	P0307	0307	—	—	2	×	<a href="#">EC-325</a>
CYL 8 MISFIRE	P0308	0308	—	—	2	×	<a href="#">EC-325</a>
KNOCK SEN/CIRC-B1	P0327	0327	—	—	2	—	<a href="#">EC-332</a>
KNOCK SEN/CIRC-B1	P0328	0328	—	—	2	—	<a href="#">EC-332</a>
KNOCK SEN/CIRC-B2	P0332	0332	—	—	2	—	<a href="#">EC-332</a>
KNOCK SEN/CIRC-B2	P0333	0333	—	—	2	—	<a href="#">EC-332</a>
CKP SEN/CIRCUIT	P0335	0335	—	—	2	×	<a href="#">EC-336</a>
CMP SEN/CIRC-B1	P0340	0340	—	—	2	×	<a href="#">EC-342</a>
TW CATALYST SYS-B1	P0420	0420	×	×	2	×	<a href="#">EC-349</a>
TW CATALYST SYS-B2	P0430	0430	×	×	2	×	<a href="#">EC-349</a>
EVAP PURG FLOW/MON	P0441	0441	×	×	2	×	<a href="#">EC-354</a>
EVAP SMALL LEAK	P0442	0442	×	×	2	×	<a href="#">EC-359</a>
PURG VOLUME CONT/V	P0443	0443	—	—	2	×	<a href="#">EC-366</a>
PURG VOLUME CONT/V	P0444	0444	—	—	2	×	<a href="#">EC-373</a>
PURG VOLUME CONT/V	P0445	0445	—	—	2	×	<a href="#">EC-373</a>

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Refer- ence page
	CONSULT-II GST*2	ECM*3					
VENT CONTROL VALVE	P0447	0447	—	—	2	×	<a href="#">EC-379</a>
VENT CONTROL VALVE	P0448	0448	—	—	2	×	<a href="#">EC-386</a>
EVAP SYS PRES SEN	P0451	0451	—	—	2	×	<a href="#">EC-392</a>
EVAP SYS PRES SEN	P0452	0452	—	—	2	×	<a href="#">EC-395</a>
EVAP SYS PRES SEN	P0453	0453	—	—	2	×	<a href="#">EC-401</a>
EVAP GROSS LEAK	P0455	0455	—	—	2	×	<a href="#">EC-408</a>
EVAP VERY SML LEAK	P0456	0456	x*4	×	2	×	<a href="#">EC-415</a>
FUEL LEV SEN SLOSH	P0460	0460	—	—	2	×	<a href="#">EC-423</a>
FUEL LEVEL SENSOR	P0461	0461	—	—	2	×	<a href="#">EC-425</a>
FUEL LEVL SEN/CIRC	P0462	0462	—	—	2	×	<a href="#">EC-427</a>
FUEL LEVL SEN/CIRC	P0463	0463	—	—	2	×	<a href="#">EC-427</a>
VEH SPEED SEN/CIRC*6	P0500	0500	—	—	2	×	<a href="#">EC-429</a>
ISC SYSTEM	P0506	0506	—	—	2	×	<a href="#">EC-431</a>
ISC SYSTEM	P0507	0507	—	—	2	×	<a href="#">EC-433</a>
PW ST P SEN/CIRC	P0550	0550	—	—	2	—	<a href="#">EC-435</a>
ECM BACK UP/CIRC	P0603	0603	—	—	2	×	<a href="#">EC-440</a>
ECM	P0605	0605	—	—	1 or 2	× or —	<a href="#">EC-444</a>
SENSOR POWER/CIRC	P0643	0643	—	—	1	×	<a href="#">EC-447</a>
TCM	P0700	0700	—	—	1	×	<a href="#">AT-98</a>
PNP SW/CIRC	P0705	0705	—	—	2	×	<a href="#">AT-99</a>
ATF TEMP SEN/CIRC	P0710	0710	—	—	2	×	<a href="#">AT-119</a>
VHCL SPD SEN/CIR AT*6	P0720	0720	—	—	2	×	<a href="#">AT-105</a>
TCC SOLENOID/CIRC	P0740	0740	—	—	2	×	<a href="#">AT-111</a>
A/T TCC S/U FNCTN	P0744	0744	—	—	2	×	<a href="#">AT-113</a>
L/PRESS SOL/CIRC	P0745	0745	—	—	2	×	<a href="#">AT-115</a>
P-N POS SW/CIRCUIT	P0850	0850	—	—	2	×	<a href="#">EC-452</a>
INTK TIM S/CIRC-B1	P1140	1140	—	—	2	×	<a href="#">EC-457</a>
INTK TIM S/CIRC-B2	P1145	1145	—	—	2	×	<a href="#">EC-457</a>
CLOSED LOOP-B1	P1148	1148	—	—	1	×	<a href="#">EC-466</a>
CLOSED LOOP-B2	P1168	1168	—	—	1	×	<a href="#">EC-466</a>
TCS C/U FUNCTN	P1211	1211	—	—	2	—	<a href="#">EC-467</a>
TCS/CIRC	P1212	1212	—	—	2	—	<a href="#">EC-468</a>
ENG OVER TEMP	P1217	1217	—	—	1	×	<a href="#">EC-469</a>
CTP LEARNING	P1225	1225	—	—	2	—	<a href="#">EC-477</a>
CTP LEARNING	P1226	1226	—	—	2	—	<a href="#">EC-479</a>
COLD START CONTROL	P1421	1421	—	—	2	×	<a href="#">EC-481</a>
BAT CURRENT SENSOR	P1550	1550	—	—	2	—	<a href="#">EC-483</a>
BAT CURRENT SENSOR	P1551	1551	—	—	2	—	<a href="#">EC-489</a>
BAT CURRENT SENSOR	P1552	1552	—	—	2	—	<a href="#">EC-489</a>
BAT CURRENT SENSOR	P1553	1553	—	—	2	—	<a href="#">EC-495</a>
BAT CURRENT SENSOR	P1554	1554	—	—	2	—	<a href="#">EC-501</a>

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# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Refer- ence page
	CONSULT-II GST*2	ECM*3					
ASCD SW	P1564	1564	—	—	1	—	<a href="#">EC-507</a> (Models with ICC) <a href="#">EC-513</a> (Models with AS-CD)
ICC COMMAND VALUE*9	P1568	1568	—	—	1	—	<a href="#">EC-519</a>
ASCD BRAKE SW	P1572	1572	—	—	1	—	<a href="#">EC-520</a> (Models with ICC) <a href="#">EC-528</a> (Models with AS-CD)
ASCD VHL SPD SEN*8	P1574	1574	—	—	1	—	<a href="#">EC-535</a> (Models with ICC) <a href="#">EC-537</a> (Models with AS-CD)
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	2	—	<a href="#">BL-116</a>
A/T INTERLOCK	P1730	1730	—	—	1	×	<a href="#">AT-126</a>
I/C SOLENOID/CIRC	P1752	1752	—	—	1	×	<a href="#">AT-130</a>
I/C SOLENOID FNCTN	P1754	1754	—	—	1	×	<a href="#">AT-132</a>
FR/B SOLENOID/CIRC	P1757	1757	—	—	1	×	<a href="#">AT-134</a>
FR/B SOLENOID FNCT	P1759	1759	—	—	1	×	<a href="#">AT-136</a>
D/C SOLENOID/CIRC	P1762	1762	—	—	1	×	<a href="#">AT-138</a>
D/C SOLENOID FNCTN	P1764	1764	—	—	1	×	<a href="#">AT-140</a>
HLR/C SOL/CIRC	P1767	1767	—	—	1	×	<a href="#">AT-142</a>
HLR/C SOL FNCTN	P1769	1769	—	—	1	×	<a href="#">AT-144</a>
LC/B SOLENOID/CIRC	P1772	1772	—	—	1	×	<a href="#">AT-146</a>
LC/B SOLENOID FNCT	P1774	1774	—	—	1	×	<a href="#">AT-148</a>
BRAKE SW/CIRCUIT	P1805	1805	—	—	2	—	<a href="#">EC-539</a>
ETC MOT PWR	P2100	2100	—	—	1	×	<a href="#">EC-543</a>
ETC FUNCTION/CIRC	P2101	2101	—	—	1	×	<a href="#">EC-548</a>
ETC MOT PWR	P2103	2103	—	—	1	×	<a href="#">EC-543</a>
ETC MOT	P2118	2118	—	—	1	×	<a href="#">EC-554</a>
ETC ACTR	P2119	2119	—	—	1	×	<a href="#">EC-559</a>
APP SEN 1/CIRC	P2122	2122	—	—	1	×	<a href="#">EC-561</a>
APP SEN 1/CIRC	P2123	2123	—	—	1	×	<a href="#">EC-561</a>
APP SEN 2/CIRC	P2127	2127	—	—	1	×	<a href="#">EC-567</a>
APP SEN 2/CIRC	P2128	2128	—	—	1	×	<a href="#">EC-567</a>
TP SENSOR	P2135	2135	—	—	1	×	<a href="#">EC-574</a>
APP SENSOR	P2138	2138	—	—	1	×	<a href="#">EC-581</a>

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Refer- ence page
	CONSULT-II GST*2	ECM*3					
A/F SENSOR1 (B1)	P2A00	2A00	—	×	2	×	<a href="#">EC-588</a>
A/F SENSOR1 (B2)	P2A03	2A03	—	×	2	×	<a href="#">EC-588</a>

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

\*2: This number is prescribed by SAE J2012.

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

\*4: SRT code will not be set if the self-diagnostic result is NG.

\*5: The troubleshooting for this DTC needs CONSULT-II.

\*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

\*7: When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

\*8: 2WD models

\*9: Models with ICC

\*10: Models without ICC

### 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 reoccur, the 1st trip DTC will not be displayed.

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

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

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

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-82. "Trouble Diagnosis Introduction"](#). Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

#### How to Read DTC and 1st Trip DTC

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

#### With CONSULT-II

#### With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012.

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

#### No Tools

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

These DTCs are controlled by NISSAN.

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

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

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

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

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS	TIME		DTC RESULTS	TIME
	CKP SEN/CIRCUIT [P0335]	0		CKP SEN/CIRCUIT [P0335]	1t

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## 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-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see [EC-111, "CONSULT-II Function \(ENGINE\)"](#).

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 - P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

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

## SYSTEM READINESS TEST (SRT) CODE

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

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

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

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

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

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

### NOTE:

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

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

### NOTE:

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

### SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133, P0153
		Heated oxygen sensor 2	P0137, P0157
		Heated oxygen sensor 2	P0138, P0158
		Heated oxygen sensor 2	P0139, P0159

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

### 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.

Self-diagnosis result		Diagnosis	Example				
			Ignition cycle				
			← ON →	OFF	← ON →	OFF	← ON →
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	OK	—	—	
		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.

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

### < SERVICE INFORMATION >

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

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

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

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

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

**NOTE:**

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

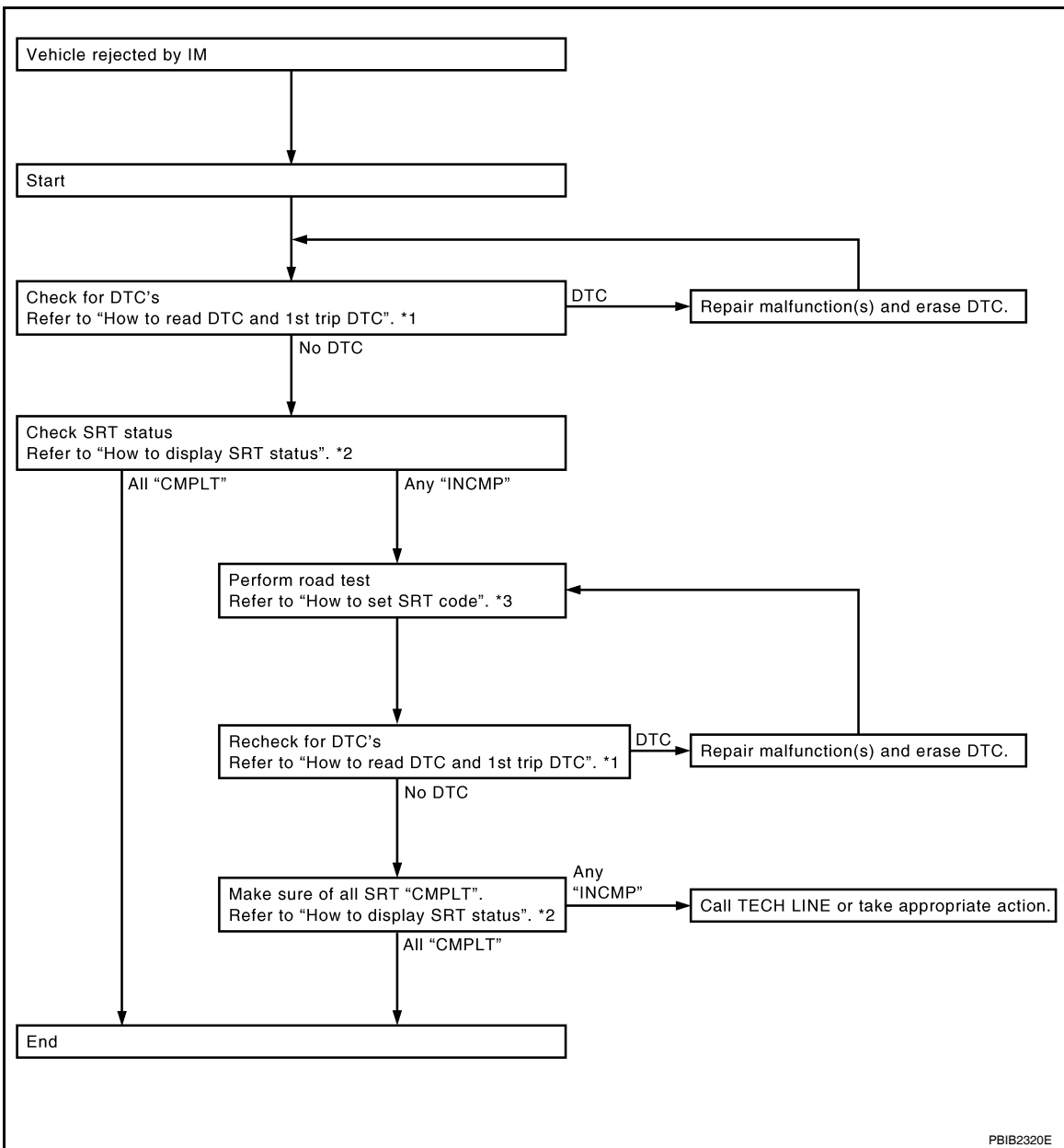
#### SRT Service Procedure

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



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >



\*1 "How to Read DTC and 1st Trip DTC" \*2 "How to Display SRT Status"

\*3 "How to Set SRT Code"

### How to Display SRT Status

#### **WITH CONSULT-II**

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT-II display for SRT code is shown in the figure.

"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

#### **NOTE:**

Though displayed on the CONSULT-II screen, "HO2S HTR" is not SRT item.

#### **WITH GST**

Selecting Service \$01 with GST (Generic Scan Tool)

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT

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# ON BOARD DIAGNOSTIC (OBD) SYSTEM

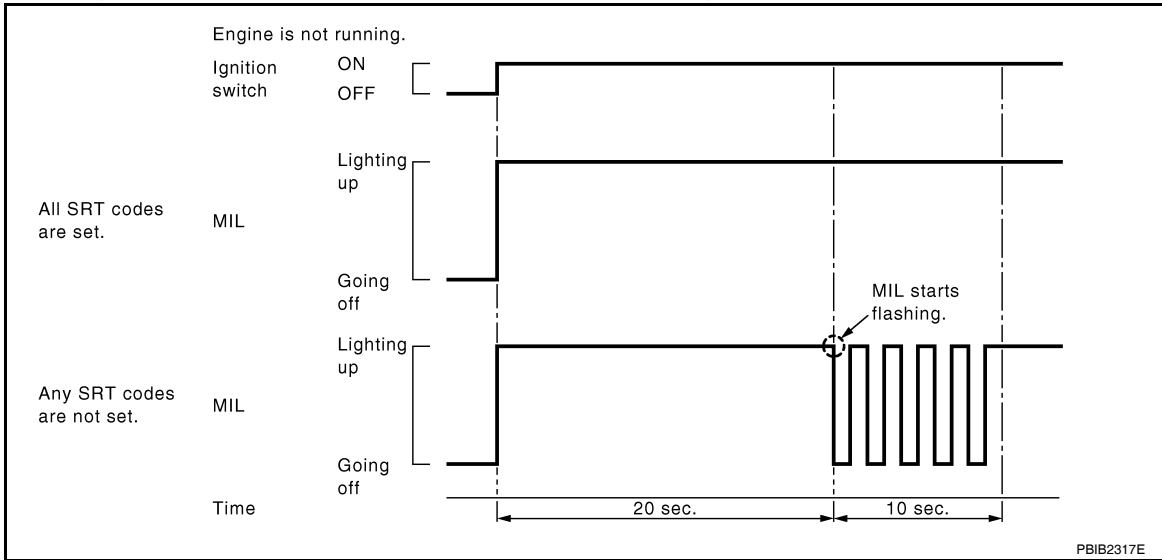
## < SERVICE INFORMATION >



### NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
  - When all SRT codes are set, MIL lights up continuously.
  - When any SRT codes are not set, MIL will flash periodically for 10 seconds.



### How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

#### WITH CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

#### WITHOUT CONSULT-II

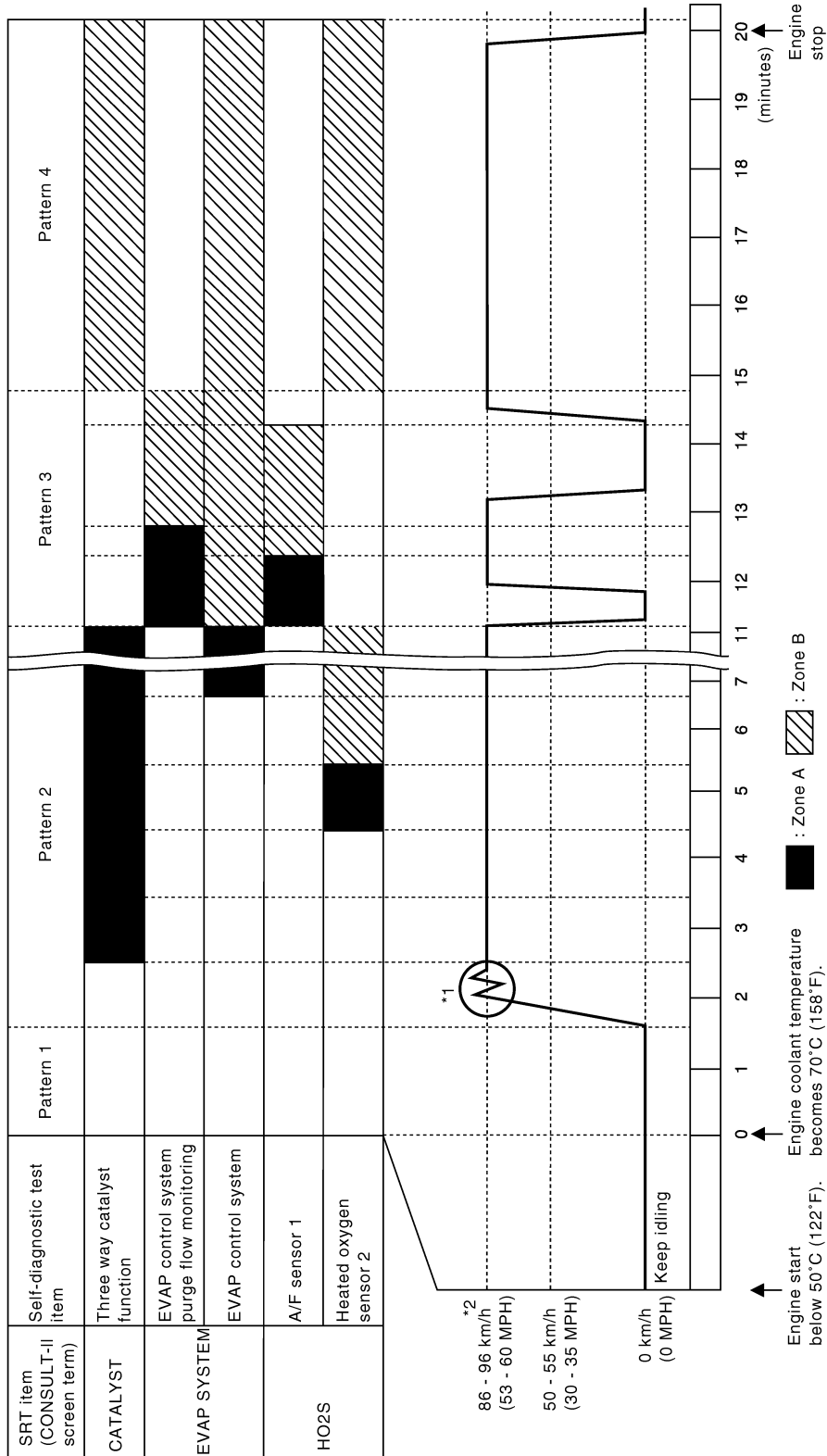
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

## Driving Pattern

**Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.**



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- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.   
 Zone A refers to the range where the time, required for the diagnosis under normal conditions\*, is the shortest.   
 Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
- \*: Normal conditions refer to the following:

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.  
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

### Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 73 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 107 and ground is less than 4.1V).**

### Pattern 2:

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

### Pattern 3:

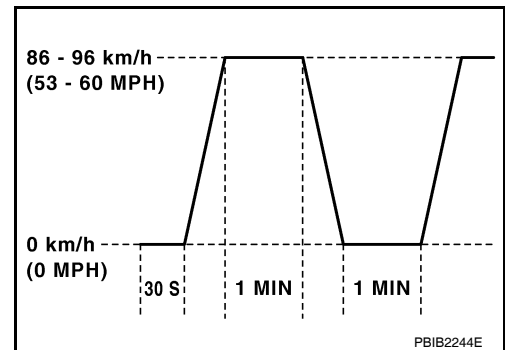
- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

### Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

\*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

\*2: Checking the vehicle speed with GST is advised.



## Suggested Transmission Gear Position

Set the selector lever in the D position with the overdrive switch turned ON.

## TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Service \$06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
	Three way catalyst function (Bank 2)	P0430	03H	02H	Max.	1/128
		P0430	04H	82H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm <sup>2</sup>
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm <sup>2</sup>

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion	
			TID	CID			
HO2S	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	41H	8EH	Min.	5mV	
		P0132	42H	0EH	Max.	5mV	
		P2A00	43H	0EH	Max.	0.002	
		P2A00	44H	8EH	Min.	0.002	
		P0133	45H	8EH	Min.	0.002	
		P0130	46H	0EH	Max.	5mV	
		P0130	47H	8EH	Min.	5mV	
		P0133	48H	8EH	Min.	0.002	
	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	4CH	8FH	Min.	5mV	
		P0152	4DH	0FH	Max.	5mV	
		P2A03	4EH	0FH	Max.	0.002	
		P2A03	4FH	8FH	Min.	0.002	
		P0153	50H	8FH	Min.	0.002	
		P0150	51H	0FH	Max.	5mV	
		P0150	52H	8FH	Min.	5mV	
		P0153	53H	8FH	Min.	0.002	
	Heated oxygen sensor 2 (Bank 1)	P0139	19H	86H	Min.	10mV/500 ms	
		P0137	1AH	86H	Min.	10 mV	
		P0138	1BH	06H	Max.	10 mV	
		P0138	1CH	06H	Max.	10mV	
	Heated oxygen sensor 2 (Bank 2)	P0159	21H	87H	Min.	10 mV/500 ms	
		P0157	22H	87H	Min.	10 mV	
		P0158	23H	07H	Max.	10 mV	
		P0158	24H	07H	Max.	10mV	
	HO2S HTR	A/F sensor 1 heater (Bank 1)	P0032	57H	10H	Max.	5 mV
			P0031	58H	90H	Min.	5 mV
		A/F sensor 1 heater (Bank 2)	P0052	59H	11H	Max.	5 mV
			P0051	5AH	91H	Min.	5 mV
Heated oxygen sensor 2 heater (Bank 1)		P0038	2DH	0AH	Max.	20 mV	
		P0037	2EH	8AH	Min.	20 mV	
Heated oxygen sensor 2 heater (Bank 2)		P0058	2FH	0BH	Max.	20 mV	
		P0057	30H	8BH	Min.	20 mV	

### HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

#### WITH CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

#### NOTE:

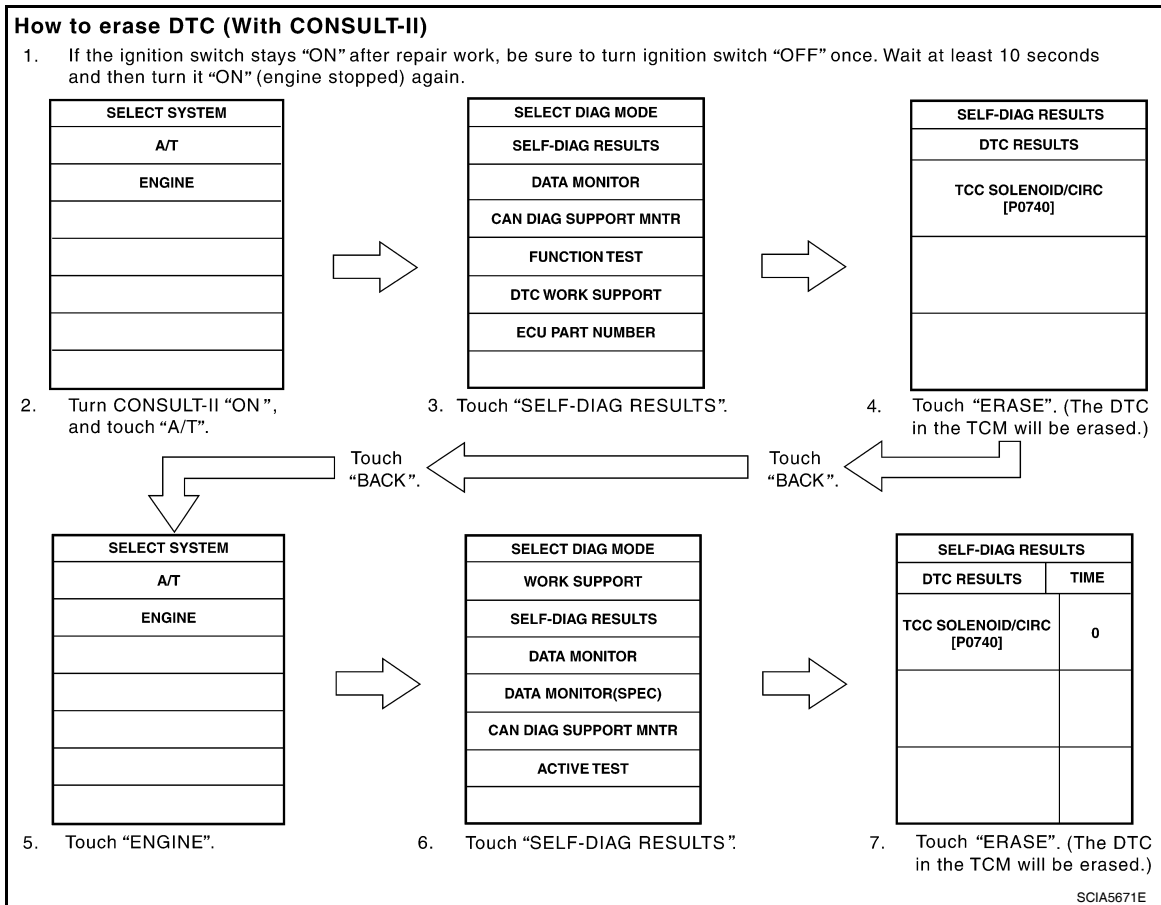
**If the DTC is not for A/T related items (see EC-9), skip steps 2 through 4.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)



### WITH GST

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

#### NOTE:

**If the DTC is not for A/T related items (see EC-9), skip step 2.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#). (The DTC in TCM will be erased)
3. Select Service \$04 with GST (Generic Scan Tool).

### No Tools

#### NOTE:

**If the DTC is not for AT related items (see EC-9), skip step 2.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#). (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to [EC-63, "Malfunction Indicator Lamp \(MIL\)"](#).

• If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.

• The following data are cleared when the ECM memory is erased.

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

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

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

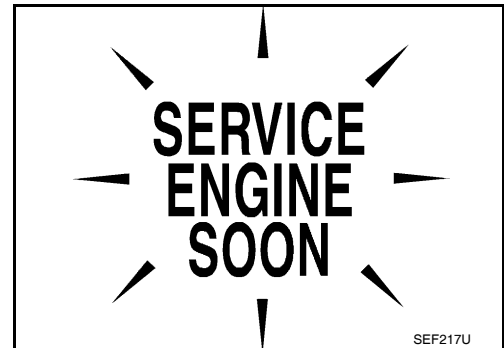
### Malfunction Indicator Lamp (MIL)

INFOID:000000003531607

#### DESCRIPTION






The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.  
If the MIL does not light up, refer to [DI-26](#) or see [EC-643](#).
2. When the engine is started, the MIL should go off.  
If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



#### ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> <li>• Misfire (Possible three way catalyst damage)</li> <li>• One trip detection diagnoses</li> </ul>
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

MIL Flashing Without DTC

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

When any SRT codes are not set, MIL may flash without DTC. For the details, refer to [EC-49, "Emission-related Diagnostic Information"](#).

### HOW TO SWITCH DIAGNOSTIC TEST MODE

#### NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

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

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

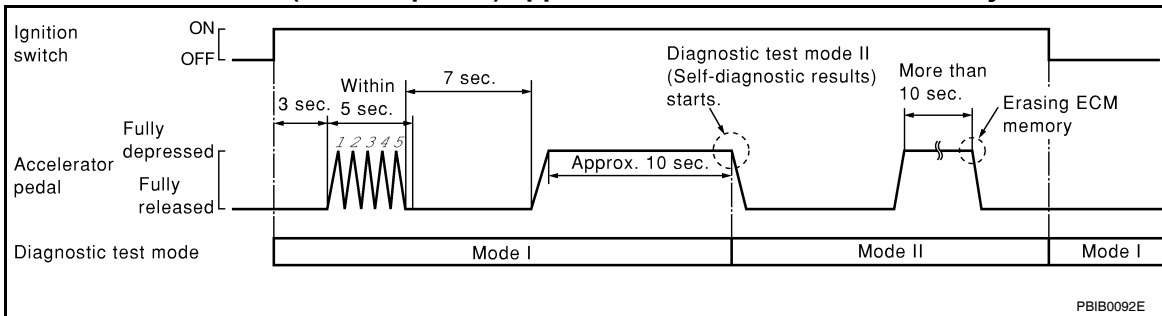
#### NOTE:

Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds. For the details, refer to [EC-49, "Emission-related Diagnostic Information"](#).

4. Fully release the accelerator pedal.  
ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

#### NOTE:

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



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

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

### DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [DI-26](#) or see [EC-643](#).

### DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

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

### DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

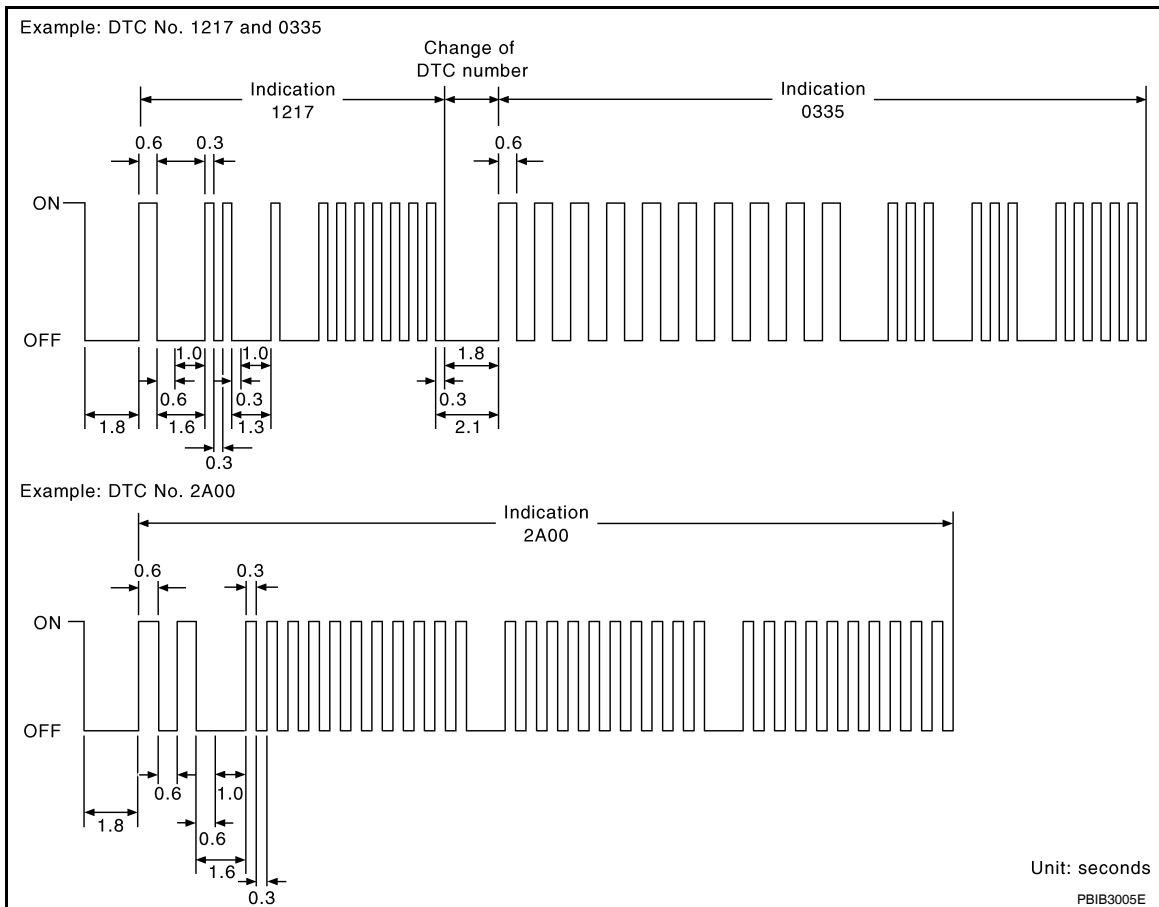
In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

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-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The “A” is indicated by the number of eleven flash. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second 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-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See [EC-9](#))

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

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

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

## OBD System Operation Chart

INFOID:000000003531608

### 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. For details, refer to [EC-48, "Two Trip Detection Logic"](#).
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, refer to [EC-48, "Two Trip Detection Logic"](#).

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

tion 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 CONSULT-II will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

## SUMMARY CHART

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

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

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

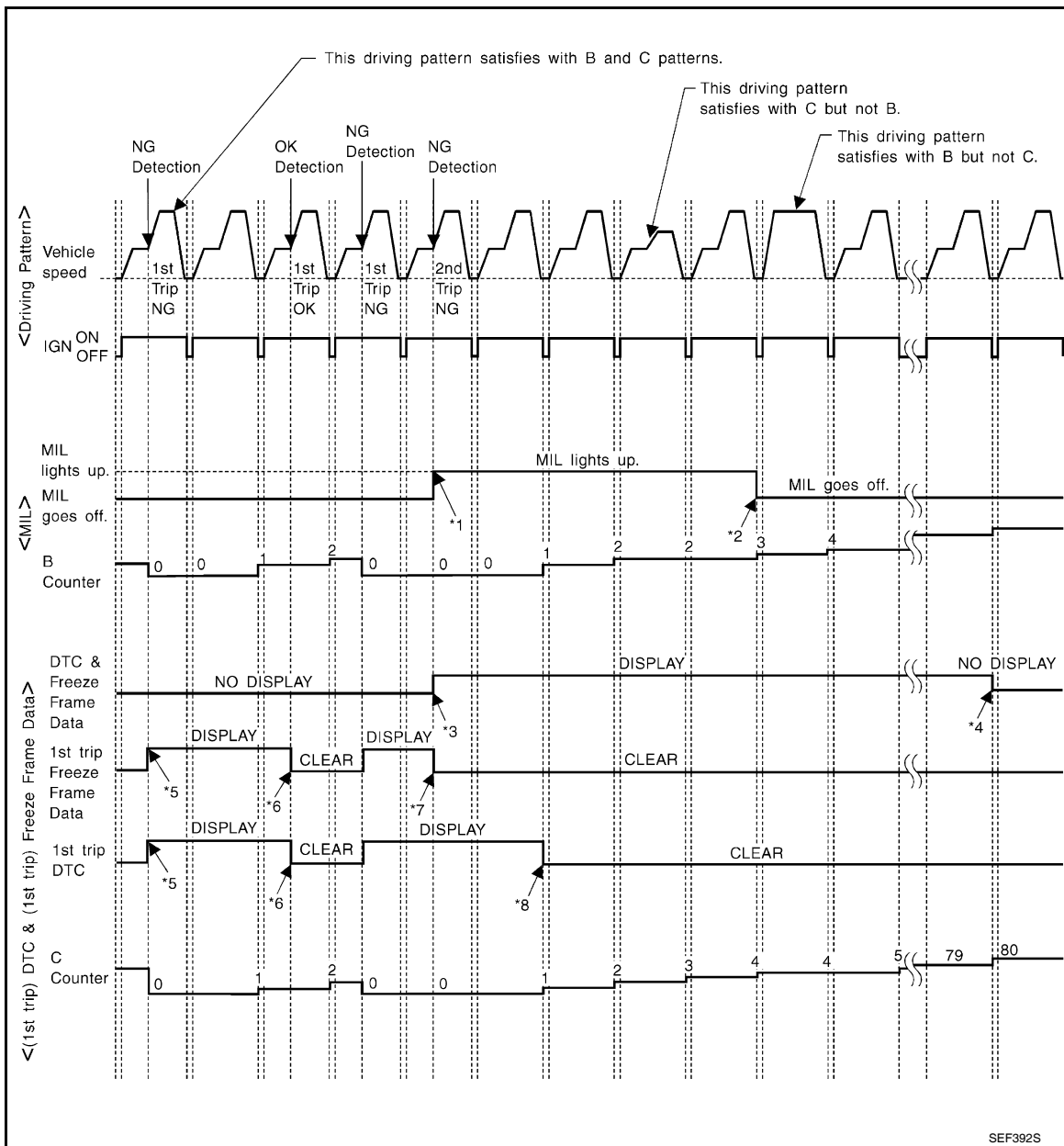
\*1: Clear timing is at the moment OK is detected.

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

## RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE " <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >



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

\*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

\*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

\*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.)

\*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

\*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

\*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

\*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

### EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

#### <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

### < SERVICE INFORMATION >

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

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

#### <Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

The following conditions should be satisfied at the same time:

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

Calculated load value: (Calculated load value in the freeze frame data)  $\times (1 \pm 0.1)$  [%]

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

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

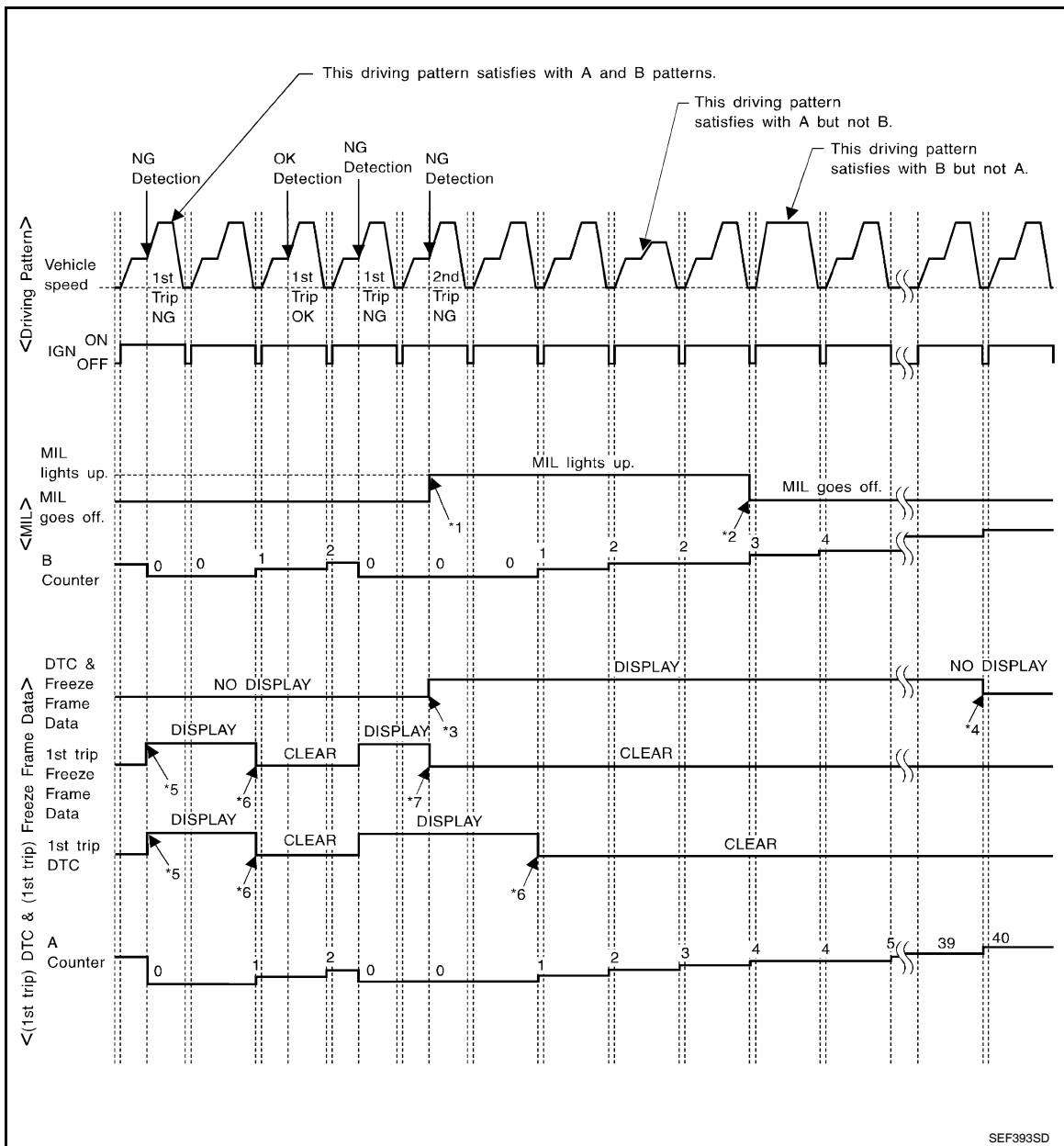
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

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

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >



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

\*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

\*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

\*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.)

\*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

\*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

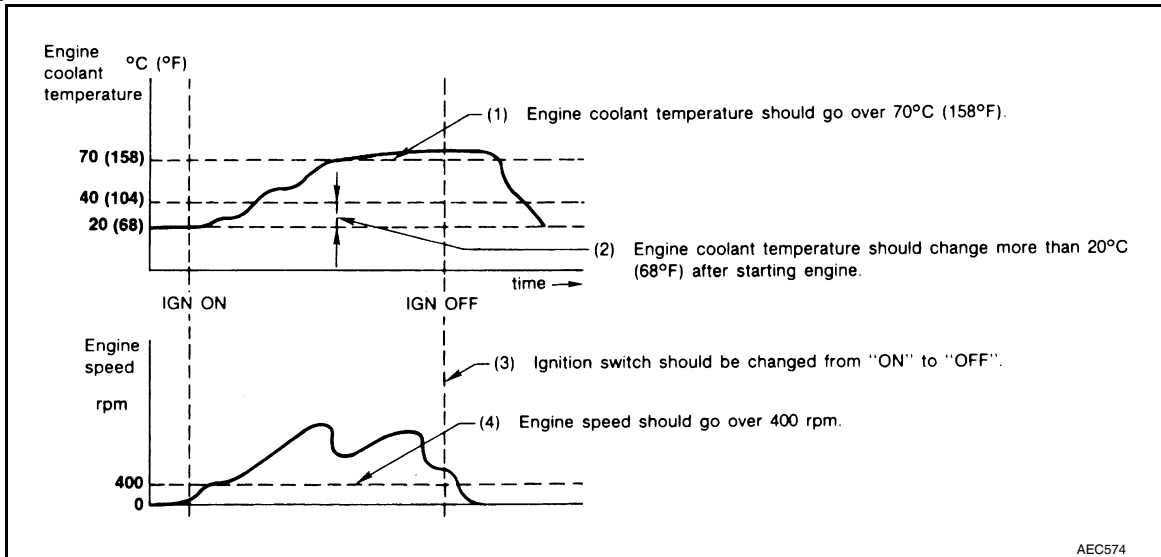
\*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

### <Driving Pattern A>



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

### <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

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

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

# BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

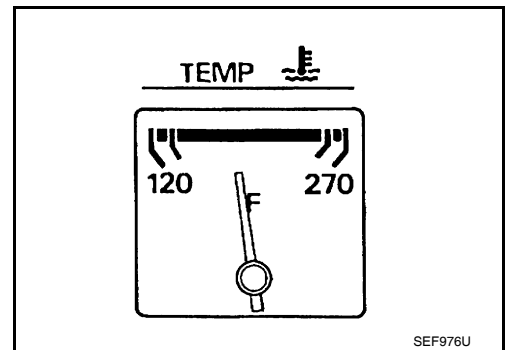
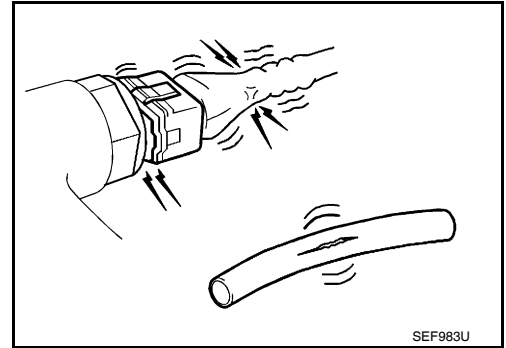
## BASIC SERVICE PROCEDURE

### Basic Inspection

INFOID:000000003531609

#### 1. INSPECTION START

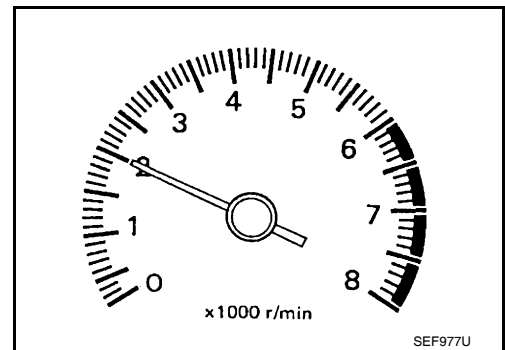
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
  - Harness connectors for improper connections
  - Wiring harness for improper connections, pinches and cut
  - Vacuum hoses for splits, kinks and improper connections
  - Hoses and ducts for leaks
  - Air cleaner clogging
  - Gasket
3. Confirm that electrical or mechanical loads are not applied.
  - Headlamp switch is OFF.
  - Air conditioner switch is OFF.
  - Rear window defogger switch is OFF.
  - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



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

#### OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



#### 2. REPAIR OR REPLACE

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

>> GO TO 3.

#### 3. CHECK TARGET IDLE SPEED

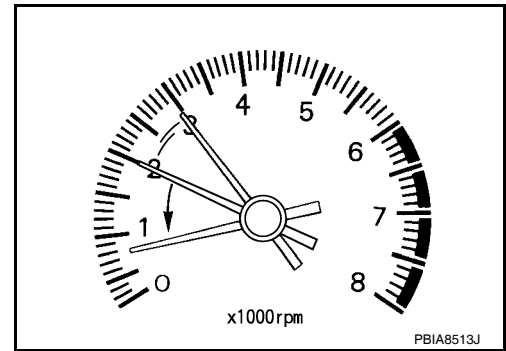
##### Ⓜ With CONSULT-II

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

# BASIC SERVICE PROCEDURE

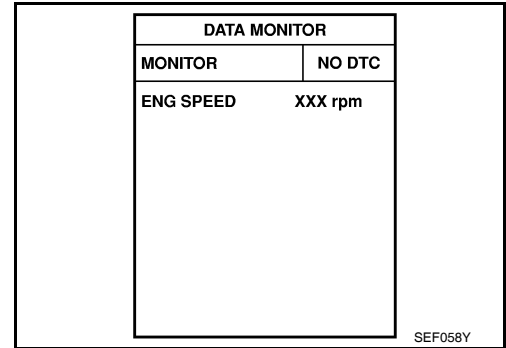
## < SERVICE INFORMATION >

- 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.



- Read idle speed in "DATA MONITOR" mode with CONSULT-II. Refer to [EC-75. "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**



### ⊗ Without CONSULT-II

- Run engine at about 2,000 rpm for about 2 minutes under no load.
- 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. Refer to [EC-75. "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**

### OK or NG

- OK >> GO TO 10.  
NG >> GO TO 4.

## 4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-77. "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

## 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-77. "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

## 6. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-78. "Idle Air Volume Learning"](#).

**Is Idle Air Volume Learning carried out successfully?**

### Yes or No

- Yes >> GO TO 7.  
No >> 1. Follow the instruction of Idle Air Volume Learning.  
2. GO TO 4.

## 7. CHECK TARGET IDLE SPEED AGAIN

### Ⓟ With CONSULT-II



# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.  
Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**

### ⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.  
Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**

### OK or NG

- OK >> GO TO 10.  
NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-342](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-336](#).

### OK or NG

- OK >> GO TO 9.  
NG >> 1. Repair or replace.  
2. GO TO 4.

## 9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).

>> GO TO 4.

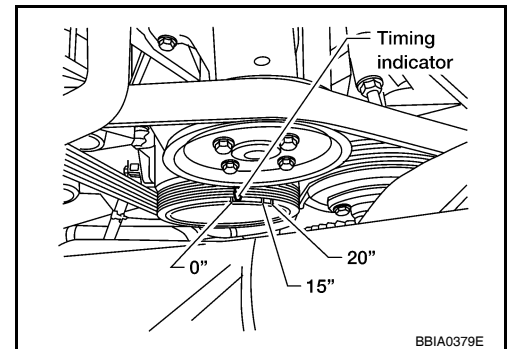
## 10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.  
Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

**15 ± 5° BTDC (in P or N position)**

### OK or NG

- OK >> GO TO 19.  
NG >> GO TO 11.



## 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

## 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-77, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

# BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

## 13. PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-78. "Idle Air Volume Learning"](#).

**Is Idle Air Volume Learning carried out successfully?**

Yes or No

- Yes >> GO TO 14.  
No >> 1. Follow the instruction of Idle Air Volume Learning.  
2. GO TO 4.

## 14. CHECK TARGET IDLE SPEED AGAIN

Ⓟ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.  
Refer to [EC-75. "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**

ⓧ **Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.  
Refer to [EC-75. "Idle Speed and Ignition Timing Check"](#).

**650 ± 50 rpm (in P or N position)**

OK or NG

- OK >> GO TO 15.  
NG >> GO TO 17.

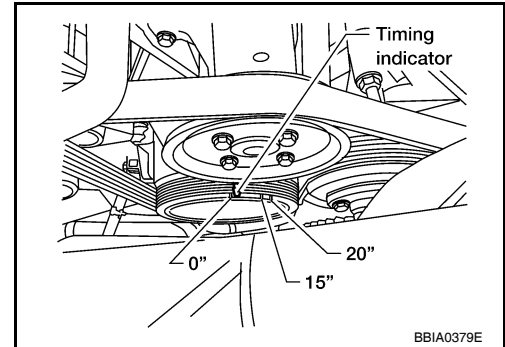
## 15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.  
Refer to [EC-75. "Idle Speed and Ignition Timing Check"](#).

**15 ± 5° BTDC (in P or N position)**

OK or NG

- OK >> GO TO 19.  
NG >> GO TO 16.



## 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-38](#).

OK or NG

- OK >> GO TO 17.  
NG >> 1. Repair the timing chain installation.  
2. GO TO 4.

## 17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to [EC-342](#).
- Check crankshaft position sensor (POS) and circuit. Refer to [EC-336](#).

OK or NG

- OK >> GO TO 18.  
NG >> 1. Repair or replace.  
2. GO TO 4.

## 18. CHECK ECM FUNCTION

# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).

>> GO TO 4.

## 19.INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No

- Yes >> 1. Perform [EC-77, "VIN Registration"](#) .  
2. **INSPECTION END**
- No >> **INSPECTION END**

## Idle Speed and Ignition Timing Check

INFOID:000000003531610

### IDLE SPEED

 With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

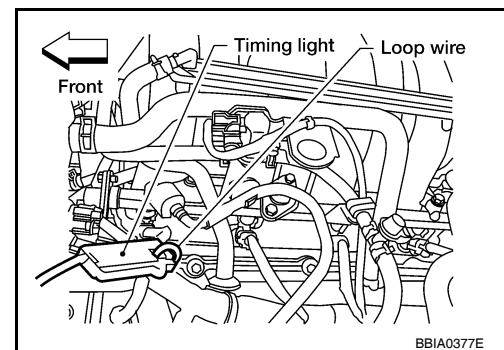
Check idle speed with GST.

### IGNITION TIMING

Any of following two methods may be used.

Method A

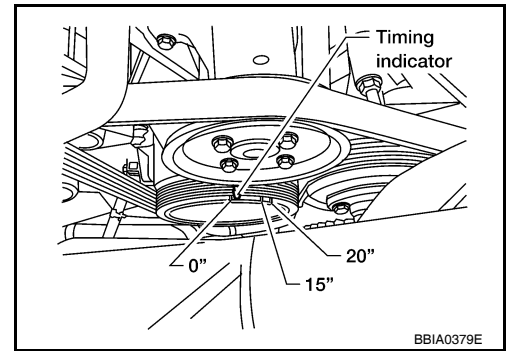
1. Attach timing light to loop wire as shown.



# BASIC SERVICE PROCEDURE

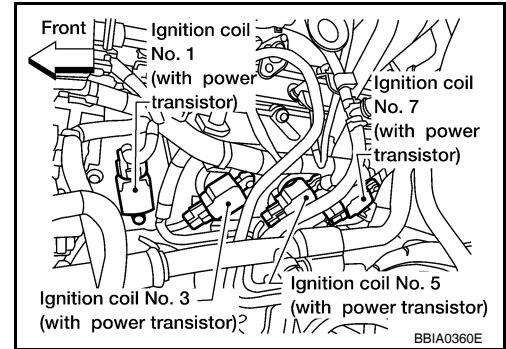
## < SERVICE INFORMATION >

2. Check ignition timing.

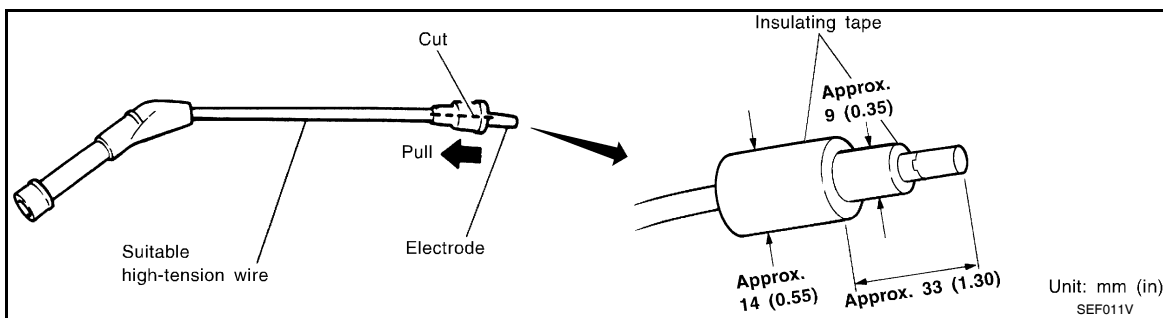
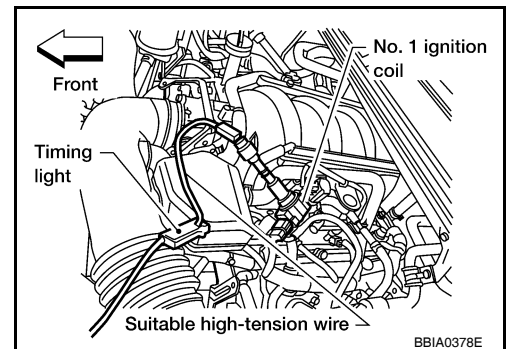


### Method B

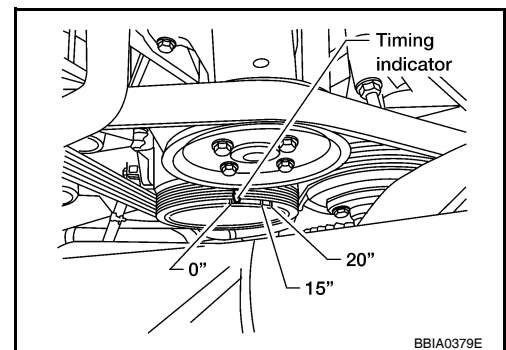
1. Remove ignition coil No.1.



2. Connect ignition coil No.1 and spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.



3. Check ignition timing.



# BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

## Procedure After Replacing ECM

INFOID:000000003531611

When replacing ECM, the following procedure must be performed.

1. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).
2. Perform [EC-77, "VIN Registration"](#).
3. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
4. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-78, "Idle Air Volume Learning"](#).

## VIN Registration

INFOID:000000003531612

### DESCRIPTION

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

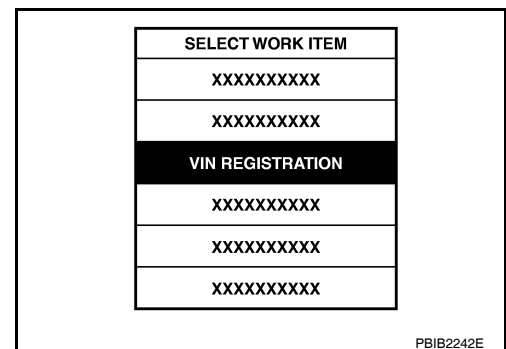
#### NOTE:

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

### OPERATION PROCEDURE

Ⓜ With CONSULT-II

1. Check the VIN of the vehicle and note it. Refer to [GI-46](#).
2. Turn ignition switch ON and engine stopped.
3. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
4. Follow the instruction of CONSULT-II display.



## Accelerator Pedal Released Position Learning

INFOID:000000003531613

### DESCRIPTION

Accelerator Pedal Released Position Learning is an operation 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.

### OPERATION PROCEDURE

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.

## Throttle Valve Closed Position Learning

INFOID:000000003531614

### DESCRIPTION

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

### OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.

# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

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

## Idle Air Volume Learning

INFOID:000000003531615

### DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine 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.

### PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/Neutral position (PNP) switch: ON
- Electric load switch: OFF  
(Air conditioner, headlamp, rear window defogger)

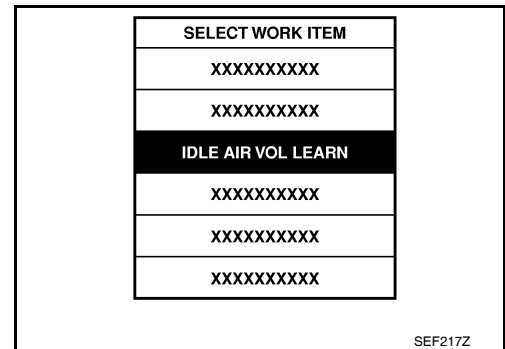
**On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is start the headlamp will not be illuminated.**

- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT-II: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- Without CONSULT-II: Drive vehicle for 10 minutes.

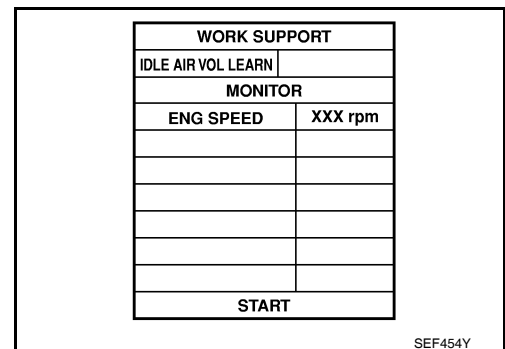
### OPERATION PROCEDURE

① With CONSULT-II

- Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
- Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
- Start engine and warm it up to normal operating temperature.
- Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
- Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.



- Touch "START" and wait 20 seconds.



# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

- Make sure that "CMPLT" is displayed on CONSULT-II screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
- Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

WORK SUPPORT	
IDLE AIR VOL LEARN	CMPLT
MONITOR	
ENG SPEED	XXX rpm
START	

MBIB0238E

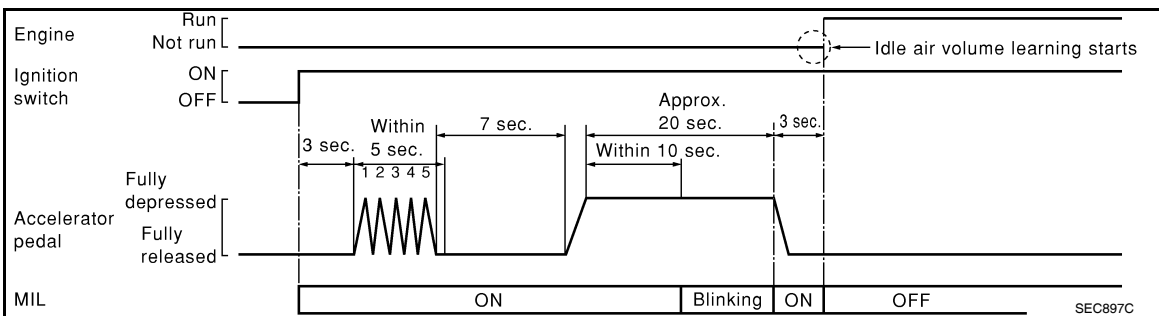
ITEM	SPECIFICATION
Idle speed	650 ± 50 rpm (in P or N position)
Ignition timing	15 ± 5° BTDC (in P or N position)

⊗ Without CONSULT-II

### 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.

- Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
- Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
- Start engine and warm it up to normal operating temperature.
- Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
- Turn ignition switch OFF and wait at least 10 seconds.
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- Repeat the following procedure quickly five times within 5 seconds.
  - Fully depress the accelerator pedal.
  - Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- Start engine and let it idle.
- Wait 20 seconds.



- Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	650 ± 50 rpm (in P or N position)
Ignition timing	15 ± 5° BTDC (in P or N position)

- If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

### DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

- Check that throttle valve is fully closed.
- Check PCV valve operation.

# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

3. Check that downstream of throttle valve is free from air leakage.
4. When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.  
It is useful to perform [EC-129](#).
5. 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.

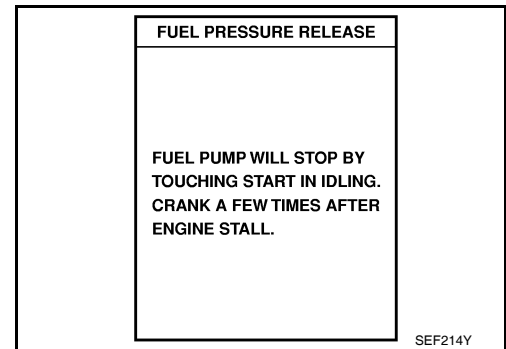
## Fuel Pressure Check

INFOID:000000003531616

## FUEL PRESSURE RELEASE

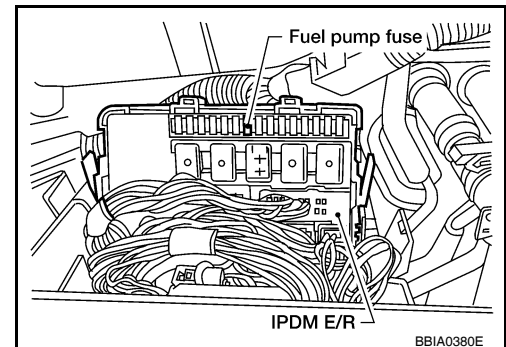
### Ⓟ With CONSULT-II

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



### ⊗ Without CONSULT-II

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



## FUEL PRESSURE CHECK

### CAUTION:

- Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- Be careful not to scratch or get the fuel hose connection area dirty when servicing, so that the quick connector o-ring maintains sealability.
- Use Fuel Pressure Gauge Kit J-44321 and Fuel Pressure Adapter J-44321-6 to check fuel pressure.
- Do not perform fuel pressure check with electrical system operating (i.e. lights, rear defog, A/C, etc.). Fuel pressure gauge may indicate false readings due to varying engine loads 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 JA60 models do not have fuel return system.

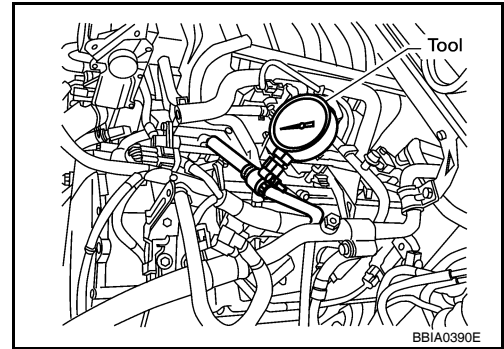
1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Remove engine cover.
3. Remove fuel hose using Quick Connector Release J-45488. Refer to [EM-17](#).
  - Do not twist or kink fuel hose because it is plastic hose.
  - Do not remove fuel hose from quick connector.
  - Keep fuel hose connections clean.



# BASIC SERVICE PROCEDURE

## < SERVICE INFORMATION >

4. Install Fuel Pressure Adapter J-44321-6 and Fuel Pressure Gauge (from kit J-44321) as shown in figure.
  - Do not distort or bend fuel rail tube when installing fuel pressure gauge adapter.
  - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
5. Turn ignition switch ON (reactivate fuel pump), and check for fuel leakage.
6. Start engine and check for fuel leakage.
7. Read the indication of fuel pressure gauge.
  - During fuel pressure check, check for fuel leakage from fuel connection every 3 minutes.



**At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup> , 51 psi)**

8. If result is unsatisfactory, go to next step.
9. Check the following.
  - Fuel hoses and fuel tubes for clogging
  - Fuel filter for clogging
  - Fuel pump
  - Fuel pressure regulator for cloggingIf OK, replace fuel pressure regulator.  
If NG, repair or replace.
10. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE" .

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

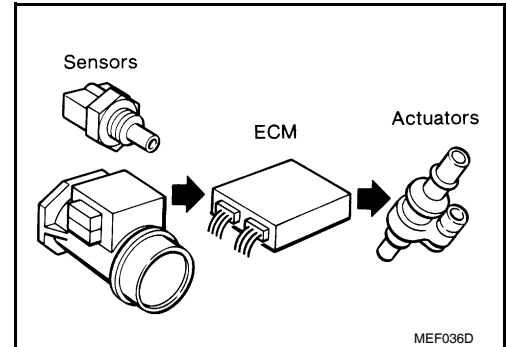
## TROUBLE DIAGNOSIS

### Trouble Diagnosis Introduction

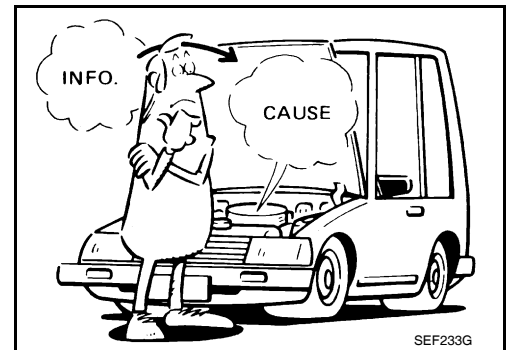
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#### INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



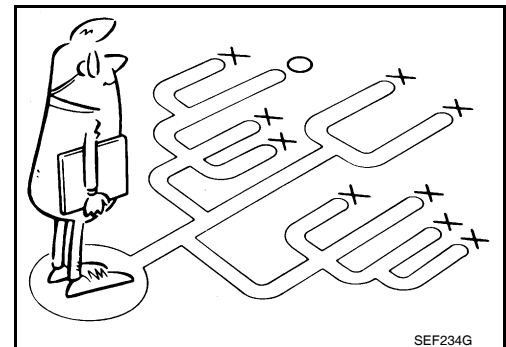
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the Work Flow on "WORK FLOW".

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.

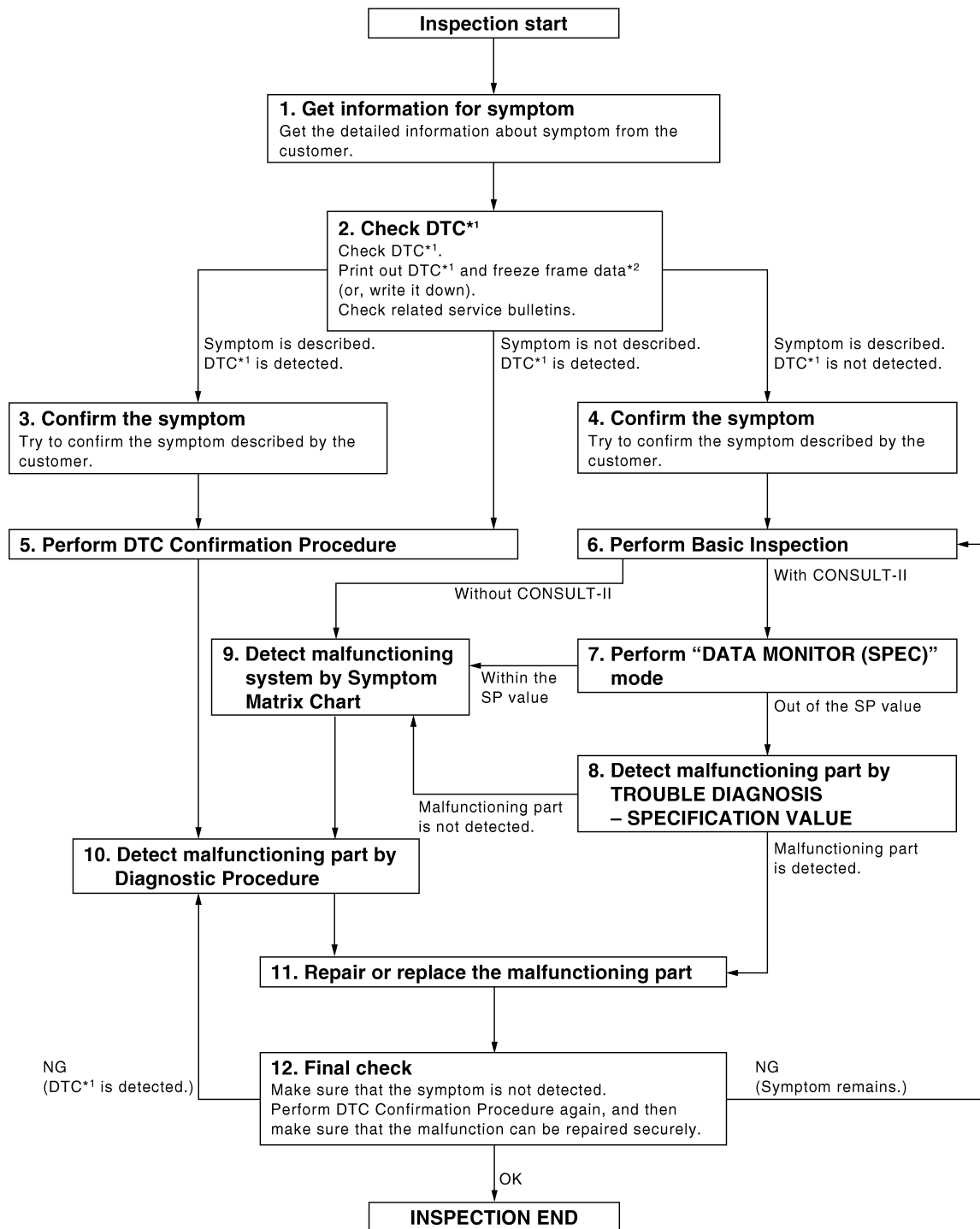


#### WORK FLOW

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Overall Sequence



\*1: Include 1st trip DTC.

\*2: Include 1st trip freeze frame data.

PBIB2267E

Detailed Flow

## 1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Worksheet Sample" .

>> GO TO 2.

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

---

### 2. CHECK DTC\*<sup>1</sup>

---

1. Check DTC\*<sup>1</sup> .
2. Perform the following procedure if DTC\*<sup>1</sup> is displayed.
  - Record DTC\*<sup>1</sup> and freeze frame data\*<sup>2</sup> . (Print them out with CONSULT-II or GST.)
  - Erase DTC\*<sup>1</sup> . (Refer to [EC-49, "Emission-related Diagnostic Information"](#) .)
  - Study the relationship between the cause detected by DTC\*<sup>1</sup> and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-90, "Symptom Matrix Chart"](#) .)
3. Check related service bulletins for information.

#### Is any symptom described and any DTC detected?

Symptom is described, DTC\*<sup>1</sup> is displayed>>GO TO 3.

Symptom is described, DTC\*<sup>1</sup> is not displayed>>GO TO 4.

Symptom is not described, DTC\*<sup>1</sup> is displayed>>GO TO 5.

### 3. CONFIRM THE SYMPTOM

---

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

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT-II to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

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.

DIAGNOSIS WORK SHEET is useful to verify the incident.

Connect CONSULT-II to the vehicle in "DATA MONITOR (AUTO TRIG)" mode and check real time diagnosis results.

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\*<sup>1</sup> is detected again.

At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on "DATA MONITOR (AUTO TRIG)".

If two or more DTCs\*<sup>1</sup> are detected, refer to [EC-87, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

#### **NOTE:**

- Freeze frame data\*<sup>2</sup> is useful if the DTC\*<sup>1</sup> is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC\*<sup>1</sup> cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC\*<sup>1</sup> by DTC Confirmation Procedure.

#### Is DTC\*<sup>1</sup> detected?

Yes >> GO TO 10.

No >> Check according to [EC-138](#) .

### 6. PERFORM BASIC INSPECTION

---

Perform [EC-71, "Basic Inspection"](#) .

With CONSULT-II>>GO TO 7.

Without CONSULT-II>>GO TO 9.

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

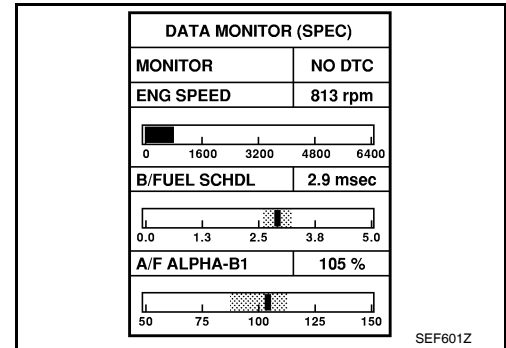
## 7. PERFORM DATA MONITOR (SPEC) MODE

④ With CONSULT-II

Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL", and "A/F ALPHA-B1", "A/F ALPHA-B2" are within the SP value using CONSULT-II "DATA MONITOR (SPEC)" mode. Refer to [EC-129](#).

Are they within the SP value?

- Yes >> GO TO 9.
- No >> GO TO 8.



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

Detect malfunctioning part according to [EC-130, "Diagnosis Procedure"](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> GO TO 9.

## 9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to [EC-90, "Symptom Matrix Chart"](#) 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 DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

**NOTE:**

The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is malfunctioning part detected?

- Yes >> GO TO 11.
- No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to [EC-103, "ECM Terminal and Reference Value"](#), [EC-124, "CONSULT-II Reference Value in Data Monitor Mode"](#).

## 11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to [EC-49, "Emission-related Diagnostic Information"](#).

>> GO TO 12.

## 12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

- NG (DTC\*<sup>1</sup> is detected)>>GO TO 10.
- NG (Symptom remains)>>GO TO 6.

OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC\*<sup>1</sup> in ECM and TCM (Transmission Control Module). (Refer to [EC-49, "Emission-related Diagnostic Information"](#) and [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).)

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to [EC-49, "Emission-related Diagnostic Information"](#) .
3. **INSPECTION END**

\*1: Include 1st trip DTC.

\*2: Include 1st trip freeze frame data.

## DIAGNOSTIC WORKSHEET

### 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.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

### KEY POINTS

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

SEF907L



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> <li>• U1000 U1001 CAN communication line</li> <li>• U1010 CAN communication</li> <li>• P0101 P0102 P0103 Mass air flow sensor</li> <li>• P0112 P0113 P0127 Intake air temperature sensor</li> <li>• P0117 P0118 P0125 Engine coolant temperature sensor</li> <li>• P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor</li> <li>• P0128 Thermostat function</li> <li>• P0181 P0182 P0183 Fuel tank temperature sensor</li> <li>• P0327 P0328 P0332 P0333 Knock sensor</li> <li>• P0335 Crankshaft position sensor (POS)</li> <li>• P0340 Camshaft position sensor (PHASE)</li> <li>• P0460 P0461 P0462 P0463 Fuel level sensor</li> <li>• P0500 Vehicle speed sensor</li> <li>• P0605 ECM</li> <li>• P0643 Sensor power supply</li> <li>• P0700 TCM</li> <li>• P0705 Park/neutral position (PNP) switch</li> <li>• P0850 Park/neutral position (PNP) switch</li> <li>• P1550 P1551 P1552 P1553 P1554 Battery current sensor</li> <li>• P1610 - P1615 NATS</li> <li>• P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor</li> </ul>
2	<ul style="list-style-type: none"> <li>• P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater</li> <li>• P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater</li> <li>• P0075 P0081 Intake valve timing control solenoid valve</li> <li>• P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1</li> <li>• P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2</li> <li>• P0441 EVAP control system purge flow monitoring</li> <li>• P0443 P0444 P0445 EVAP canister purge volume control solenoid valve</li> <li>• P0447 P0448 EVAP canister vent control valve</li> <li>• P0451 P0452 P0453 EVAP control system pressure sensor</li> <li>• P0550 Power steering pressure sensor</li> <li>• P0603 ECM power supply</li> <li>• P0710 P0717 P0720 P0740 P0744 P0745 P1730 P1752 P1754 P1757 P1759 P1762 P1764 P1767 P1769 P1772 P1774 A/T related sensors, solenoid valves and switches</li> <li>• P1217 Engine over temperature (OVERHEAT)</li> <li>• P1140 P1145 Intake valve timing control position sensor</li> <li>• P1805 Brake switch</li> <li>• P2100 P2103 P2118 Electric throttle control actuator</li> <li>• P2101 Electric throttle control function</li> </ul>
3	<ul style="list-style-type: none"> <li>• P0011 P0021 Intake valve timing control</li> <li>• P0171 P0172 P0174 P0175 Fuel injection system function</li> <li>• P0300 - P0308 Misfire</li> <li>• P0420 P0430 Three way catalyst function</li> <li>• P0442 EVAP control system (SMALL LEAK)</li> <li>• P0455 EVAP control system (GROSS LEAK)</li> <li>• P0456 EVAP control system (VERY SMALL LEAK)</li> <li>• P0506 P0507 Idle speed control system</li> <li>• P1148 P1168 Closed loop control</li> <li>• P1211 TCS control unit</li> <li>• P1212 TCS communication line</li> <li>• P1421 Cold start control</li> <li>• P1564 ICC/ASCD steering switch</li> <li>• P1568 ICC command value</li> <li>• P1572 ICC/ASCD brake switch</li> <li>• P1574 ICC/ASCD vehicle speed sensor</li> <li>• P2119 Electric throttle control actuator</li> </ul>

### Fail-Safe Chart

INFOID:000000003531619

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening 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.	
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.  
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.  
The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

## Symptom Matrix Chart

INFOID:000000003531620

### SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM												Refer- ence page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	<a href="#">EC-613</a>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<a href="#">EC-80</a>
	Injector circuit	1	1	2	3	2		2	2			2			<a href="#">EC-608</a>
	Evaporative emission system	3	3	4	4	4	4	4	4	4	4	4			<a href="#">EC-33</a>
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		<a href="#">EC-45</a>
	Incorrect idle speed adjustment						1	1	1	1		1			<a href="#">EC-71</a>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<a href="#">EC-543</a> , <a href="#">EC-548</a> , <a href="#">EC-554</a> , <a href="#">EC-559</a>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<a href="#">EC-71</a>
	Ignition circuit	1	1	2	2	2		2	2			2			<a href="#">EC-626</a>
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			<a href="#">EC-139</a>
Mass air flow sensor circuit		1			2										<a href="#">EC-186</a> , <a href="#">EC-194</a>
Engine coolant temperature sensor circuit							3				3				<a href="#">EC-205</a> , <a href="#">EC-217</a>
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			<a href="#">EC-225</a> , <a href="#">EC-234</a> , <a href="#">EC-242</a> , <a href="#">EC-250</a> , <a href="#">EC-588</a>
Throttle position sensor circuit							2			2					<a href="#">EC-210</a> , <a href="#">EC-318</a> , <a href="#">EC-477</a> , <a href="#">EC-479</a> , <a href="#">EC-574</a>
Accelerator pedal position sensor circuit				3	2	1									<a href="#">EC-440</a> , <a href="#">EC-561</a> , <a href="#">EC-567</a> , <a href="#">EC-581</a>
Knock sensor circuit				2								3			<a href="#">EC-332</a>
Crankshaft position sensor (POS) circuit		2	2												<a href="#">EC-336</a>

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

	SYMPTOM												Refer- ence page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	3	2												<a href="#">EC-342</a>
Vehicle speed signal circuit		2	3		3						3			<a href="#">EC-429</a>
Power steering pressure sensor circuit		2					3	3						<a href="#">EC-435</a>
ECM	2	2	3	3	3	3	3	3	3	3	3			<a href="#">EC-440</a> , <a href="#">EC-444</a>
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			<a href="#">EC-178</a>
Park/Neutral position (PNP) switch circuit			3		3		3	3			3			<a href="#">EC-452</a>
Refrigerant pressure sensor circuit		2				3			3		4			<a href="#">EC-638</a>
Electrical load signal circuit							3							<a href="#">EC-606</a>
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<a href="#">ATC-30</a>
ABS actuator and electric unit (control unit)			4											<a href="#">EC-467</a> , <a href="#">EC-468</a> or <a href="#">BRC-11</a>

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

## SYSTEM — ENGINE MECHANICAL & OTHER

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# TROUBLE DIAGNOSIS

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		SYMPTOM													Reference page												
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATSWATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)													
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA													
Fuel	Fuel tank	5													<a href="#">FL-10</a>												
	Fuel piping			5	5	5		5	5		5				<a href="#">FL-4</a>												
	Vapor lock			5												—											
	Valve deposit															—											
	Poor fuel (Heavy weight gasoline, Low octane)	5			5	5	5		5	5			5			—											
Air	Air duct														<a href="#">EM-15</a>												
	Air cleaner														<a href="#">EM-15</a>												
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<a href="#">EM-15</a>												
	Electric throttle control actuator	5			5		5			5					<a href="#">EM-17</a>												
	Air leakage from intake manifold/Collector/Gasket														<a href="#">EM-17</a>												
Cranking	Battery	1	1	1		1		1	1					1	<a href="#">SC-4</a>												
	Generator circuit														<a href="#">SC-15</a>												
	Starter circuit	3										1			<a href="#">SC-9</a>												
	Signal plate	6													<a href="#">EM-38</a>												
	Park/Neutral position (PNP) switch	4													<a href="#">AT-99</a>												
Engine	Cylinder head	5	5	5	5	5		5	5			5	3		<a href="#">EM-64</a>												
	Cylinder head gasket														4	3											
	Cylinder block																										
	Piston																							4			
	Piston ring																										
	Connecting rod	6													6	6	6	6		6	6			6			<a href="#">EM-78</a>
	Bearing																										
	Crankshaft																										
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5	3		<a href="#">EM-38</a>												
	Camshaft														<a href="#">EM-46</a>												
	Intake valve timing control														<a href="#">EM-46</a>												
	Intake valve																										
	Exhaust valve														<a href="#">EM-64</a>												

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			<a href="#">EM-21, EX-3</a>
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<a href="#">EM-24, LU-14, LU-11, LU-12</a>
	Oil level (Low)/Filthy oil														<a href="#">LU-8</a>
Cooling	Radiator/Hose/Radiator filler cap														<a href="#">CO-13</a>
	Thermostat									5					<a href="#">CO-20</a>
	Water pump														<a href="#">CO-18</a>
	Water gallery	5	5	5	5	5		5	5		4	5			<a href="#">CO-8</a>
	Cooling fan									5					<a href="#">CO-16</a>
	Coolant level (Low)/Contaminated coolant									5					<a href="#">CO-9</a>
IVIS (INFINITI Vehicle Immobilizer System — NATS)		1	1												<a href="#">BL-116</a>

1 - 6: The numbers refer to the order of inspection.

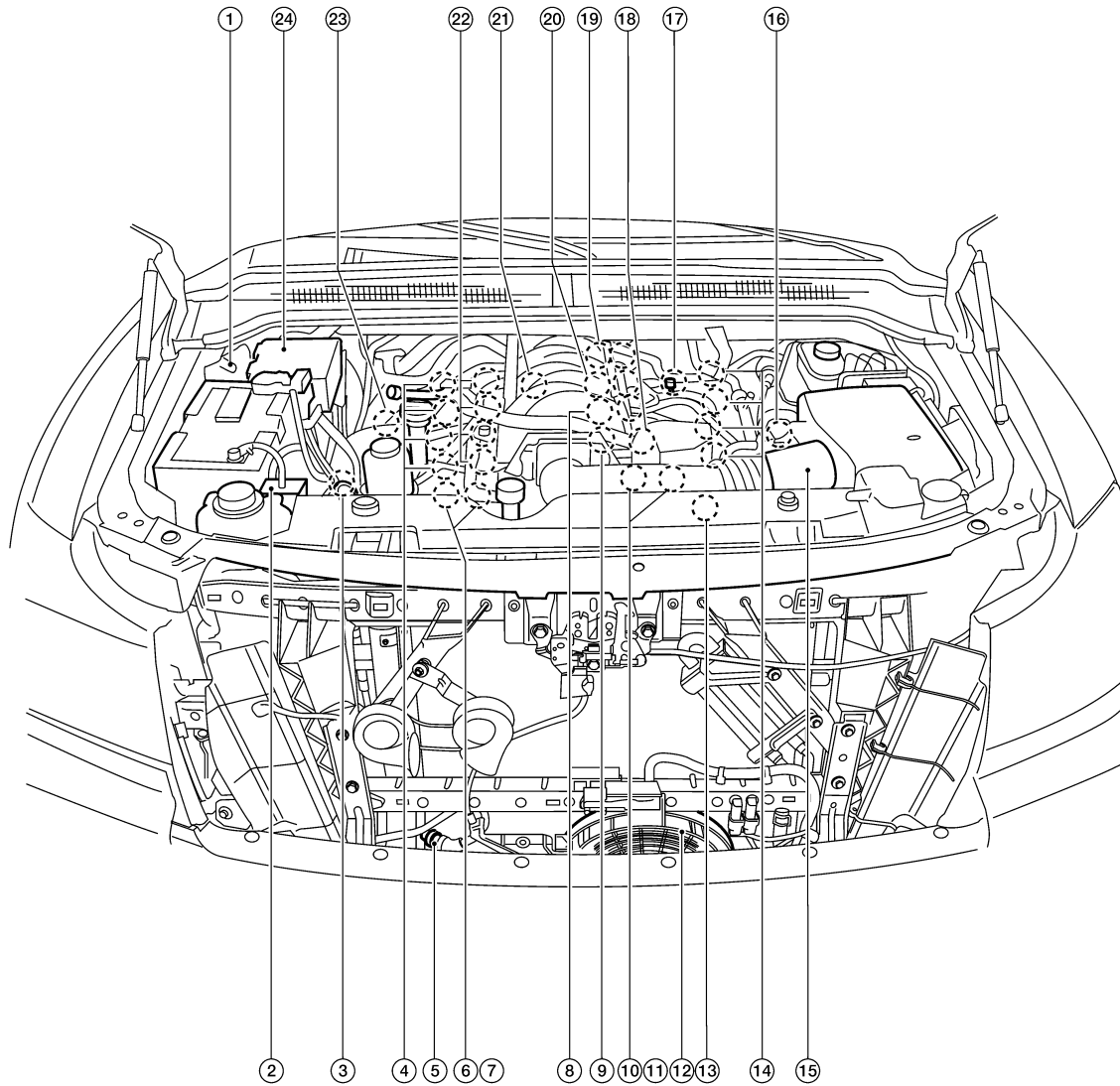
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# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

## Engine Control Component Parts Location

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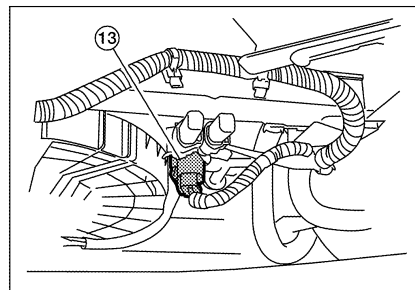
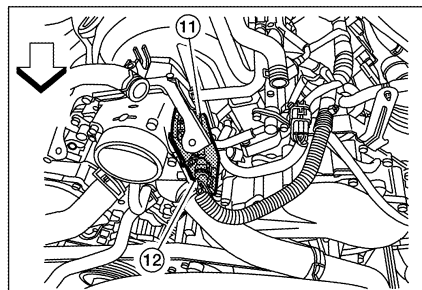
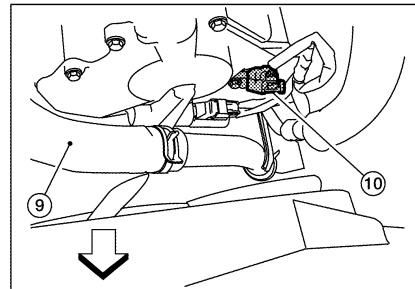
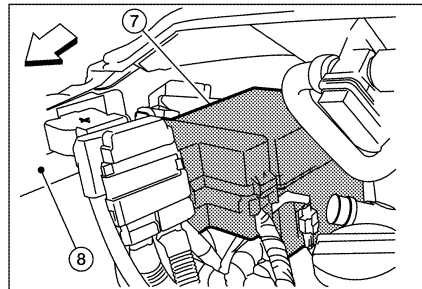
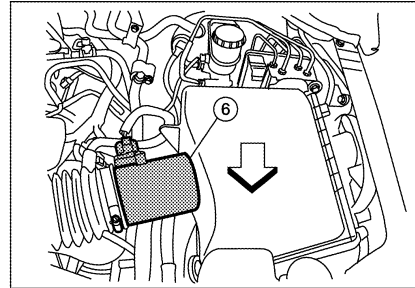
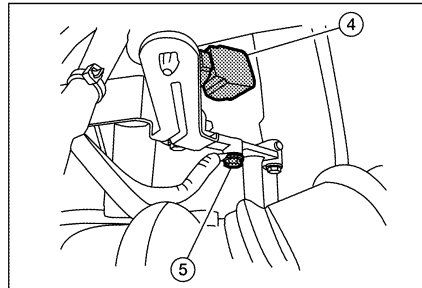
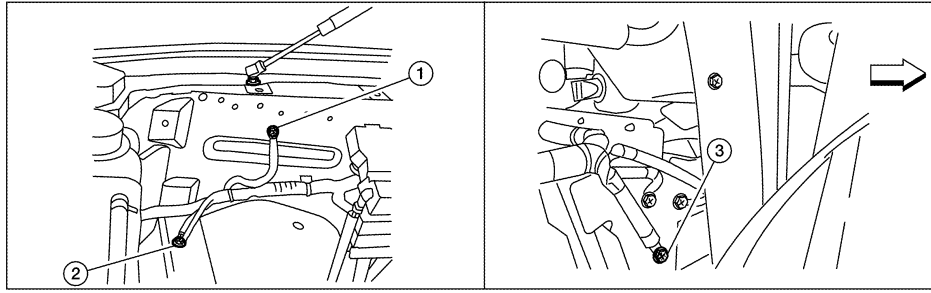


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|--|---|---|
| 1. ECM   | 2. Battery current sensor   | 3. Power steering pressure sensor                             |
| 4. Ignition coil (with power transistor) and spark plug (bank 2) | 5. Refrigerant pressure sensor                                    | 6. Intake valve timing control position sensor (bank 2)       |
| 7. Intake valve timing control solenoid valve (bank 2)           | 8. Engine coolant temperature sensor                              | 9. Electric throttle control actuator                         |
| 10. Intake valve timing control position sensor (bank 1)         | 11. Intake valve timing control solenoid valve (bank 1)           | 12. Cooling fan motor   |
| 13. Camshaft position sensor (PHASE)                             | 14. Ignition coil (with power transistor) and spark plug (bank 1) | 15. Mass air flow sensor (with intake air temperature sensor) |
| 16. A/F sensor 1 (bank 1)  | 17. EVAP service port   | 18. Fuel injector (bank 1)                                    |
| 19. Knock sensor (bank 1)  | 20. EVAP canister purge volume control solenoid valve             | 21. Knock sensor (bank 2)                                     |
| 22. Fuel injector (bank 2)                                       | 23. A/F sensor 1 (bank 2)   | 24. IPDM E/R  |

# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >



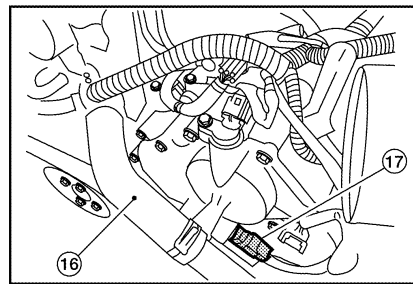
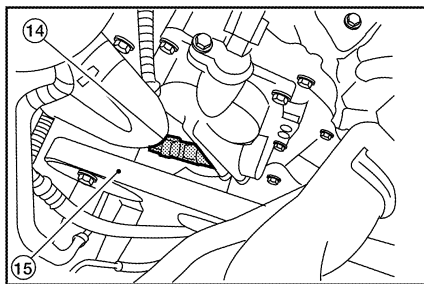
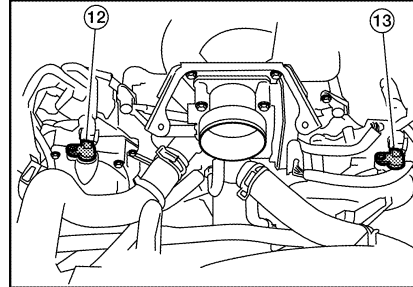
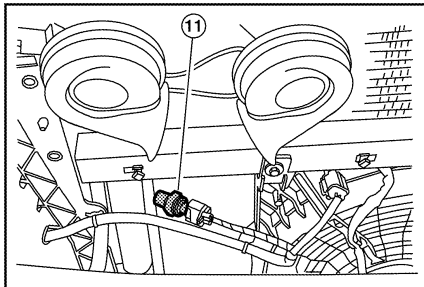
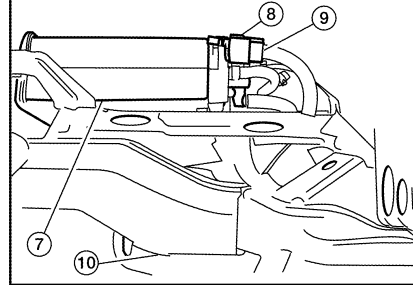
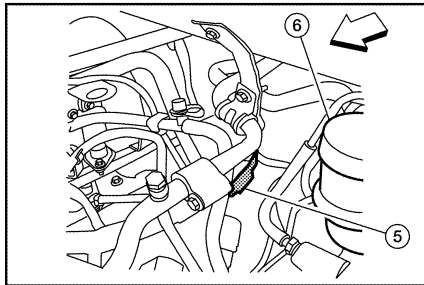
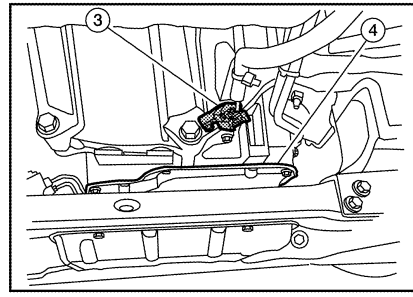
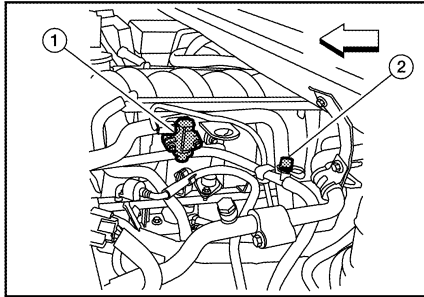
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| 1. Body ground (view with battery removed) | 2. Body ground (view with battery removed)                                 | 3. Body ground   |
| 4. No. 1 ignition coil                     | 5. Engine ground   | 6. Mass air flow sensor (with intake air temperature sensor) |
| 7. IPDM E/R                                | 8. Battery   | 9. Radiator hose   |
| 10. Camshaft position sensor (PHASE)       | 11. Electric throttle control actuator (view with intake air duct removed) | 12. Cooling fan motor harness connector                      |

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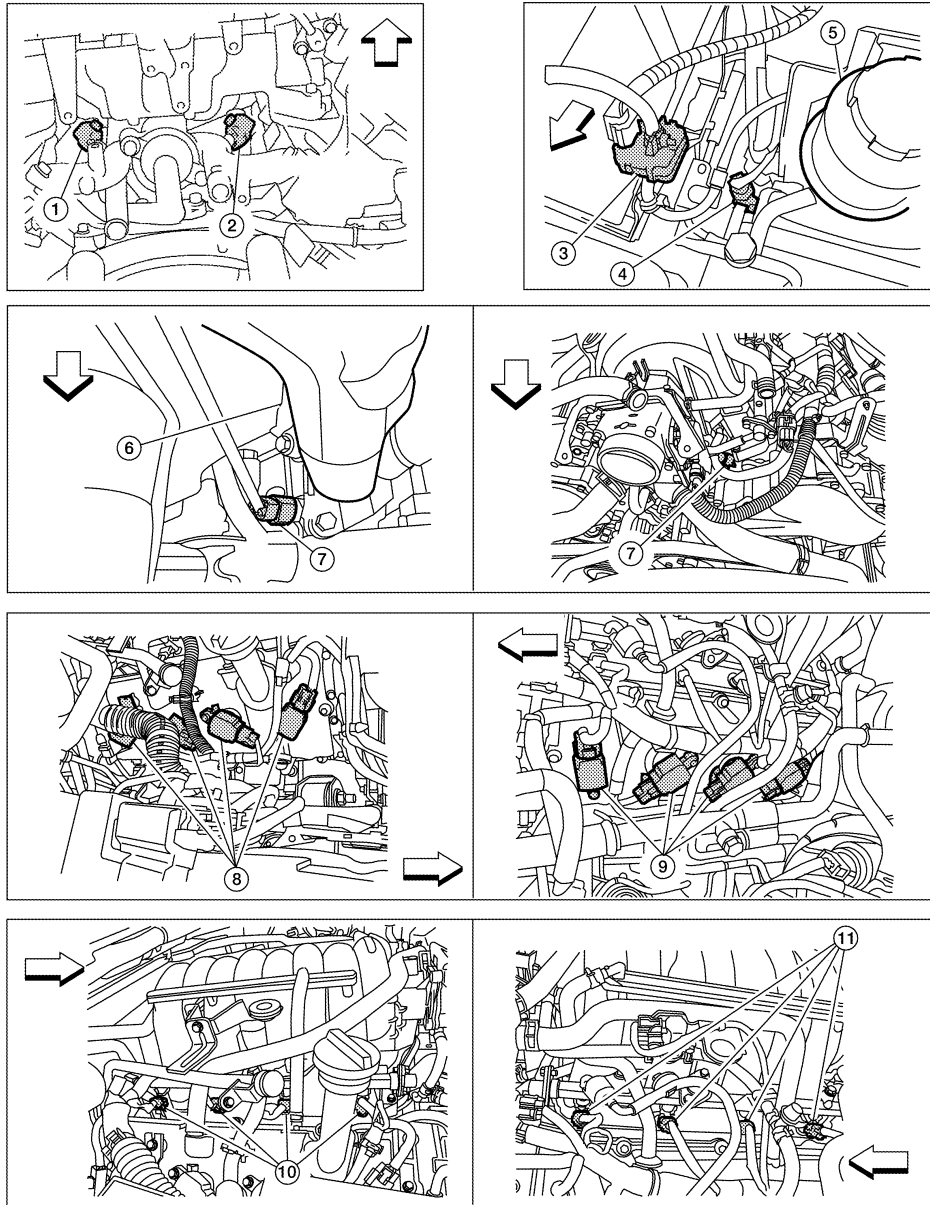
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| 1. EVAP canister purge volume control solenoid valve (view with engine cover removed) | 2. EVAP service port (view with engine cover removed)                | 3. Crankshaft position sensor (POS) (view from under the vehicle)   |
| 4. Engine oil pan (view from under the vehicle)                                       | 5. Condenser-1   | 6. Brake fluid reservoir  |
| 7. EVAP canister (view with fuel tank removed)  | 8. EVAP control system pressure sensor (view with fuel tank removed) | 9. EVAP canister vent control valve (view with fuel tank removed)   |
| 10. Rear suspension member (view with fuel tank removed)                              | 11. Refrigerant pressure sensor (view with hood open)                | 12. Intake valve timing control position sensor (bank 2) (view with engine cover and intake air duct removed) |



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

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| 13. Intake valve timing control position sensor (bank 1) (view with engine cover and intake air duct removed) | 14. Intake valve timing control solenoid valve (bank 2) (view with engine cover and intake air duct removed) | 15. Drive belt (view with engine cover and intake air duct removed) |
| 16. Radiator hose (view with engine cover and intake air duct removed)  | 17. Intake valve timing control solenoid valve (bank 1) (view with engine cover and intake air duct removed) |   |



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|---|---|--|
| 1. Knock sensor (bank 1) (view with engine removed) | 2. Knock sensor (bank 2) (view with engine removed) | 3. Battery current sensor                |
| 4. Power steering pressure sensor                   | 5. Power steering fluid reservoir                   | 6. Intake manifold                       |
| 7. Engine coolant temperature sensor                | 8. Ignition coils (with power transistor)           | 9. Ignition coil (with power transistor) |
| 10. Injector harness connectors (bank 2)            | 11. Injector harness connectors (bank 1)            |  |

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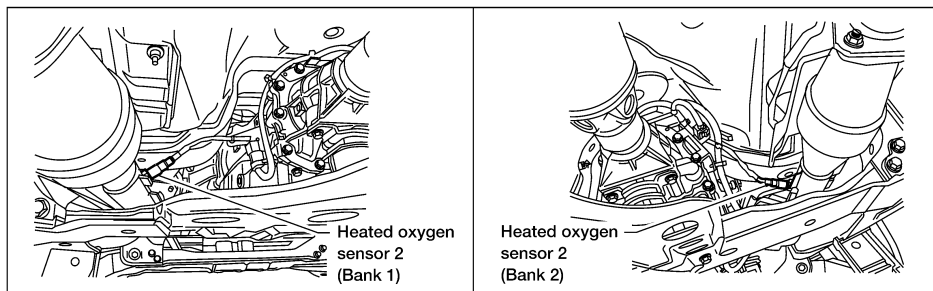
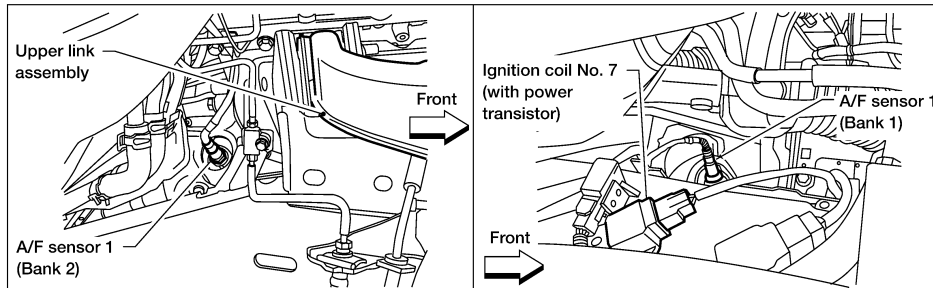
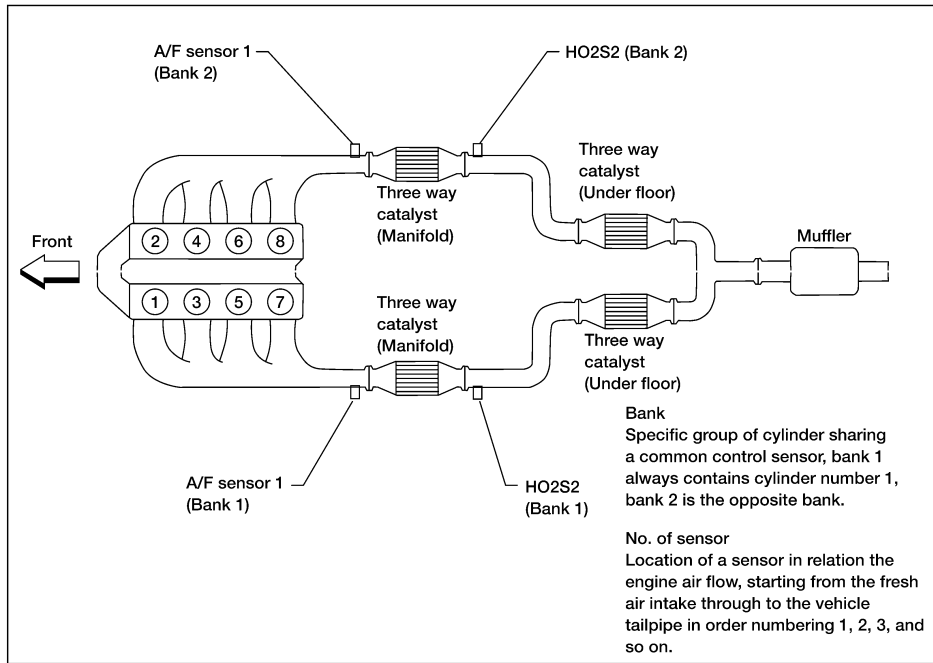
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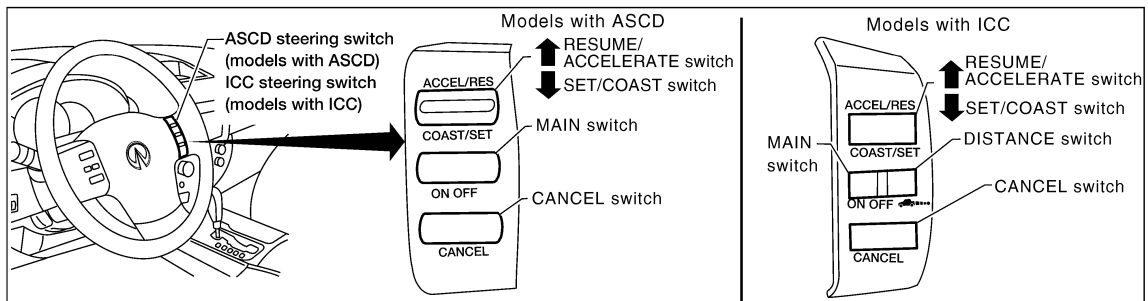
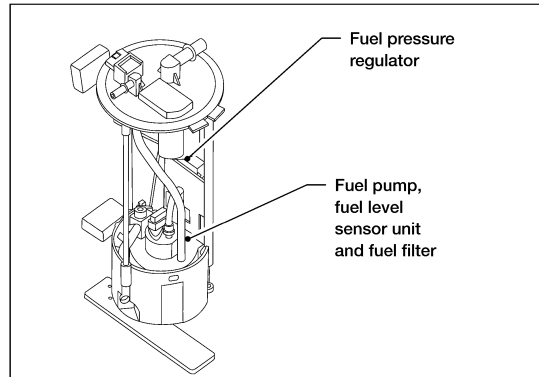
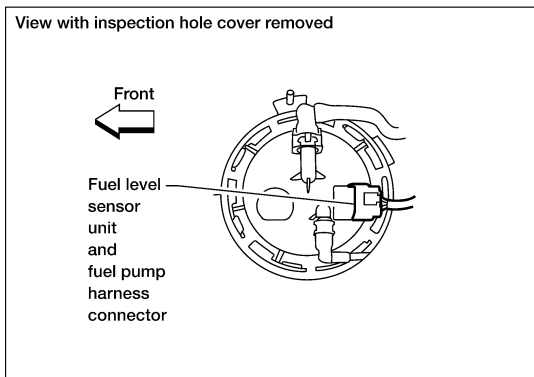
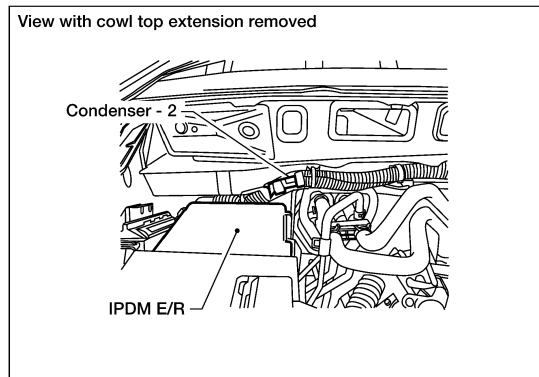
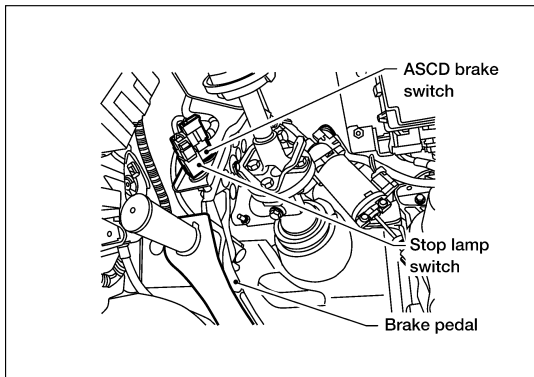
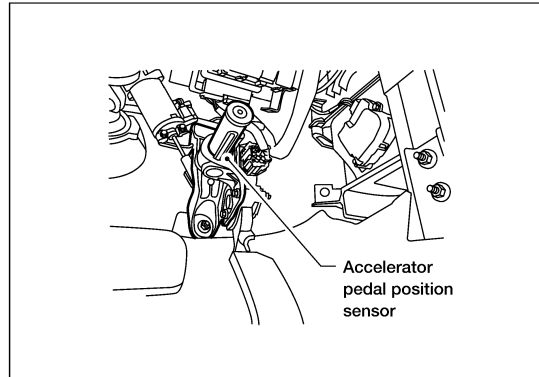
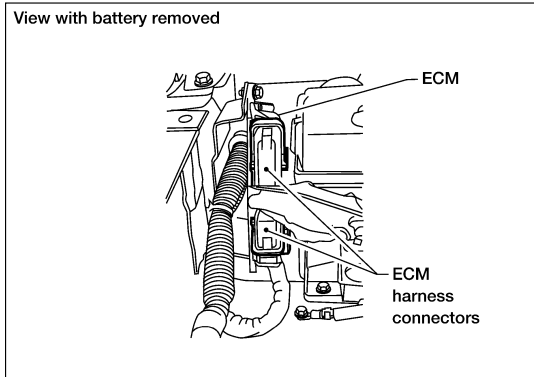
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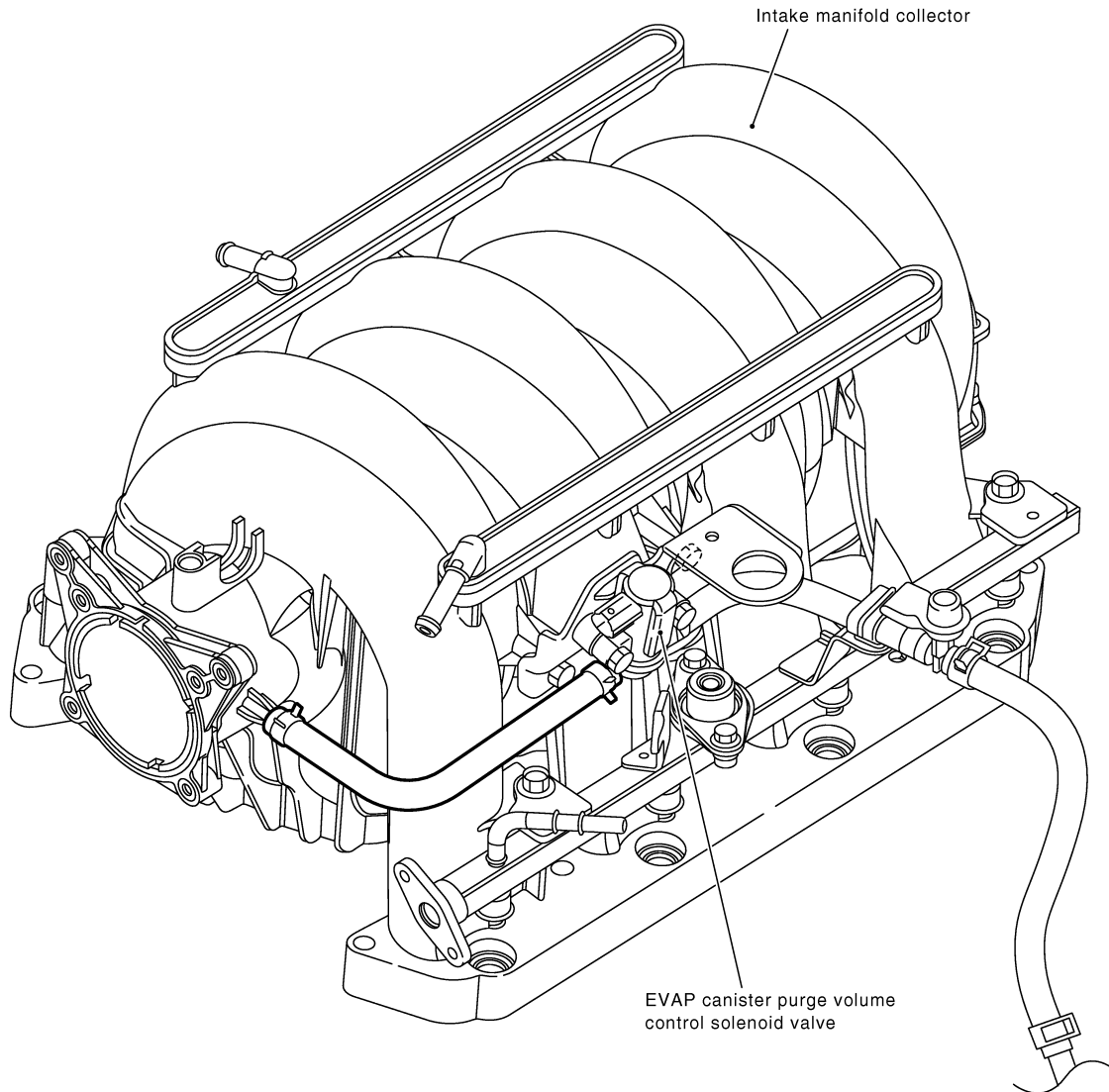
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# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

## Vacuum Hose Drawing

INFOID:000000003531622



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

Refer to [EC-24, "Schematic"](#) for Vacuum Control System.

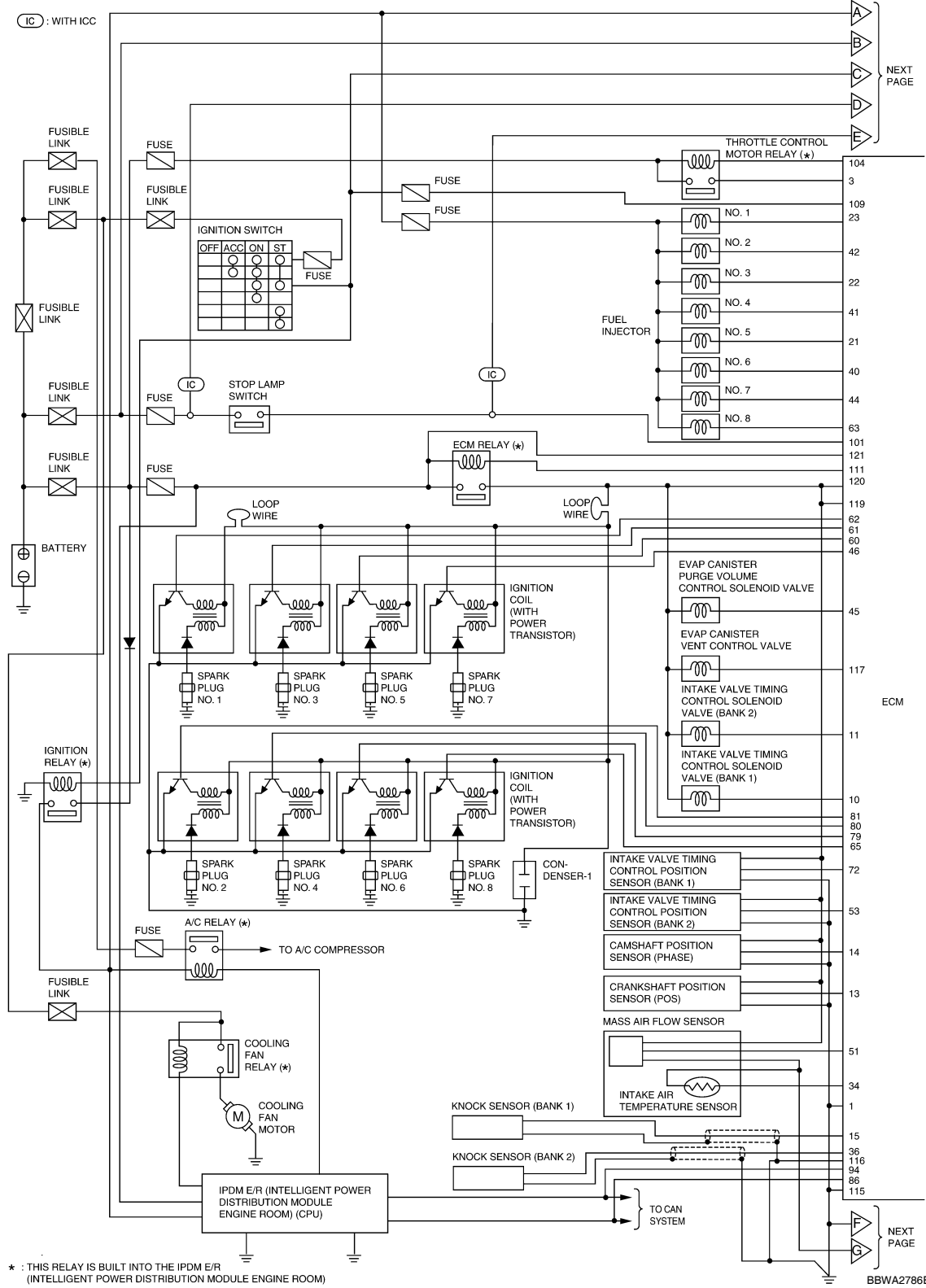
PBIB2052E

# TROUBLE DIAGNOSIS

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## Circuit Diagram

INFOID:000000003511623



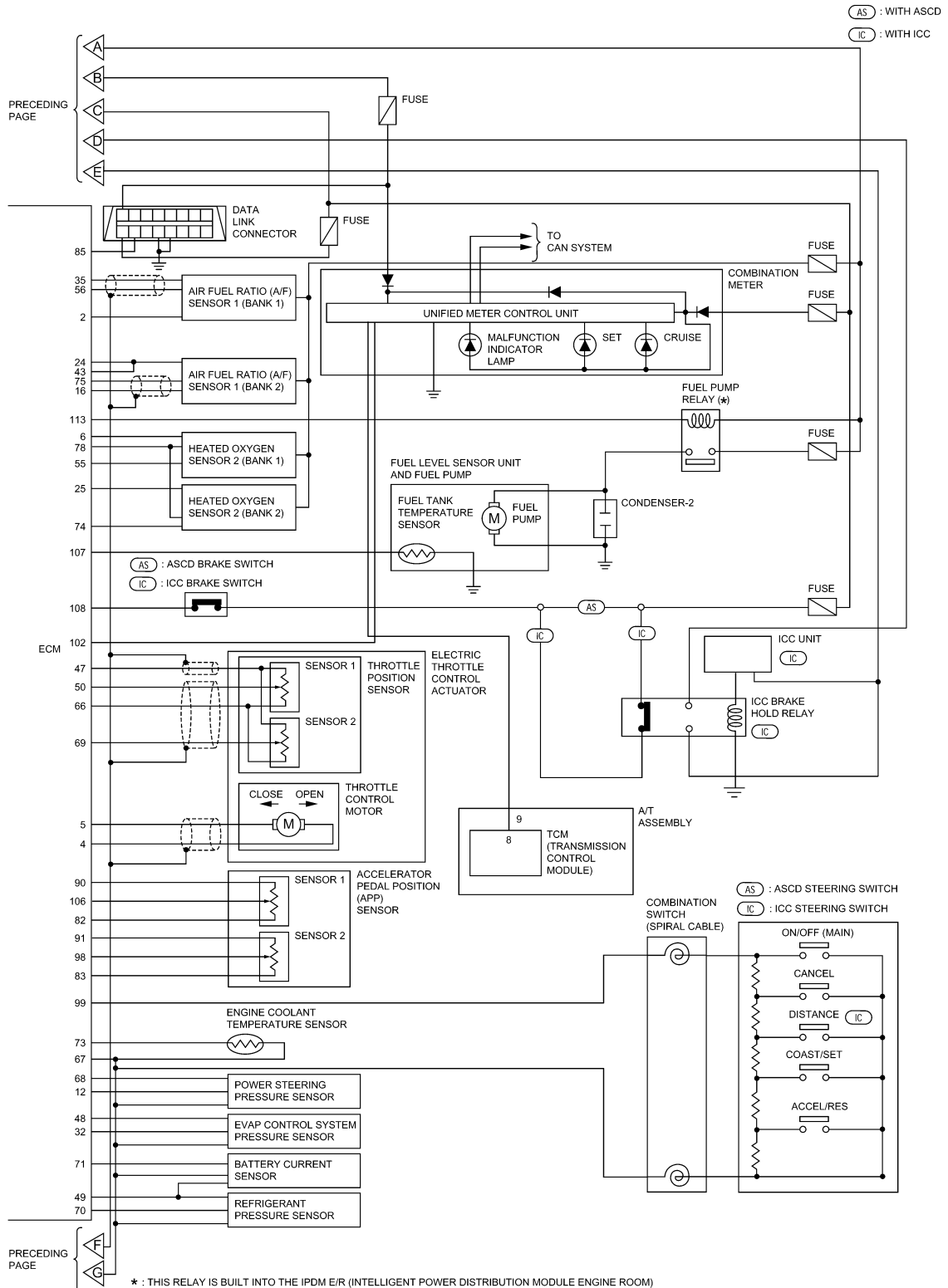
\* : THIS RELAY IS BUILT INTO THE IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

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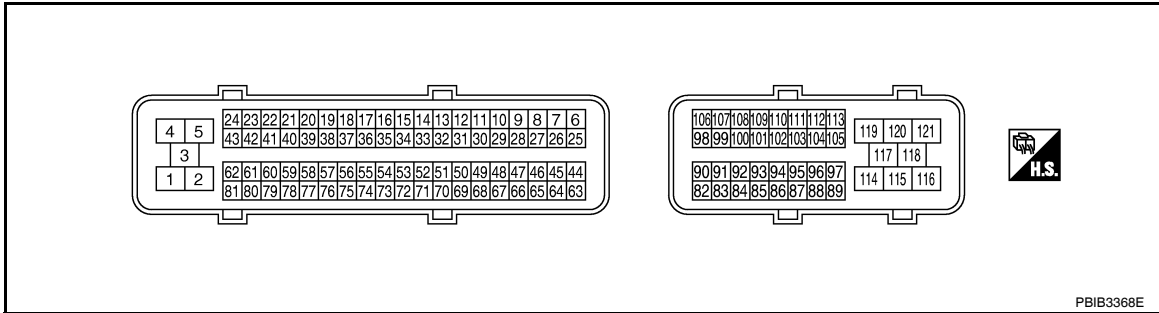
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# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

## ECM Harness Connector Terminal Layout

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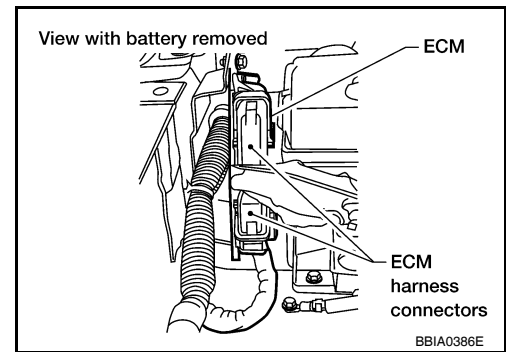
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## ECM Terminal and Reference Value

INFOID:000000003531625

### PREPARATION

ECM is located in the engine room passenger side behind battery.



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### ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

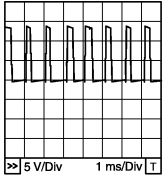
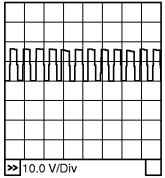
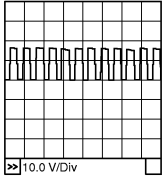
#### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	<b>[Engine is running]</b> • Idle speed	Body ground
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  10.0V/Div 50ms/Div T PBIA8148J
3	L	Throttle control motor relay power supply	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14V★  5 V/Div 1 ms/Div T PBIB1104E

# TROUBLE DIAGNOSIS

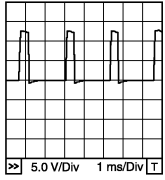
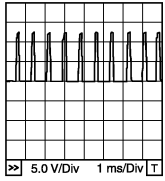
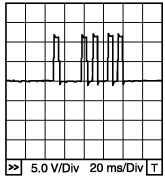
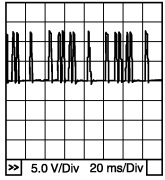
## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	L/B	Throttle control motor (Open)	<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> <li>• Selector lever: D</li> <li>• Accelerator pedal: Fully depressed</li> </ul>	0 - 14V★  <small>PBIB1105E</small>
6	GR	Heated oxygen sensor 2 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14V)
10	W	Intake valve timing control solenoid valve (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Engine speed: 2,000rpm</li> </ul>	7 - 12V★  <small>PBIB1790E</small>
11	LG	Intake valve timing control solenoid valve (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Engine speed: 2,000rpm</li> </ul>	7 - 12V★  <small>PBIB1790E</small>
12	R	Power steering pressure sensor	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Steering wheel: Being turned</li> </ul>	0.5 - 4.5V
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Steering wheel: Not being turned</li> </ul>	0.4 - 0.8V



# TROUBLE DIAGNOSIS

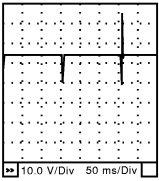
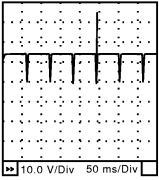
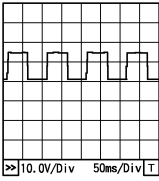
## < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	O	Crankshaft position sensor (POS)	<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <p><b>NOTE:</b> The pulse cycle changes depending on rpm at idle</p>	<p>Approximately 10V★</p>  <p style="text-align: right;">PBIB1041E</p>
			<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Engine speed: 2,000 rpm</li> </ul>	<p>Approximately 10V★</p>  <p style="text-align: right;">PBIB1042E</p>
14	Y	Camshaft position sensor (PHASE)	<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <p><b>NOTE:</b> The pulse cycle changes depending on rpm at idle</p>	<p>1.0 - 4.0V★</p>  <p style="text-align: right;">PBIB1039E</p>
			<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Engine speed: 2,000 rpm</li> </ul>	<p>1.0 - 4.0V★</p>  <p style="text-align: right;">PBIB1040E</p>
15	W	Knock sensor (bank 1)	<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Idle speed</li> </ul>	Approximately 2.5V
16	G/L	A/F sensor 1 (bank 1)	<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.

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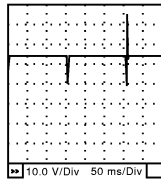
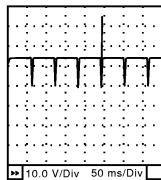
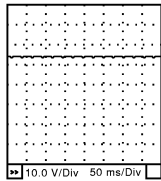
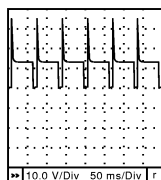
# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 44	O/L BR GR/W O	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 7	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	<b>BATTERY VOLTAGE</b> (11 - 14V)★  <small>SEC984C</small>
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	<b>BATTERY VOLTAGE</b> (11 - 14V)★  <small>SEC985C</small>
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★  <small>PBIA8148J</small>
25	O/G	Heated oxygen sensor 2 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm</li> </ul>	<b>BATTERY VOLTAGE</b> (11 - 14V)
32	L	EVAP control system pressure sensor	<b>[Ignition switch: ON]</b>	Approximately 1.8 - 4.8V
34	R/B	Intake air temperature sensor	<b>[Engine is running]</b>	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
36	W	Knock sensor (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Idle speed</li> </ul>	Approximately 2.5V

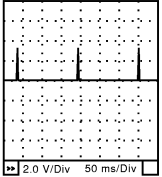
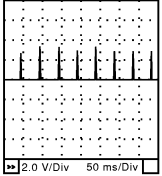
# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	A EC C D E F G H I J K L M N O P
40 41 42 63	Y/G P L G	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2 Fuel injector No. 8	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C	C D E F G
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14V)★  SEC985C	
45	L/Y	EVAP canister purge volume control solenoid valve	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Idle speed</li> <li>• Accelerator pedal: Not depressed even slightly, after engine starting</li> </ul>	BATTERY VOLTAGE (11 - 14V)★  SEC990C	H I J K L
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>	BATTERY VOLTAGE (11 - 14V)★  SEC991C	
47	Y	Sensor power supply (Throttle position sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V	M
48	SB	Sensor power supply (EVAP control system pressure sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V	N
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V	O
50	B	Throttle position sensor 1	<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> <li>• Selector lever: D</li> <li>• Accelerator pedal: Fully released</li> </ul>	More than 0.36V	P
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> <li>• Selector lever: D</li> <li>• Accelerator pedal: Fully depressed</li> </ul>	Less than 4.75V	

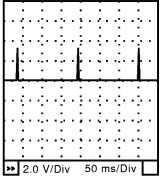
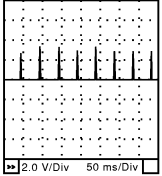
# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.7 - 2.1V
55	R	Heated oxygen sensor 2 (bank 1)	[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 - Approximately 1.0V
56	BR/G	A/F sensor 1 (bank 1)	[Ignition switch: ON]	Approximately 2.2V
46 60 61 62	L/R GR/R O/W Y/R	Ignition signal No. 7 Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	0 - 0.3V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.6V★ 
66	R	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
67	B	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
68	W/L	Sensor power supply (PSP sensor)	[Ignition switch: ON]	Approximately 5V
69	W	Throttle position sensor 2	[Ignition switch: ON] • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36V
70	B/W	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates.)	1.0 - 4.0V
71	R	Battery current sensor	[Engine is running] • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5V

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	Y/B	Engine coolant temperature sensor	<b>[Engine is running]</b>	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
74	L	Heated oxygen sensor 2 (bank 2)	<b>[Engine is running]</b> • 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 - Approximately 1.0V
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
65 79 80 81	G/R V/W W/R W/G	Ignition signal No. 8 Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle	0 - 0.3V★ 
			<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,500 rpm	0.1 - 0.6V★ 
82	B/R	Sensor ground (APP sensor 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
83	G/W	Sensor ground (APP sensor 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
85	G/W	Data link connector	<b>[Ignition switch: ON]</b> • CONSULT-II or GST: Disconnected	Approximately 5V - Battery voltage (11 - 14V)
86	P	CAN communication line	<b>[Ignition switch: ON]</b>	Approximately 1.1 - 2.3V Output voltage varies with the communication status
90	L	Sensor power supply (APP sensor 1)	<b>[Ignition switch: ON]</b>	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V
94	L	CAN communication line	<b>[Ignition switch: ON]</b>	Approximately 2.6 - 3.2V Output voltage varies with the communication status.

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## TROUBLE DIAGNOSIS

### < SERVICE INFORMATION >

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
98	G/R	Accelerator pedal position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.25 - 0.50V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V
99	G/Y	ASCD steering switch (Models with ICC system)	<b>[Ignition switch: ON]</b> • ICC steering switch: OFF	Approximately 4.3V
			<b>[Ignition switch: ON]</b> • MAIN switch: Pressed	Approximately 0V
			<b>[Ignition switch: ON]</b> • CANCEL switch: Pressed	Approximately 1.3V
			<b>[Ignition switch: ON]</b> • RESUME/ACCELERATE switch: Pressed	Approximately 3.7V
			<b>[Ignition switch: ON]</b> • SET/COAST switch: Pressed	Approximately 3V
			<b>[Ignition switch: ON]</b> • DISTANCE switch: Pressed	Approximately 2.2V
99	G/Y	ASCD steering switch (Models with ASCD system)	<b>[Ignition switch: ON]</b> • ASCD steering switch: OFF	Approximately 4V
			<b>[Ignition switch: ON]</b> • MAIN switch: Pressed	Approximately 0V
			<b>[Ignition switch: ON]</b> • CANCEL switch: Pressed	Approximately 1V
			<b>[Ignition switch: ON]</b> • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			<b>[Ignition switch: ON]</b> • SET/COAST switch: Pressed	Approximately 2V
101	R/W	Stop lamp switch	<b>[Ignition switch: OFF]</b> • Brake pedal: Fully released	Approximately 0V
			<b>[Ignition switch: OFF]</b> • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	GR/R	PNP switch	<b>[Ignition switch: ON]</b> • Selector lever: P or N	Approximately 0V
			<b>[Ignition switch: ON]</b> • Except the above gear position	BATTERY VOLTAGE (11 - 14V)
104	O	Throttle control motor relay	<b>[Ignition switch: OFF]</b>	BATTERY VOLTAGE (11 - 14V)
			<b>[Ignition switch: ON]</b>	0 - 1.0V
106	BR/W	Accelerator pedal position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.5 - 1.0V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V
107	V/R	Fuel tank temperature sensor	<b>[Engine is running]</b>	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	BR/W	ICC brake switch (Models with ICC system) ASCD brake switch (Models with ASCD system)	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
109	L/W	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
113	GR	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON	0 - 1.5V
			[Engine is running] [Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B/W	ECM ground	[Engine is running] • Idle speed	Body ground
117	L/Y	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
121	W	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

★: 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 [SC-4](#).

## CONSULT-II Function (ENGINE)

INFOID:000000003531626

### FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

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

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

## ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS INPUT	Crankshaft position sensor (POS)		×	×	×	×			
	Camshaft position sensor (PHASE)		×	×	×	×			
	Mass air flow sensor		×		×	×			
	Engine coolant temperature sensor		×	×	×	×	×		
	Air fuel ratio (A/F) sensor 1		×		×	×		×	
	Heated oxygen sensor 2		×		×	×		×	
	Wheel sensor		×	×	×	×			
	Accelerator pedal position sensor		×		×	×			
	Throttle position sensor		×	×	×	×			
	Fuel tank temperature sensor		×		×	×	×		
	EVAP control system pressure sensor		×		×	×			
	Intake air temperature sensor		×	×	×	×			
	Knock sensor		×						
	Refrigerant pressure sensor				×	×			
	Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
	Air conditioner switch				×	×			
	Park/neutral position (PNP) switch		×		×	×			
	Stop lamp switch		×		×	×			
	Power steering pressure sensor		×		×	×			
	Battery voltage				×	×			
	Load signal				×	×			
	Intake valve timing control position sensor		×		×	×			
	Fuel level sensor		×		×	×			
	Battery current sensor		×		×	×			
	ICC steering switch		×		×	×			
	ASCD steering switch		×		×	×			
ICC brake switch		×		×	×				
ASCD brake switch		×		×	×				



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
<b>ENGINE CONTROL COMPONENT PARTS</b>	<b>OUTPUT</b>	Fuel injector			×	×	×		
		Power transistor (Ignition timing)			×	×	×		
		Throttle control motor relay	×		×	×			
		Throttle control motor	×						
		EVAP canister purge volume control solenoid valve	×		×	×	×		×
		Air conditioner relay			×	×			
		Fuel pump relay	×		×	×	×		
		Cooling fan relay	×		×	×	×		
		Air fuel ratio (A/F) sensor 1 heater	×		×	×		×	
		Heated oxygen sensor 2 heater	×		×	×		×	
		EVAP canister vent control valve	×	×	×	×	×		
		Intake valve timing control solenoid valve		×	×	×	×		
		Alternator			×	×	×		
		Calculated load value		×	×	×			

X: Applicable

\*1: This item includes 1st trip DTCs.

\*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to "Freeze Frame Data and 1st Trip Freeze Frame Data".

### INSPECTION PROCEDURE

Refer to [GI-36, "CONSULT-II Start Procedure"](#).

### WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> <li>FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.</li> </ul>	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> <li>THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.</li> </ul>	When learning the idle air volume
SELF-LEARNING CONT	<ul style="list-style-type: none"> <li>THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.</li> </ul>	When clearing the coefficient of self-learning control value

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	<p>CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> <li>• IGN SW ON</li> <li>• ENGINE NOT RUNNING</li> <li>• AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).</li> <li>• NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM</li> <li>• FUEL TANK TEMP. IS MORE THAN 0°C (32°F).</li> <li>• WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE"</li> <li>• WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION.</li> </ul> <p><b>NOTE:</b>  <b>WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</b></p>	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	<ul style="list-style-type: none"> <li>• IN THIS MODE, VIN IS REGISTERED IN ECM</li> </ul>	When registering VIN in ECM
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> <li>• IDLE CONDITION</li> </ul>	When setting target idle speed
TARGET IGN TIM ADJ*	<ul style="list-style-type: none"> <li>• IDLE CONDITION</li> </ul>	When adjusting target ignition timing

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

## SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to [EC-49, "Emission-related Diagnostic Information"](#).

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> <li>• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to <a href="#">EC-9</a>.)</li> </ul>
FUEL SYS-B1	<ul style="list-style-type: none"> <li>• "Fuel injection system status" at the moment a malfunction is detected is displayed.</li> <li>• One mode in the following is displayed.  Mode2: Open loop due to detected system malfunction  Mode3: Open loop due to driving conditions (power enrichment, deceleration enrichment)  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</li> </ul>
FUEL SYS-B2	
CAL/LD VALUE [%]	<ul style="list-style-type: none"> <li>• The calculated load value at the moment a malfunction is detected is displayed.</li> </ul>
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> <li>• The engine coolant temperature at the moment a malfunction is detected is displayed.</li> </ul>
L-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> <li>• "Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>• The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> <li>• "Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>• The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> <li>• The engine speed at the moment a malfunction is detected is displayed.</li> </ul>
VEHICL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> <li>• The vehicle speed at the moment a malfunction is detected is displayed.</li> </ul>
ABSOL TH-P/S [%]	<ul style="list-style-type: none"> <li>• The throttle valve opening at the moment a malfunction is detected is displayed.</li> </ul>

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Freeze frame data item*	Description
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> <li>The base fuel schedule at the moment a malfunction is detected is displayed.</li> </ul>
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> <li>The intake air temperature at the moment a malfunction is detected is displayed.</li> </ul>

\*: The item is the same as that of 1st trip freeze frame data.

## DATA MONITOR MODE

### Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	<ul style="list-style-type: none"> <li>Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).</li> </ul>	<ul style="list-style-type: none"> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be indicated.</li> </ul>
MAS A/F SE-B1 [V]	×	×	<ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>
B/FUEL SCHDL [msec]		×	<ul style="list-style-type: none"> <li>Base fuel schedule indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul>	
A/F ALPHA-B1 [%]		×	<ul style="list-style-type: none"> <li>The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>
A/F ALPHA-B2 [%]		×		
COOLAN TEMP/S [°C] or [°F]	×	×	<ul style="list-style-type: none"> <li>The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.</li> </ul>
A/F SEN1 (B1) [V]	×	×	<ul style="list-style-type: none"> <li>The A/F signal computed from the input signal of the A/F sensor 1 is displayed.</li> </ul>	
A/F SEN1 (B2) [V]	×			
HO2S2 (B1) [V]	×		<ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 2 is displayed.</li> </ul>	
HO2S2 (B2) [V]	×			
HO2S2 MNTR (B1) [RICH/LEAN]	×		<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	<ul style="list-style-type: none"> <li>The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.</li> </ul>	
BATTERY VOLT [V]	×	×	<ul style="list-style-type: none"> <li>The power supply voltage of ECM is displayed.</li> </ul>	
ACCEL SEN 1 [V]	×	×	<ul style="list-style-type: none"> <li>The accelerator pedal position sensor signal voltage is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.</li> </ul>
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	<ul style="list-style-type: none"> <li>The throttle position sensor signal voltage is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.</li> </ul>
THRTL SEN 2 [V]	×			

## TROUBLE DIAGNOSIS

### < SERVICE INFORMATION >

Monitored item [Unit]	ECM IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
FUEL T/TMP SE [°C] or [°F]	×		<ul style="list-style-type: none"> <li>The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.</li> </ul>	
INT/A TEMP SE [°C] or [°F]	×	×	<ul style="list-style-type: none"> <li>The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.</li> </ul>	
EVAP SYS PRES [V]	×		<ul style="list-style-type: none"> <li>The signal voltage of EVAP control system pressure sensor is displayed.</li> </ul>	
FUEL LEVEL SE [V]	×		<ul style="list-style-type: none"> <li>The signal voltage of the fuel level sensor is displayed.</li> </ul>	
START SIGNAL [ON/OFF]	×	×	<ul style="list-style-type: none"> <li>Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.</li> </ul>	<ul style="list-style-type: none"> <li>After starting the engine, [OFF] is displayed regardless of the starter signal.</li> </ul>
CLSD THL POS [ON/OFF]	×	×	<ul style="list-style-type: none"> <li>Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.</li> </ul>	
AIR COND SIG [ON/OFF]	×	×	<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.</li> </ul>	
P/N POSI SW [ON/OFF]	×	×	<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.</li> </ul>	
PW/ST SIGNAL [ON/OFF]	×	×	<ul style="list-style-type: none"> <li>[ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.</li> </ul>	
LOAD SIGNAL [ON/ OFF]	×	×	<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the electrical load signal.</li> <li>ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position.</li> <li>OFF: Both rear window defogger switch and lighting switch are OFF.</li> </ul>	
IGNITION SW [ON/OFF]	×		<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from ignition switch signal.</li> </ul>	
HEATER FAN SW [ON/OFF]	×		<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from heater fan switch signal.</li> </ul>	
BRAKE SW [ON/OFF]	×		<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the stop lamp switch signal.</li> </ul>	
INJ PULSE-B1 [msec]		×	<ul style="list-style-type: none"> <li>Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine is stopped, a certain computed value is indicated.</li> </ul>
INJ PULSE-B2 [msec]				
IGN TIMING [BT- DC]		×	<ul style="list-style-type: none"> <li>Indicates the ignition timing computed by ECM according to the input signals.</li> </ul>	<ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>
CAL/LD VALUE [%]			<ul style="list-style-type: none"> <li>"Calculated load value" indicates the value of the current air flow divided by peak air flow.</li> </ul>	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> <li>Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.</li> </ul>	

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Monitored item [Unit]	ECM IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks	
PURG VOL C/V [%]			<ul style="list-style-type: none"> <li>Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>		A EC
INT/V TIM (B1) [°CA]			<ul style="list-style-type: none"> <li>Indicates [°CA] of intake camshaft advanced angle.</li> </ul>		C
INT/V TIM (B2) [°CA]				D	
INT/V SOL (B1) [%]			<ul style="list-style-type: none"> <li>The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated.</li> <li>The advance angle becomes larger as the value increases.</li> </ul>		E
INT/V SOL (B2) [%]				F	
AIR COND RLY [ON/OFF]		×	<ul style="list-style-type: none"> <li>The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.</li> </ul>		G
FUEL PUMP RLY [ON/OFF]		×	<ul style="list-style-type: none"> <li>Indicates the fuel pump relay control condition determined by ECM according to the input signals.</li> </ul>		H
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> <li>The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated.</li> </ul> ON: Closed OFF: Open		I
THRTL RELAY [ON/ OFF]		×	<ul style="list-style-type: none"> <li>Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.</li> </ul>		J
COOLING FAN [HI/OFF]		×	<ul style="list-style-type: none"> <li>The control condition of the cooling fan (determined by ECM according to the input signals) is indicated.</li> </ul> HI: High speed operation OFF: Stop		K
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.</li> </ul>		L
HO2S2 HTR (B2) [ON/OFF]				M	
I/P PULLY SPD [rpm]			<ul style="list-style-type: none"> <li>Indicates the engine speed computed from the turbine revolution sensor signal.</li> </ul>		N
VEHICLE SPEED [km/h] or [mph]			<ul style="list-style-type: none"> <li>Indicates the vehicle speed computed from the revolution sensor signal.</li> </ul>		O
IDL A/V LEARN [YET/CMPLT]			<ul style="list-style-type: none"> <li>Display the condition of idle air volume learning</li> </ul> YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.		P
TRVL AFTER MIL [km] or [mile]			<ul style="list-style-type: none"> <li>Distance traveled while MIL is activated.</li> </ul>		

## TROUBLE DIAGNOSIS

### < SERVICE INFORMATION >

Monitored item [Unit]	ECM IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
A/F S1 HTR (B1) [%]			<ul style="list-style-type: none"> <li>A/F sensor 1 heater control value computed by ECM according to the input signals.</li> <li>The current flow to the heater becomes larger as the value increases.</li> </ul>	
A/F S1 HTR (B2) [%]				
AC PRESS SEN [V]			<ul style="list-style-type: none"> <li>The signal voltage from the refrigerant pressure sensor is displayed.</li> </ul>	
VHCL SPEED SE [km/h] or [mph]			<ul style="list-style-type: none"> <li>The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.</li> </ul>	
SET VHCL SPD [km/h] or [mph]			<ul style="list-style-type: none"> <li>The preset vehicle speed is displayed.</li> </ul>	
MAIN SW [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from MAIN switch signal.</li> </ul>	
CANCEL SW [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from CANCEL switch signal.</li> </ul>	
RESUME/ACC SW [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.</li> </ul>	
SET SW [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from SET/COAST switch signal.</li> </ul>	
BRAKE SW1 [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from ASCD brake switch signal.</li> </ul>	
BRAKE SW2 [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of stop lamp switch signal.</li> </ul>	
DIST SW [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from DISTANCE switch signal.</li> </ul>	
VHCL SPD CUT [NON/CUT]			<ul style="list-style-type: none"> <li>Indicates the vehicle cruise condition.</li> <li>NON: Vehicle speed is maintained at the ASCD set speed.</li> <li>CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.</li> </ul>	
LO SPEED CUT [NON/CUT]			<ul style="list-style-type: none"> <li>Indicates the vehicle cruise condition.</li> <li>NON: Vehicle speed is maintained at the ASCD set speed.</li> <li>CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.</li> </ul>	
AT OD MONITOR [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.</li> </ul>	
AT OD CANCEL [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.</li> </ul>	
CRUISE LAMP [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.</li> </ul>	
SET LAMP [ON/OFF]			<ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.</li> </ul>	
ALT DUTY [%]			<ul style="list-style-type: none"> <li>Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.</li> </ul>	
BAT CUR SEN [mV]			<ul style="list-style-type: none"> <li>The signal voltage of battery current sensor is displayed.</li> </ul>	

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Monitored item [Unit]	ECM IN- PUT SIG- NALS	MAIN SIGNALS	Description	Remarks
ALT DUTY SIG [ON/OFF]			<ul style="list-style-type: none"> <li>The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated.</li> <li>ON: Power generation voltage variable control is active.</li> <li>OFF: Power generation voltage variable control is inactive.</li> </ul>	
A/F ADJ-B1			<ul style="list-style-type: none"> <li>Indicates the correction 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 air fuel ratio (A/F) sensor 1 signal.</li> </ul>	
A/F ADJ-B2				
Voltage [V]			<ul style="list-style-type: none"> <li>Voltage, frequency, duty cycle or pulse width measured by the probe.</li> </ul>	<ul style="list-style-type: none"> <li>Only # is displayed if item is unable to be measured.</li> <li>Figures with #s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.</li> </ul>
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

**NOTE:**

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

## DATA MONITOR (SPEC) MODE

### Monitored Item

Monitored item [Unit]	ECM IN- PUT SIG- NALS	MAIN SIG- NALS	Description	Remarks
ENG SPEED [rpm]	×	×	<ul style="list-style-type: none"> <li>Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).</li> </ul>	
MAS A/F SE-B1 [V]	×	×	<ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor specification is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> </ul>
B/FUEL SCHDL [msec]		×	<ul style="list-style-type: none"> <li>Base fuel schedule indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul>	<ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> </ul>
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	<ul style="list-style-type: none"> <li>The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.</li> </ul>	<ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>

**NOTE:**

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

## ACTIVE TEST MODE

### Test Item

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Fuel injector</li> <li>Air fuel ratio (A/F) sensor 1</li> </ul>
IGNITION TIMING	<ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> <li>Perform Idle Air Volume Learning.</li> </ul>
POWER BALANCE	<ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine.</li> <li>A/C switch: OFF</li> <li>Selector lever: P or N</li> <li>Cut off each injector signal one at a time using CONSULT-II.</li> </ul>	Engine runs rough or dies.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Compression</li> <li>Fuel injector</li> <li>Power transistor</li> <li>Spark plug</li> <li>Ignition coil</li> </ul>
COOLING FAN*	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> <li>Turn the cooling fan HI and OFF using CONSULT-II.</li> </ul>	Cooling fan moves and stops.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Cooling fan motor</li> <li>IPDM E/R</li> </ul>
ENG COOLANT TEMP	<ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant temperature using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Engine coolant temperature sensor</li> <li>Fuel injector</li> </ul>
FUEL PUMP RELAY	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.</li> </ul>	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Fuel pump relay</li> </ul>
PURG VOL CONT/V	<ul style="list-style-type: none"> <li>Engine: After warming up, run engine at 1,500 rpm.</li> <li>Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.</li> </ul>	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Solenoid valve</li> </ul>
FUEL/T TEMP SEN	<ul style="list-style-type: none"> <li>Change the fuel tank temperature using CONSULT-II.</li> </ul>		
VENT CONTROL/V	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn solenoid valve ON and OFF with the CONSULT-II and listen to operating sound.</li> </ul>	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Solenoid valve</li> </ul>
V/T ASSIGN ANGLE	<ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change intake valve timing using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>Intake valve timing control solenoid valve</li> </ul>
ALTERNATOR DUTY	<ul style="list-style-type: none"> <li>Engine: Idle</li> <li>Change duty ratio using CONSULT-II.</li> </ul>	Battery voltage changes.	<ul style="list-style-type: none"> <li>Harness and connectors</li> <li>IPDM E/R</li> <li>Alternator</li> </ul>

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

## DTC & SRT CONFIRMATION MODE

### SRT STATUS Mode

For details, refer to [EC-49, "Emission-related Diagnostic Information"](#).

### SRT WORK SUPPORT Mode

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

### DTC WORK SUPPORT Mode



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	PURG FLOW P0441	P0441	<a href="#">EC-354</a>
	EVP SML LEAK P0442/P1442*	P0442	<a href="#">EC-359</a>
		P0455	<a href="#">EC-408</a>
	EVP V/S LEAK P0456/P1456*	P0456	<a href="#">EC-415</a>
	PURG VOL CN/V P1444	P0443	<a href="#">EC-366</a>
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<a href="#">EC-225</a>
	A/F SEN1 (B1) P1278/P1279	P0133	<a href="#">EC-250</a>
	A/F SEN1 (B2) P1286	P0150	<a href="#">EC-225</a>
	A/F SEN1 (B2) P1288/P1289	P0153	<a href="#">EC-250</a>
HO2S2	HO2S2 (B1) P0139	P0139	<a href="#">EC-282</a>
	HO2S2 (B1) P1146	P0138	<a href="#">EC-270</a>
	HO2S2 (B1) P1147	P0137	<a href="#">EC-260</a>
	HO2S2 (B2) P0159	P0159	<a href="#">EC-282</a>
	HO2S2 (B2) P1166	P0158	<a href="#">EC-270</a>
	HO2S2 (B2) P1167	P0157	<a href="#">EC-260</a>

\*: DTC P1442 and P1456 does not apply to JA60 models but appears in DTC Work Support Mode screens.

## REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

### Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

#### 1. “AUTO TRIG” (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.

In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.

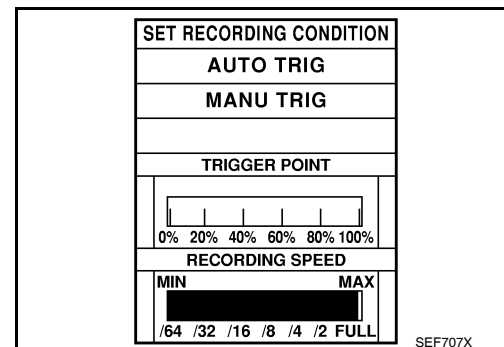
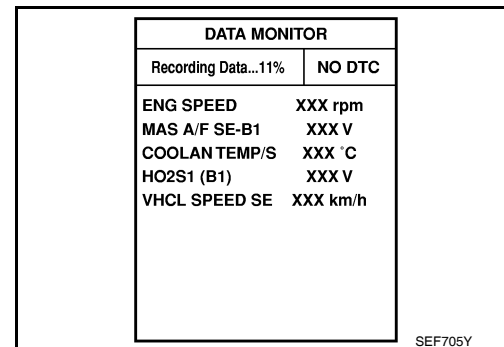
At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.

The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II Operation Manual.

#### 2. “MANU TRIG” (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.

DATA MONITOR can be performed continuously even though a malfunction is detected.



### Operation

#### 1. “AUTO TRIG”

- While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.

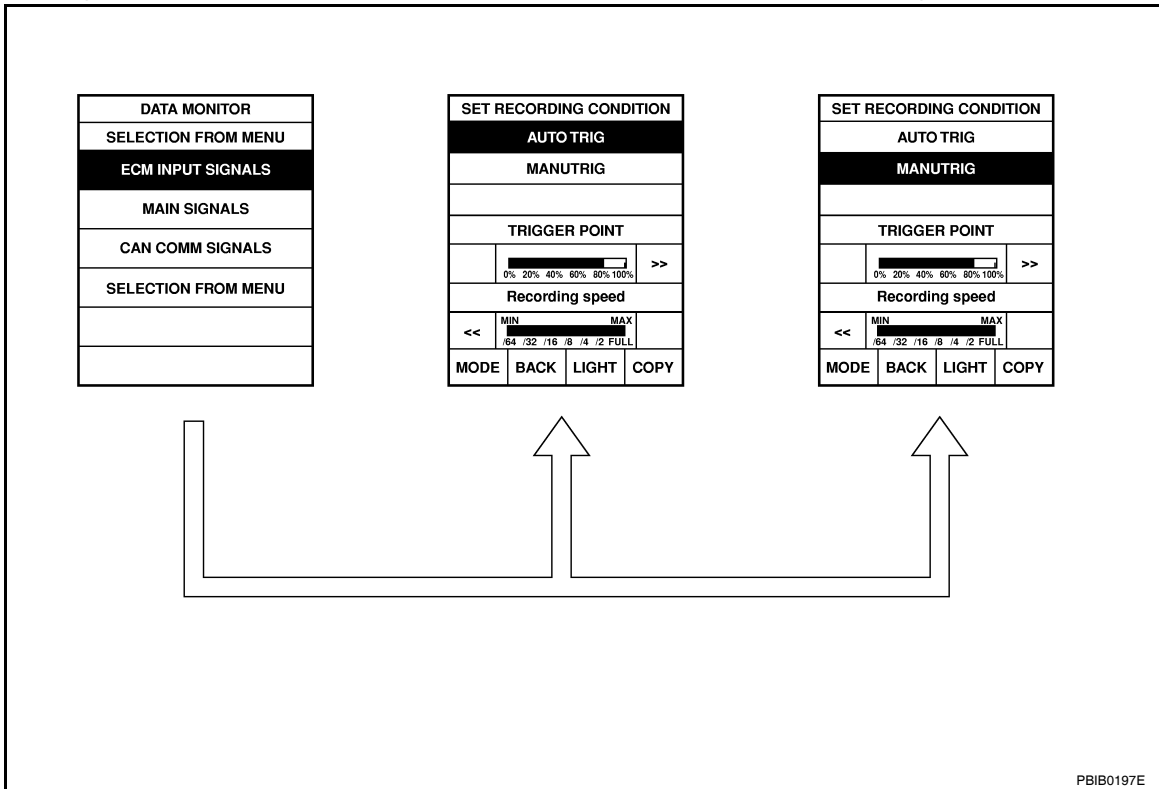
# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "INCIDENT SIMULATION TESTS" in [GI-25. "How to Perform Efficient Diagnosis for an Electrical Incident".](#))

### 2. "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



## Generic Scan Tool (GST) Function

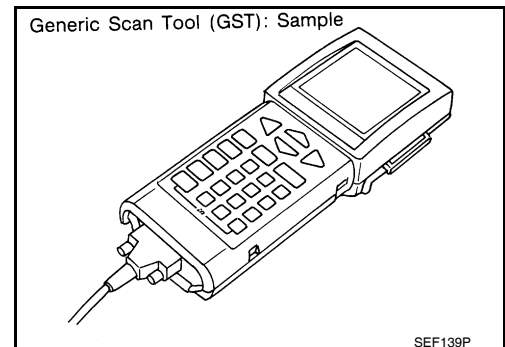
INFOID:000000003531627

### DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.

ISO9141 is used as the protocol.

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



### FUNCTION

Diagnostic test mode		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to <a href="#">EC-49. "Emission-related Diagnostic Information"</a> .
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

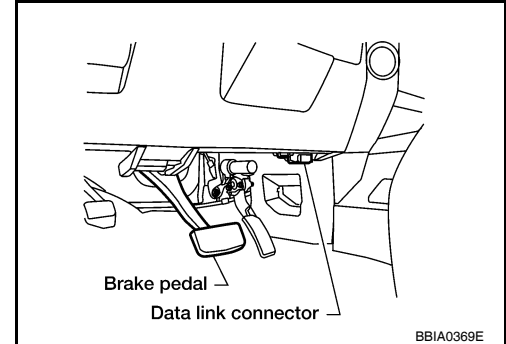
# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

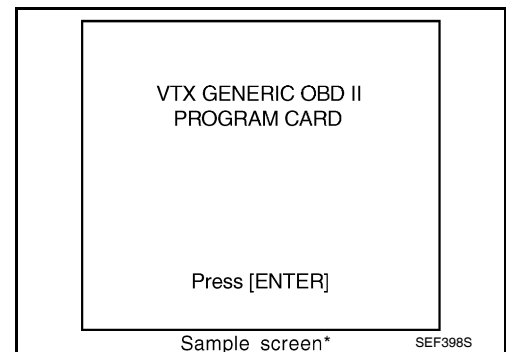
Diagnostic test mode		Function
Service \$04	CLEAR DIAG INFO	<p>This diagnostic service can clear all emission-related diagnostic information. This includes:</p> <ul style="list-style-type: none"> <li>• Clear number of diagnostic trouble codes (Service \$01)</li> <li>• Clear diagnostic trouble codes (Service \$03)</li> <li>• Clear trouble code for freeze frame data (Service \$01)</li> <li>• Clear freeze frame data (Service \$02)</li> <li>• Reset status of system monitoring test (Service \$01)</li> <li>• Clear on board monitoring test results (Service \$06 and \$07)</li> </ul>
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	—	<p>This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, the EVAP canister vent control valve can be closed.</p> <p>In the following conditions, this diagnostic service cannot function.</p> <ul style="list-style-type: none"> <li>• Low ambient temperature</li> <li>• Low battery voltage</li> <li>• Engine running</li> <li>• Ignition switch OFF</li> <li>• Low fuel temperature</li> <li>• Too much pressure is applied to EVAP system</li> </ul>
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

## INSPECTION PROCEDURE

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



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



# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

5. Perform each diagnostic service according to each service procedure.  
**For further information, see the GST Operation Manual of the tool maker.**

<div style="border: 1px solid black; padding: 10px; margin: 0 auto; width: 80%;"> <p style="text-align: center; margin: 0;">OBD II FUNCTIONS</p> <p style="margin: 0;">F0: DATA LIST</p> <p style="margin: 0;">F1: FREEZE DATA</p> <p style="margin: 0;">F2: DTCs</p> <p style="margin: 0;">F3: SNAPSHOT</p> <p style="margin: 0;">F4: CLEAR DIAG INFO</p> <p style="margin: 0;">F5: O2 TEST RESULTS</p> <p style="margin: 0;"><b>F6: READINESS TESTS</b></p> <p style="margin: 0;">F7: ON BOARD TESTS</p> <p style="margin: 0;">F8: EXPAND DIAG PROT</p> <p style="margin: 0;">F9: UNIT CONVERSION</p> </div>
<p style="margin: 0;">Sample screen* <span style="float: right;">SEF416S</span></p>

## CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531628

Remarks:

I Specification data are reference values.

I Specification data are output/input values which are detected or supplied by the ECM at the connector.

\* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> <li>Run engine and compare CONSULT-II value with the tachometer indication.</li> </ul>	Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See <a href="#">EC-129</a> .	
B/FUEL SCHDL	See <a href="#">EC-129</a> .	
A/F ALPHA-B1 A/F ALPHA-B2	See <a href="#">EC-129</a> .	
COOLAN TEMP/S	<ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul>	More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	<ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul>	Fluctuates around 2.2 V
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> <li>Revvng engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul style="list-style-type: none"> <li>Revvng engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> <li>Turn drive wheels and compare CONSULT-II value with the speedometer indication.</li> </ul>	Almost the same speed as the speedometer indication
BATTERY VOLT	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>	11 - 14V
ACCEL SEN 1	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
ACCEL SEN 2*1	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
THRTL SEN 1 THRTL SEN 2*2	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Selector lever: D</li> </ul>	Accelerator pedal: Fully released
		Accelerator pedal: Fully depressed
EVAP SYS PRES	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	Approx. 1.8 - 4.8V
START SIGNAL	<ul style="list-style-type: none"> <li>Ignition switch: ON → START → ON</li> </ul>	OFF → ON → OFF
CLSD THL POS	<ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>	Accelerator pedal: Fully released
		Accelerator pedal: Slightly depressed

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

MONITOR ITEM	CONDITION	SPECIFICATION		
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF	A
		Air conditioner switch: ON (Compressor operates.)	ON	EC
P/N POSI SW	• Ignition switch: ON	Selector lever: P or N	ON	
		Selector lever: Except above	OFF	
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned (Forward direction)	OFF	C
		Steering wheel: Being turned	ON	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON	D
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF	E
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON	
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan control switch: ON	ON	F
		Heater fan control switch: OFF	OFF	
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF	
		Brake pedal: Slightly depressed	ON	G
INJ PULSE-B1 INJ PULSE-B2	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	2.0 - 2.8 msec	
		2,000 rpm	1.9 - 2.9 msec	H
IGN TIMING	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC	
		2,000 rpm	25° - 45° BTDC	I
CAL/LD VALUE	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	14% - 33%	
		2,500 rpm	12% - 25%	J
MASS AIRFLOW	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	3.0 - 9.0 g·m/s	K
		2,500 rpm	9.0 - 28.0 g·m/s	
PURG VOL C/V	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%	L
		2,000 rpm	—	M
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	-5° - 5°C	
		2,000 rpm	Approx. 0° - 20°C	N
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle	0% - 2%	
		2,000 rpm	Approx. 25% - 50%	O
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF	
		Air conditioner switch: ON (Compressor: Operates)	ON	P
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking		ON	
	• Except above conditions		OFF	
VENT CONT/V	• Ignition switch: ON		OFF	
THRTL RELAY	• Ignition switch: ON		ON	

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> <li>Air conditioner switch: OFF</li> </ul>	Engine coolant temperature: 99°C (210°F) or less	OFF
		Engine coolant temperature: 100°C (212°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> <li>Engine speed: Below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>		ON
	<ul style="list-style-type: none"> <li>Engine speed: Above 3,600 rpm</li> </ul>		OFF
I/P PULLY SPD	<ul style="list-style-type: none"> <li>Vehicle speed: More than 20 km/h (12 MPH)</li> </ul>		Almost the same speed as the tachometer indication
VEHICLE SPEED	<ul style="list-style-type: none"> <li>Turn drive wheels and compare CONSULT-II value with the speedometer indication.</li> </ul>		Almost the same speed as the speedometer indication
TRVL AFTER MIL	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1) A/F S1 HTR (B2)	<ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> </ul>		4 - 100%
AC PRESS SEN	<ul style="list-style-type: none"> <li>Engine: Idle</li> <li>Both A/C switch and blower fan switch: ON (Compressor operates.)</li> </ul>		1.0 - 4.0V
VHCL SPEED SE	<ul style="list-style-type: none"> <li>Turn drive wheels and compare CONSULT-II value with the speedometer indication.</li> </ul>		Almost the same speed as the speedometer indication
SET VHCL SPD	<ul style="list-style-type: none"> <li>Engine: Running</li> </ul>	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
DIST SW	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	DISTANCE switch: Pressed	ON
		DISTANCE switch: Released	OFF
BRAKE SW1	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	<ul style="list-style-type: none"> <li>Ignition switch: ON</li> </ul>	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	<ul style="list-style-type: none"> <li>MAIN switch: ON</li> <li>Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)</li> </ul>	ASCD: Operating	ON
		ASCD: Not operating	OFF
ALT DUTY	<ul style="list-style-type: none"> <li>Engine: Idle</li> </ul>		0 - 80%
BAT CUR SEN	<ul style="list-style-type: none"> <li>Engine speed: Idle</li> <li>Battery: Fully charged*2</li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>		Approx. 2,600 - 3,500mV

# TROUBLE DIAGNOSIS

## < SERVICE INFORMATION >

MONITOR ITEM	CONDITION	SPECIFICATION
ALT DUTY SIG	• Power generation voltage variable control: Operating	ON
	• Power generation voltage variable control: Not operating	OFF

\*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

\*2: Before measuring the terminal voltage, confirm the battery is fully charged. Refer to [SC-4](#).

## Major Sensor Reference Graph in Data Monitor Mode

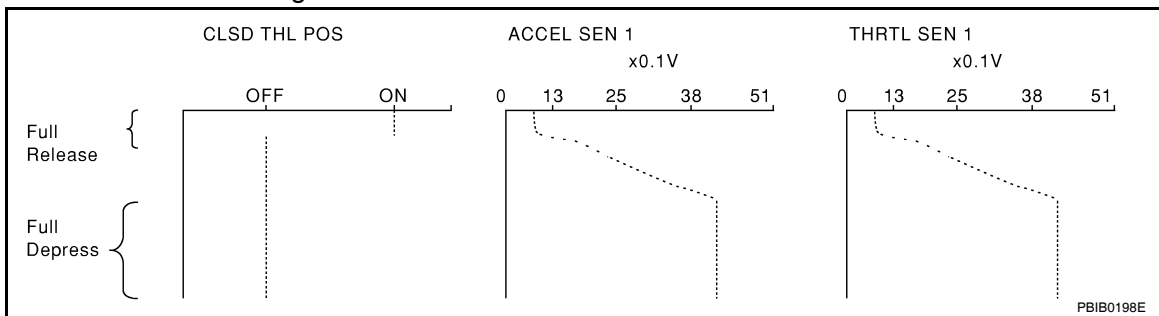
INFOID:000000003531629

The following are the major sensor reference graphs in “DATA MONITOR” mode.

### CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position.

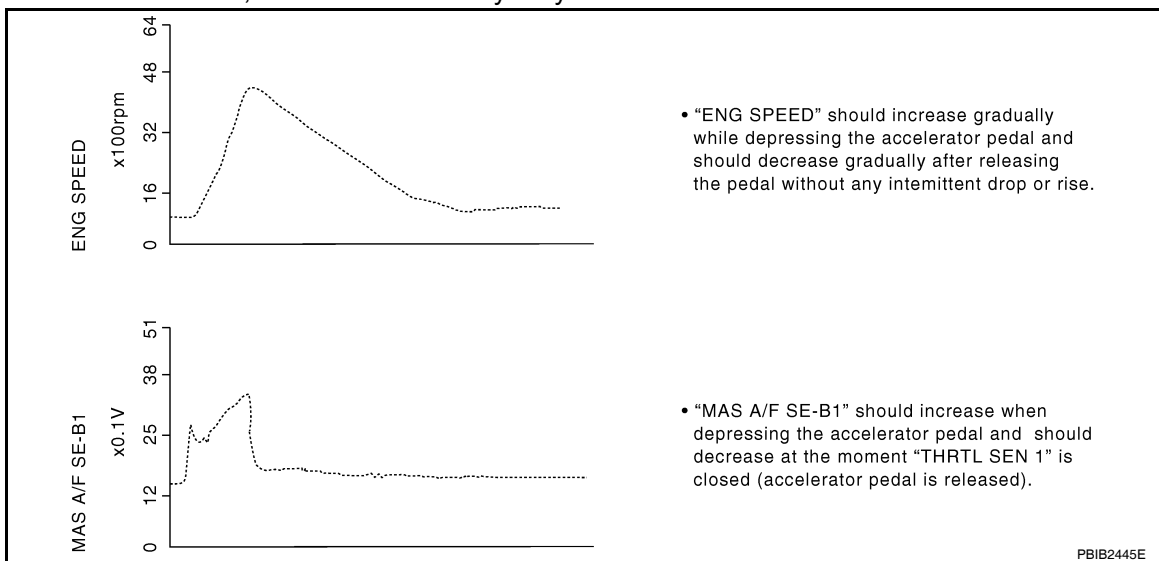
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.



### ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

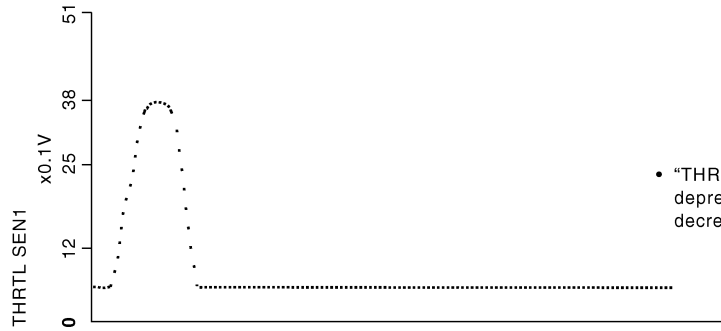
Each value is for reference, the exact value may vary.



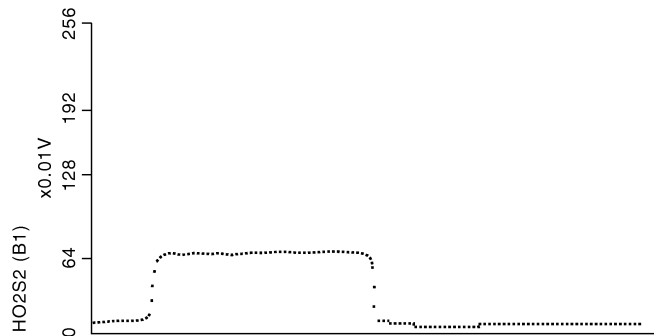
# TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

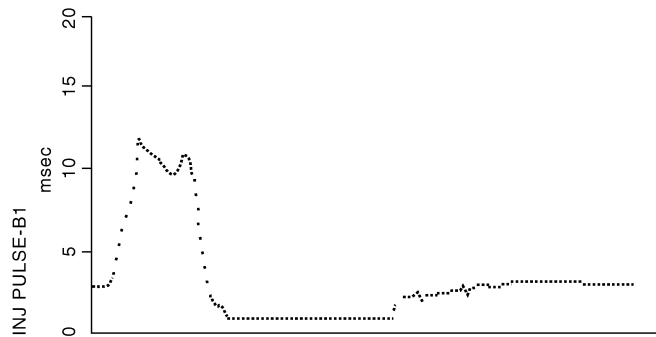
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- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB2099E



# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

### Description

INFOID:000000003531630

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

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

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

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

### Testing Condition

INFOID:000000003531631

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm<sup>2</sup> , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle until “ATF TEMP SE 1” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

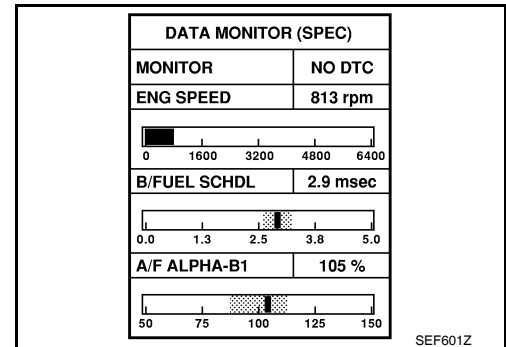
### Inspection Procedure

INFOID:000000003531632

#### NOTE:

Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform [EC-71. "Basic Inspection"](#) .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-130. "Diagnosis Procedure"](#) .



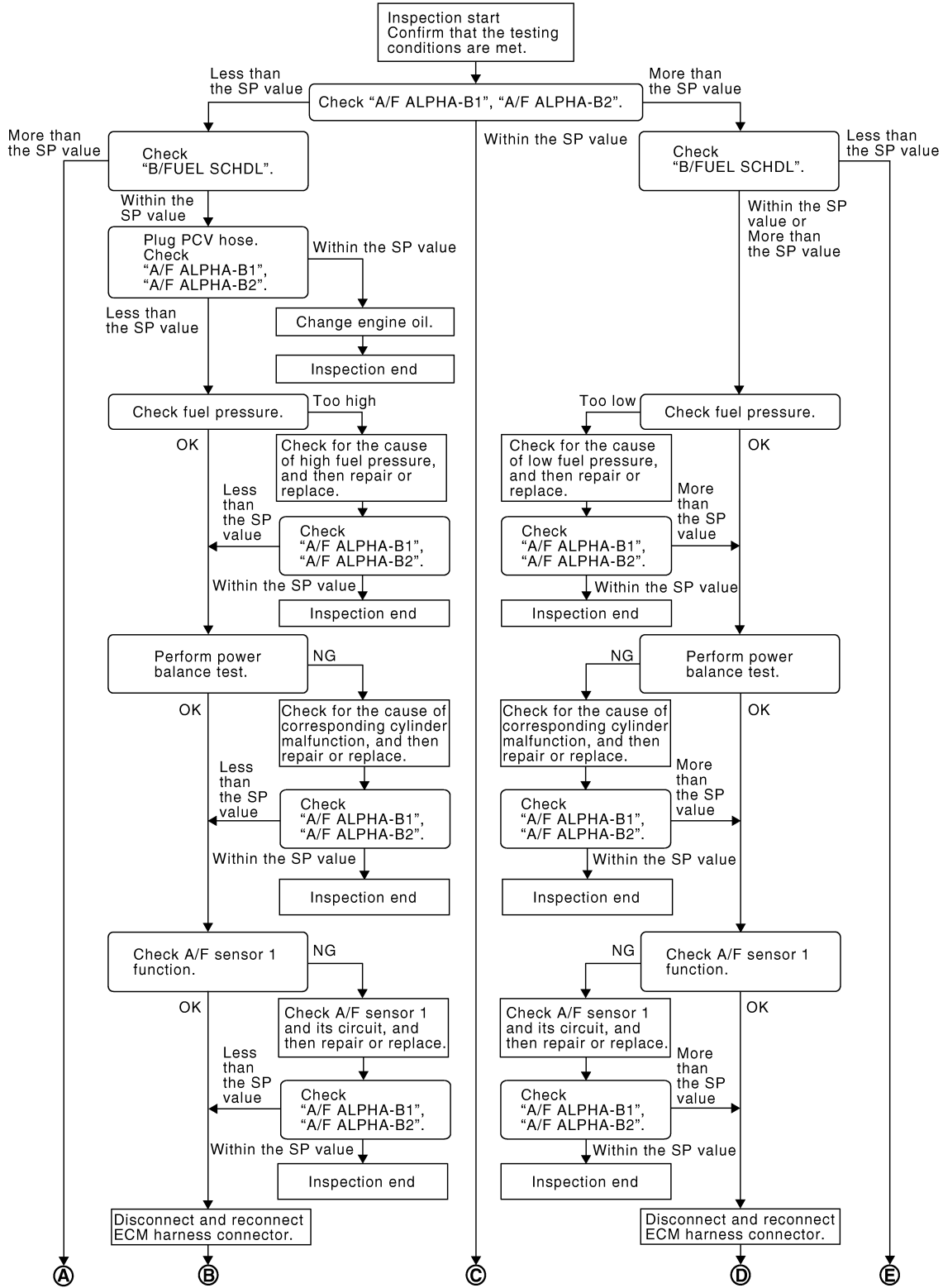
# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

## Diagnosis Procedure

INFOID:000000003531633

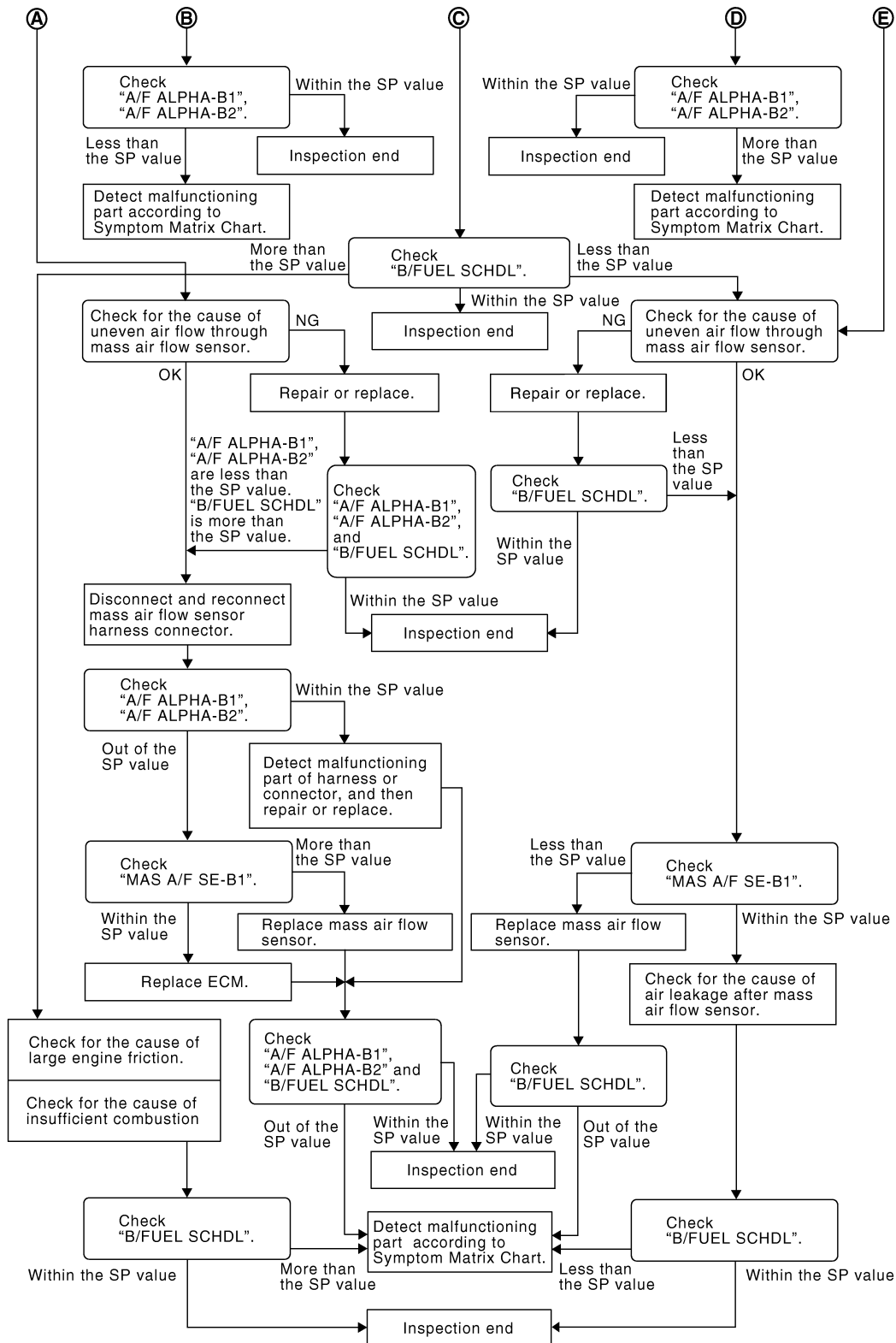
### OVERALL SEQUENCE



FBI2268E

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >



FBI83214E

## DETAILED PROCEDURE

### 1. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to [EC-129, "Testing Condition"](#).

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

## < SERVICE INFORMATION >

3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

**NOTE:**

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

- OK >> GO TO 17.
- NG (Less than the SP value)>>GO TO 2.
- NG (More than the SP value)>>GO TO 3.

### 2.CHECK "B/FUEL SCHDL"

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

OK or NG

- OK >> GO TO 4.
- NG (More than the SP value)>>GO TO 19.

### 3.CHECK "B/FUEL SCHDL"

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

OK or NG

- OK >> GO TO 6.
- NG (More than the SP value)>>GO TO 6.
- NG (Less than the SP value)>>GO TO 25.

### 4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 6.

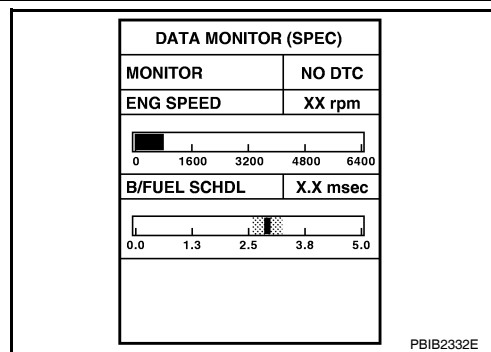
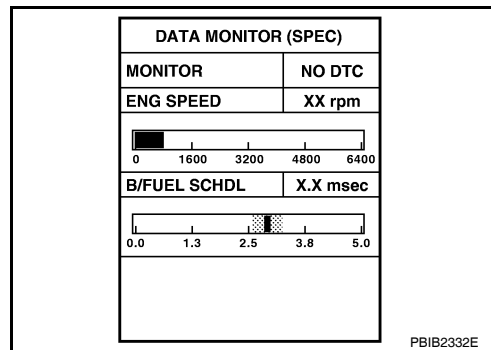
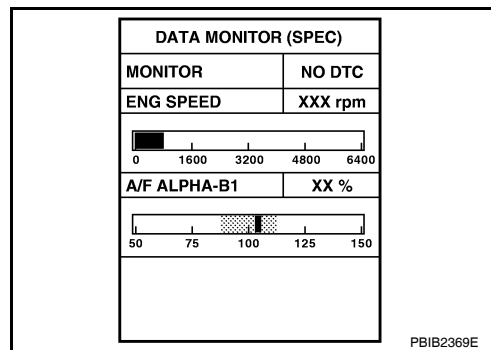
### 5.CHANGE ENGINE OIL

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



# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

## 6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-80, "Fuel Pressure Check"](#) .)

OK or NG

OK >> GO TO 9.

NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to [EC-80, "Fuel Pressure Check"](#) .  
GO TO 8.

NG (Fuel pressure is too low)>>GO TO 7.

## 7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to [EC-613](#) .)

2. If NG, repair or replace the malfunctioning part. (Refer to [EC-80, "Fuel Pressure Check"](#) .)  
If OK, replace fuel pressure regulator.

>> GO TO 8.

## 8. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.

2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 9.

## 9. 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.

OK or NG

OK >> GO TO 12.

NG >> GO TO 10.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

## 10. DETECT MALFUNCTIONING PART

1. Check the following.

- Ignition coil and its circuit (Refer to [EC-626](#) .)
- Fuel injector and its circuit (Refer to [EC-608](#) .)
- Intake air leakage
- Low compression pressure (Refer to [EM-64, "On-Vehicle Service"](#).)

2. If NG, repair or replace the malfunctioning part.

If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

## 11. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.

2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 12.

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

## 12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P0130, P0150, refer to [EC-225, "DTC Confirmation Procedure"](#).
- For DTC P0131, P0151, refer to [EC-234, "DTC Confirmation Procedure"](#).
- For DTC P0132, P0152, refer to [EC-242, "DTC Confirmation Procedure"](#).
- For DTC P0133, P0153, refer to [EC-250, "DTC Confirmation Procedure"](#).
- For DTC P2A00, P2A03, refer to [EC-588, "DTC Confirmation Procedure"](#).

OK or NG

- OK >> GO TO 15.
- NG >> GO TO 13.

## 13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

## 14. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

- OK >> **INSPECTION END**
- NG >> GO TO 15.

## 15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 16.

## 16. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

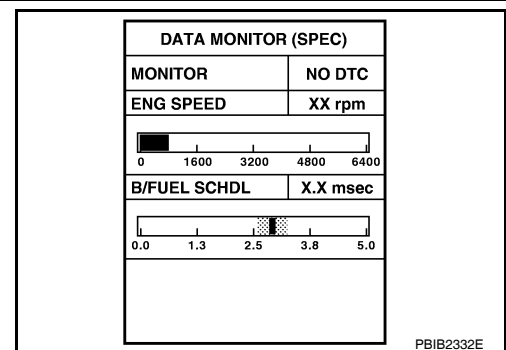
- OK >> **INSPECTION END**
- NG >> Detect malfunctioning part according to [EC-90, "Symptom Matrix Chart"](#).

## 17. CHECK "B/FUEL SCHDL"

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

OK or NG

- OK >> **INSPECTION END**
- NG (More than the SP value) >> GO TO 18.
- NG (Less than the SP value) >> GO TO 25.



## 18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
  - Engine oil level is too high
  - Engine oil viscosity
  - Belt tension of power steering, alternator, A/C compressor, etc. is excessive
  - Noise from engine

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

## < SERVICE INFORMATION >

- Noise from transmission, etc.
- 2. Check for the cause of insufficient combustion. Refer to the following.
  - Valve clearance malfunction
  - Intake valve timing control function malfunction
  - Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

## 19. CHECK INTAKE SYSTEM

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

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

### OK or NG

OK >> GO TO 21.

NG >> Repair or replace malfunctioning part, and then GO TO 20.

## 20. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

### OK or NG

OK >> **INSPECTION END**

NG ("B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value)>>GO TO 21.

## 21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

## 22. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

### OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to [EC-194](#).  
2. GO TO 29.

NG >> GO TO 23.

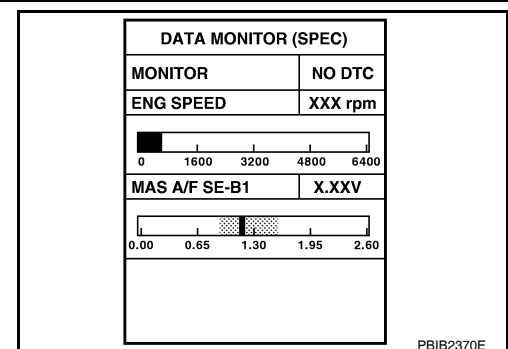
## 23. CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

### OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



## 24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

## < SERVICE INFORMATION >

3. Perform [EC-77, "VIN Registration"](#) .
4. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
5. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
6. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> GO TO 29.

## 25.CHECK INTAKE SYSTEM

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

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

### OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

## 26.CHECK "B/FUEL SCHDL"

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

### OK or NG

OK >> **INSPECTION END**

NG (Less than the SP value)>>GO TO 27.

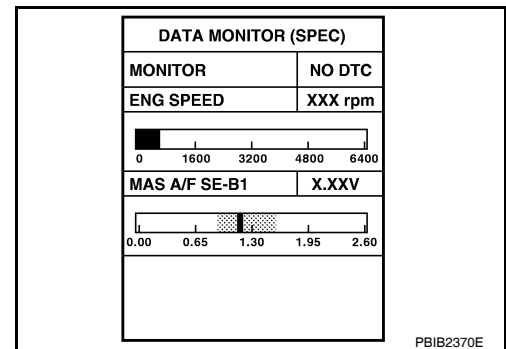
## 27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

### OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



## 28.CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

## 29.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

### OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-90, "Symptom Matrix Chart"](#) .



## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

---

### 30.CHECK "B/FUEL SCHDL"

---

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

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-90, "Symptom Matrix Chart"](#) .

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

## TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

### Description

INFOID:000000003531634

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

#### Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

### Diagnosis Procedure

INFOID:000000003531635

#### 1.INSPECTION START

Erase (1st trip) DTCs. Refer to [EC-49, "Emission-related Diagnostic Information"](#).

>> GO TO 2.

#### 2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-143, "Ground Inspection"](#).

##### OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

#### 3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

##### OK or NG

OK >> GO TO 4.

NG >> Repair or replace.

#### 4.CHECK CONNECTOR TERMINALS

Refer to [GI-22, "How to Check Terminal"](#), "HOW TO PROBE CONNECTORS", "How to Check Enlarged Contact Spring of Terminal".

##### OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace connector.

# POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

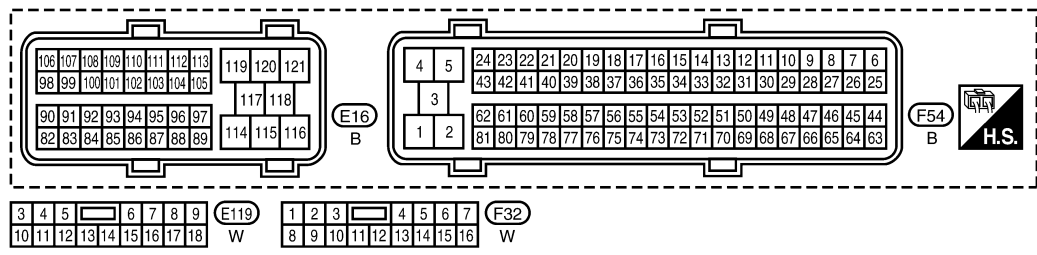
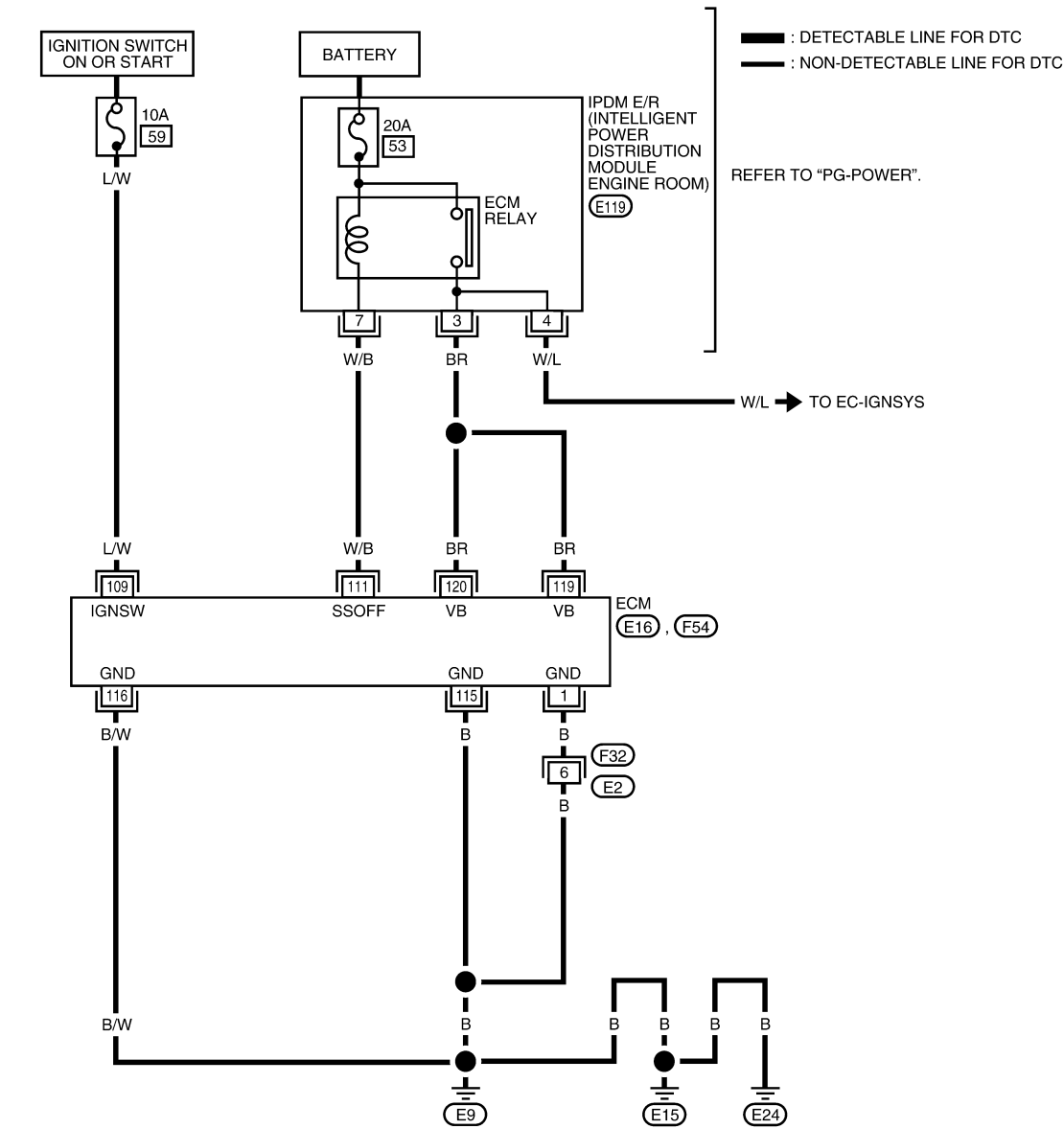
## POWER SUPPLY AND GROUND CIRCUIT

### Wiring Diagram

INFOID:000000003531636

### EC-MAIN-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P



BBWA2088E

Specification data are reference values and are measured between each terminal and ground.  
**CAUTION:**  
 Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# POWER SUPPLY AND GROUND CIRCUIT

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	<b>[Engine is running]</b> • Idle speed	Body ground
109	L/W	Ignition switch	<b>[Ignition switch: OFF]</b>	0V
			<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115 116	B B/W	ECM ground	<b>[Engine is running]</b> • Idle speed	Body ground
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531637

### 1. INSPECTION START

Start engine.

**Is engine running?**

Yes or No

Yes >> GO TO 8.

No >> GO TO 2.

### 2. CHECK ECM POWER SUPPLY CIRCUIT-I

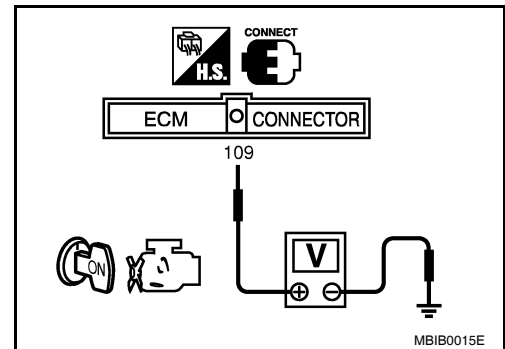
- Turn ignition switch OFF and then ON.
- Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

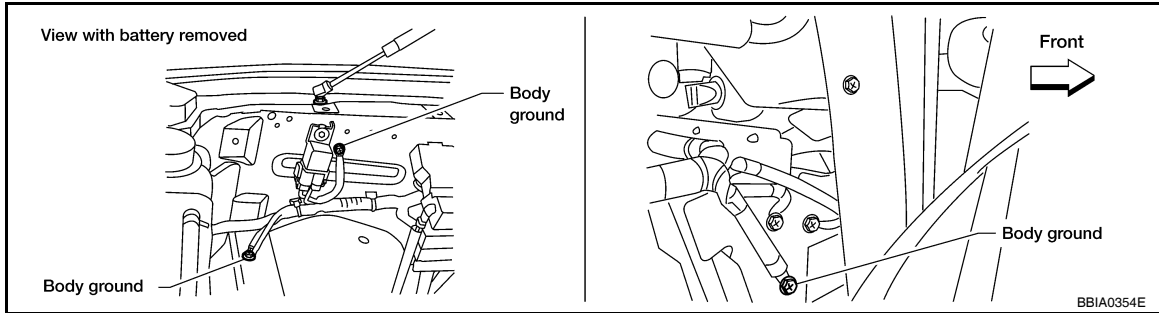
### 4. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.

# POWER SUPPLY AND GROUND CIRCUIT

## < SERVICE INFORMATION >

Refer to [EC-143, "Ground Inspection"](#) .



### OK or NG

- OK >> GO TO 5.
- NG >> Repair or replace ground connections.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between ECM and ground

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

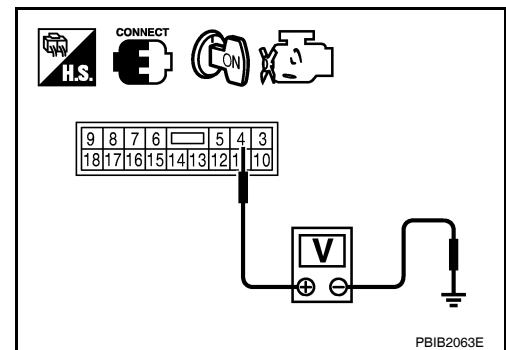
## 7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> Go to [EC-626](#) .
- NG >> GO TO 8.



## 8.CHECK ECM POWER SUPPLY CIRCUIT-III

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

# POWER SUPPLY AND GROUND CIRCUIT

## < SERVICE INFORMATION >

3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

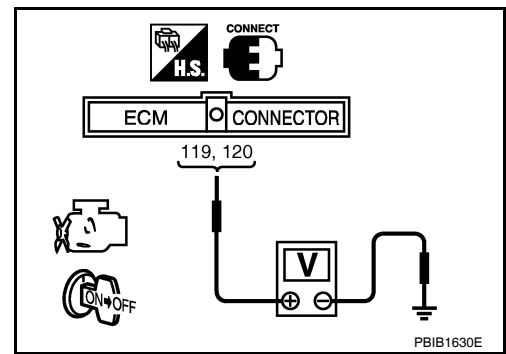
**Voltage:** After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

### OK or NG

OK >> GO TO 13.

NG (Battery voltage does not exist.)>>GO TO 9.

NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.



## 9. CHECK ECM POWER SUPPLY CIRCUIT-IV

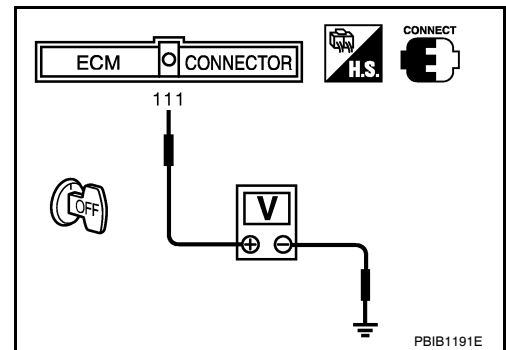
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check voltage between ECM terminal 111 and ground with CONSULT-II or tester.

**Voltage:** Battery voltage

### OK or NG

OK >> GO TO 10.

NG >> GO TO 11.



## 10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E119.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 3. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

OK >> GO TO 13.

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

## 11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E119.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 7. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

OK >> GO TO 12.

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

## 12. CHECK 20A FUSE

1. Disconnect 20A fuse from IPDM E/R.
2. Check 20A fuse.

### OK or NG

OK >> GO TO 16.

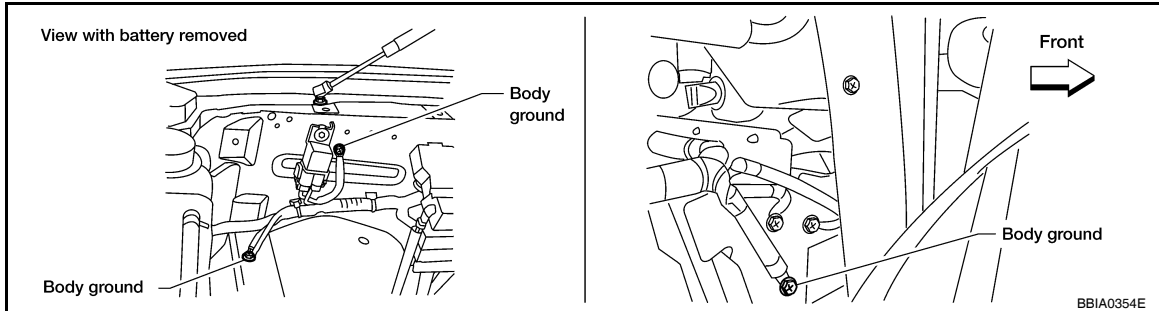
NG >> Replace 20A fuse.

# POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

## 13. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground three screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



OK or NG

- OK >> GO TO 14.  
NG >> Repair or replace ground connections.

## 14. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 16.  
NG >> GO TO 15.

## 15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between ECM and ground

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

## 16. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

OK or NG

- OK >> Replace IPDM E/R.  
NG >> Repair open circuit or short to power in harness or connectors.

## Ground Inspection

INFOID:000000003531638

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

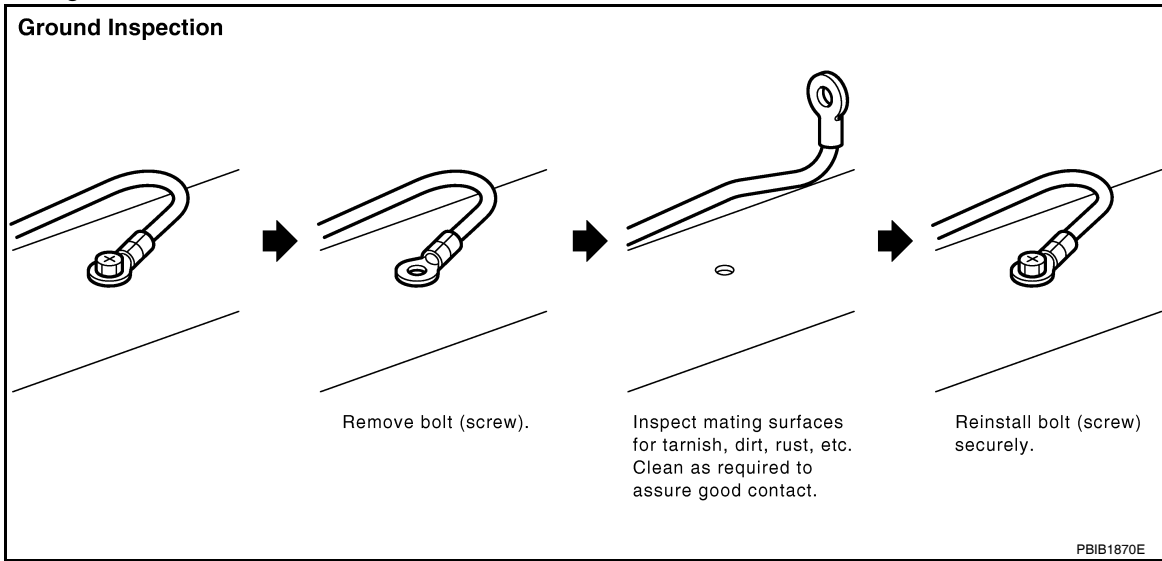
- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.

# POWER SUPPLY AND GROUND CIRCUIT

## < SERVICE INFORMATION >

- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to [PG-29. "Ground Distribution"](#).





# DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

## DTC U1000, U1001 CAN COMMUNICATION LINE

### Description

INFOID:000000003531639

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.

### On Board Diagnosis Logic

INFOID:000000003531640

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)
U1001*2*3 1001*2*3		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	

\*1: This self-diagnosis has the one trip detection logic.

\*2: The MIL will not light up for this self-diagnosis.

\*3: This self-diagnosis has the one or two trip detection logic (Models with ICC)

### DTC Confirmation Procedure

INFOID:000000003531641

1. Turn ignition switch ON and wait at least 3 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If 1st trip DTC is detected, go to [EC-146, "Diagnosis Procedure"](#).

# DTC U1000, U1001 CAN COMMUNICATION LINE

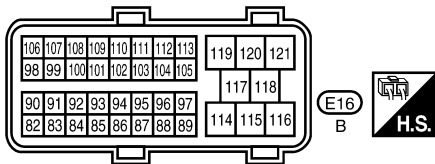
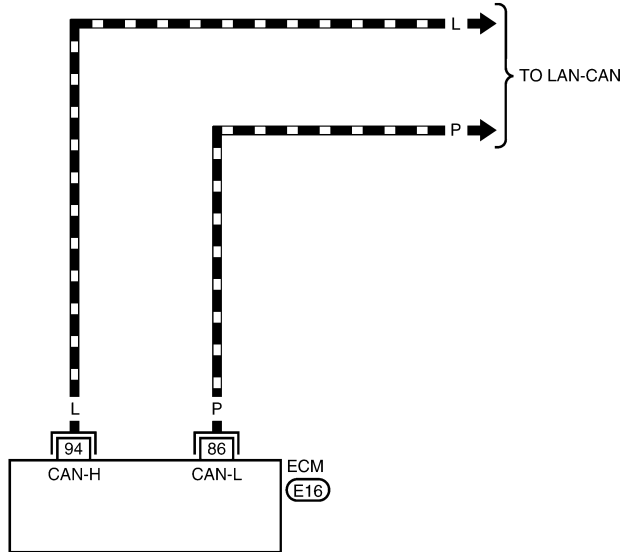
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531642

### EC-CAN-01

▬ : DATA LINE



BBWA1671E

## Diagnosis Procedure

INFOID:000000003531643

Go to [LAN-44, "CAN System Specification Chart"](#).

# DTC U1010 CAN COMMUNICATION

< SERVICE INFORMATION >

## DTC U1010 CAN COMMUNICATION

### Description

INFOID:000000003531644

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.

### On Board Diagnosis Logic

INFOID:000000003531645

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010 1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

### DTC Confirmation Procedure

INFOID:000000003531646

#### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-147, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003531647

#### 1. INSPECTION START

##### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF-DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**  
See [EC-147, "DTC Confirmation Procedure"](#).
5. Is the DTC U1010 displayed again?

##### With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**  
See [EC-147, "DTC Confirmation Procedure"](#).
4. Is the DTC U1010 displayed again?

#### Yes or No

- Yes >> GO TO 2.  
No >> **INSPECTION END**

## DTC U1010 CAN COMMUNICATION

< SERVICE INFORMATION >

---

### 2. REPLACE ECM

---

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to [BL-117. "ECM Re-communicating Function"](#).
3. Perform [EC-77. "VIN Registration"](#) .
4. Perform [EC-77. "Accelerator Pedal Released Position Learning"](#) .
5. Perform [EC-77. "Throttle Valve Closed Position Learning"](#) .
6. Perform [EC-78. "Idle Air Volume Learning"](#) .

>> INSPECTION END

# DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

## DTC P0011, P0021 IVT CONTROL

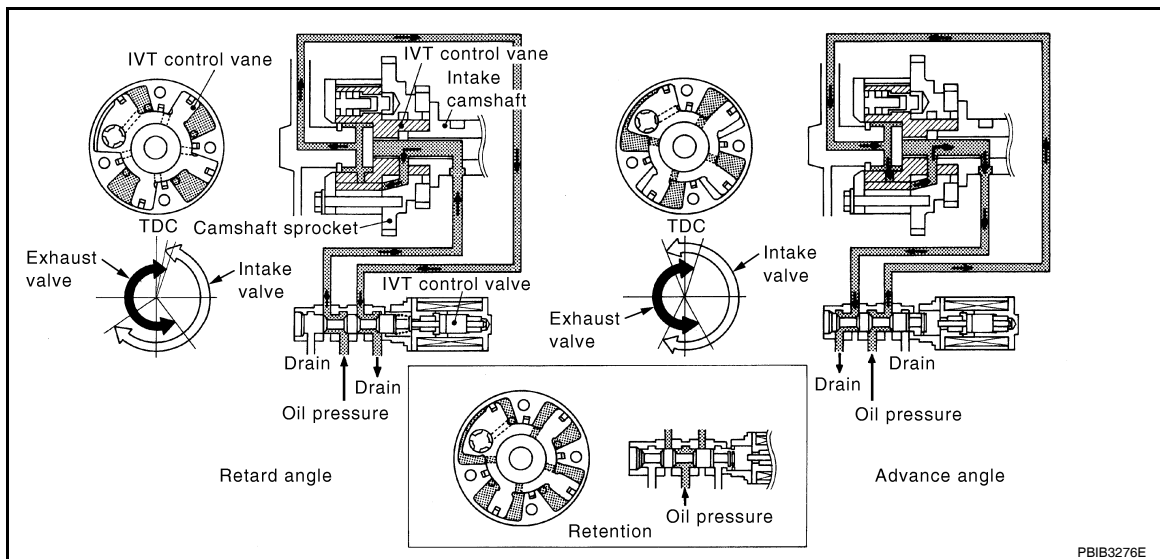
### Description

INFOID:000000003531648

### SYSTEM DESCRIPTION

Sensor	Input signal to ECM function	ECM	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Intake valve timing control position sensor	Intake valve timing signal		
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

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



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

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

### COMPONENT DESCRIPTION

#### Intake Valve Timing Control Solenoid Valve

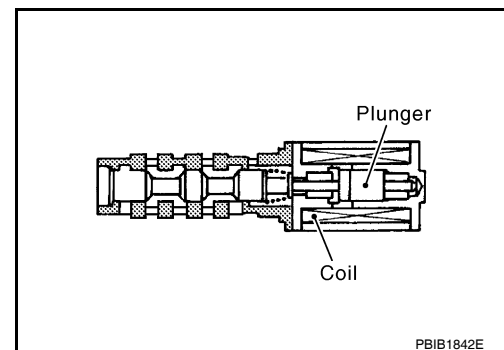
Intake Valve Timing (IVT) control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The IVT 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 Valve Timing Control Position Sensor

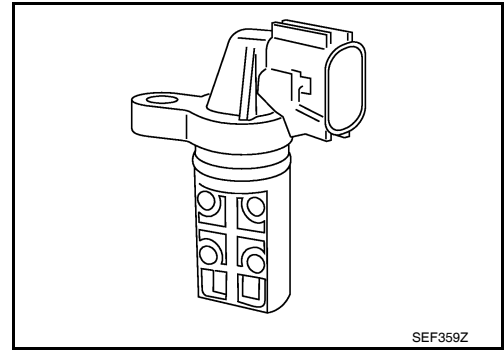
# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

Intake valve timing control position sensors are located in the front of cylinder heads in both bank 1 and bank 2.

This sensor uses a Hall IC.

The cam position is determined by the intake camshaft sprocket concave (in three places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.



## CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531649

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle -5° - 5°C
		2,000 rpm Approx. 0° - 20°C
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle 0% - 2%
		2,000 rpm Approx. 25% - 50%

## On Board Diagnosis Logic

INFOID:000000003531650

DTC No.	Trouble diagnosis name	Detecting condition		Possible cause
P0011 0011 (Bank 1)	Intake valve timing control performance	A	The alignment of the intake valve timing control has been misregistered.	<ul style="list-style-type: none"> <li>• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</li> <li>• Harness or connectors (Intake valve timing control position sensor circuit is open or shorted.)</li> <li>• Intake valve timing control solenoid valve</li> <li>• Intake valve timing control position sensor</li> <li>• Crankshaft position sensor (POS)</li> <li>• Camshaft position sensor (PHASE)</li> <li>• Accumulation of debris to the signal pick-up portion of the camshaft sprocket</li> <li>• Timing chain installation</li> <li>• Foreign matter caught in the oil groove for intake valve timing control</li> </ul>
P0021 0021 (Bank 2)		B	There is a gap between angle of target and phase-control angle degree.	

## FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

## DTC Confirmation Procedure

INFOID:000000003531651

### CAUTION:

Always drive at a safe speed.

### NOTE:

- If DTC P0011 or P0021 is displayed with DTC P0075, P0081, P1140 or P1145, first perform the trouble diagnosis for [EC-178](#) or [EC-457](#).

# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

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

### TESTING CONDITION:

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

### PROCEDURE FOR MALFUNCTION A

Ⓟ With CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

PBIB0164E

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

ENG SPEED	Idle
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	P or N position

5. If 1st trip DTC is detected, go to [EC-155, "Diagnosis Procedure"](#).

Ⓟ With GST

Follow the procedure "With CONSULT-II" above.

### PROCEDURE FOR MALFUNCTION B

Ⓟ With CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

PBIB0164E

4. If 1st trip DTC is detected, go to [EC-155, "Diagnosis Procedure"](#).

Ⓟ With GST

Follow the procedure "With CONSULT-II" above.

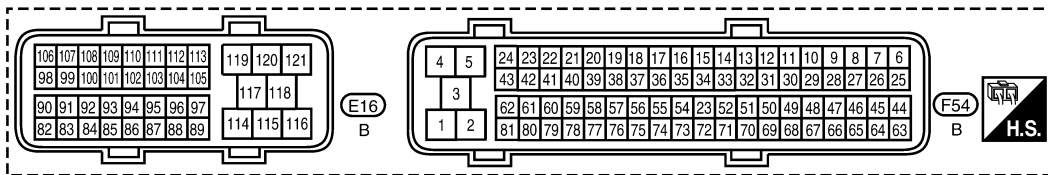
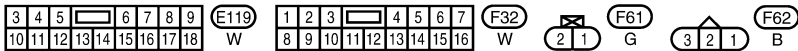
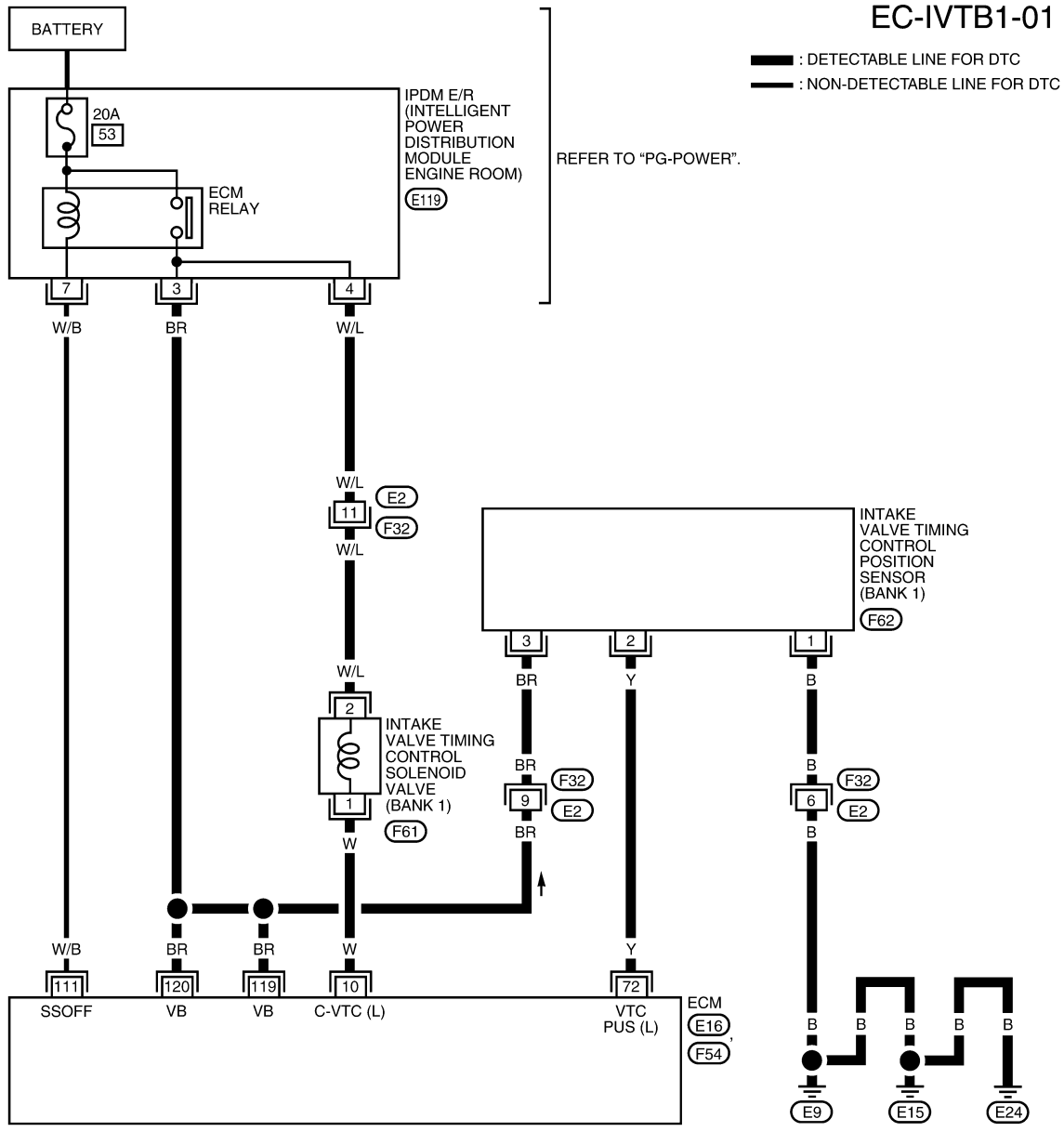
# DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531652

BANK 1



BBWA2796E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

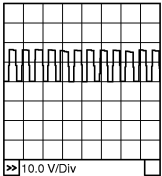
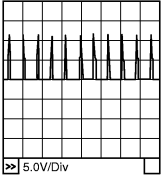
**CAUTION:**



# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

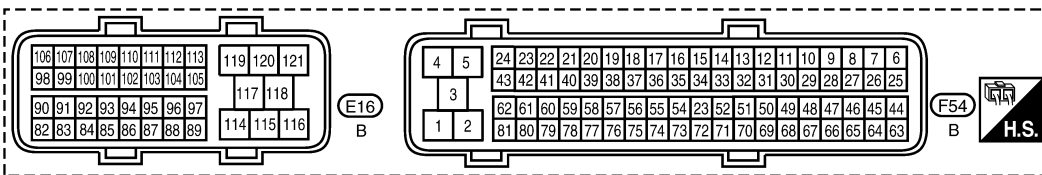
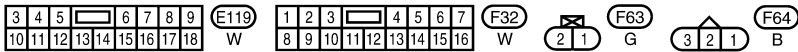
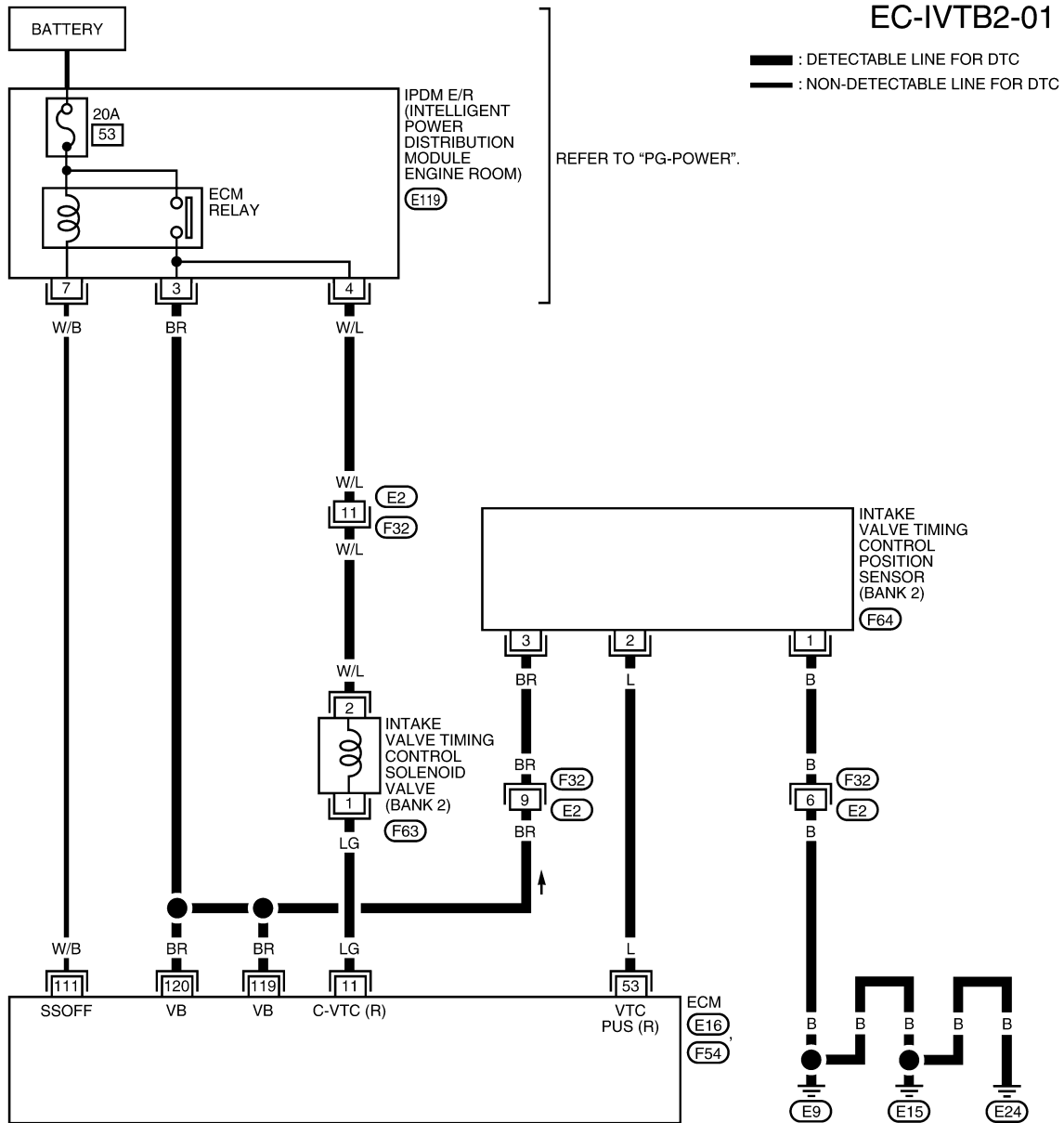
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12V★  PBIB1790E
72	Y	Intake valve timing control position sensor (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0V
			[Engine is running] • Engine speed: 2,000rpm	0 - 1.0V★  PBIB2046E
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

BANK 2



BBWA2797E

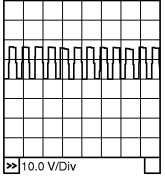
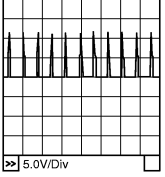
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	LG	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12V★ 
53	L	Intake valve timing control position sensor (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0V
			[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★ 
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

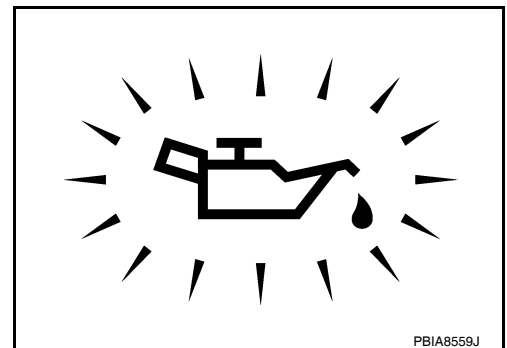
INFOID:000000003531653

### 1. CHECK OIL PRESSURE WARNING LAMP

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

#### OK or NG

- OK >> GO TO 2.  
NG >> Go to [LU-8. "Inspection"](#).



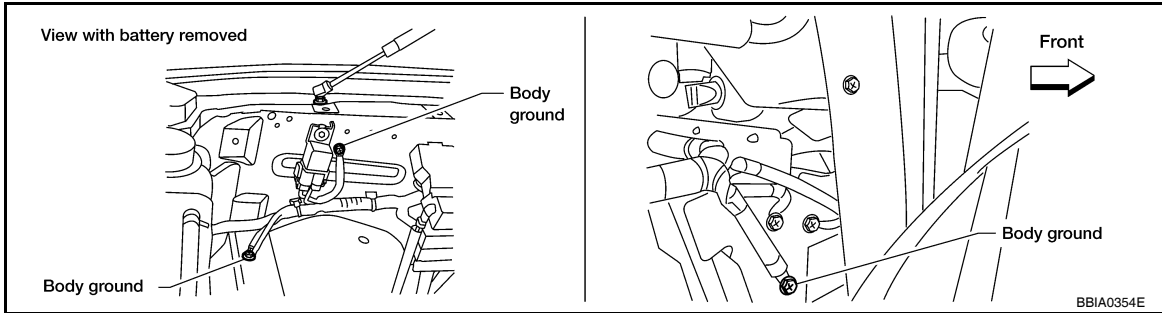
### 2. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.

# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

Refer to [EC-143, "Ground Inspection"](#).

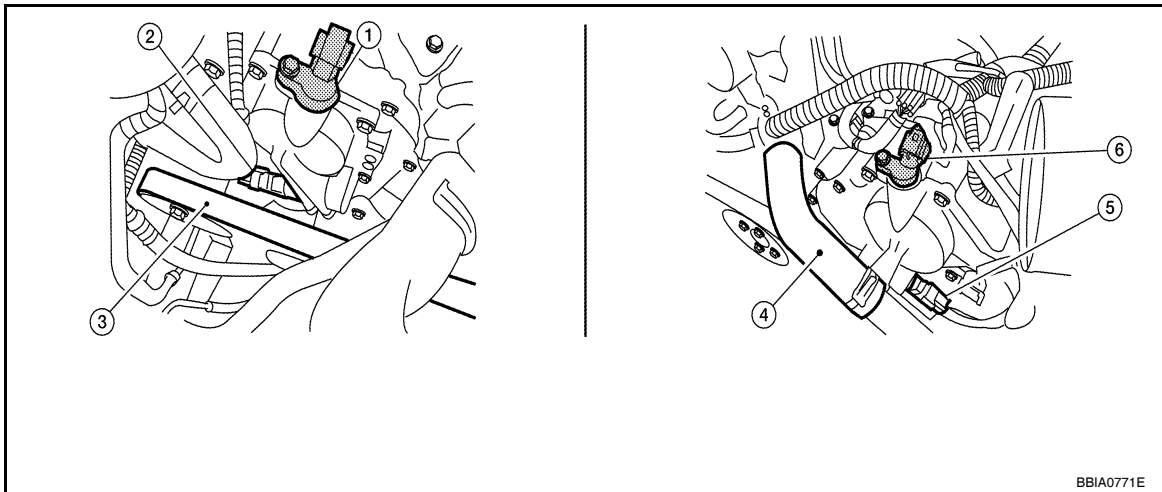


### OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace ground connections.

## 3. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect intake valve timing control position sensor harness connector.



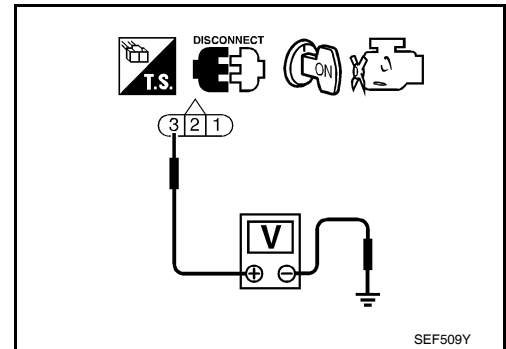
- |   |  |   |
|---|--|---|
| 1. Intake valve timing control position sensor (bank 2) | 2. Intake valve timing control solenoid valve (bank 2) | 3. Drive belt   |
| 4. Radiator hose  | 5. Intake valve timing control solenoid valve (bank 1) | 6. Intake valve timing control position sensor (bank 1) |

2. Turn ignition switch ON.
3. Check voltage between intake valve timing control position sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between intake valve timing control position sensor and ECM
- Harness for open or short between intake valve timing control position sensor and IPDM E/R

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

## DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

---

### 5. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between intake valve timing control position sensor terminal 1 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

---

### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between intake valve timing control position sensor and ground

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

---

### 7. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between the following;  
ECM terminal 72 and intake valve timing control position sensor (Bank 1) terminal 2 or  
ECM terminal 53 and intake valve timing control position sensor (Bank 2) terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

---

### 8. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to [EC-159. "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
- NG >> Replace malfunctioning intake valve timing control position sensor. Refer to [EC-160](#).

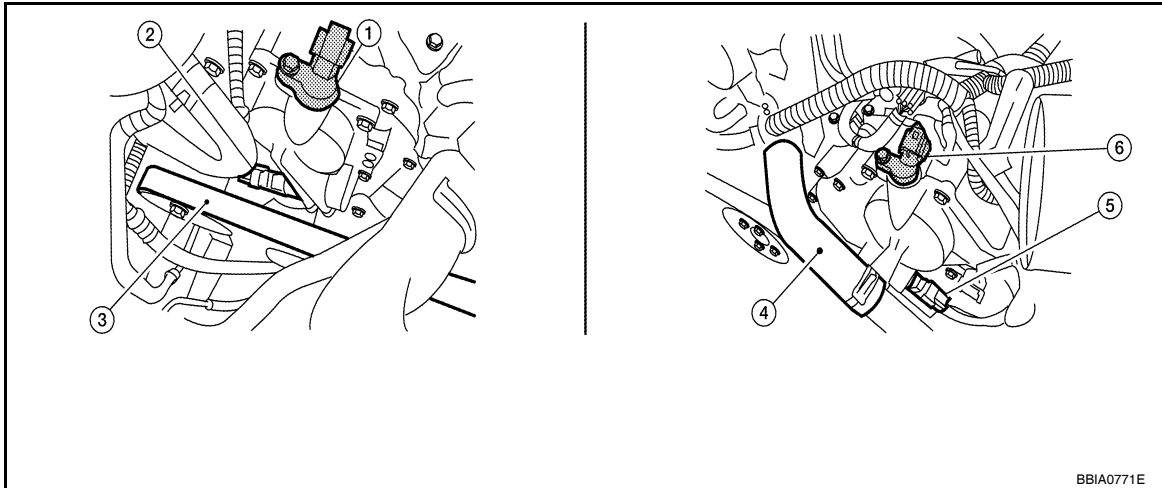
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### 9. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Reconnect ECM harness connector.
2. Disconnect intake valve timing control solenoid valve harness connector.

## DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >



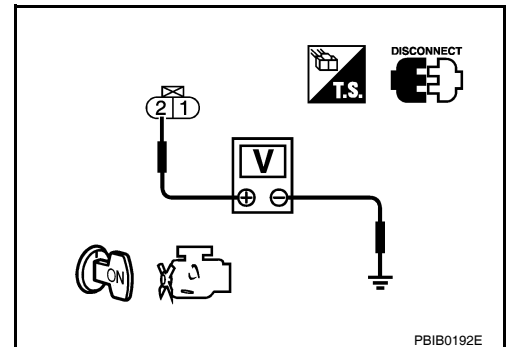
- |   |  |   |
|---|--|---|
| 1. Intake valve timing control position sensor (bank 2) | 2. Intake valve timing control solenoid valve (bank 2) | 3. Drive belt   |
| 4. Radiator hose  | 5. Intake valve timing control solenoid valve (bank 1) | 6. Intake valve timing control position sensor (bank 1) |

3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 10.



### 10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R.

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

### 11. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;  
ECM terminal 10 and intake valve timing control solenoid valve (Bank 1) terminal 1 or  
ECM terminal 11 and intake valve timing control solenoid valve (Bank 2) terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 12.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 12. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

## DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

Refer to [EC-159, "Component Inspection"](#).

OK or NG

OK >> GO TO 13.

NG >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EC-160](#).

### 13.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-341, "Component Inspection"](#).

OK or NG

OK >> GO TO 14.

NG >> Replace crankshaft position sensor (POS).

### 14.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-347, "Component Inspection"](#).

OK or NG

OK >> GO TO 15.

NG >> Replace malfunctioning camshaft position sensor (PHASE). Refer to [EC-348](#).

### 15.CHECK CAMSHAFT SPROCKET

Check accumulation of debris to the signal pick-up portion of the camshaft sprocket. Refer to [EM-46](#).

OK or NG

OK >> GO TO 16.

NG >> Remove debris and clean the signal pick-up cutout of camshaft sprocket.

### 16.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 or No

Yes >> Check timing chain installation. Refer to [EM-38](#).

No >> GO TO 17.

### 17.CHECK LUBRICATION CIRCUIT

Refer to [EM-55, "Inspection after Installation"](#).

OK or NG

OK >> GO TO 18.

NG >> Clean lubrication line.

### 18.CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531654

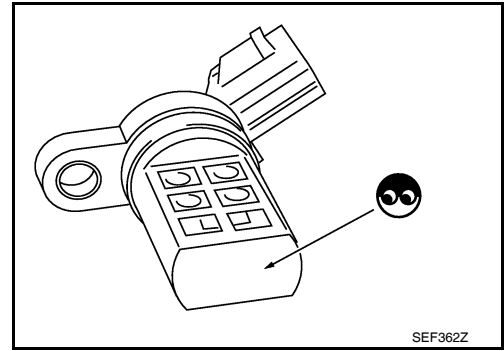
### INTAKE VALVE TIMING CONTROL POSITION SENSOR

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.

# DTC P0011, P0021 IVT CONTROL

## < SERVICE INFORMATION >

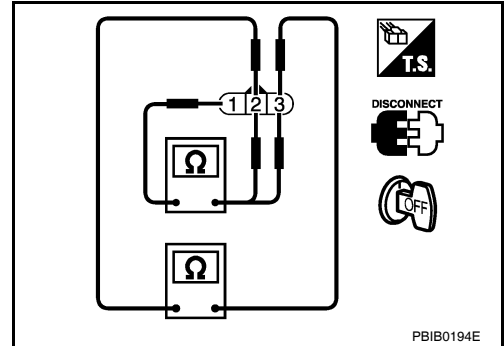
4. Visually check the sensor for chipping.



5. Check resistance as shown below.

Terminal No. (Polarity)	Resistance $\Omega$ [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or $\infty$
2 (+) - 1 (-)	
3 (+) - 2 (-)	

6. If NG, replace intake valve timing control position sensor. Refer to [EC-160](#).



## INTAKE VALVE TIMING CONTROL SOLENOID VALVE

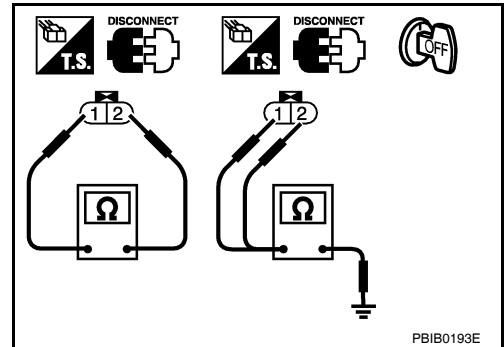
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.0 - 7.5 $\Omega$ [at 20°C (68°F)]
1 or 2 and ground	$\infty\Omega$ (Continuity should not exist)

If NG, replace intake valve timing control solenoid valve. Refer to [EC-160](#).

If OK, go to next step.

3. Remove intake valve timing control solenoid valve. Refer to [EC-160](#).



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

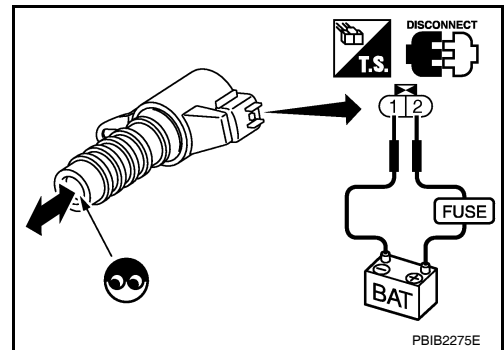
**CAUTION:**

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

If NG, replace intake valve timing control solenoid valve.

**NOTE:**

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



## Removal and Installation

INFOID:000000003531655

### INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)

#### Removal

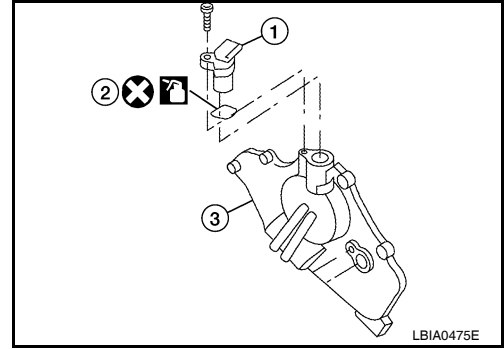
1. Remove engine room cover using power tool. Refer to [EM-12, "Removal and Installation"](#).
2. Remove air duct and resonator assembly. Refer to [EM-15, "Removal and Installation"](#).



## DTC P0011, P0021 IVT CONTROL

### < SERVICE INFORMATION >

3. Disconnect intake valve timing control position sensor (bank 2) connector.
4. Remove intake valve timing control position sensor (bank 2) (1) from intake valve control solenoid cover (bank 2) (3).



#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

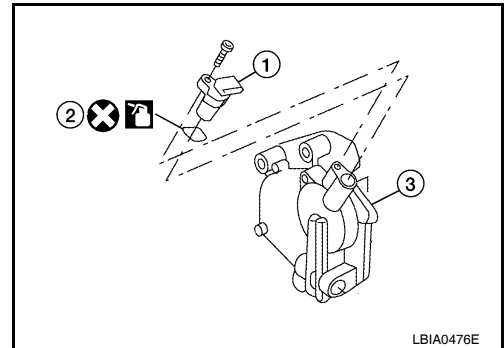
**Replace the O-ring (2) of the intake valve timing control position sensor with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control position sensor bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

### INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 1)

#### Removal

1. Remove engine room cover using power tool. Refer to [EM-12. "Removal and Installation"](#).
2. Disconnect intake valve timing control position sensor (bank 1) connector.
3. Remove intake valve timing control position sensor (bank 1) (1) from intake valve control solenoid cover (bank 1) (3).



#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

**Replace the O-ring (2) of the intake valve timing control position sensor with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control position sensor bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)

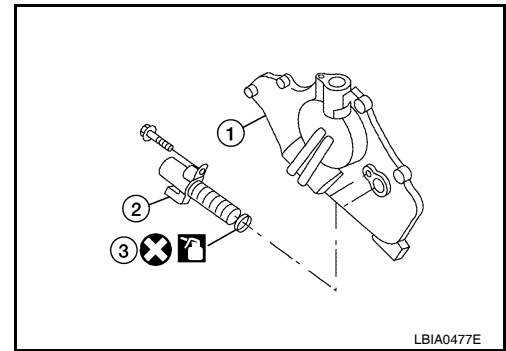
#### Removal

1. Remove engine room cover using power tool. Refer to [EM-12. "Removal and Installation"](#).
2. Remove air duct and resonator assembly. Refer to [EM-15. "Removal and Installation"](#).
3. Remove drive belt. Refer to [EM-13. "Removal and Installation"](#).
4. Disconnect intake valve timing control solenoid valve (bank 2) connector.

## DTC P0011, P0021 IVT CONTROL

### < SERVICE INFORMATION >

5. Remove intake valve timing control solenoid valve (bank 2) (2) from intake valve control solenoid cover (bank 2) (1).



LBIA0477E

#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

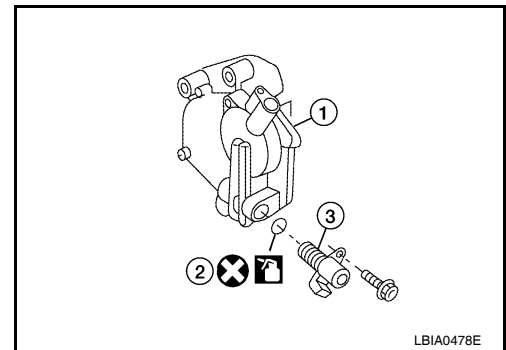
**Replace the O-ring (3) of the intake valve timing control solenoid valve with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control solenoid valve bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)

#### Removal

1. Remove drive belt. Refer to [EM-13. "Removal and Installation"](#).
2. Disconnect intake valve timing control solenoid valve (bank 1) connector.
3. Remove intake valve timing control solenoid valve (bank 1) (3) from intake valve control solenoid cover (bank 1) (1).



LBIA0478E

#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

**Replace the O-ring (2) of the intake valve timing control solenoid valve with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control solenoid valve bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

## DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

### Description

INFOID:000000003531656

### SYSTEM DESCRIPTION

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

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

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531657

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	• Engine: After warming up, idle the engine	4 - 100%

### On Board Diagnosis Logic

INFOID:000000003531658

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031 (Bank 1) P0051 0051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.)</li> <li>• A/F sensor 1 heater</li> </ul>
P0032 0032 (Bank 1) P0052 0052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 heater circuit is shorted.)</li> <li>• A/F sensor 1 heater</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531659

#### NOTE:

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

#### TESTING CONDITION:

**Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.**

#### ④ WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and let it idle for at least 10 seconds.
3. If 1st trip DTC is detected, go to [EC-167. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

WITH GST

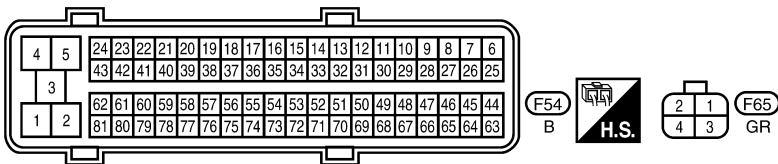
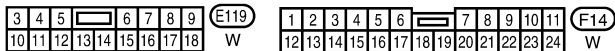
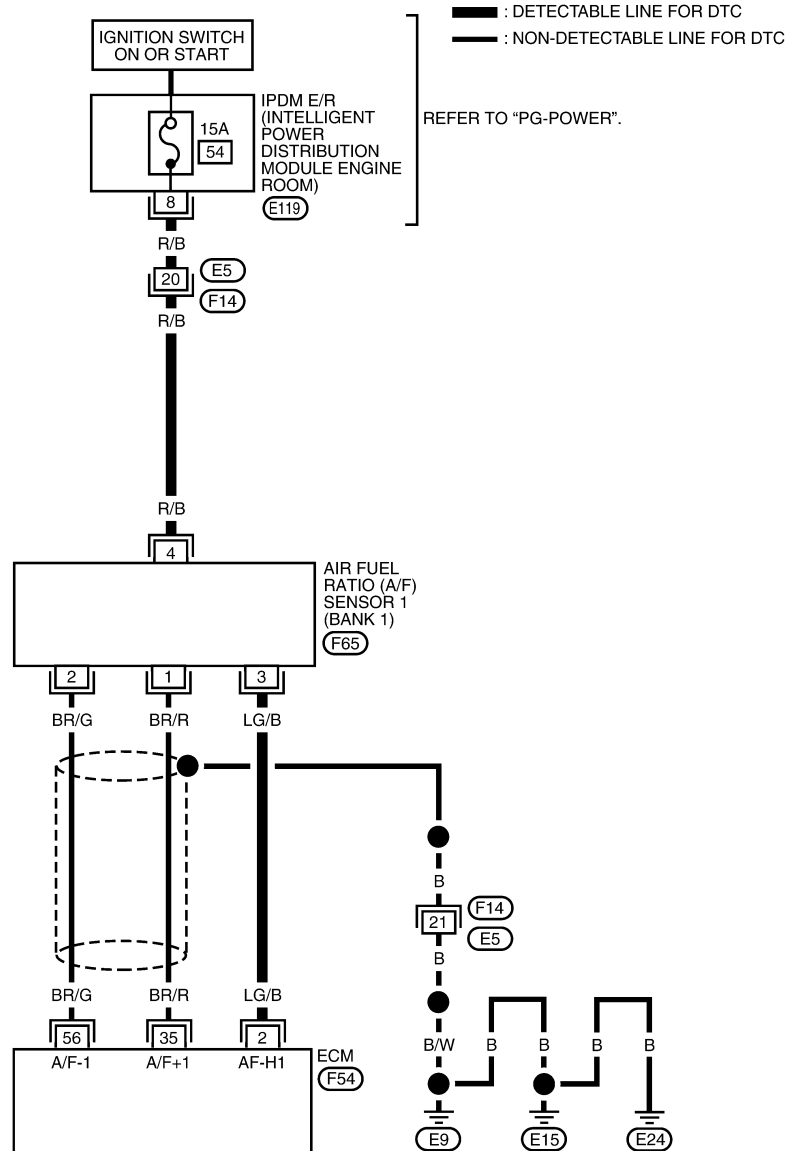
Follow the procedure "WITH CONSULT-II" above.

## Wiring Diagram

INFOID:000000003531660

BANK 1

### EC-AF1HB1-01



BBWA2788E

Specification data are reference values and are measured between each terminal and ground.

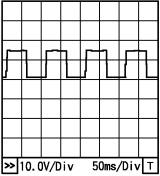
# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

## < SERVICE INFORMATION >

Pulse signal is measured by CONSULT-II.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★  <small>PBIA8148J</small>
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

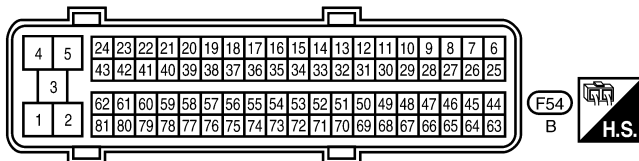
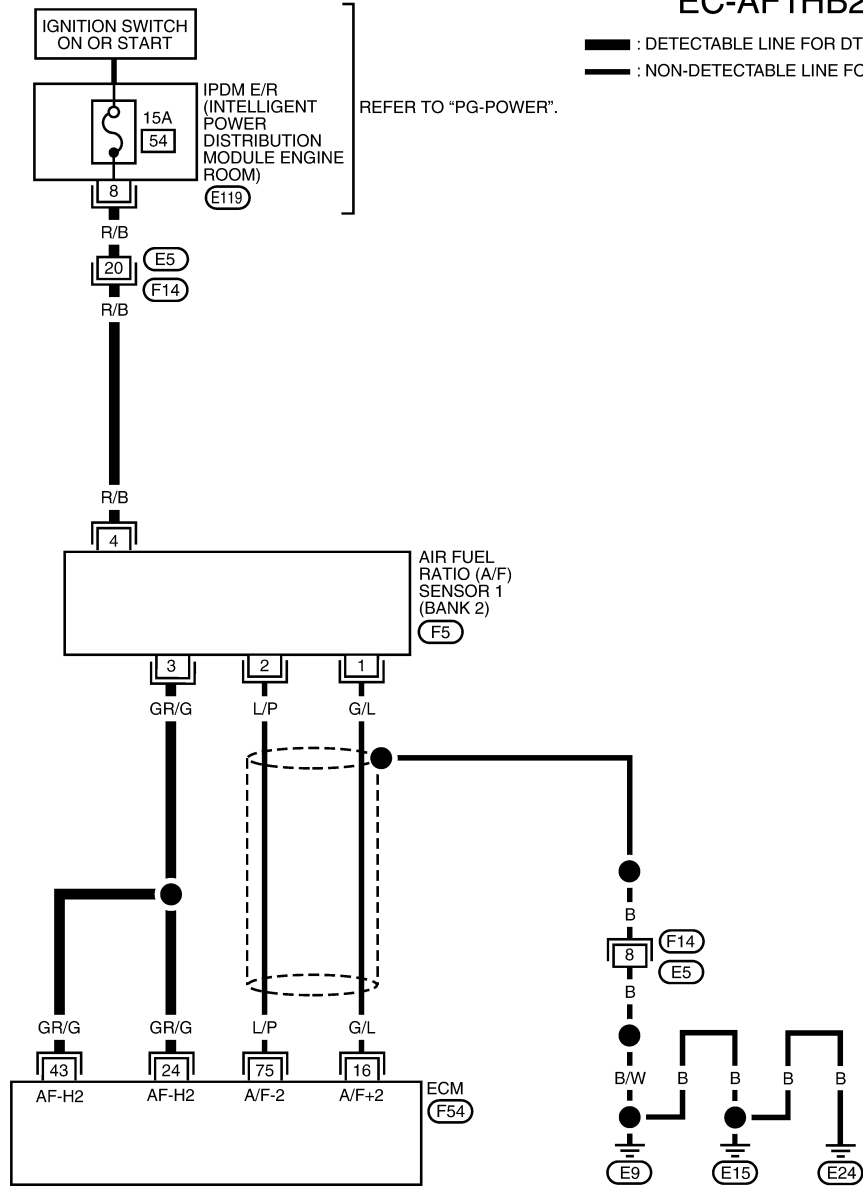
# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< SERVICE INFORMATION >

BANK 2

EC-AF1HB2-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2789E

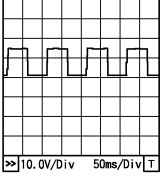
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBI A8148J
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

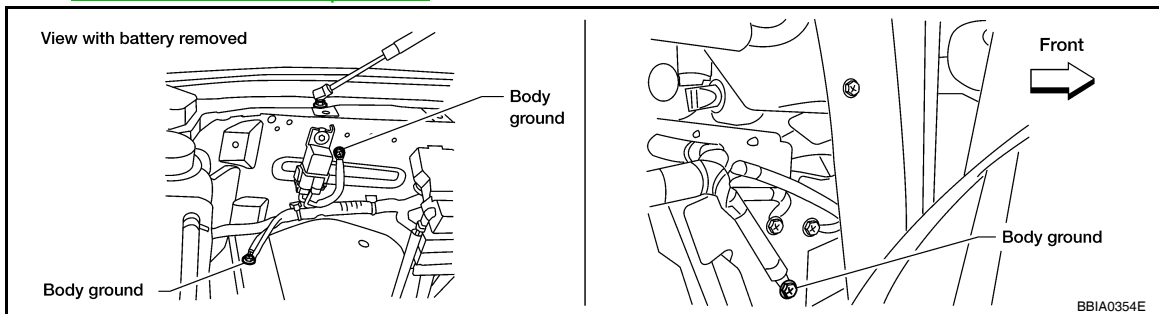
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531661

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

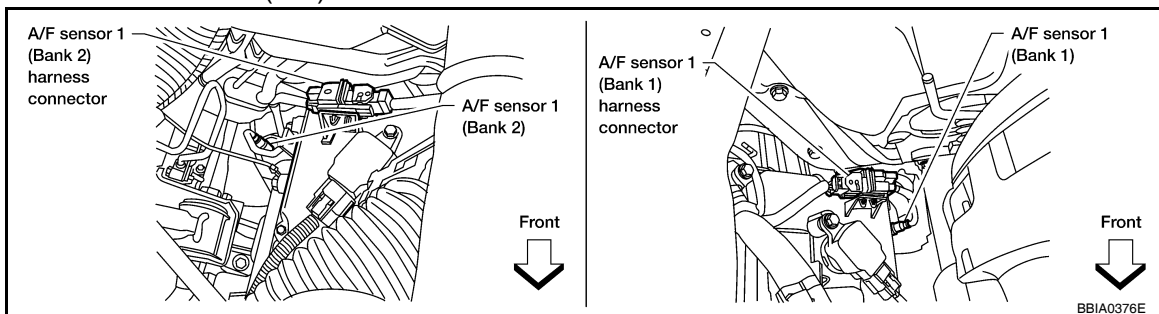


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

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

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.

## DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

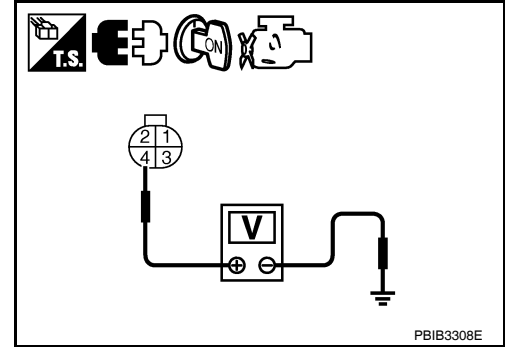
### < SERVICE INFORMATION >

3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24, 43 (bank 2) and A/F sensor 1 terminal 3.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 5.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK A/F SENSOR 1 HEATER

Refer to [EC-168. "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 6.  
NG >> Replace malfunctioning air fuel ratio (A/F) sensor 1.

### 6. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531662

## AIR FUEL RATIO (A/F) SENSOR 1 HEATER



# DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

## < SERVICE INFORMATION >

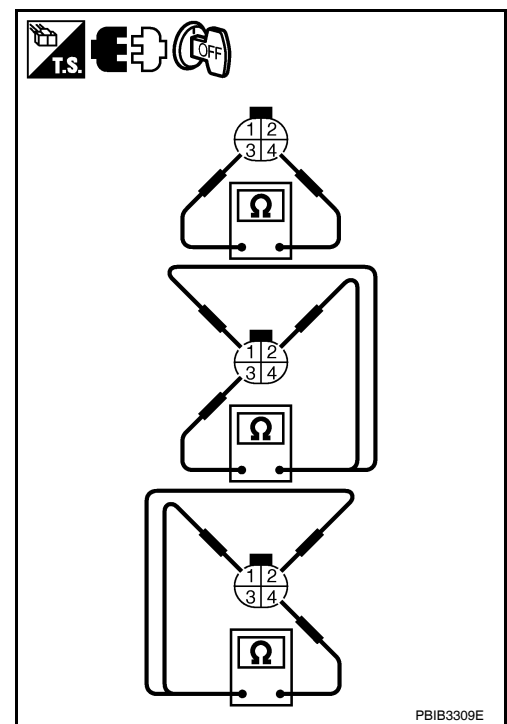
1. Check resistance between A/F sensor 1 terminals as follows.

Terminal No.	Resistance
3 and 4	1.8 - 2.44 $\Omega$ [at 25°C (77°F)]
3 and 1, 2	$\infty \Omega$ (Continuity should not exist)
4 and 1, 2	$\infty \Omega$ (Continuity should not exist)

2. If NG, replace air fuel ratio (A/F) sensor 1.

### CAUTION:

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



INFOID:000000003531663

## Removal and Installation

### AIR FUEL RATIO SENSOR HEATER

Refer to [EM-21](#).

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

## DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

### Description

INFOID:000000003531664

### SYSTEM DESCRIPTION

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

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

### OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. <ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	ON

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531665

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	ON
	<ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm</li> </ul>	OFF

### On Board Diagnosis Logic

INFOID:000000003531666

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037 (Bank 1)	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>• Heated oxygen sensor 2 heater</li> </ul>
P0057 0057 (Bank 2)			
P0038 0038 (Bank 1)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul style="list-style-type: none"> <li>• Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>• Heated oxygen sensor 2 heater</li> </ul>
P0058 0058 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531667

#### NOTE:

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:

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

## < SERVICE INFORMATION >

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

### ④ WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start the engine and keep the engine speed between 3,500 rpm and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to [EC-175, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANTTEMP/S	XXX °C

SEF174Y

### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

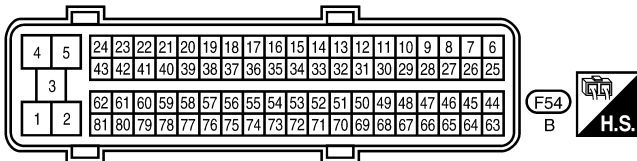
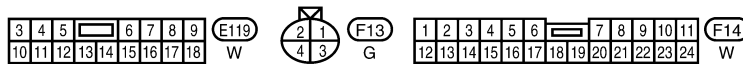
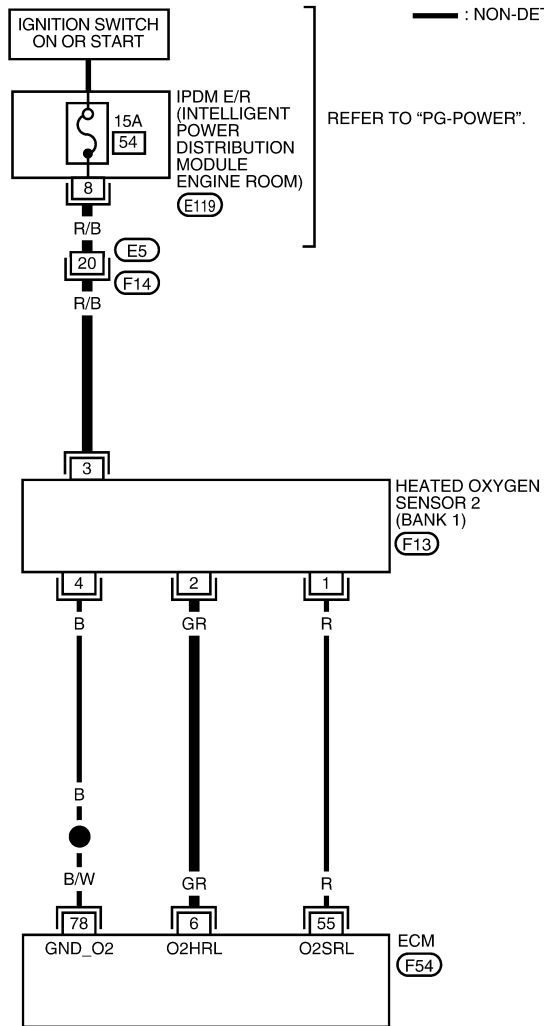
## Wiring Diagram

INFOID:000000003531668

BANK 1

### EC-O2H2B1-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2798E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

## < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	A
6	GR	Heated oxygen sensor 2 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V	EC
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)	C
55	R	Heated oxygen sensor 2 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0V	D
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	Approximately 0V	E
					F
					G
					H
					I
					J
					K
					L
					M
					N
					O
					P

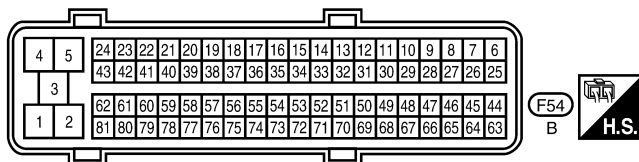
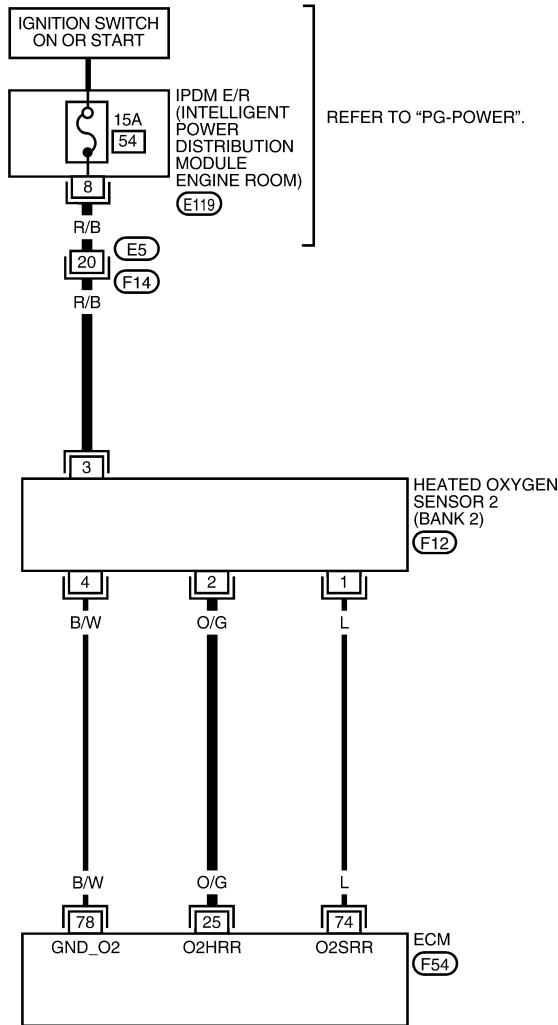
# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

BANK 2

EC-O2H2B2-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2799E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

## < SERVICE INFORMATION >

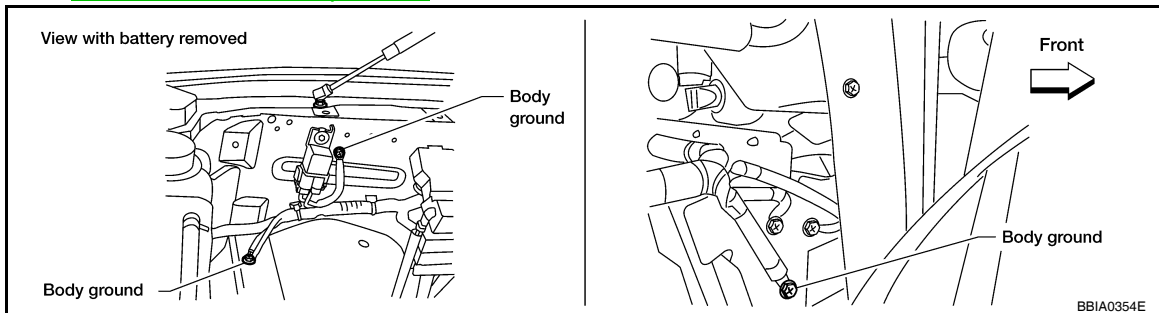
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	O/G	Heated oxygen sensor 2 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
74	L	Heated oxygen sensor 2 (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Revvng engine from idle to 3,000 rpm quickly after the following conditions are met.                             <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li><b>Warm-up condition</b></li> <li>Idle speed</li> </ul>	Approximately 0V

## Diagnosis Procedure

INFOID:000000003531669

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

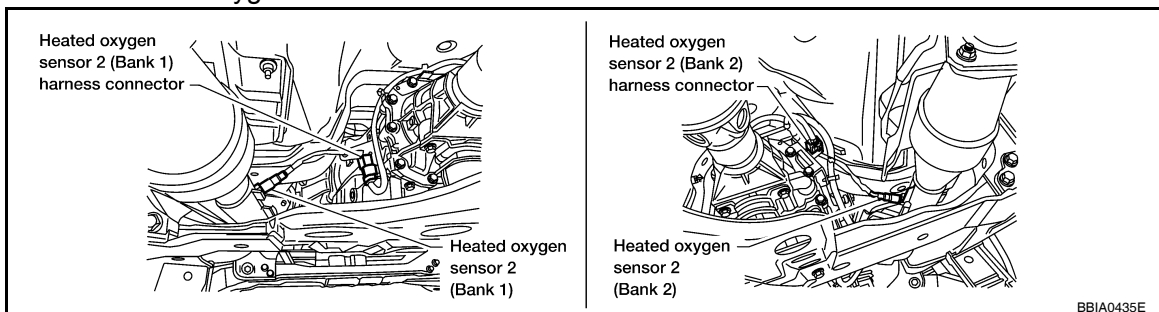


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK HO2S2 POWER SUPPLY CIRCUIT

- Disconnect heated oxygen sensor 2 harness connector.



## DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

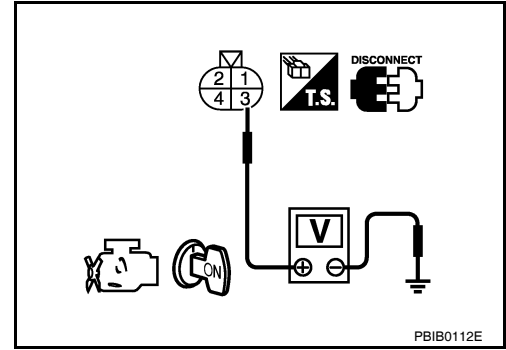
### < SERVICE INFORMATION >

- Turn ignition switch ON.
- Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

### 4. CHECK HO2S2 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	6	2	1
P0057, P0058	25	2	2

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 5.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-176. "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 6.  
NG >> Replace malfunctioning heated oxygen sensor 2.

### 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531670

## HEATED OXYGEN SENSOR 2 HEATER



# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

## < SERVICE INFORMATION >

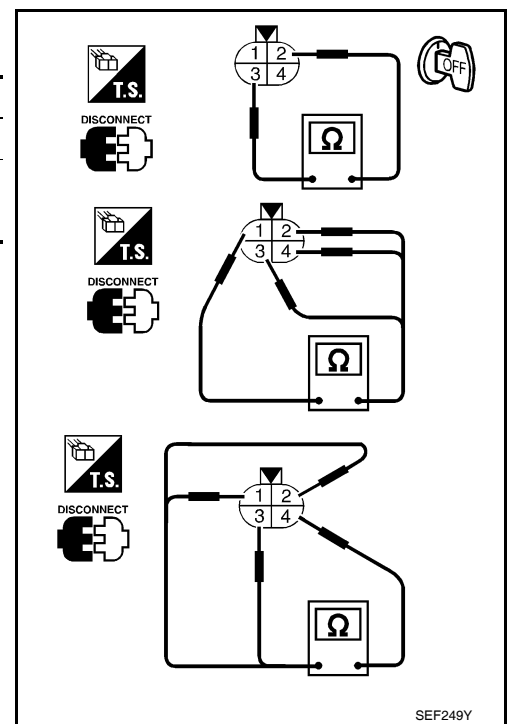
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	8 - 10 $\Omega$ at 25°C (77°F)
1 and 2, 3, 4	$\infty \Omega$
4 and 1, 2, 3	(Continuity should not exist)

2. If NG, replace heated oxygen sensor 2.

### CAUTION:

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



SEF249Y

INFOID:000000003531671

## Removal and Installation

### HEATED OXYGEN SENSOR 2

Refer to [EM-21](#).

A  
EC  
C  
D  
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F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

### Component Description

INFOID:000000003531672

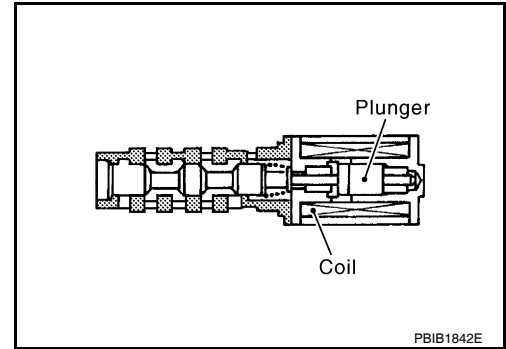
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531674

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION				
INT/V SOL (B1) INT/V SOL (B2)	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	<table border="1"> <tr> <td>Idle</td> <td>0% - 2%</td> </tr> <tr> <td>2,000 rpm</td> <td>Approx. 25% - 50%</td> </tr> </table>	Idle	0% - 2%	2,000 rpm	Approx. 25% - 50%
Idle	0% - 2%					
2,000 rpm	Approx. 25% - 50%					

### On Board Diagnosis Logic

INFOID:000000003531674

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075 0075 (Bank 1)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	<ul style="list-style-type: none"> <li>Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</li> <li>Intake valve timing control solenoid valve</li> </ul>
P0081 0081 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531675

#### NOTE:

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

#### Ⓟ WITH CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and let it idle for 5 seconds.
- If 1st trip DTC is detected, go to [EC-182, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓟ WITH GST

Following the procedure "WITH CONSULT-II" above.

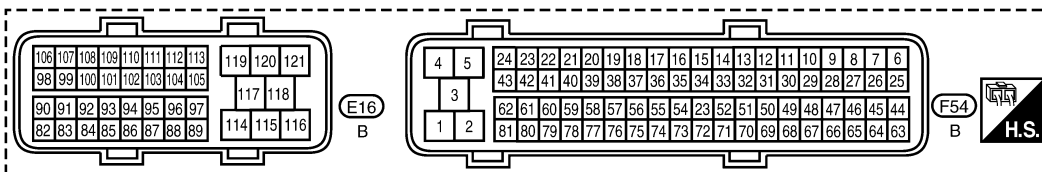
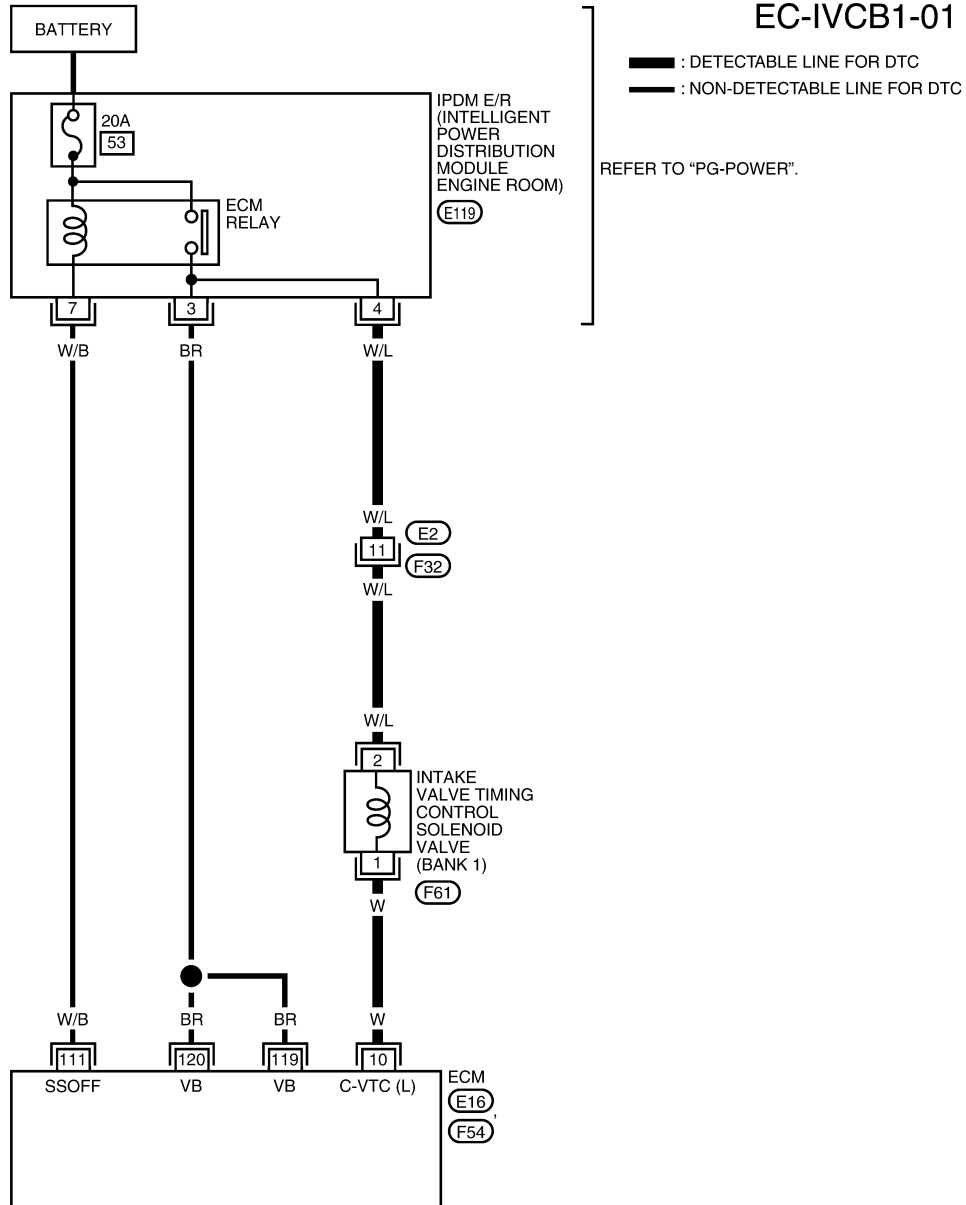
# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531676

BANK 1



BBWA2860E

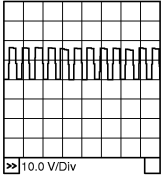
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

### < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

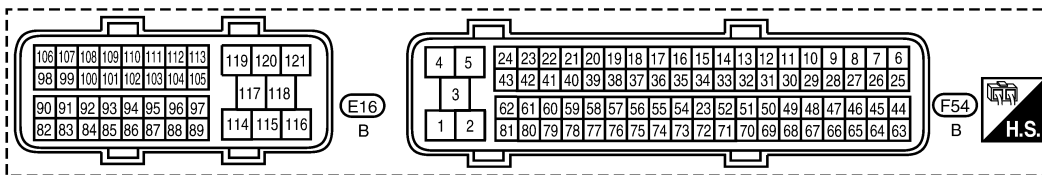
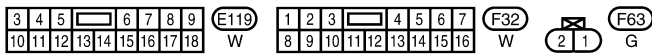
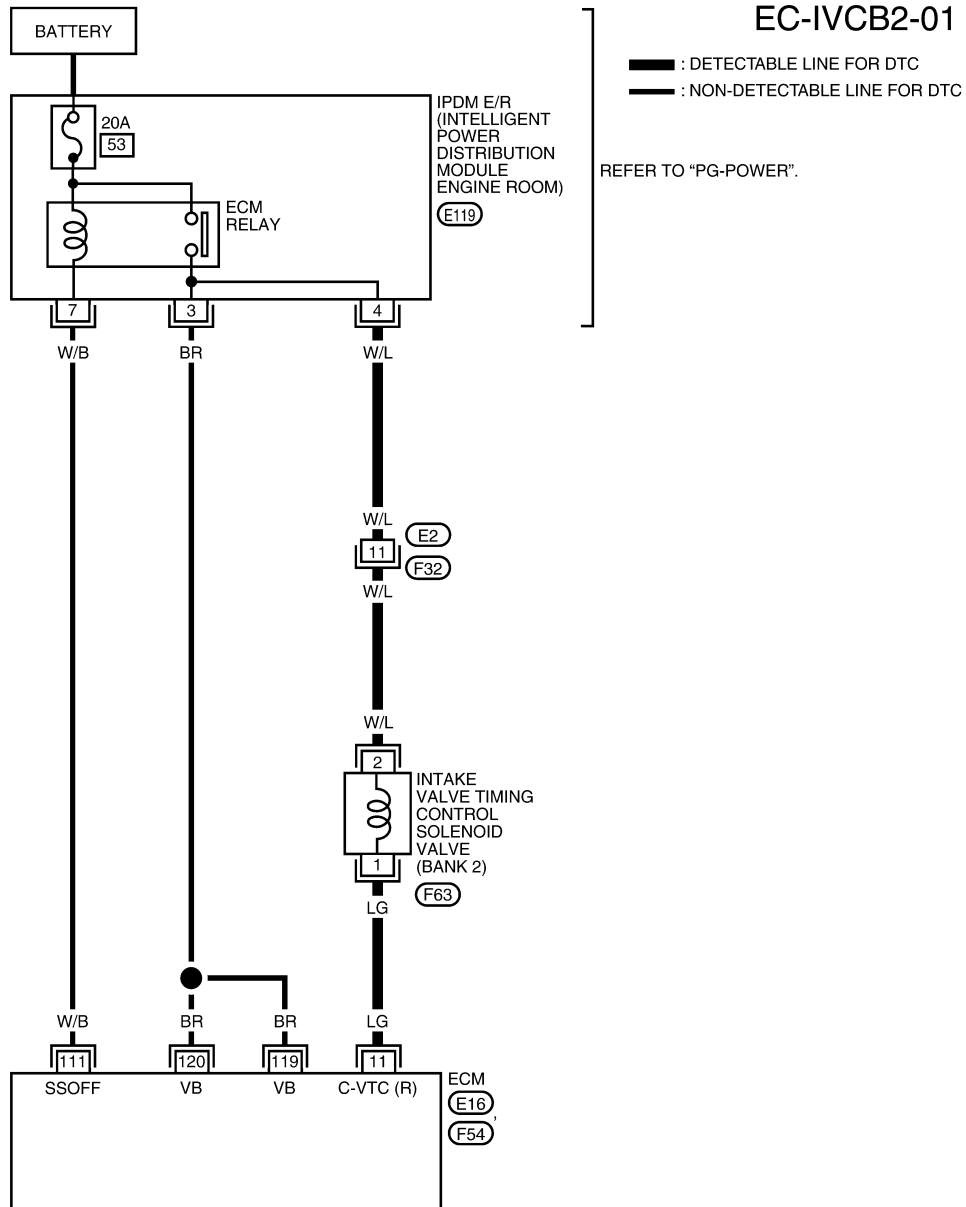
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000rpm</li> </ul>	7 - 12V★ 
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>• For a few seconds after turning ignition switch OFF</li> </ul>	0 - 1.5V
			<b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>• More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

BANK 2



BBWA2861E

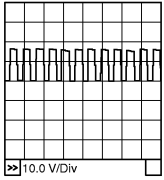
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	LG	Intake valve timing control solenoid valve (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12V★ 
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

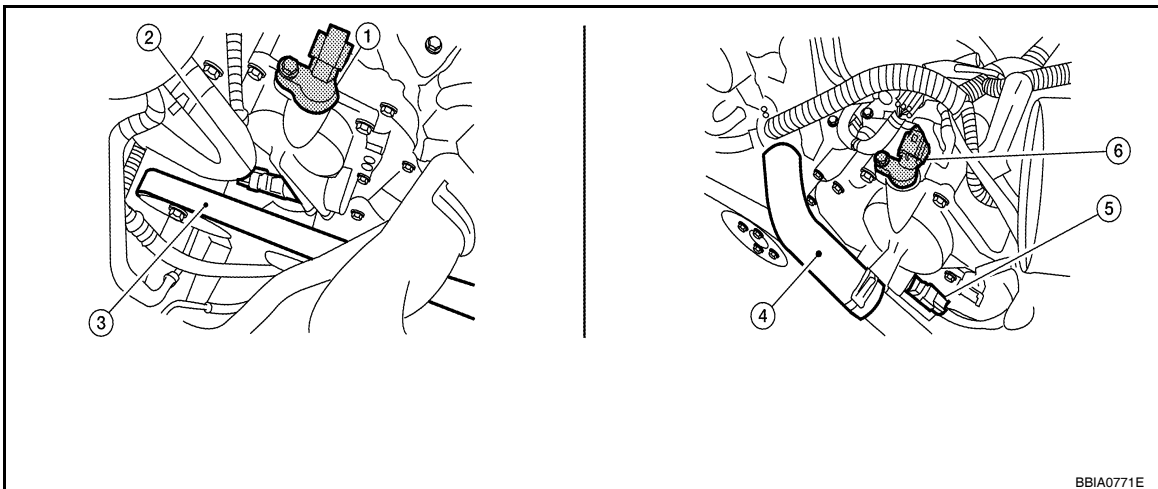
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531677

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

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.



- |   |  |   |
|---|--|---|
| 1. Intake valve timing control position sensor (bank 2) | 2. Intake valve timing control solenoid valve (bank 2) | 3. Drive belt   |
| 4. Radiator hose  | 5. Intake valve timing control solenoid valve (bank 1) | 6. Intake valve timing control position sensor (bank 1) |

3. Turn ignition switch ON.

# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

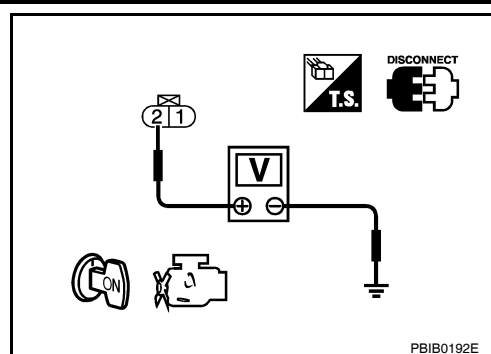
## < SERVICE INFORMATION >

4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- IPDM E/R harness connector E119
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

## 3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;  
ECM terminal 10 and intake valve timing control solenoid valve (Bank 1) terminal 1 or  
ECM terminal 11 and intake valve timing control solenoid valve (Bank 2) terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-183, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 5.
- NG >> Replace malfunctioning intake valve timing control solenoid valve. Refer to [EC-184](#).

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531678

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.

# DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

## < SERVICE INFORMATION >

- Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.0 - 7.5Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)

If NG, replace intake valve timing control solenoid valve. Refer to [EC-184](#).  
If OK, go to next step.

- Remove intake valve timing control solenoid valve. Refer to [EC-184](#).

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

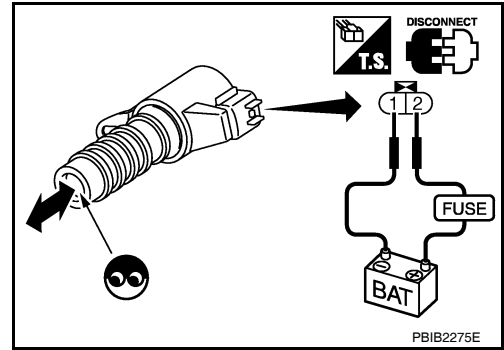
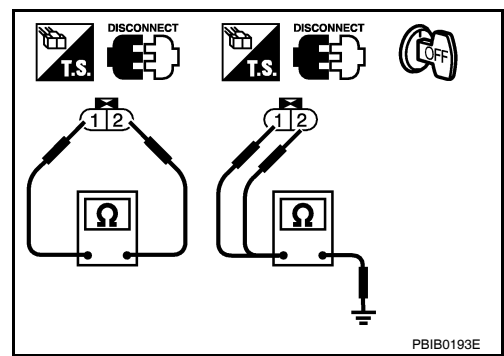
**CAUTION:**

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

If NG, replace intake valve timing control solenoid valve. Refer to [EC-184](#).

**NOTE:**

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



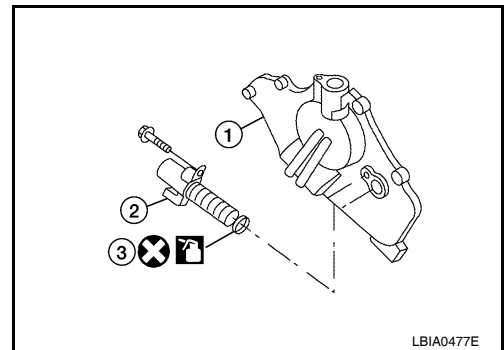
## Removal and Installation

INFOID:000000003531679

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)

#### Removal

- Remove engine room cover using power tool. Refer to [EM-12. "Removal and Installation"](#).
- Remove air duct and resonator assembly. Refer to [EM-15. "Removal and Installation"](#).
- Remove drive belt. Refer to [EM-13. "Removal and Installation"](#).
- Disconnect intake valve timing control solenoid valve (bank 2) connector.
- Remove intake valve timing control solenoid valve (bank 2) (2) from intake valve control solenoid cover (bank 2) (1).



#### Installation

Installation is in the reverse order of removal.

**CAUTION:**

**Replace the O-ring (3) of the intake valve timing control solenoid valve with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control solenoid valve bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)

#### Removal

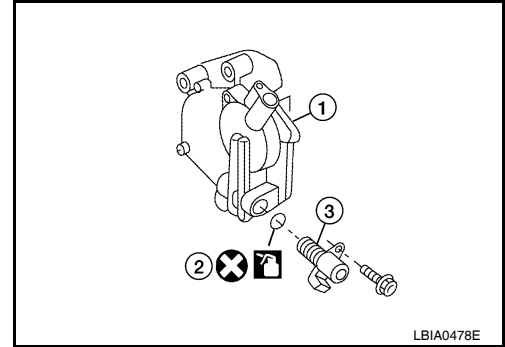
- Remove drive belt. Refer to [EM-13. "Removal and Installation"](#).



## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

### < SERVICE INFORMATION >

2. Disconnect intake valve timing control solenoid valve (bank 1) connector.
3. Remove intake valve timing control solenoid valve (bank 1) (3) from intake valve control solenoid cover (bank 1) (1).



### Installation

Installation is in the reverse order of removal.

### **CAUTION:**

**Replace the O-ring (2) of the intake valve timing control solenoid valve with a new one, then lubricate O-ring with engine oil before installing.**

**Intake valve timing control solenoid valve bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

A

EC

C

D

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# DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

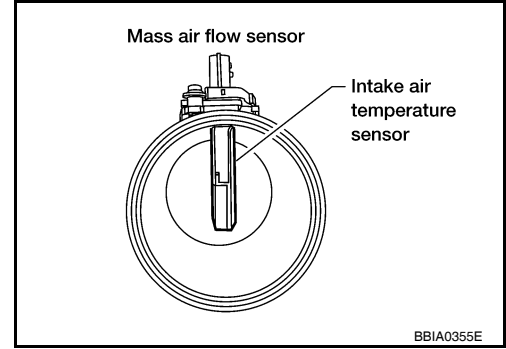
## DTC P0101 MAF SENSOR

### Component Description

INFOID:000000003531680

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

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



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### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531681

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	See <a href="#">EC-129</a> .	
CAL/LD VALUE	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle 14% - 33%
		2,500 rpm 12% - 25%
MASS AIRFLOW	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle 3.0 - 9.0 g·m/s
		2,500 rpm 9.0 - 28.0 g·m/s

### On Board Diagnosis Logic

INFOID:000000003531682

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101 0101	Mass air flow sensor circuit range/performance	A) A high voltage from the sensor is sent to ECM under light load driving condition.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> <li>EVAP control system pressure sensor</li> <li>Intake air temperature sensor</li> </ul>
		B) A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> <li>EVAP control system pressure sensor</li> <li>Intake air temperature sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531683

**Perform PROCEDURE FOR MALFUNCTION A first.**

**If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.**

#### NOTE:

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

#### PROCEDURE FOR MALFUNCTION A

#### NOTE:

# DTC P0101 MAF SENSOR

## < SERVICE INFORMATION >

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

### With CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to [EC-190. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

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### With GST

Follow the procedure "With CONSULT-II" above.

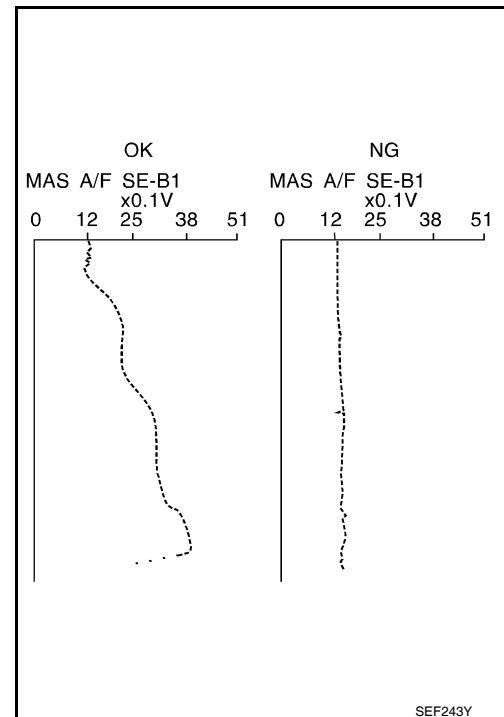
## PROCEDURE FOR MALFUNCTION B

### CAUTION:

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

### With CONSULT-II

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.  
**If engine cannot be started, go to [EC-190. "Diagnosis Procedure"](#).**
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.  
If NG, go to [EC-190. "Diagnosis Procedure"](#).  
If OK, go to following step.



# DTC P0101 MAF SENSOR

## < SERVICE INFORMATION >

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

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL SEN 1	XXX V
THRTL SEN 2	XXX V

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8. If 1st trip DTC is detected, go to [EC-190, "Diagnosis Procedure"](#).

## Overall Function Check

INFOID:000000003531684

### PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

 With GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Check the mass air flow sensor signal with Service \$01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to [EC-190, "Diagnosis Procedure"](#).

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
<b>MAF</b>	<b>14.1gm/sec</b>
THROTTLE POS	3%

SEF534P

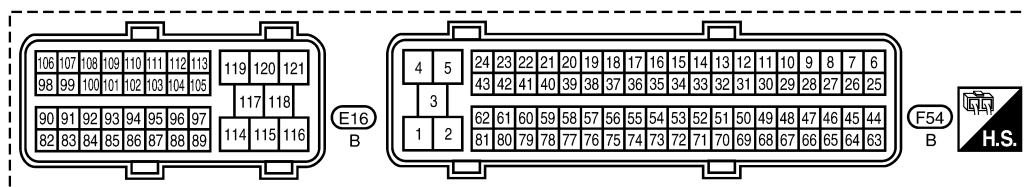
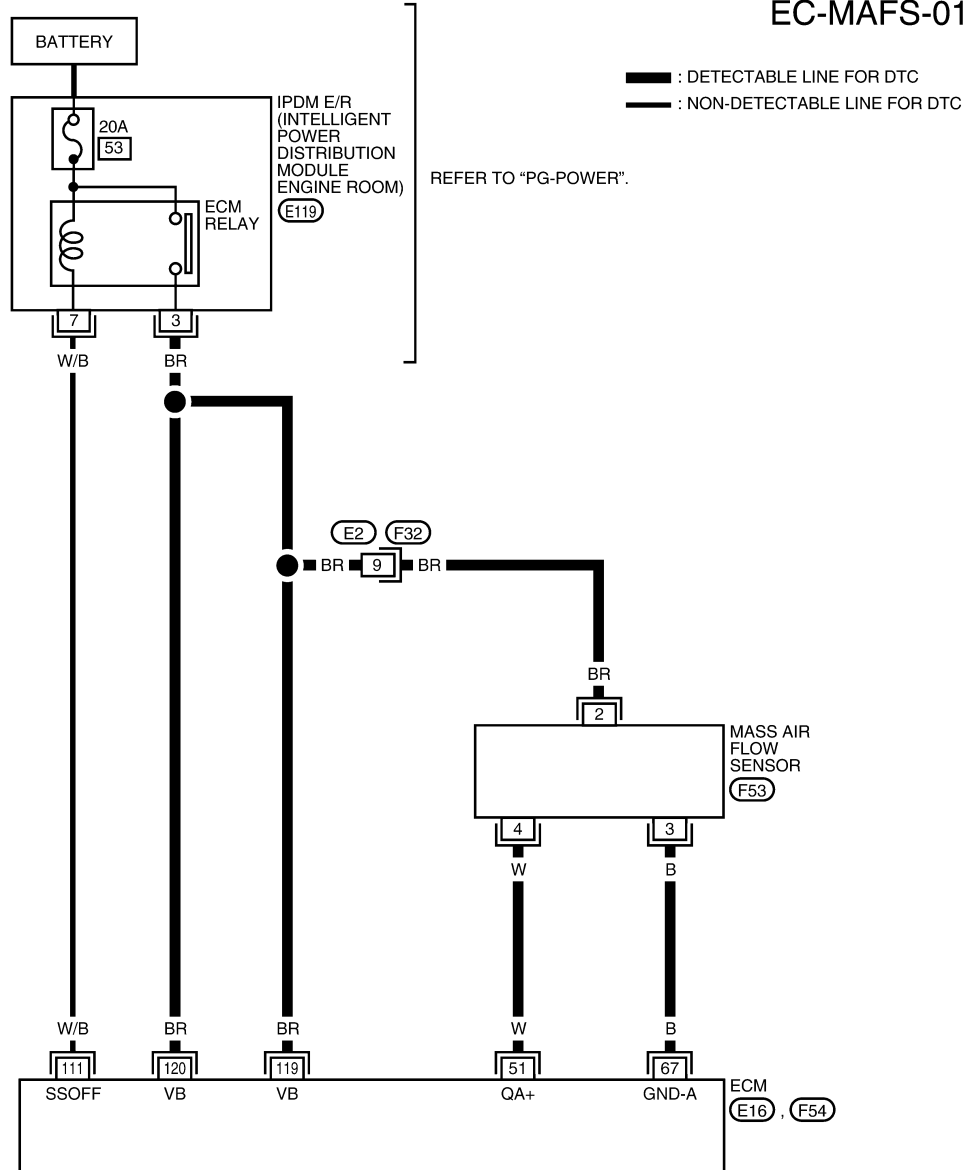
# DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531685

### EC-MAFS-01



BBWA1674E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0101 MAF SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm.	1.7 - 2.1V
67	B	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531686

### 1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

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

### 2. CHECK INTAKE SYSTEM

Check the following for connection.

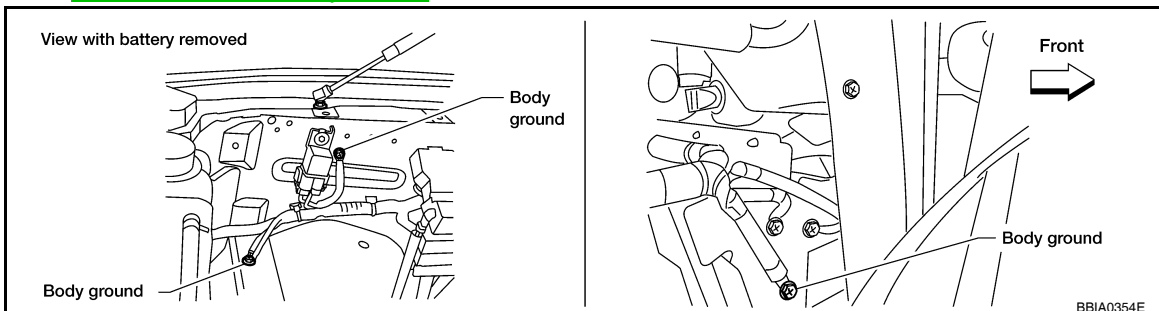
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

OK or NG

- OK >> GO TO 3.
- NG >> Reconnect the parts.

### 3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



OK or NG

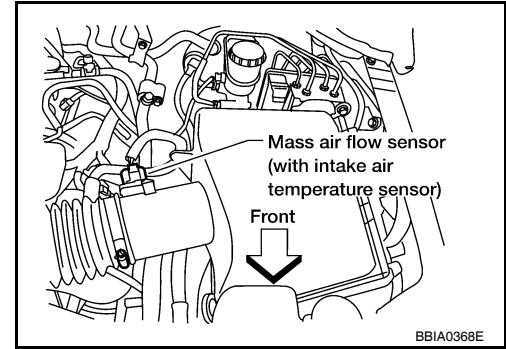
- OK >> GO TO 4.
- NG >> Repair or replace ground connections.

# DTC P0101 MAF SENSOR

## < SERVICE INFORMATION >

### 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.

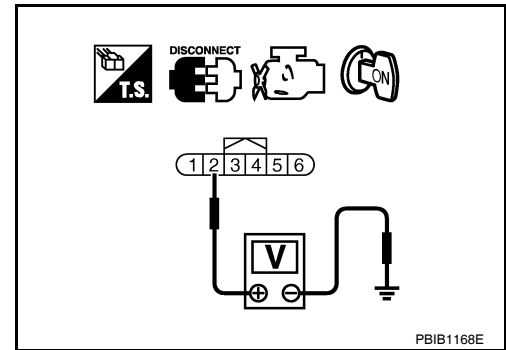


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.



### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

### 6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 7.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 8.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 8. CHECK INTAKE AIR TEMPERATURE SENSOR

# DTC P0101 MAF SENSOR

## < SERVICE INFORMATION >

Refer to [EC-204, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 9.
- NG >> Replace intake air temperature sensor.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 10.
- NG >> Replace EVAP control system pressure sensor.

## 10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-192, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 11.
- NG >> Replace mass air flow sensor.

## 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531687

### MASS AIR FLOW SENSOR

#### Ⓟ With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB2371E

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

5. If the voltage is out of specification, proceed the following.
  - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
    - Crushed air ducts
    - Malfunctioning seal of air cleaner element
    - Uneven dirt of air cleaner element
    - Improper specification of intake air system parts
  - b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.  
If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

#### ⓧ Without CONSULT-II



# DTC P0101 MAF SENSOR

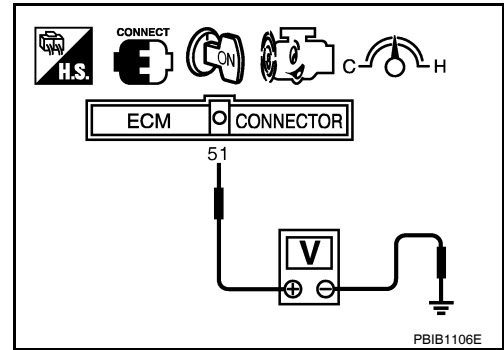
## < SERVICE INFORMATION >

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*

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

4. If the voltage is out of specification, proceed the following.
  - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
    - Crushed air ducts
    - Malfunctioning seal of air cleaner element
    - Uneven dirt of air cleaner element
    - Improper specification of intake air system parts
  - b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again. If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.



## Removal and Installation

INFOID:000000003531688

### MASS AIR FLOW SENSOR

Refer to [EM-15](#).

# DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

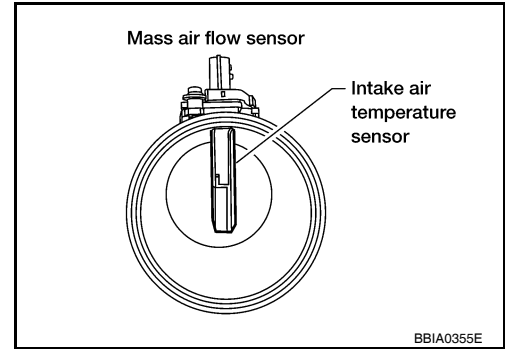
## DTC P0102, P0103 MAF SENSOR

### Component Description

INFOID:000000003531689

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

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



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### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531692

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	See <a href="#">EC-129</a> .	
CAL/LD VALUE	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle 14% - 33%
		2,500 rpm 12% - 25%
MASS AIRFLOW	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle 3.0 - 9.0 g·m/s
		2,500 rpm 9.0 - 28.0 g·m/s

### On Board Diagnosis Logic

INFOID:000000003531691

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> </ul>
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> </ul>

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

### DTC Confirmation Procedure

INFOID:000000003531692

#### NOTE:

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

#### PROCEDURE FOR DTC P0102

④ With CONSULT-II

1. Turn ignition switch ON.

## DTC P0102, P0103 MAF SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to [EC-197. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

Follow the procedure "With CONSULT-II" above.

### PROCEDURE FOR DTC P0103

 With CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to [EC-197. "Diagnosis Procedure"](#).  
If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to [EC-197. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

Follow the procedure "With CONSULT-II" above.

A  
EC  
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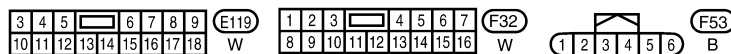
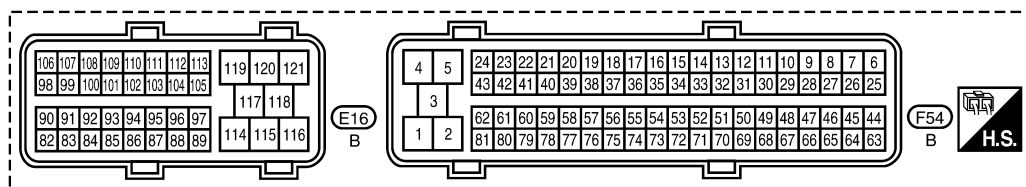
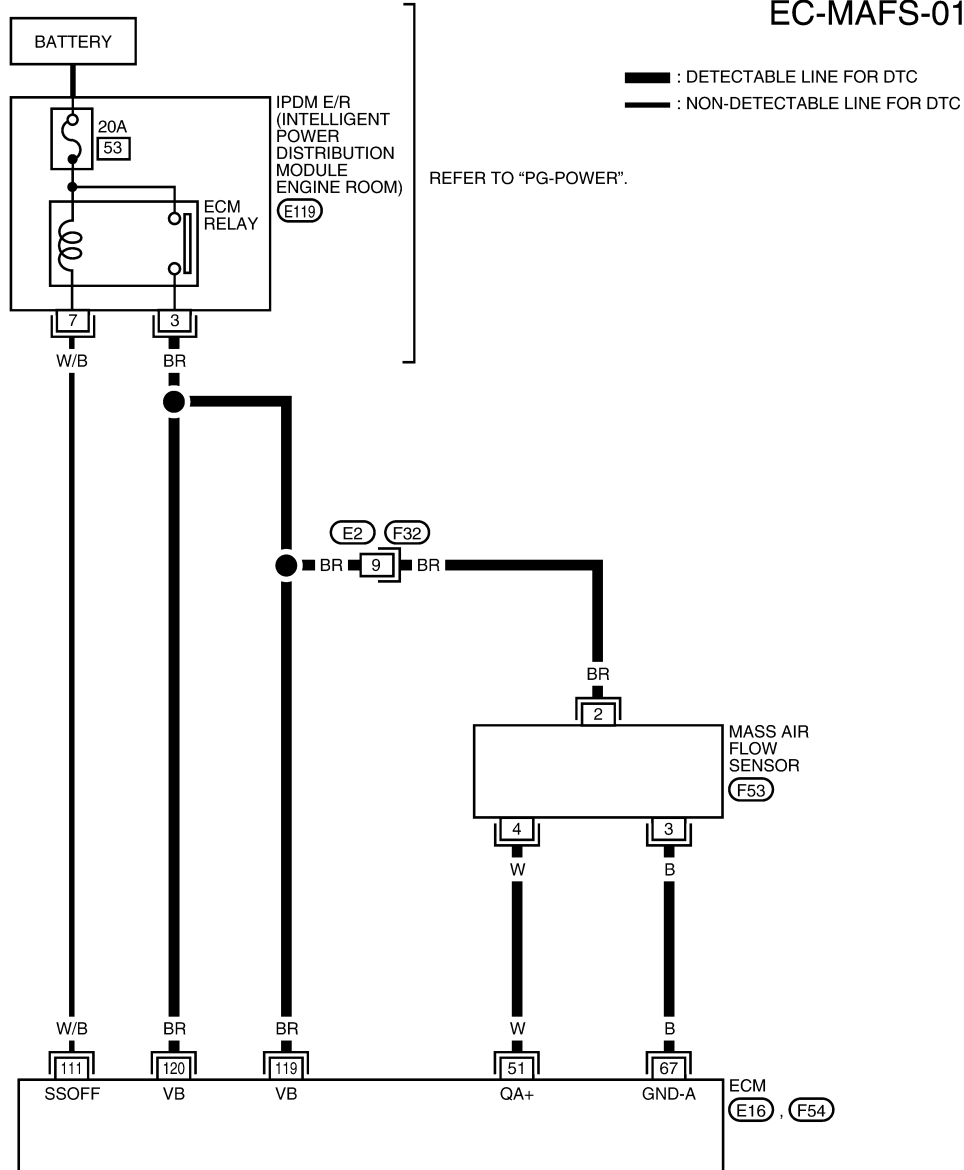
# DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531693

### EC-MAFS-01



BBWA1674E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0102, P0103 MAF SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	W	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm.	1.7 - 2.1V
67	B	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531694

### 1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

#### P0102 or P0103

P0102 >> GO TO 2.

P0103 >> GO TO 3.

### 2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

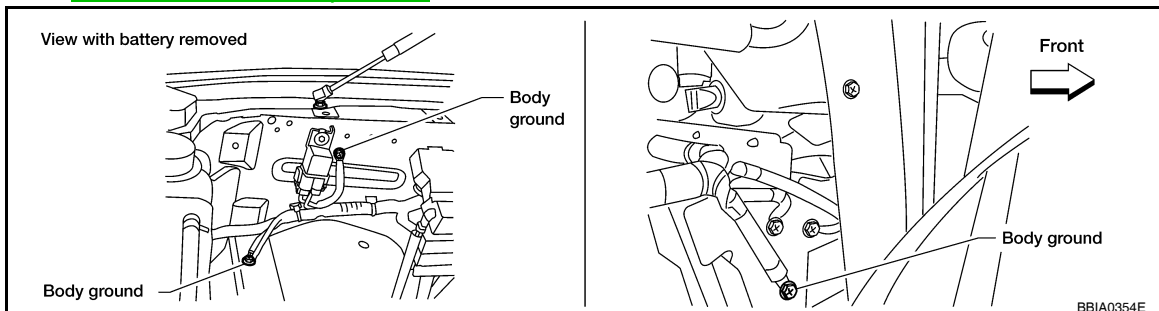
#### OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

### 3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

OK >> GO TO 4.

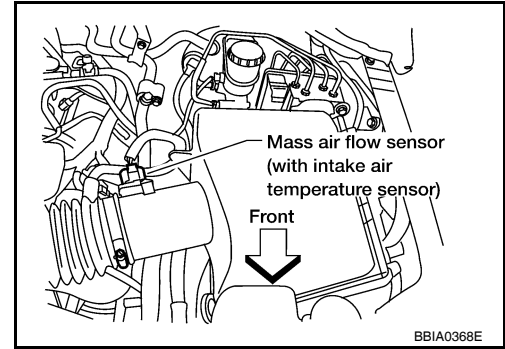
NG >> Repair or replace ground connections.

## DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION >

### 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.

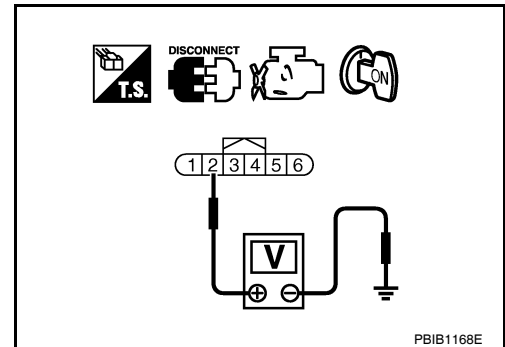


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.



### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

### 6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 7.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 8.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 8. CHECK MASS AIR FLOW SENSOR

# DTC P0102, P0103 MAF SENSOR

## < SERVICE INFORMATION >

Refer to [EC-199](#), "Component Inspection".

### OK or NG

- OK >> GO TO 9.
- NG >> Replace mass air flow sensor.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

### >> INSPECTION END

## Component Inspection

INFOID:000000003531695

## MASS AIR FLOW SENSOR

### Ⓟ With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and check indication under the following conditions.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB2371E

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

5. If the voltage is out of specification, proceed the following.
  - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
    - Crushed air ducts
    - Malfunctioning seal of air cleaner element
    - Uneven dirt of air cleaner element
    - Improper specification of intake air system parts
  - b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again. If OK, go to next step.
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

### ⓧ Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

## DTC P0102, P0103 MAF SENSOR

### < SERVICE INFORMATION >

3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*

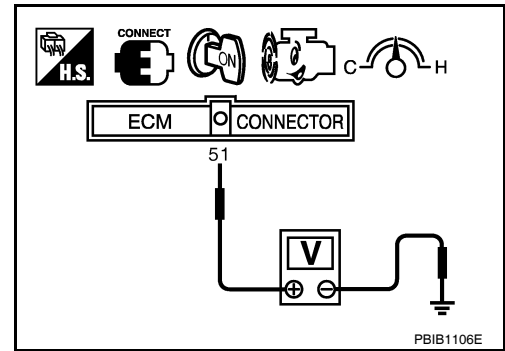
\*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.
  - a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
    - Crushed air ducts
    - Malfunctioning seal of air cleaner element
    - Uneven dirt of air cleaner element
    - Improper specification of intake air system parts
  - b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again. If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

### Removal and Installation

#### MASS AIR FLOW SENSOR

Refer to [EM-15](#).



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INFOID:000000003531696



# DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

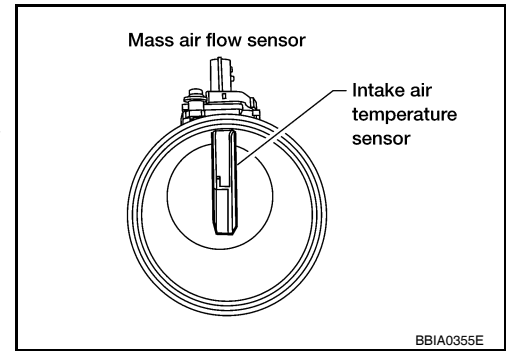
## DTC P0112, P0113 IAT SENSOR

### Component Description

INFOID:000000003531697

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

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



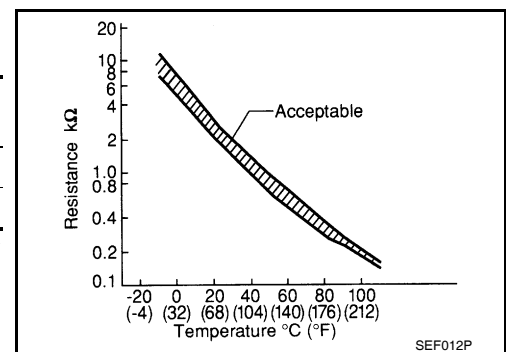
### <Reference data>

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

\*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



### On Board Diagnosis Logic

INFOID:000000003531698

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Intake air temperature sensor</li> </ul>
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

### DTC Confirmation Procedure

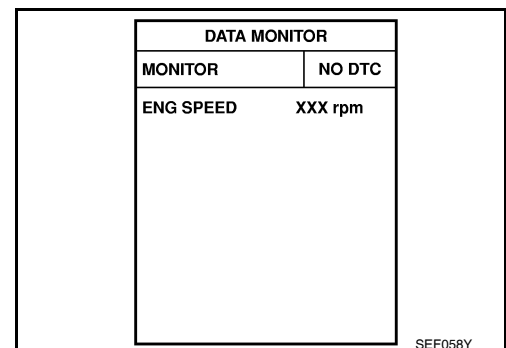
INFOID:000000003531699

### NOTE:

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

### ④ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to [EC-202, "Diagnosis Procedure"](#).



### ④ WITH GST

# DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

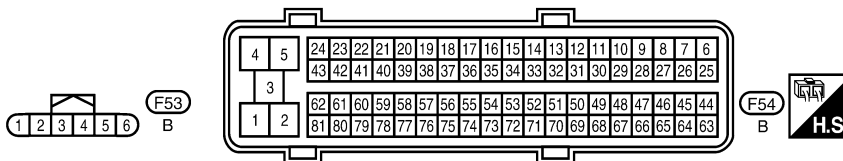
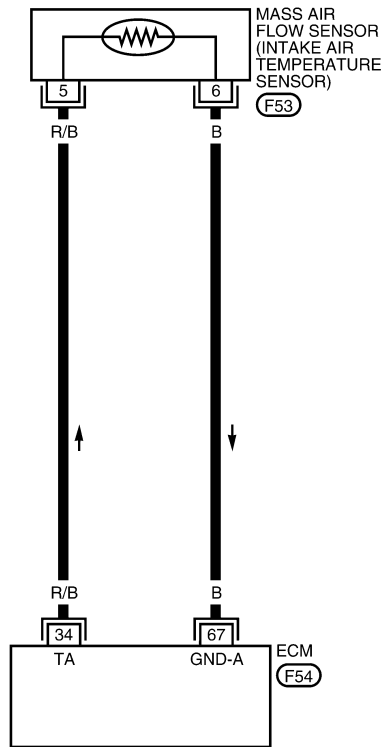
Follow the procedure "WITH CONSULT-II" above.

## Wiring Diagram

INFOID:000000003531700

### EC-IATS-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



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## Diagnosis Procedure

INFOID:000000003531701

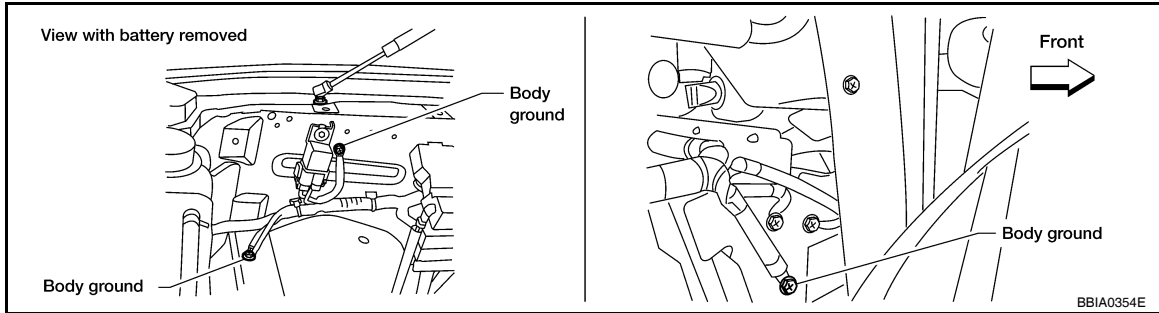
### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

## DTC P0112, P0113 IAT SENSOR

### < SERVICE INFORMATION >

Refer to [EC-143, "Ground Inspection"](#).

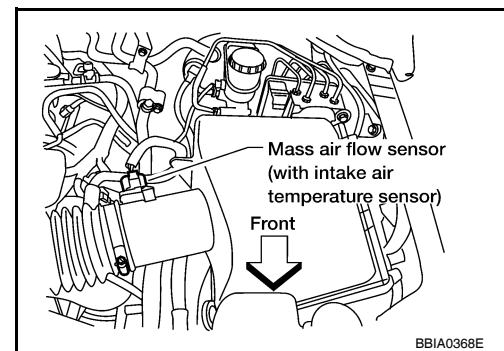


#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.

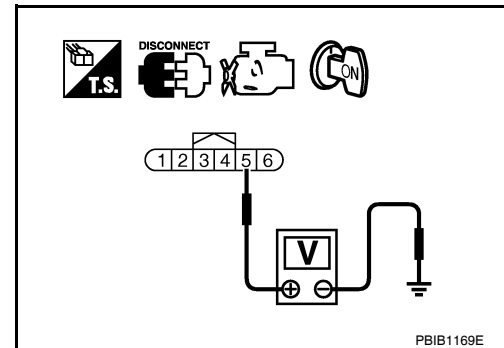


3. Check voltage between mass air flow sensor terminal 5 and ground.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 3.
- NG >> Repair harness or connectors.



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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 67.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-204, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 5.
- NG >> Replace mass air flow sensor (with intake air temperature sensor).

# DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

### Component Inspection

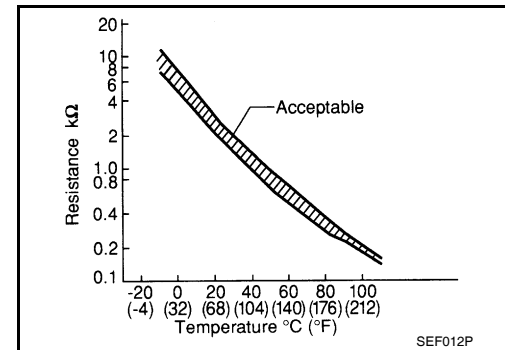
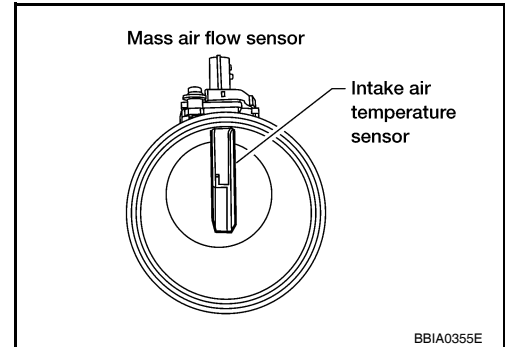
INFOID:000000003531702

#### INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).



### Removal and Installation

INFOID:000000003531703

#### MASS AIR FLOW SENSOR

Refer to [EM-15](#).

# DTC P0117, P0118 ECT SENSOR

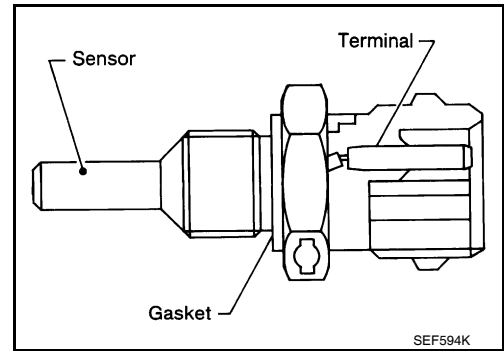
< SERVICE INFORMATION >

## DTC P0117, P0118 ECT SENSOR

### Component Description

INFOID:000000003531704

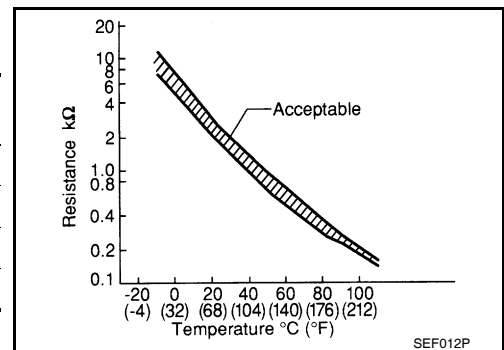
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



### <Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

\*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

### On Board Diagnosis Logic

INFOID:000000003531705

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Engine coolant temperature sensor</li> </ul>
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

# DTC P0117, P0118 ECT SENSOR

## < SERVICE INFORMATION >

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or START	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.		

### DTC Confirmation Procedure

INFOID:000000003531706

**NOTE:**

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

**Ⓟ WITH CONSULT-II**

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to [EC-207, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

**Ⓟ WITH GST**

Follow the procedure "WITH CONSULT-II" above.

# DTC P0117, P0118 ECT SENSOR

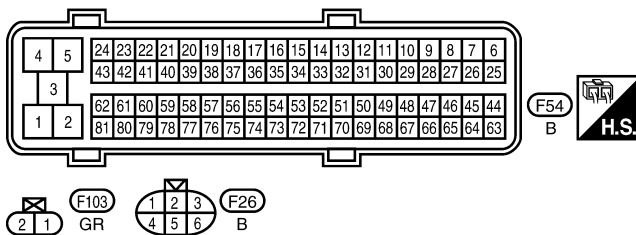
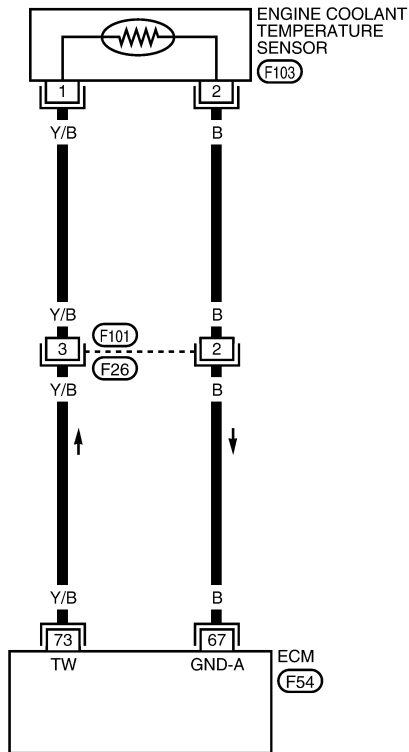
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531707

### EC-ECTS-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA1676E

## Diagnosis Procedure

INFOID:000000003531708

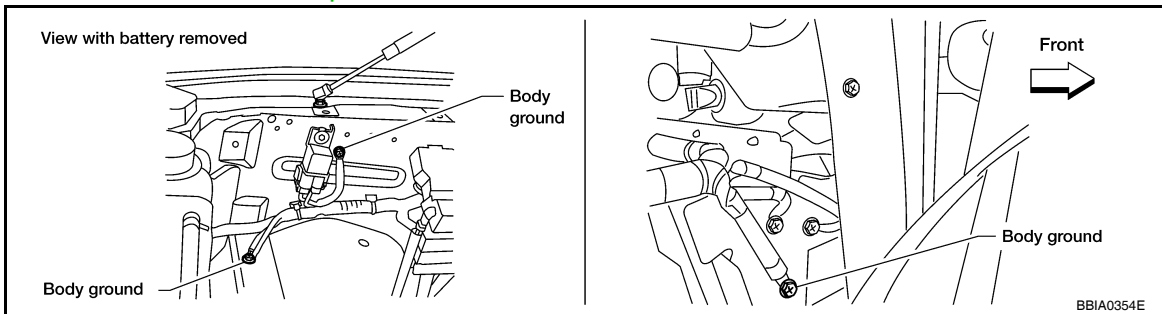
### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

## DTC P0117, P0118 ECT SENSOR

### < SERVICE INFORMATION >

Refer to [EC-143, "Ground Inspection"](#).



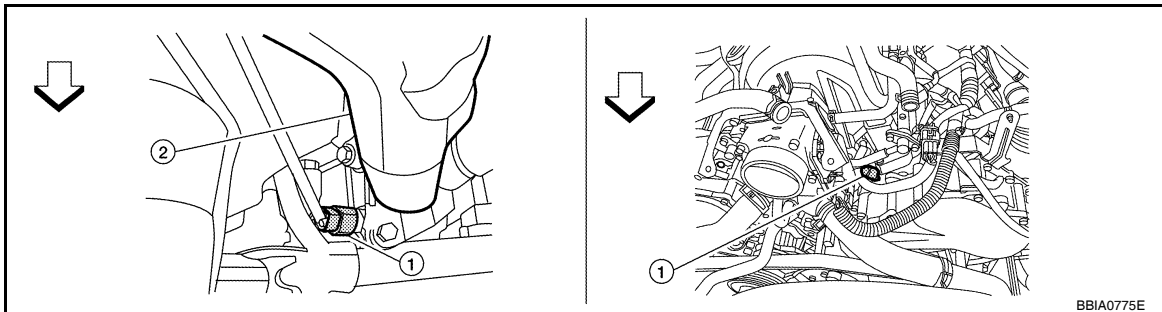
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

### 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor (1) harness connector.



1. Engine coolant temperature (ECT) sensor
2. Intake manifold sensor

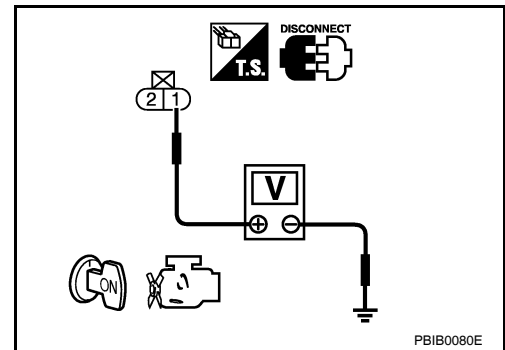
2. Turn ignition switch ON.
3. Check voltage between ECT sensor (1) terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F26, F101
- Harness for open or short between ECM and engine coolant temperature sensor

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

### 4. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**



# DTC P0117, P0118 ECT SENSOR

## < SERVICE INFORMATION >

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

### OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F26, F101
- Harness for open and short between ECT sensor and ECM

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

## 6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-209](#). "Component Inspection".

### OK or NG

- OK >> GO TO 7.
- NG >> Replace engine coolant temperature sensor.

## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

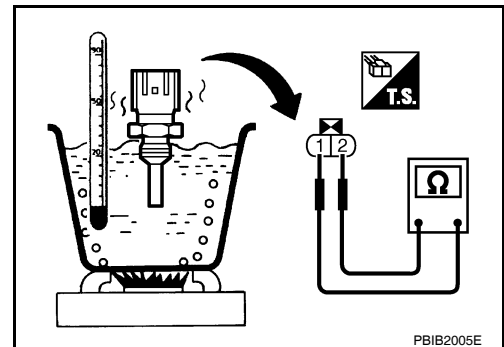
>> **INSPECTION END**

## Component Inspection

INFOID:000000003531709

### ENGINE COOLANT TEMPERATURE SENSOR

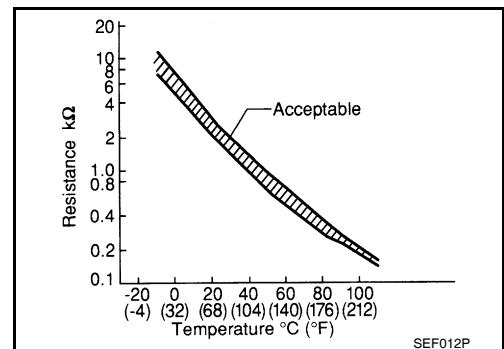
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



### <Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



## Removal and Installation

INFOID:000000003531710

### ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EM-64](#).

# DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

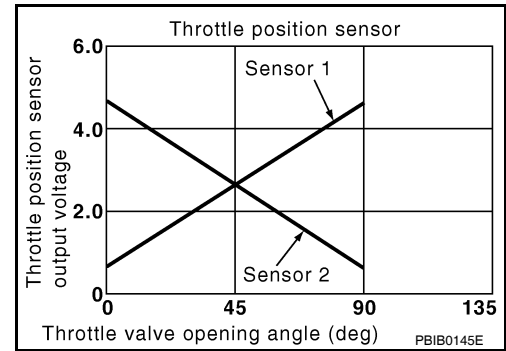
## DTC P0122, P0123 TP SENSOR

### Component Description

INFOID:000000003531711

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

The throttle position sensor has the 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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531712

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.36V
		Accelerator pedal: Fully depressed Less than 4.75V

\*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

### On Board Diagnosis Logic

INFOID:000000003531713

**These self-diagnoses have the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.)</li> <li>• Electric throttle control actuator (TP sensor 2)</li> <li>• Accelerator pedal position sensor (APP sensor 2)</li> </ul>
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:000000003531714

#### NOTE:

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 8V at idle.**

④ WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P0122, P0123 TP SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-213. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

A

EC

C

D

E

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P

# DTC P0122, P0123 TP SENSOR

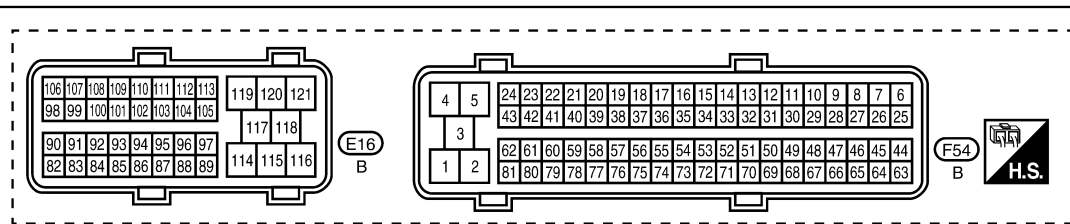
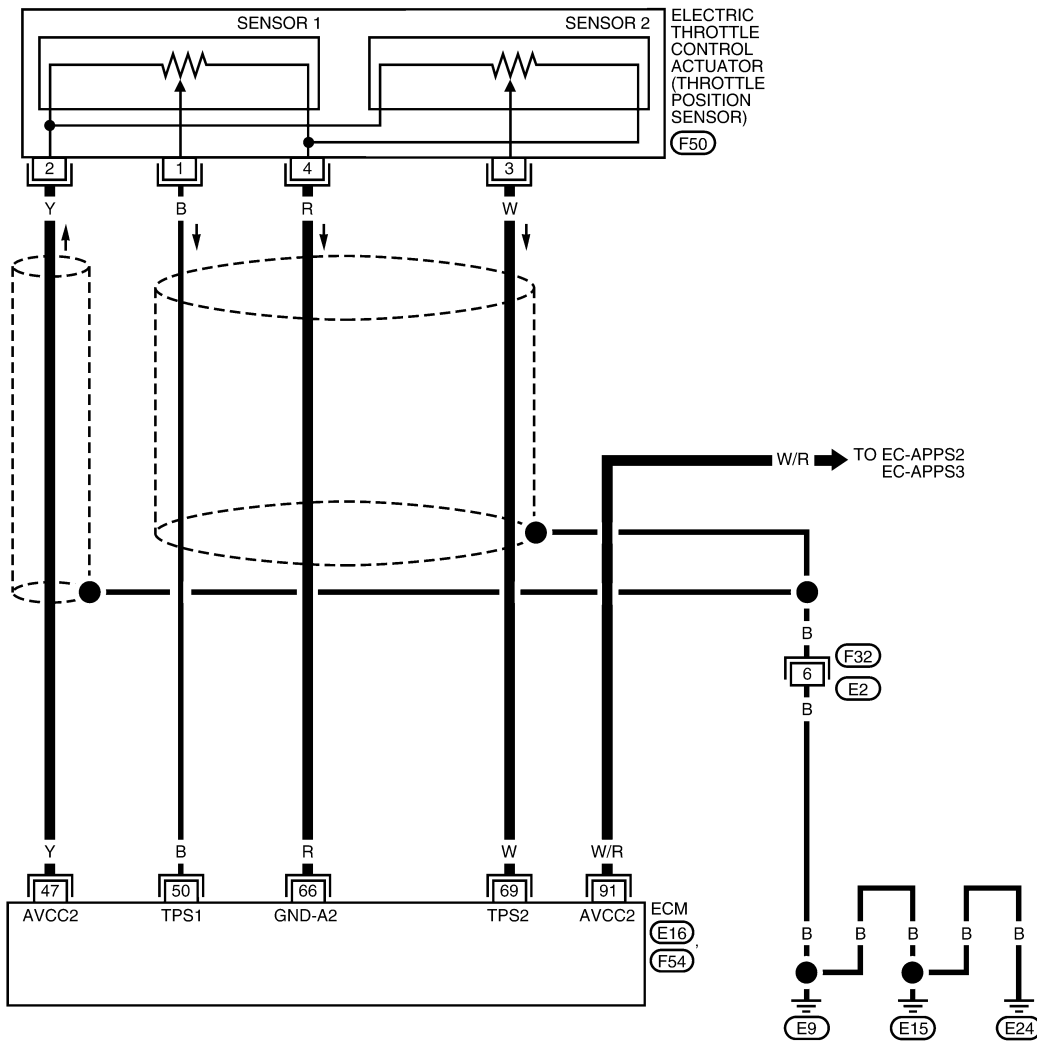
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531715

### EC-TPS2-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



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Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0122, P0123 TP SENSOR

## < SERVICE INFORMATION >

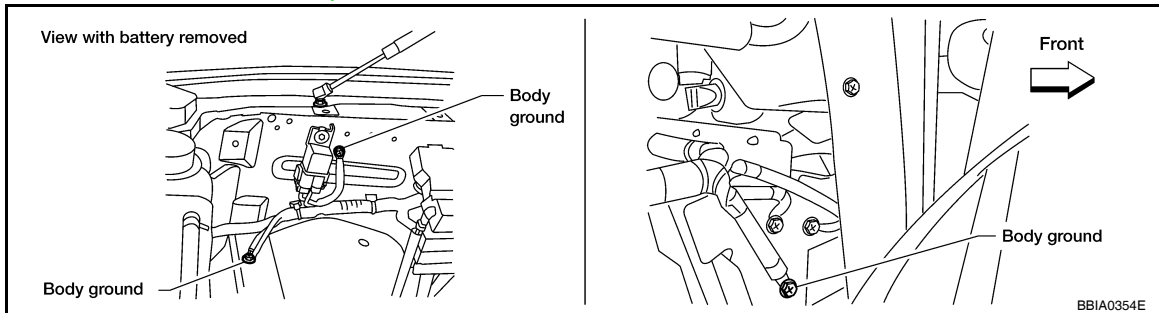
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	Y	Sensor power supply (Throttle position sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
50	B	Throttle position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
69	W	Throttle position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V

## Diagnosis Procedure

INFOID:000000003531716

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

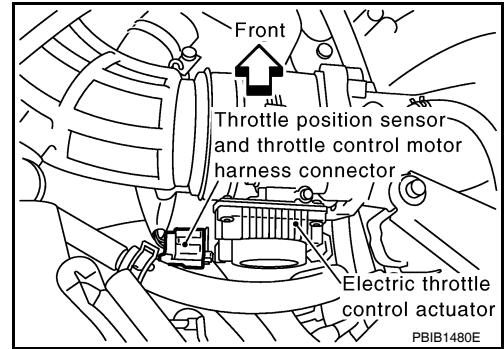
- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

## DTC P0122, P0123 TP SENSOR

### < SERVICE INFORMATION >

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

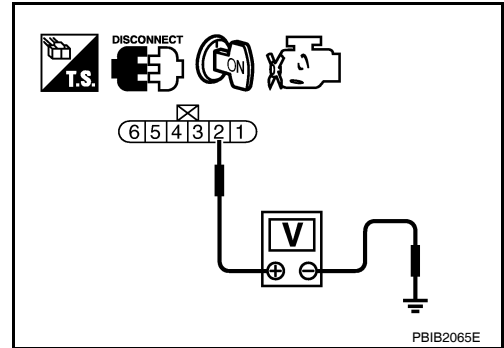


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 7.  
 NG >> GO TO 3.



### 3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

#### OK or NG

- OK >> GO TO 4.  
 NG >> Repair or replace open circuit.

### 4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	<a href="#">EC-212</a>
91	APP sensor terminal 6	<a href="#">EC-583</a>

#### OK or NG

- OK >> GO TO 5.  
 NG >> Repair short to ground or short to power in harness or connectors.

### 5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-587, "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 11.  
 NG >> GO TO 6.

### 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-78, "Idle Air Volume Learning"](#) .

# DTC P0122, P0123 TP SENSOR

< SERVICE INFORMATION >

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>> INSPECTION END

## 7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

---

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

## 8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 9.

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

## 9. CHECK THROTTLE POSITION SENSOR

---

Refer to [EC-215. "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

---

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-78. "Idle Air Volume Learning"](#) .

>> INSPECTION END

## 11. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

>> INSPECTION END

## Component Inspection

INFOID:000000003531717

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#) .
3. Turn ignition switch ON.
4. Set selector lever to D position.

## DTC P0122, P0123 TP SENSOR

### < SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

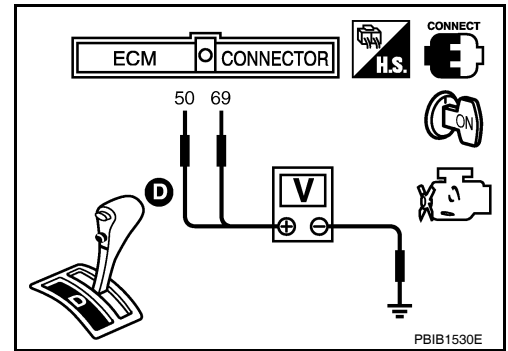
7. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .

8. Perform [EC-78, "Idle Air Volume Learning"](#) .

### Removal and Installation

#### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#) .



INFOID:000000003531718



# DTC P0125 ECT SENSOR

< SERVICE INFORMATION >

## DTC P0125 ECT SENSOR

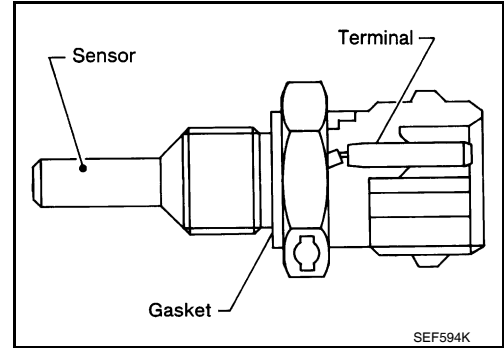
### Component Description

INFOID:000000003531719

**NOTE:**

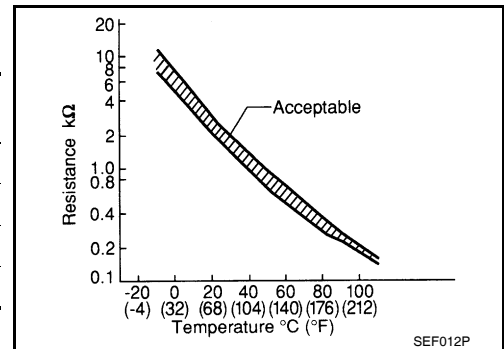
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to [EC-205](#).

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



### <Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



\*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

### On Board Diagnosis Logic

INFOID:000000003531720

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	<ul style="list-style-type: none"> <li>Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul>	<ul style="list-style-type: none"> <li>Harness or connectors (High resistance in the circuit)</li> <li>Engine coolant temperature sensor</li> <li>Thermostat</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531721

**CAUTION:**

Be careful not to overheat engine.

**NOTE:**

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

Ⓟ WITH CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- Check that "COOLAN TEMP/S" is above 31°C (88°F).  
If it is above 31°C (88°F), the test result will be OK.  
If it is below 31°C (88°F), go to following step.

# DTC P0125 ECT SENSOR

## < SERVICE INFORMATION >

- Start engine and run it for 65 minutes at idle speed.  
**If "COOLAN TEMP/S" increases to more than 31°C (88°F) within 65 minutes, stop engine because the test result will be OK.**
- If 1st trip DTC is detected, go to [EC-218, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

### WITH GST

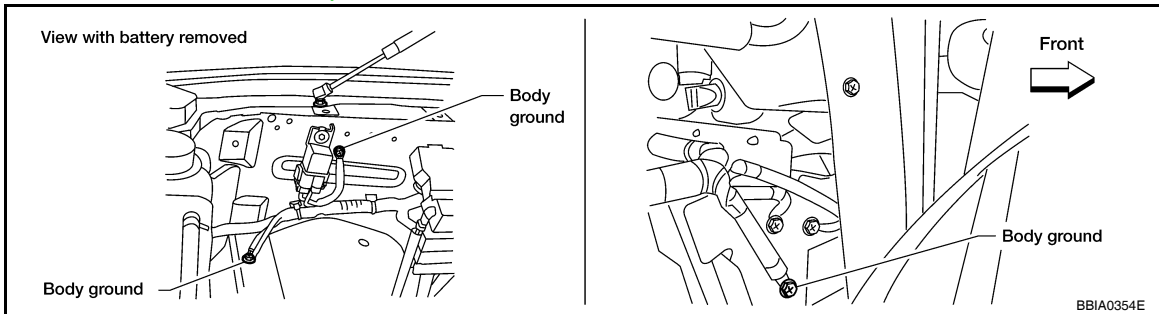
Follow the procedure "WITH CONSULT-II" above.

## Diagnosis Procedure

INFOID:000000003531722

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-218, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 3.
- NG >> Replace engine coolant temperature sensor.

### 3. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

#### OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace thermostat. Refer to [CO-20](#).

### 4. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

Refer to [EC-207, "Wiring Diagram"](#).

>> **INSPECTION END**

## Component Inspection

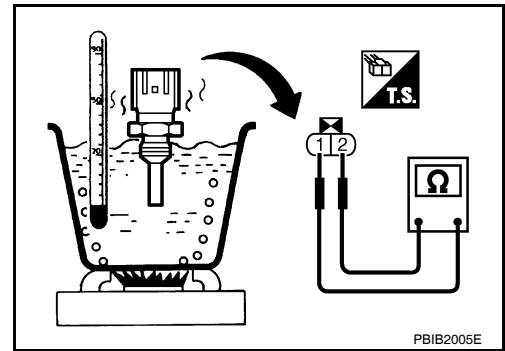
INFOID:000000003531723

## ENGINE COOLANT TEMPERATURE SENSOR

# DTC P0125 ECT SENSOR

## < SERVICE INFORMATION >

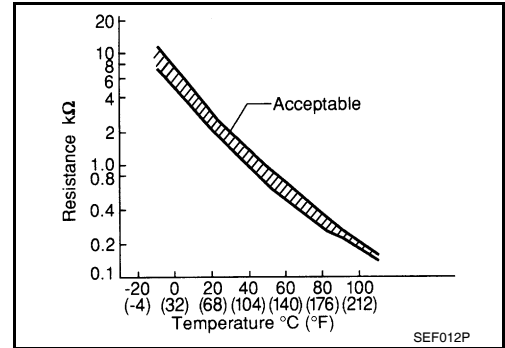
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



### <Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



## Removal and Installation

### ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-20](#) .

INFOID:000000003531724

# DTC P0127 IAT SENSOR

< SERVICE INFORMATION >

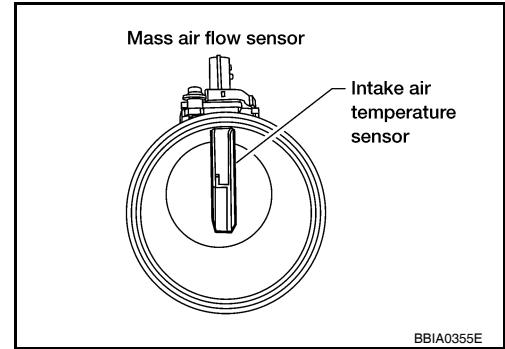
## DTC P0127 IAT SENSOR

### Component Description

INFOID:000000003531725

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

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



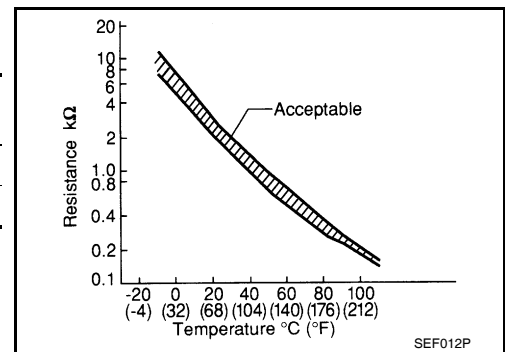
### <Reference data>

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

\*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

#### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



### On Board Diagnosis Logic

INFOID:000000003531726

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Intake air temperature sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531727

#### NOTE:

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

#### CAUTION:

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

#### 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.**

#### Ⓜ WITH CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F)
  - a. Turn ignition switch ON.

# DTC P0127 IAT SENSOR

## < SERVICE INFORMATION >

- b. Select "DATA MONITOR" mode with CONSULT-II.
  - c. Check the engine coolant temperature.
  - d. If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
    - Perform the following steps before engine coolant temperature is above 90°C (194°F).
2. Turn ignition switch ON.
  3. Select "DATA MONITOR" mode with CONSULT-II.
  4. Start engine.
  5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
  6. If 1st trip DTC is detected, go to [EC-221, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

### WITH GST

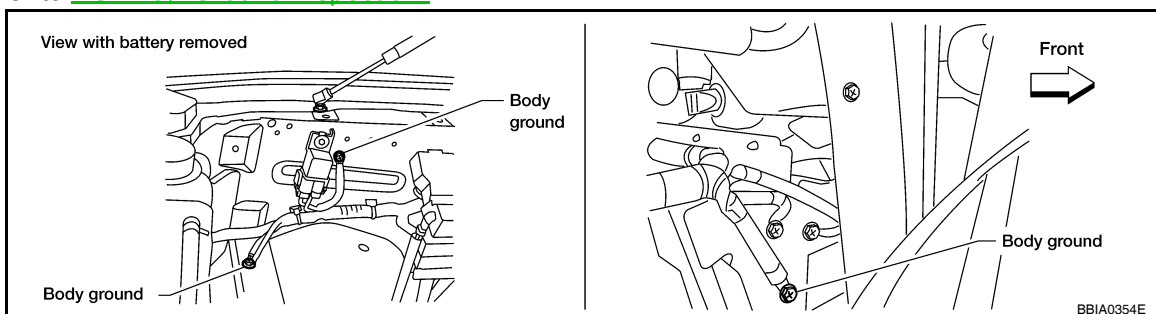
Follow the procedure "WITH CONSULT-II" above.

## Diagnosis Procedure

INFOID:000000003531728

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-221, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 3.
- NG >> Replace mass air flow sensor (with intake air temperature sensor).

### 3. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

Refer to [EC-202, "Wiring Diagram"](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531729

## INTAKE AIR TEMPERATURE SENSOR

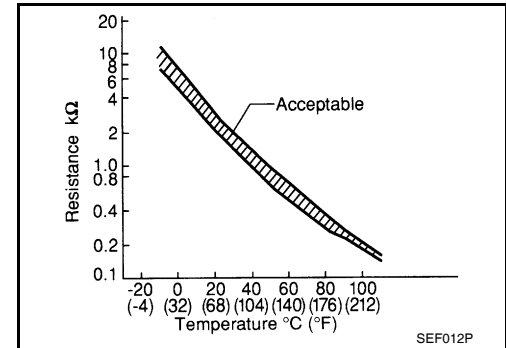
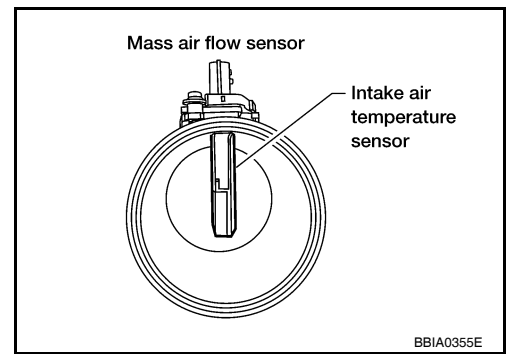
# DTC P0127 IAT SENSOR

## < SERVICE INFORMATION >

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).



## Removal and Installation

INFOID:000000003531730

### MASS AIR FLOW SENSOR

Refer to [EM-15](#).

# DTC P0128 THERMOSTAT FUNCTION

< SERVICE INFORMATION >

## DTC P0128 THERMOSTAT FUNCTION

### On Board Diagnosis Logic

INFOID:000000003531731

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul style="list-style-type: none"><li>• Thermostat</li><li>• Leakage from sealing portion of thermostat</li><li>• Engine coolant temperature sensor</li></ul>

### DTC Confirmation Procedure

INFOID:000000003531732

#### NOTE:

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

#### TESTING CONDITION:

- For best results, perform at ambient temperature of  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ) or higher.
- For best results, perform at engine coolant temperature of  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ) to  $72^{\circ}\text{C}$  ( $162^{\circ}\text{F}$ ).

#### WITH CONSULT-II

1. Replace thermostat with new one. Refer to [CO-20](#). Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
4. Check that the "COOLAN TEMP/S" is above  $72^{\circ}\text{C}$  ( $162^{\circ}\text{F}$ ).  
If it is below  $72^{\circ}\text{C}$  ( $162^{\circ}\text{F}$ ), go to following step.  
If it is above  $72^{\circ}\text{C}$  ( $162^{\circ}\text{F}$ ), cool down the engine to less than  $72^{\circ}\text{C}$  ( $162^{\circ}\text{F}$ ), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)
---------------	-----------------------------

If 1st trip DTC is detected, go to [EC-223. "Diagnosis Procedure"](#).

#### WITH GST

1. Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003531733

#### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-223. "Component Inspection"](#).

#### OK or NG

- OK >> **INSPECTION END**
- NG >> Replace engine coolant temperature sensor.

### Component Inspection

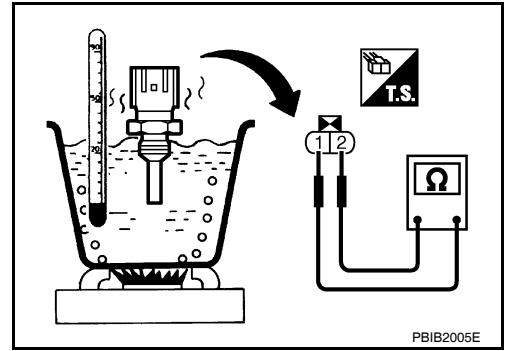
INFOID:000000003531734

#### ENGINE COOLANT TEMPERATURE SENSOR

# DTC P0128 THERMOSTAT FUNCTION

## < SERVICE INFORMATION >

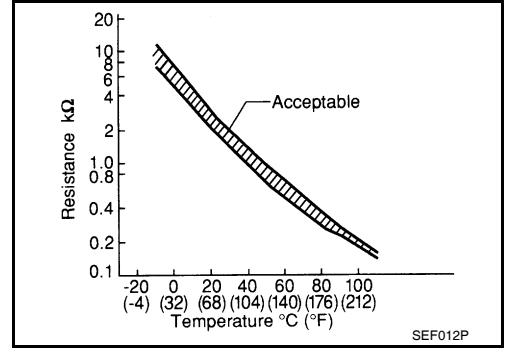
1. Check resistance between engine coolant temperature sensor terminals as shown in the figure.



## <Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



## Removal and Installation

### ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-20](#).

INFOID:000000003531735



# DTC P0130, P0150 A/F SENSOR 1

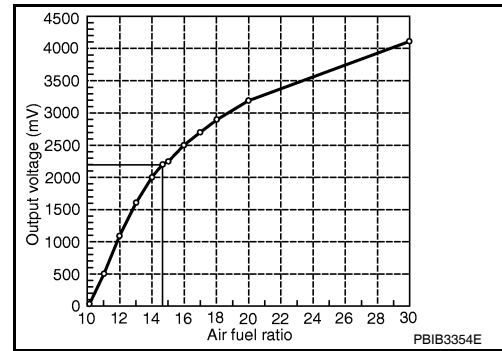
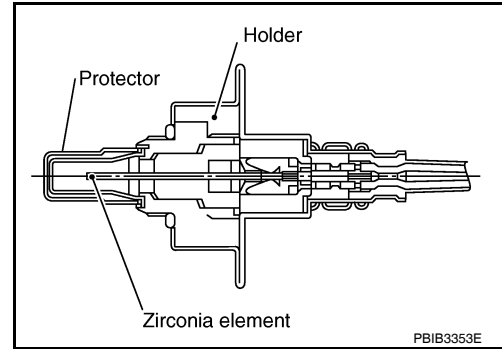
< SERVICE INFORMATION >

## DTC P0130, P0150 A/F SENSOR 1

### Component Description

INFOID:000000003531736

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531737

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

### On Board Diagnosis Logic

INFOID:000000003531738

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0130 0130 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit	A) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2V.	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>• Air fuel ratio (A/F) sensor 1</li> </ul>
P0150 0150 (Bank 2)		B) The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	

### DTC Confirmation Procedure

INFOID:000000003531739

**Perform PROCEDURE FOR MALFUNCTION A first.**

**If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.**

#### NOTE:

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 11V at idle.**

#### PROCEDURE FOR MALFUNCTION A

# DTC P0130, P0150 A/F SENSOR 1

## < SERVICE INFORMATION >

### Ⓟ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Let engine idle for 2 minutes.
4. If 1st trip DTC is detected, go to [EC-231. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

### Ⓟ With GST

Follow the procedure "With CONSULT-II" above.

## PROCEDURE FOR MALFUNCTION B

### CAUTION:

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

### Ⓟ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-II.
3. Check "A/F SEN1 (B1)" indication.  
If the indication is constantly approx. 2.2V and does not fluctuates, go to [EC-231. "Diagnosis Procedure"](#).  
If the indication fluctuates around 2.2V, go to next step.
4. Select "A/F SEN1 (B1) P1276" (for DTC P0130) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-II.
5. Touch "START".
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen.

ENG SPEED	850 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Shift lever	D position

**If "TESTING" is not displayed after 20 seconds, retry from step 2.**

A/F SEN1 (B1) P1276	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF576Z

7. Release accelerator pedal fully.

### NOTE:

Never apply brake during releasing the accelerator pedal.

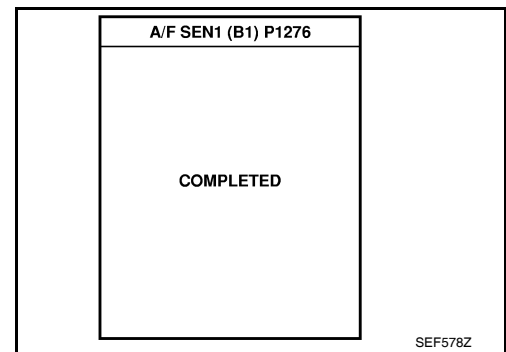
A/F SEN1 (B1) P1276	
TESTING	
SELECT 3RD GEAR AND THEN RELEASE ACCELERATOR PEDAL OFF	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF577Z

## DTC P0130, P0150 A/F SENSOR 1

### < SERVICE INFORMATION >

8. Make sure that "TESTING" changes to "COMPLETED".  
If "TESTING" changed to "OUT OF CONDITION", retry from step 6.
9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".  
If "NG" is displayed, go to [EC-231, "Diagnosis Procedure"](#).



### Overall Function Check

INFOID:000000003531740

#### PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

 With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set shift lever to D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

#### NOTE:

Never apply brake during releasing the accelerator pedal.

4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 and 3 for five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.  
If the 1st trip DTC is displayed, go to [EC-231, "Diagnosis Procedure"](#).

# DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

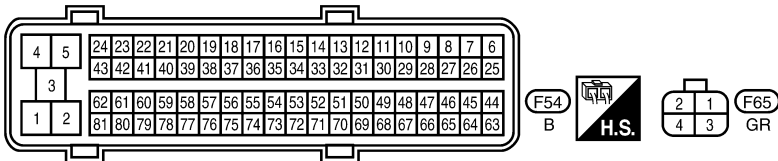
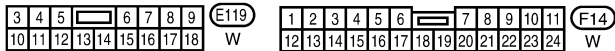
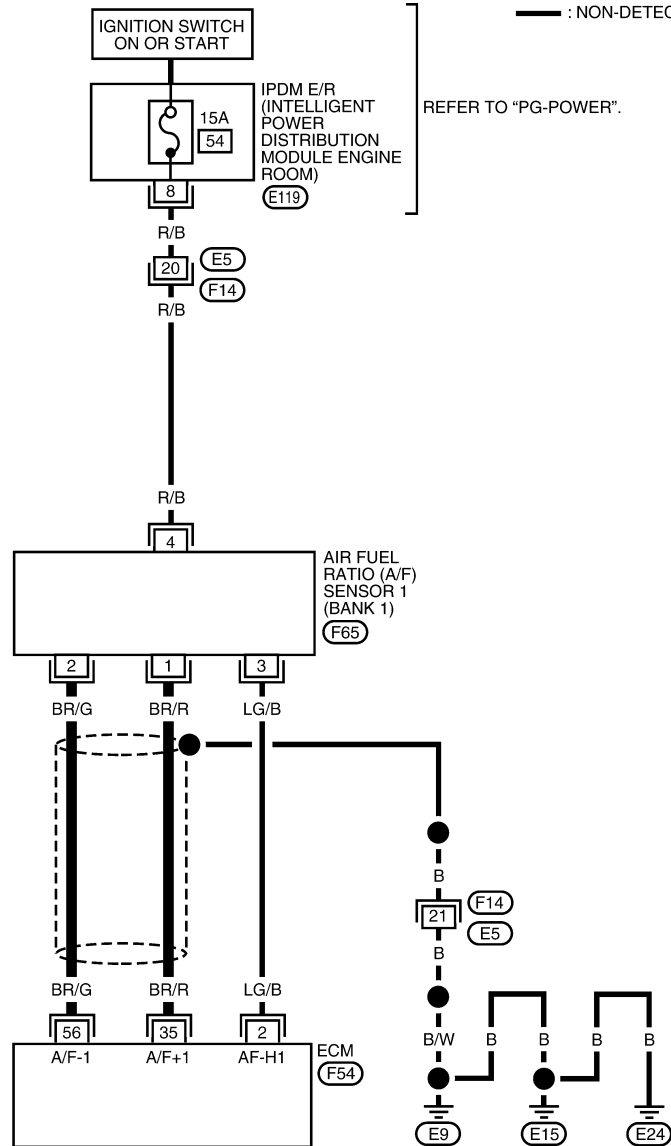
## Wiring Diagram

INFOID:000000003531741

BANK 1

### EC-AF1B1-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2790E

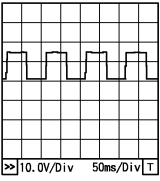
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0130, P0150 A/F SENSOR 1

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★ 
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

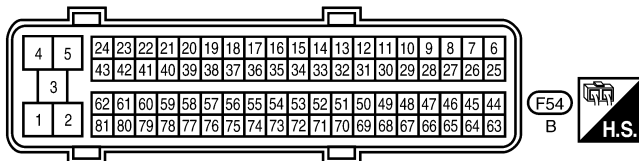
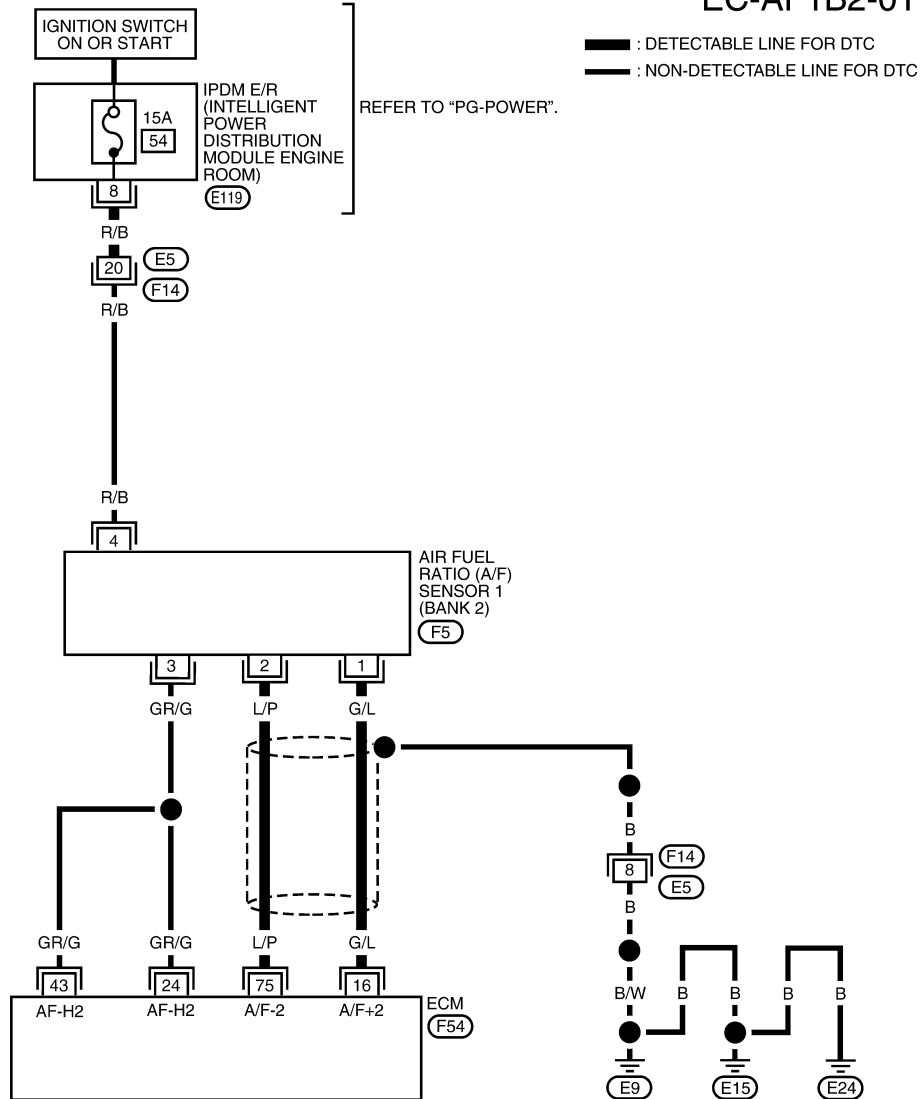
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



BBWA2791E

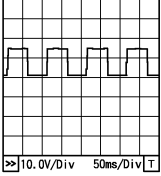
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0130, P0150 A/F SENSOR 1

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBI A8148J
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

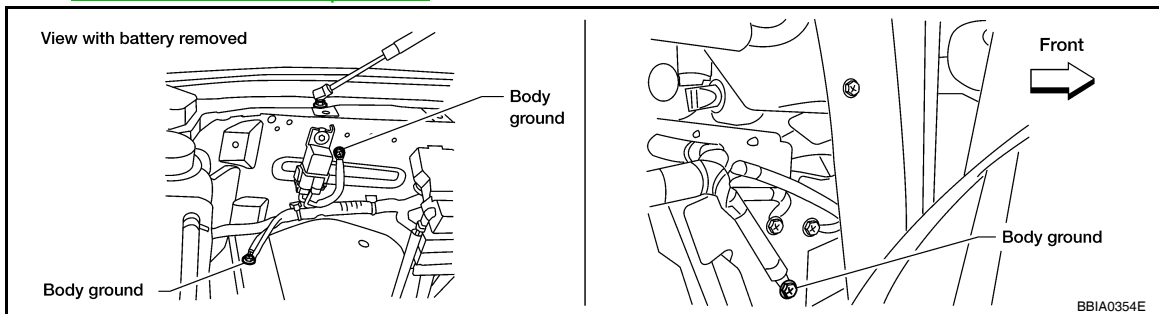
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531742

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

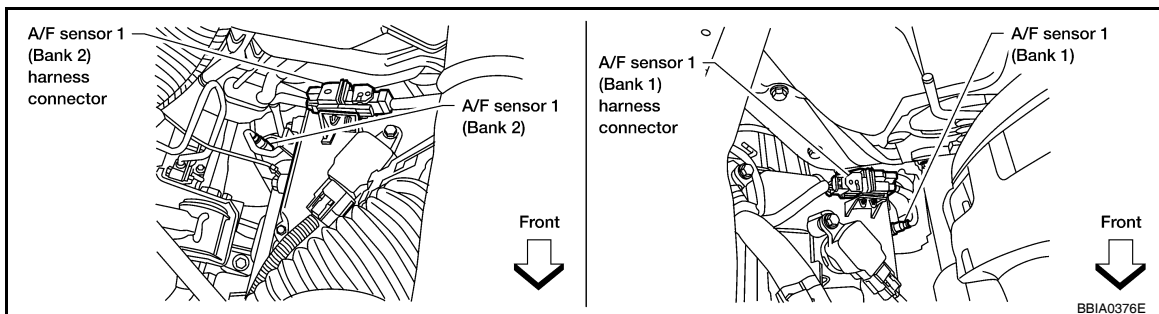


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

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

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.

# DTC P0130, P0150 A/F SENSOR 1

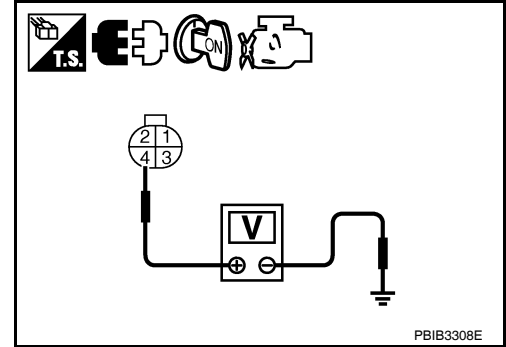
## < SERVICE INFORMATION >

- Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

- Also check harness for short to power.

### OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

### OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace.

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



# DTC P0130, P0150 A/F SENSOR 1

## < SERVICE INFORMATION >

---

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

**CAUTION:**

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

>> INSPECTION END

## Removal and Installation

INFOID:000000003531743

## AIR FUEL RATIO SENSOR

Refer to [EM-21](#).

A

EC

C

D

E

F

G

H

I

J

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# DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

## DTC P0131, P0151 A/F SENSOR 1

### Component Description

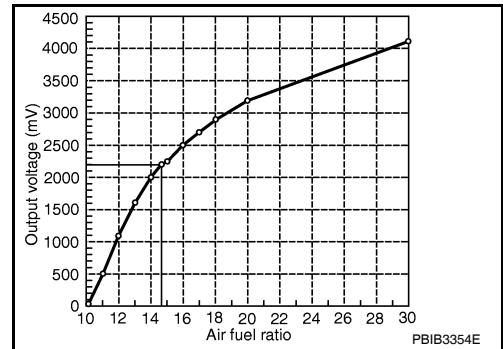
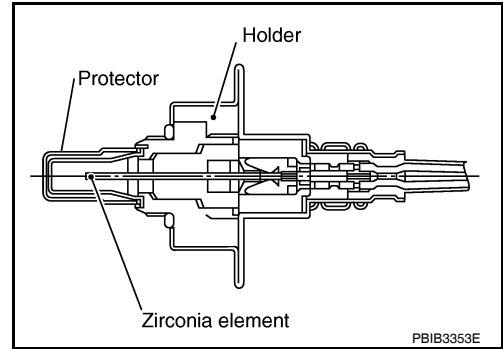
INFOID:000000003531744

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531745

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

### On Board Diagnosis Logic

INFOID:000000003531746

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131 0131 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit low voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>• Air fuel ratio (A/F) sensor 1</li> </ul>
P0151 0151 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531747

#### NOTE:

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

#### TESTING CONDITION:

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

#### Ⓟ WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-II.

# DTC P0131, P0151 A/F SENSOR 1

## < SERVICE INFORMATION >

3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.  
If the indication is constantly approx. 0V, go to [EC-239, "Diagnosis Procedure"](#).  
If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
A/F SEN1 (B1)	XXX V

SEF581Z

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
Gear position	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 4, return to step 4.
7. If 1st trip DTC is displayed, go to [EC-239, "Diagnosis Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

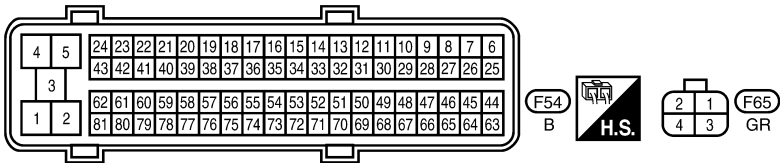
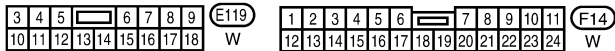
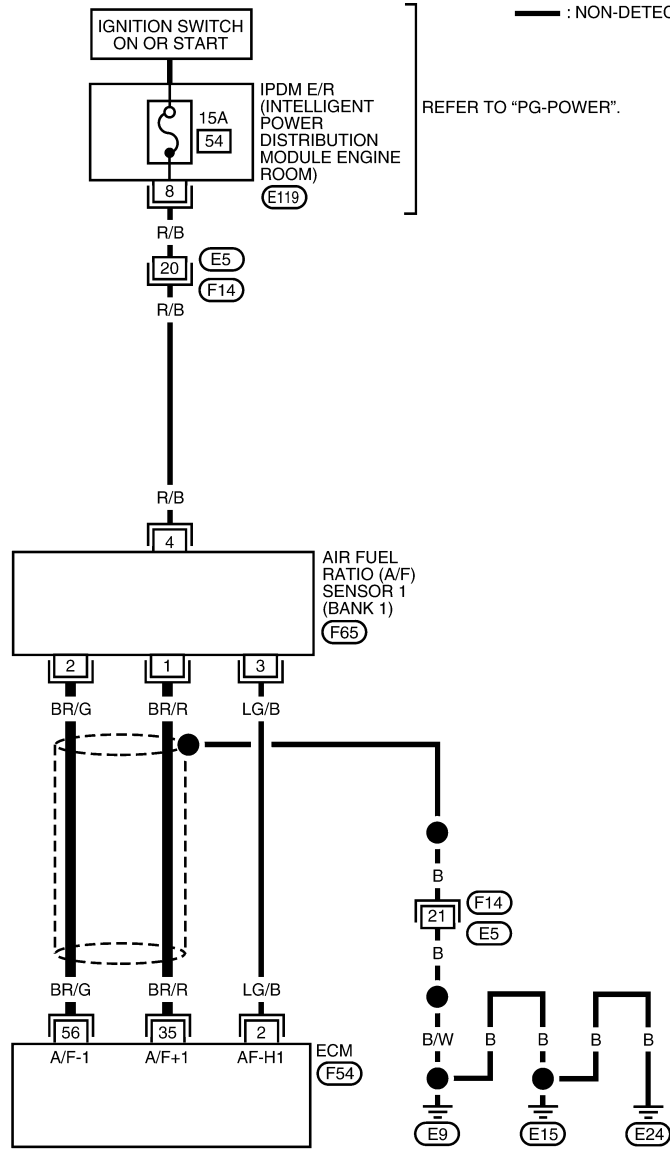
## Wiring Diagram

INFOID:000000003531748

BANK 1

### EC-AF1B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2790E

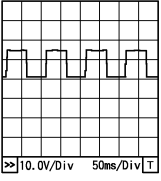
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0131, P0151 A/F SENSOR 1

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★ 
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

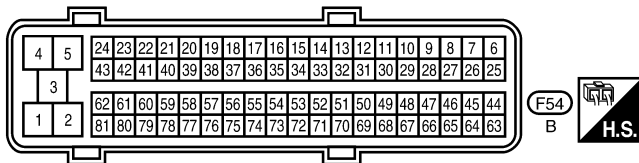
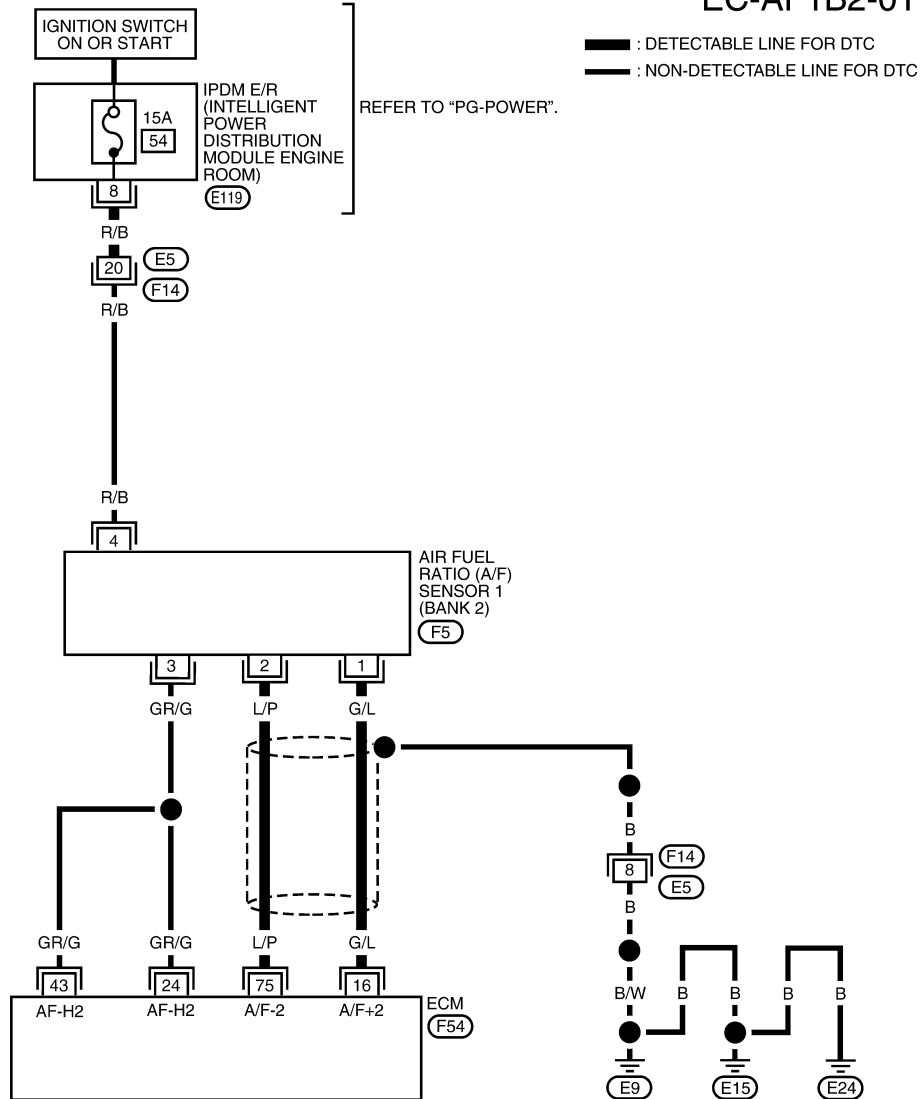
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



BBWA2791E

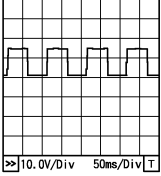
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0131, P0151 A/F SENSOR 1

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBI A8148J
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

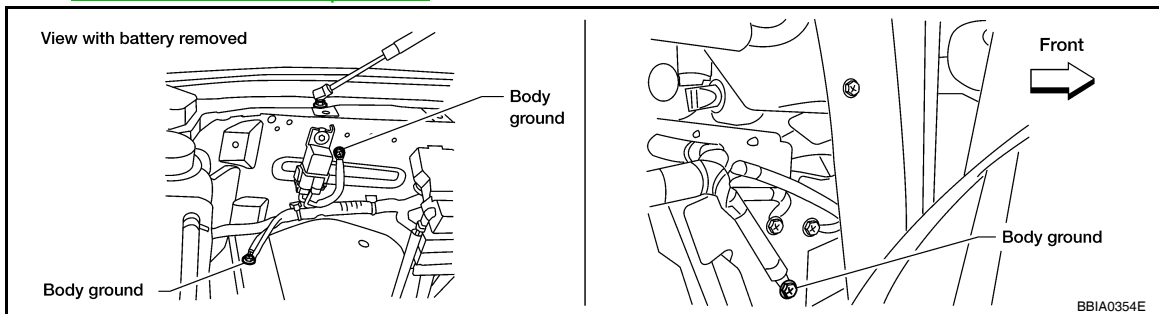
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531749

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

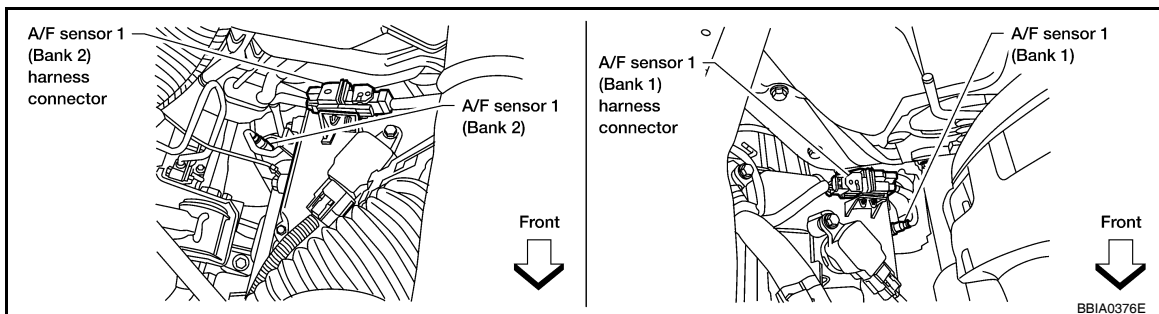


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

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

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.

# DTC P0131, P0151 A/F SENSOR 1

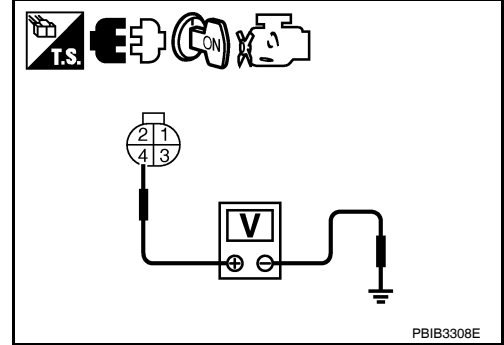
## < SERVICE INFORMATION >

- Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

- Also check harness for short to power.

### OK or NG

- OK >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

### OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace.



# DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

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

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

**CAUTION:**

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

>> INSPECTION END

## Removal and Installation

INFOID:000000003531750

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-21](#).

A  
EC  
C  
D  
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F  
G  
H  
I  
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K  
L  
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N  
O  
P

# DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

## DTC P0132, P0152 A/F SENSOR 1

### Component Description

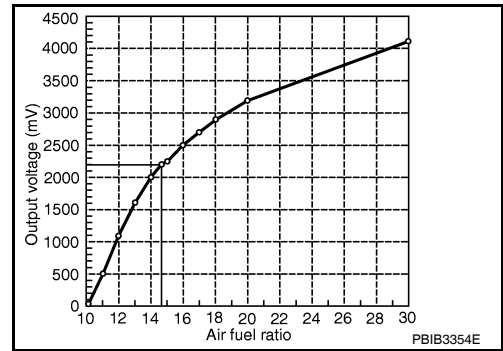
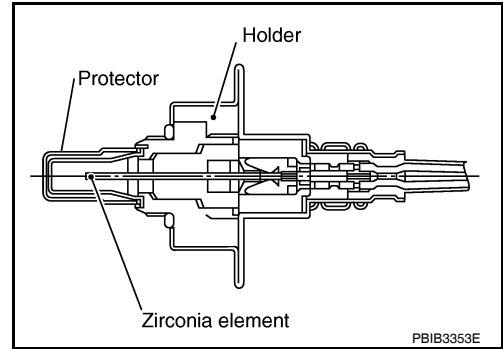
INFOID:000000003531751

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531752

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

### On Board Diagnosis Logic

INFOID:000000003531753

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132 0132 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>• Air fuel ratio (A/F) sensor 1</li> </ul>
P0132 0132 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531754

#### NOTE:

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

#### TESTING CONDITION:

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

#### Ⓟ WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-II.

# DTC P0132, P0152 A/F SENSOR 1

## < SERVICE INFORMATION >

3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.  
If the indication is constantly approx. 5V, go to [EC-247, "Diagnosis Procedure"](#).  
If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
A/F SEN1 (B1)	XXX V

SEF581Z

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
Gear position	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 4, return to step 4.
7. If 1st trip DTC is displayed, go to [EC-247, "Diagnosis Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
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N  
O  
P

# DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

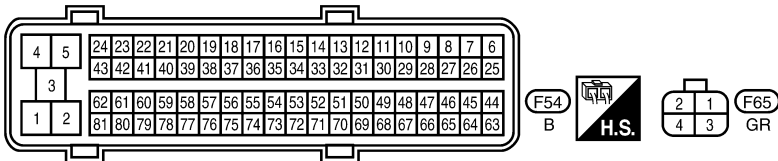
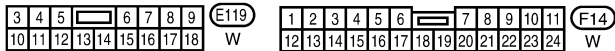
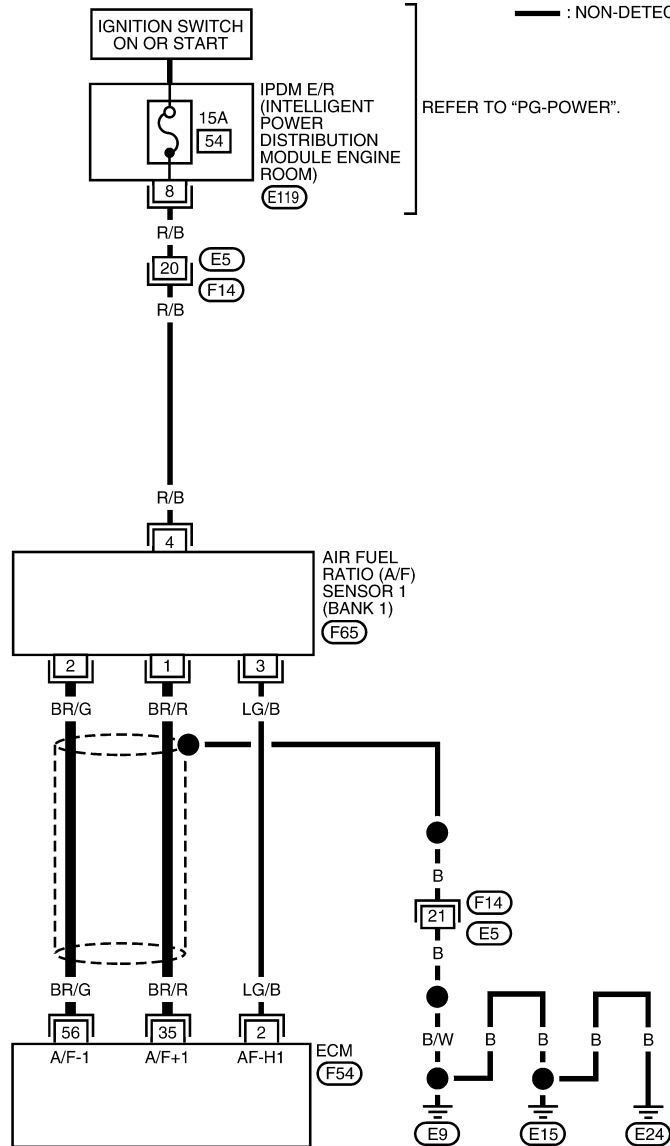
## Wiring Diagram

INFOID:000000003531755

BANK 1

### EC-AF1B1-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2790E

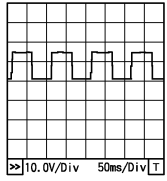
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0132, P0152 A/F SENSOR 1

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★ 
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

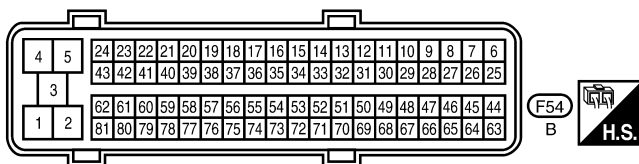
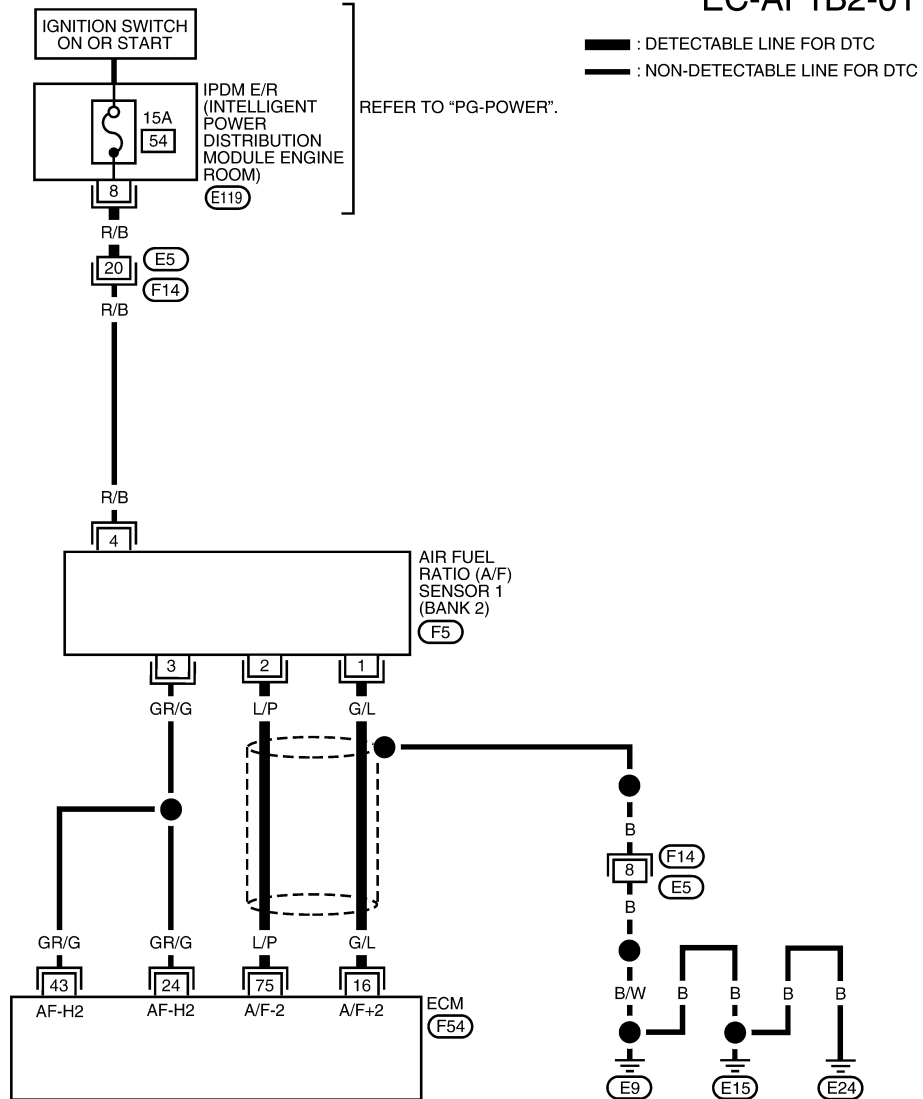
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



BBWA2791E

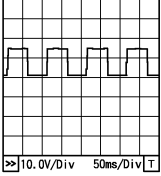
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0132, P0152 A/F SENSOR 1

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBI A8148J
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

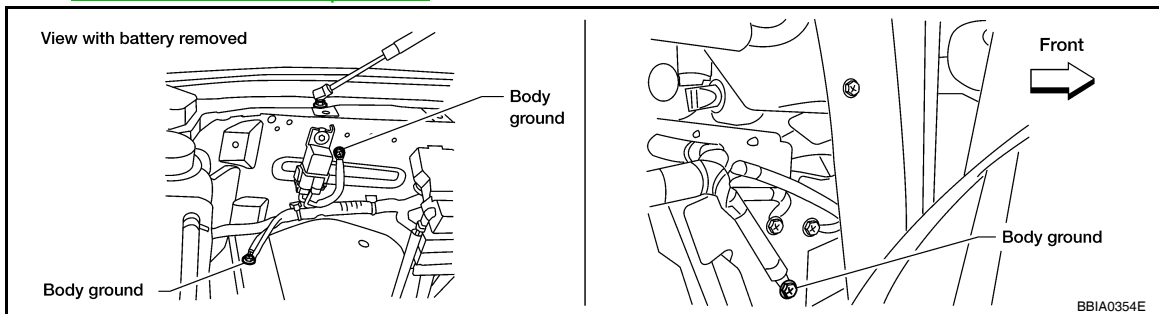
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531756

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

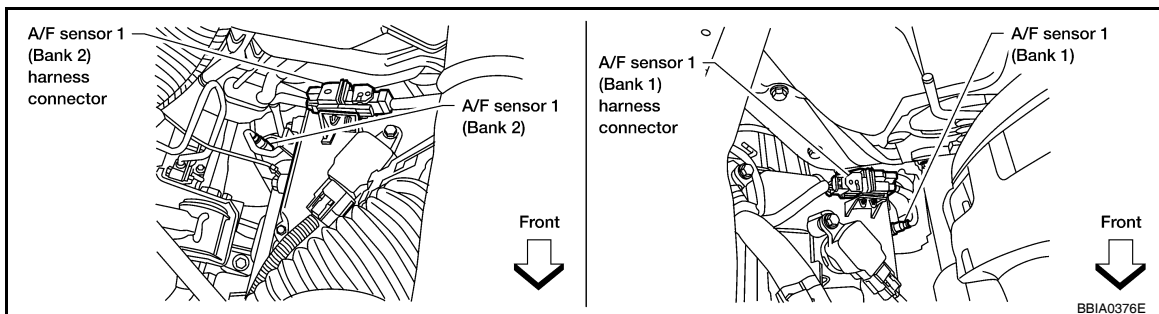


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

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

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.

# DTC P0132, P0152 A/F SENSOR 1

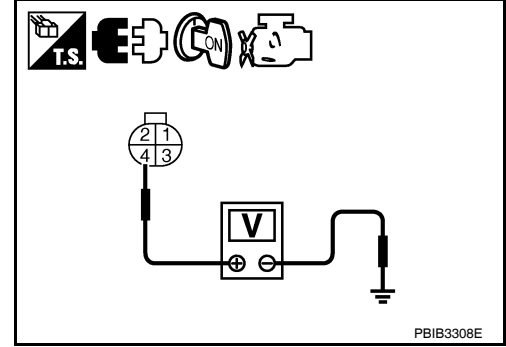
## < SERVICE INFORMATION >

- Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 4.  
 NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

- Also check harness for short to power.

### OK or NG

- OK >> GO TO 5.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

### OK or NG

- OK >> GO TO 6.  
 NG >> Repair or replace.



# DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

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

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

**CAUTION:**

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

>> INSPECTION END

## Removal and Installation

INFOID:000000003531757

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-21](#).

A  
EC  
C  
D  
E  
F  
G  
H  
I  
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K  
L  
M  
N  
O  
P

# DTC P0133, P0153 A/F SENSOR 1

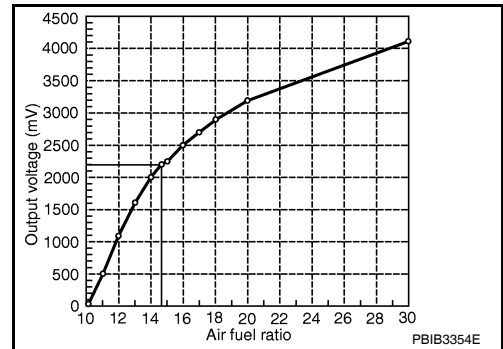
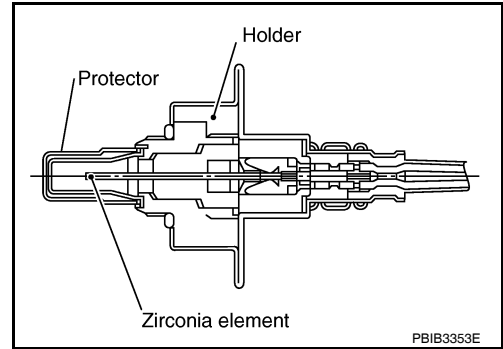
< SERVICE INFORMATION >

## DTC P0133, P0153 A/F SENSOR 1

### Component Description

INFOID:000000003531758

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531759

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

### On Board Diagnosis Logic

INFOID:000000003531760

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133 0133 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit slow response	• The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	<ul style="list-style-type: none"> <li>• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>• A/F sensor 1</li> <li>• A/F sensor 1 heater</li> <li>• Fuel pressure</li> <li>• Fuel injector</li> <li>• Intake air leaks</li> <li>• Exhaust gas leaks</li> <li>• PCV</li> <li>• Mass air flow sensor</li> </ul>
P0153 0153 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531761

#### NOTE:

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

# DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

## TESTING CONDITION:

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

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B1) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-II.

#### 6. Touch "START".

If "COMPLETED" appears on CONSULT-II screen, go to step 10.

If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.

A/F SEN1 (B1) P1278/P1279	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB0756E

7. After perform the following procedure, "TESTING" will be displayed on the CONSULT-II screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.

If "TESTING" is not displayed after 10 seconds, refer to [EC-129](#).

8. Wait for about 20 seconds at idle at under the condition that "TESTING" is displayed on the CONSULT-II screen.

A/F SEN1 (B1) P1278/P1279	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB1925E

9. Make sure that "TESTING" changes to "COMPLETED".

If "TESTING" changed to "OUT OF CONDITION", refer to [EC-129](#).

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".

If "NG" is displayed, go to [EC-256, "Diagnosis Procedure"](#).

A/F SEN1 (B1) P1278/P1279	
COMPLETED	

PBIB0758E

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service \$01 with GST.
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications. Make sure that the total percentage should be within  $\pm 15\%$ .

If OK, go to the following step.

If NG, check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel

## DTC P0133, P0153 A/F SENSOR 1

### < SERVICE INFORMATION >

---

- Fuel injector
  - Incorrect PCV hose connection
  - PCV valve
  - Mass air flow sensor
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. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
  8. Fully release accelerator pedal and then let engine idle for about 1 minute.
  9. Select Service \$07 with GST.  
If the 1st trip DTC is displayed, go to [EC-256, "Diagnosis Procedure"](#).

# DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

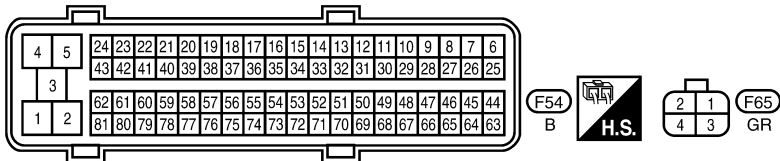
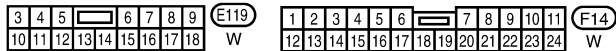
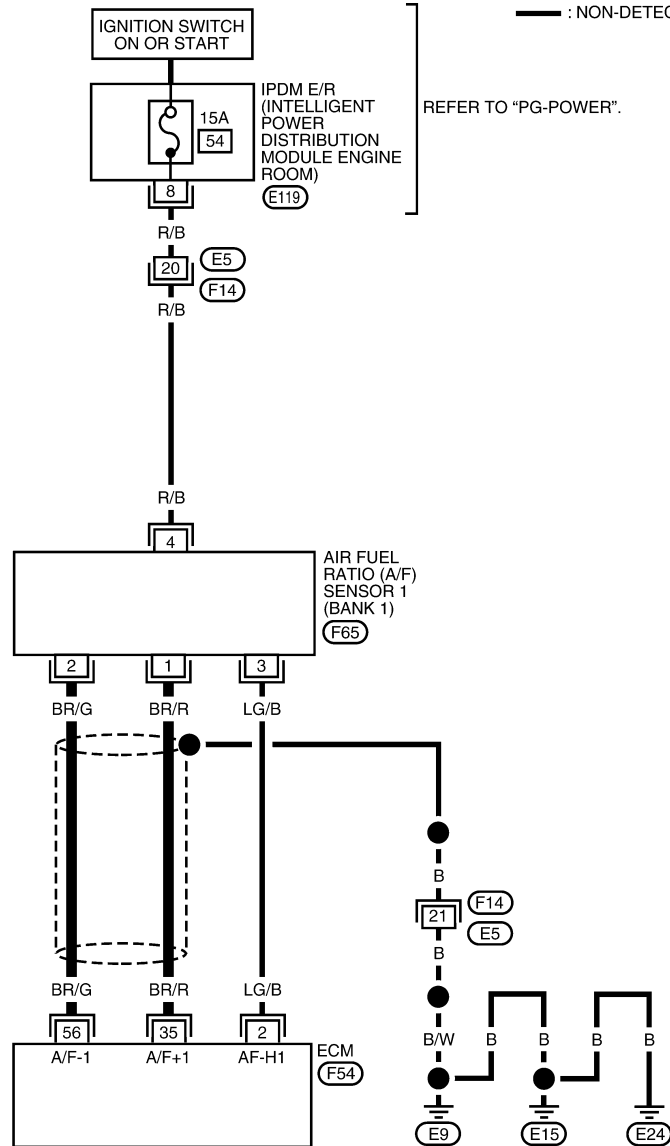
## Wiring Diagram

INFOID:000000003531762

BANK 1

### EC-AF1B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2790E

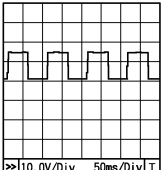
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

## DTC P0133, P0153 A/F SENSOR 1

### < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★  <small>PBIA8148J</small>
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

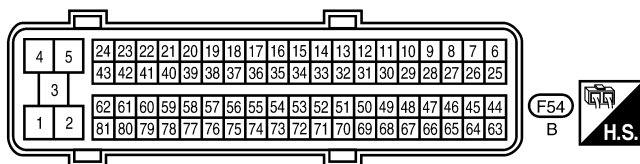
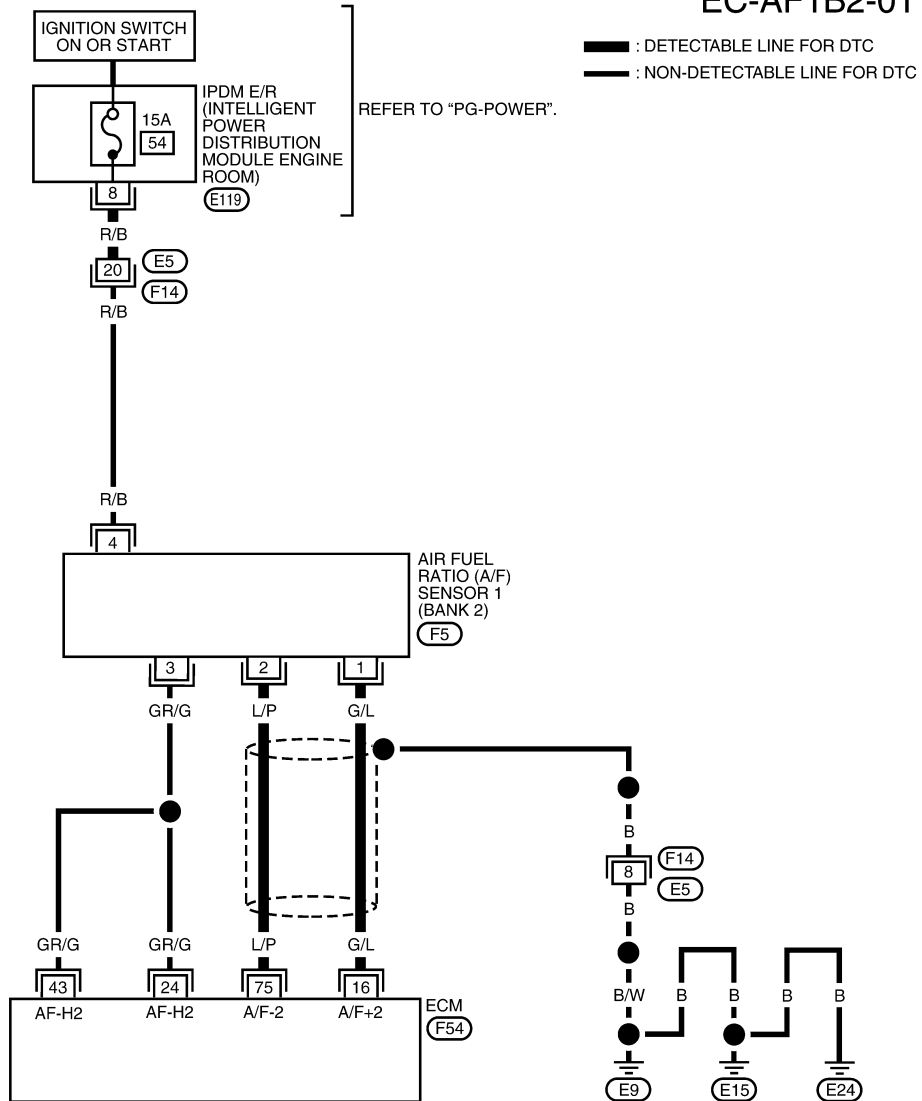
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



BBWA2791E

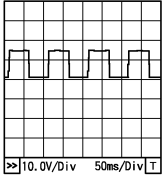
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0133, P0153 A/F SENSOR 1

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBIAB148J
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

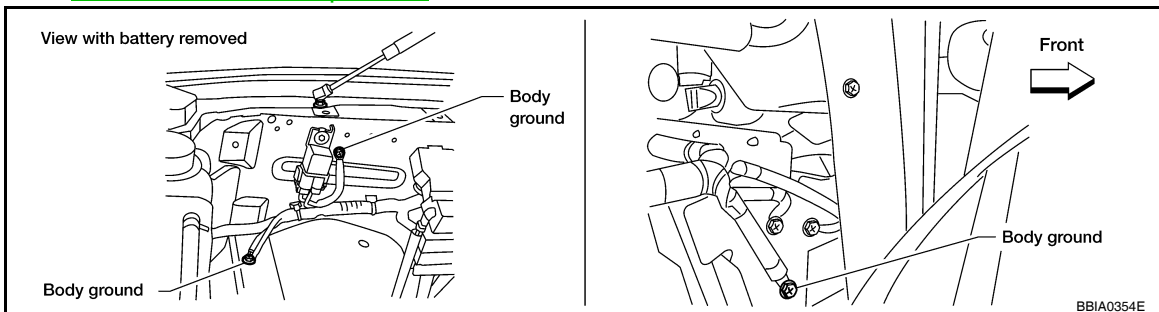
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531763

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

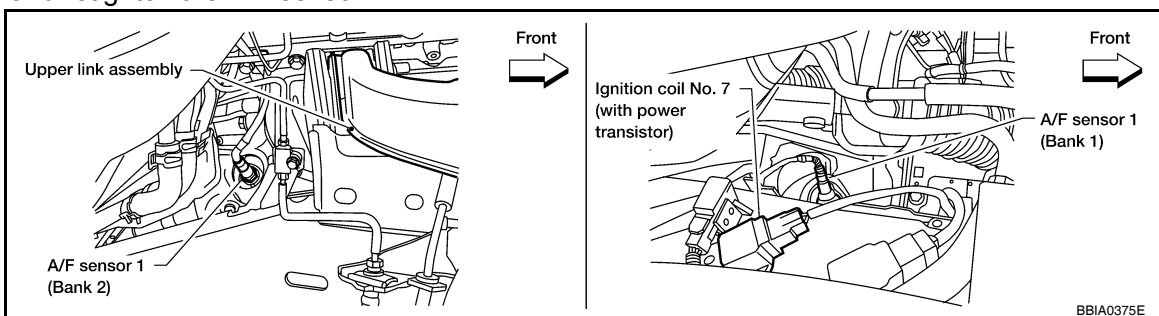


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1.



**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

### 3. CHECK EXHAUST GAS LEAK

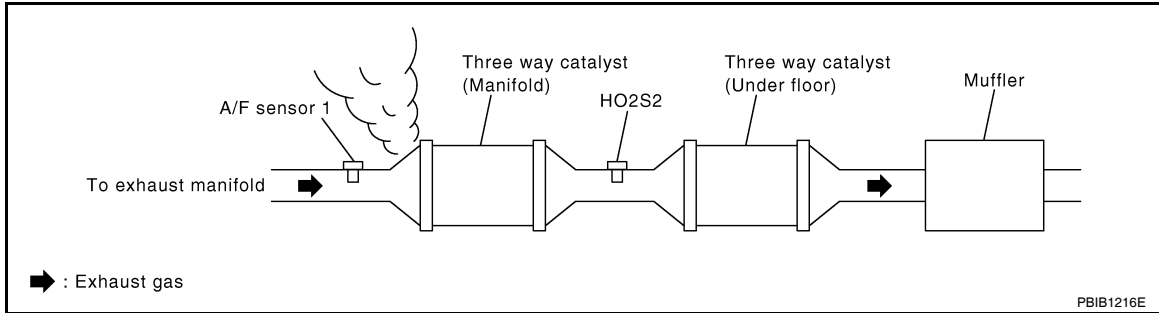
1. Start engine and run it at idle.



## DTC P0133, P0153 A/F SENSOR 1

### < SERVICE INFORMATION >

- Listen for an exhaust gas leak before three way catalyst (manifold).



#### OK or NG

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

### 4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

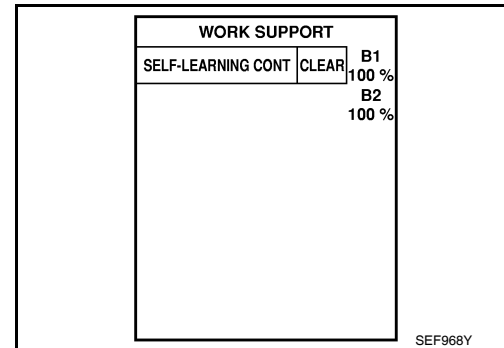
#### OK or NG

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

### 5. CLEAR THE SELF-LEARNING DATA

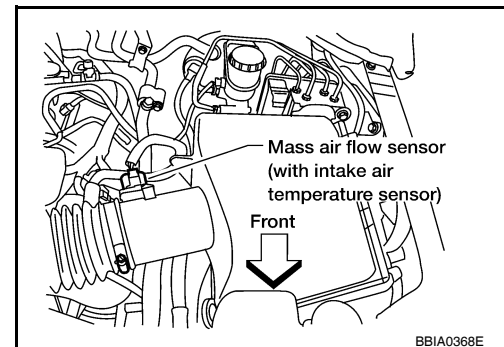
#### With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR" or "START".
- Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P172, P0174 or P0175 detected?  
Is it difficult to start engine?**



#### Without CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- Make sure DTC P0102 is displayed.
- Erase the DTC memory. Refer to [EC-49. "Emission-related Diagnostic Information"](#).
- Make sure DTC P0000 is displayed.
- Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-292](#) or [EC-301](#).
- No >> GO TO 6.

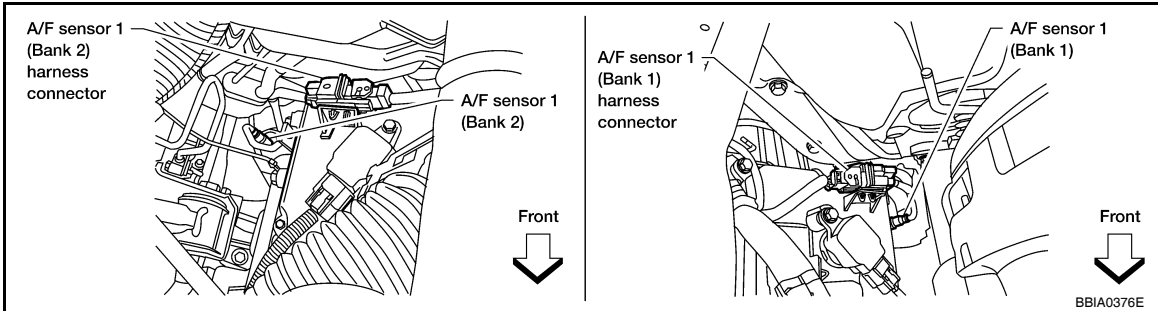
### 6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.

# DTC P0133, P0153 A/F SENSOR 1

## < SERVICE INFORMATION >

2. Disconnect A/F sensor 1 harness connector.

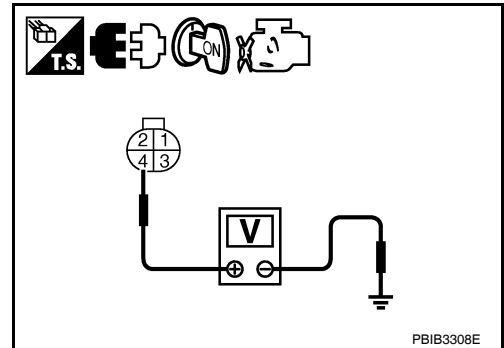


3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.



## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

## DTC P0133, P0153 A/F SENSOR 1

### < SERVICE INFORMATION >

5. Also check harness for short to power.

#### OK or NG

OK >> GO TO 9.

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

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

Refer to [EC-168, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 10.

NG >> GO TO 13.

### 10. CHECK MASS AIR FLOW SENSOR

Refer to [EC-192, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

### 11. CHECK PCV VALVE

Refer to [EC-45, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

### 12. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

#### OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

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

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

#### **CAUTION:**

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

>> INSPECTION END

### Removal and Installation

INFOID:000000003531764

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-21](#).

# DTC P0137, P0157 HO2S2

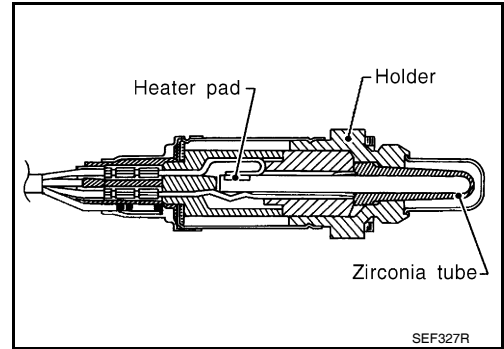
< SERVICE INFORMATION >

## DTC P0137, P0157 HO2S2

### Component Description

INFOID:000000003531765

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531766

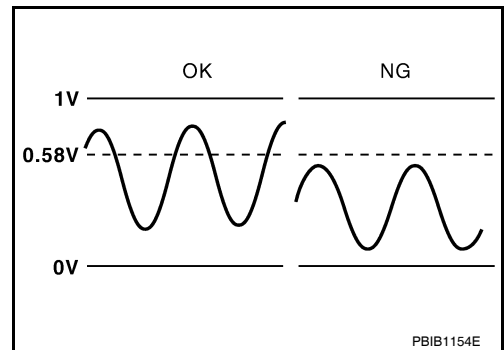
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

### On Board Diagnosis Logic

INFOID:000000003531767

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 fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137 0137 (Bank 1)	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> <li>• Fuel pressure</li> <li>• Fuel injector</li> <li>• Intake air leaks</li> </ul>
P0157 0157 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531768

#### NOTE:

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

Ⓜ WITH CONSULT-II

#### TESTING CONDITION:

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

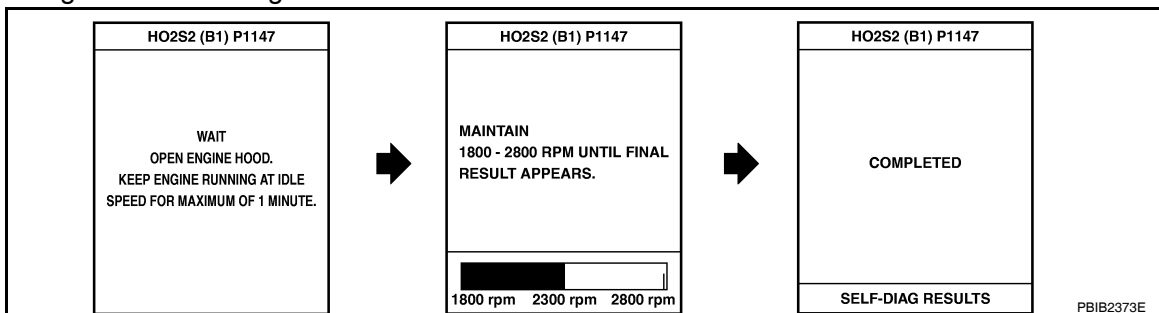
# DTC P0137, P0157 HO2S2

## < SERVICE INFORMATION >

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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 "COOLAN TEMP/S" indicates more than 70°C (158°F).  
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y



### NOTE:

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

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-265, "Diagnosis Procedure"](#).  
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
  - b. Return to step 1.

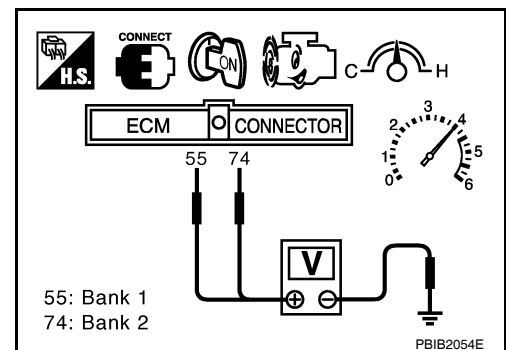
## Overall Function Check

INFOID:000000003531769

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

### WITH GST

1. Start engine and warm it up to the 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. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.58V at least once during this procedure.**  
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.



# DTC P0137, P0157 HO2S2

## < SERVICE INFORMATION >

The voltage should be above 0.58V at least once during this procedure.

8. If NG, go to [EC-265, "Diagnosis Procedure"](#) .

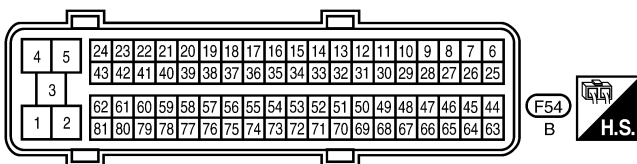
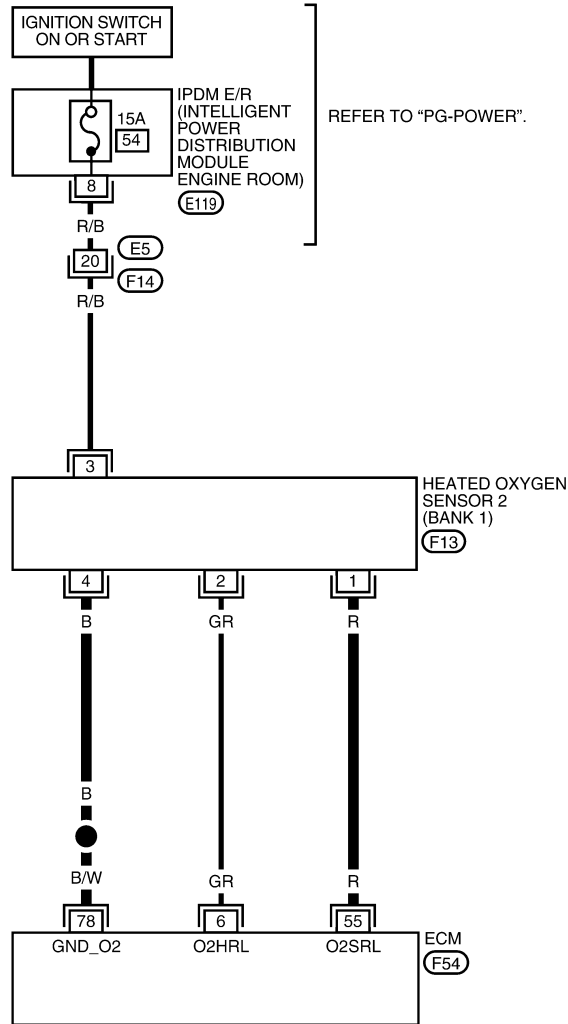
## Wiring Diagram

INFOID:000000003531770

BANK 1

### EC-O2S2B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2800E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

## DTC P0137, P0157 HO2S2

### < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	GR	Heated oxygen sensor 2 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
55	R	Heated oxygen sensor 2 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	Approximately 0V

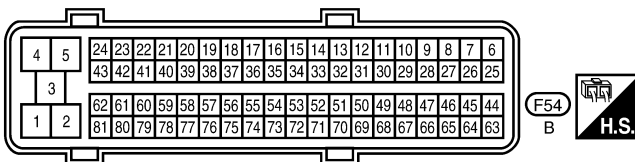
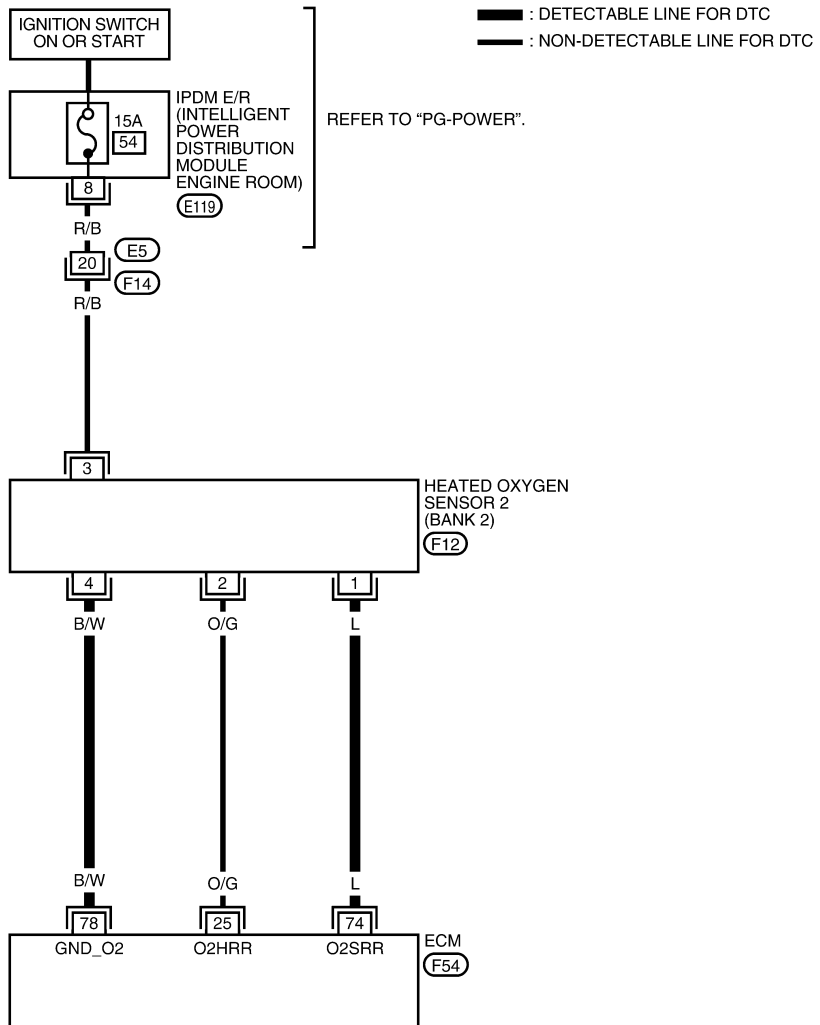
A  
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P

# DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



BBWA2801E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P0137, P0157 HO2S2

## < SERVICE INFORMATION >

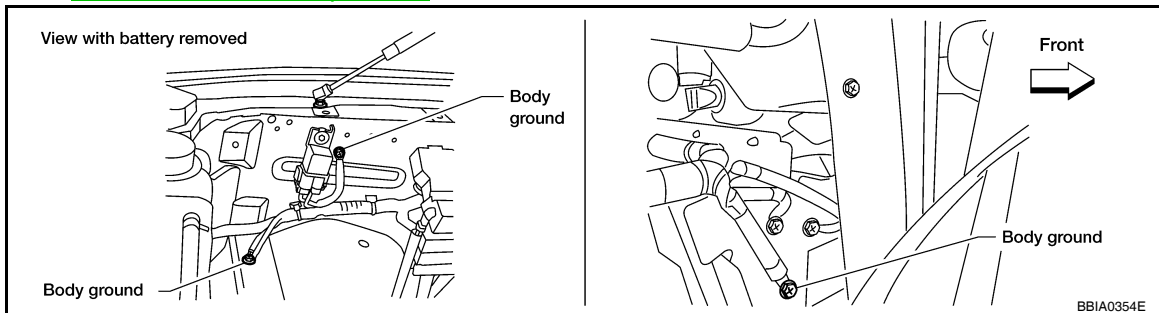
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	O/G	Heated oxygen sensor 2 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
74	L	Heated oxygen sensor 2 (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Revvng engine from idle to 3,000 rpm quickly after the following conditions are met.                             <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li><b>Warm-up condition</b></li> <li>Idle speed</li> </ul>	Approximately 0V

## Diagnosis Procedure

INFOID:000000003531771

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CLEAR THE SELF-LEARNING DATA

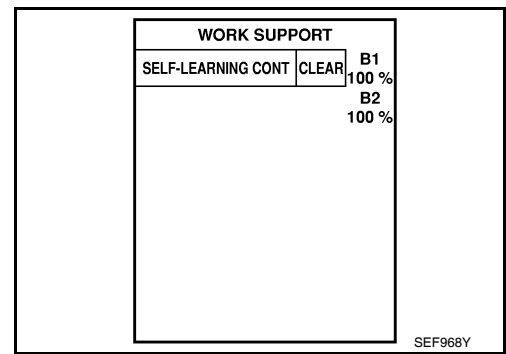
#### With CONSULT-II

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

## DTC P0137, P0157 HO2S2

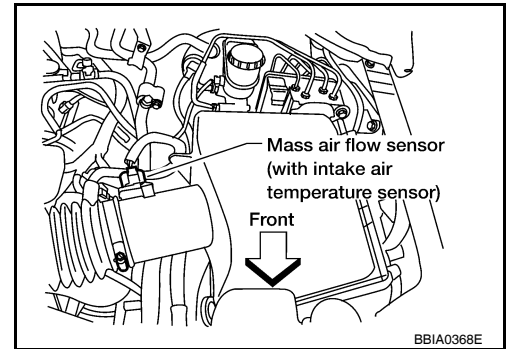
### < SERVICE INFORMATION >

2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171 or P0174 detected?  
Is it difficult to start engine?**



### ⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-49, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171 or P0174 detected?  
Is it difficult to start engine?**

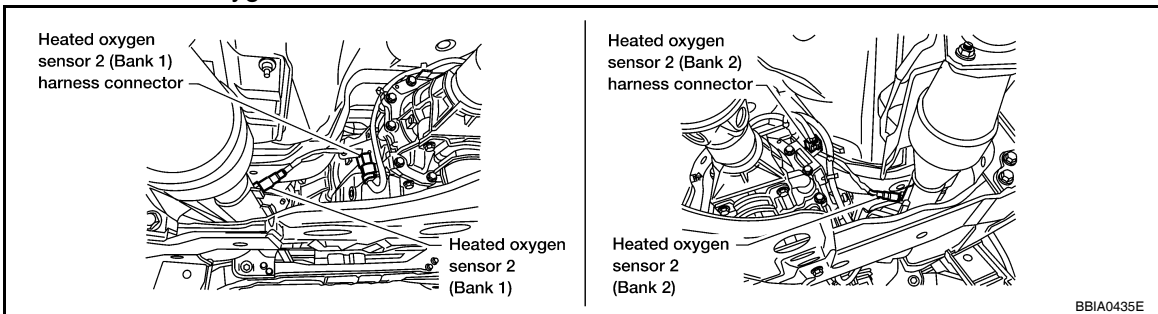


### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to [EC-292](#).
- No >> GO TO 3.

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

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

# DTC P0137, P0157 HO2S2

## < SERVICE INFORMATION >

DTC	Terminals		Bank
	ECM	Sensor	
P0137	55	1	1
P0157	74	1	2

### Continuity should exist.

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	55	1	1
P0157	74	1	2

### Continuity should not exist.

- Also check harness for short to power.

#### OK or NG

OK >> GO TO 5.

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-267, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531772

### HEATED OXYGEN SENSOR 2

Ⓟ With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

## DTC P0137, P0157 HO2S2

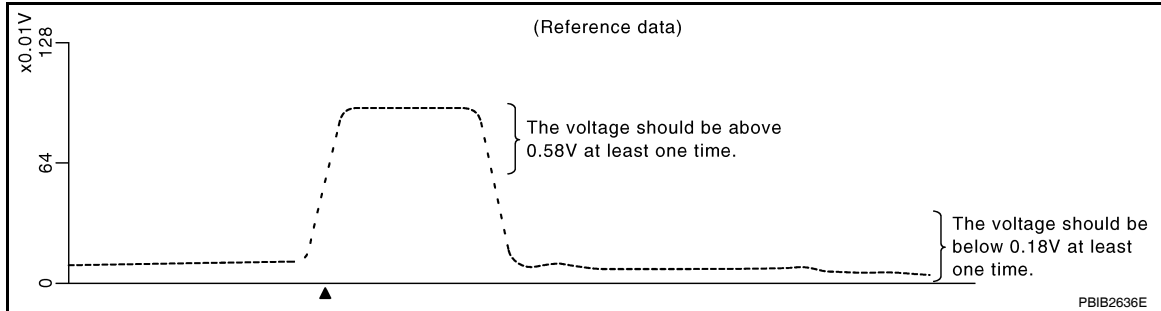
### < SERVICE INFORMATION >

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V
HO2S2 (B2)	XXX V

PBIB1672E

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%$ .



**"HO2S2 (B1)/(B2)" should be above 0.58V at least once when the "FUEL INJECTION" is +25%.  
 "HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.**

**CAUTION:**

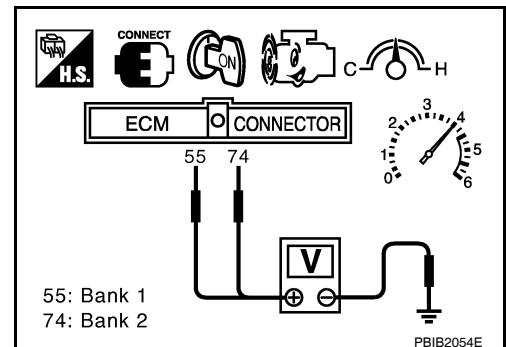
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

⊗ Without CONSULT-II

1. Start engine and warm it up to the 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. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
 (Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.58V at least once during this procedure.**  
**If the voltage is above 0.58V at step 6, step 7 is not necessary.**

7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.  
**The voltage should be below 0.18V at least once during this procedure.**



8. If NG, replace heated oxygen sensor 2.

**CAUTION:**

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

# DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

## Removal and Installation

INFOID:000000003531773

HEATED OXYGEN SENSOR 2

Refer to [EM-21](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

## DTC P0138, P0158 HO2S2

### Component Description

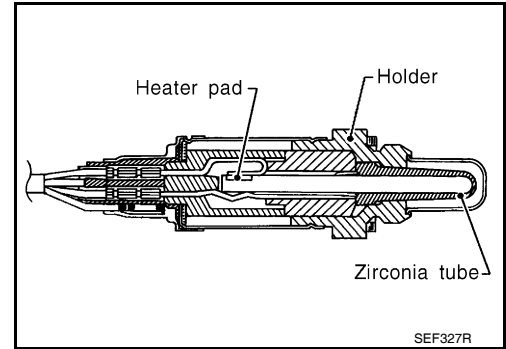
INFOID:000000003531774

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

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

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

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



SEF327R

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531775

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

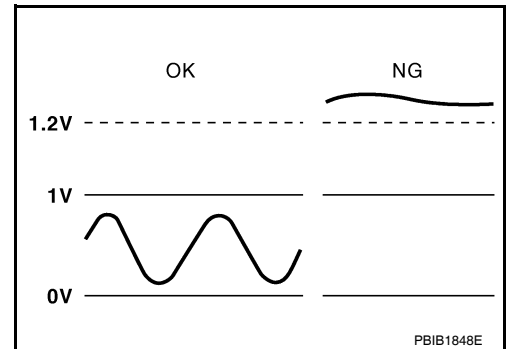
### On Board Diagnosis Logic

INFOID:000000003531776

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

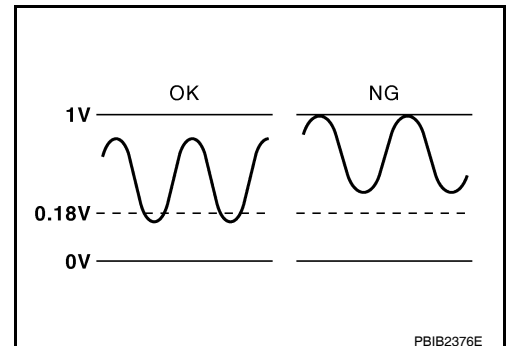
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



PBIB1848E

#### 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.



PBIB2376E

# DTC P0138, P0158 HO2S2

## < SERVICE INFORMATION >

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> </ul>
P0158 0158 (Bank 2)		B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Heated oxygen sensor 2</li> <li>• Fuel pressure</li> <li>• Fuel injector</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531777

**Perform PROCEDURE FOR MALFUNCTION A first.**  
**If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.**

**NOTE:**

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

#### PROCEDURE FOR MALFUNCTION A

Ⓟ With CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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 2 minutes.
6. If 1st trip DTC is detected, go to [EC-276, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

Ⓢ With GST

Follow the procedure "With CONSULT-II" above.

#### PROCEDURE FOR MALFUNCTION B

Ⓟ With CONSULT-II

**TESTING CONDITION:**

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

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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 "COOLAN TEMP/S" indicates more than 70°C (158°F).  
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.

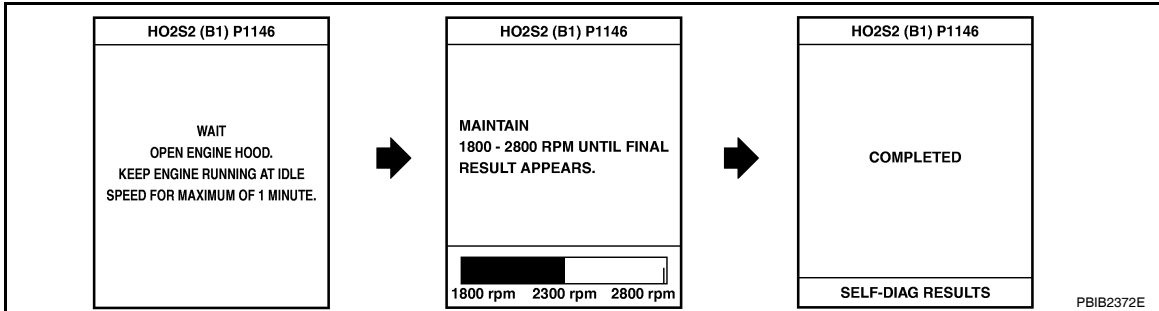
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

9. Start engine and following the instruction of CONSULT-II.



#### NOTE:

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

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.  
If “NG” is displayed, refer to [EC-276, "Diagnosis Procedure"](#).  
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
  - Return to step 1.

### Overall Function Check

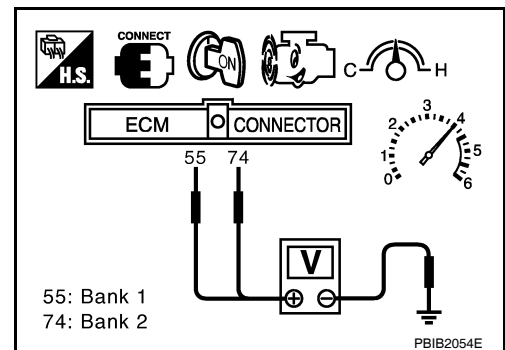
INFOID:000000003531778

#### PROCEDURE FOR MALFUNCTION B

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

With GST

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Set voltmeter probes between ECM terminal 55 [HO2S2 (B2) signal] or 74 [HO2S2 (B1) signal] and ground.
- Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be below 0.18V at least once during this procedure.**  
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
- Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.  
**The voltage should be below 0.18V at least once during this procedure.**
- If NG, go to [EC-276, "Diagnosis Procedure"](#).





# DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

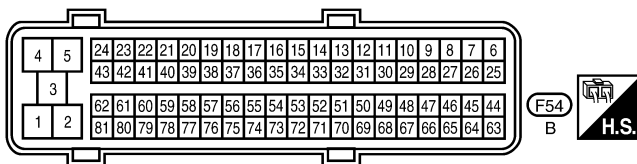
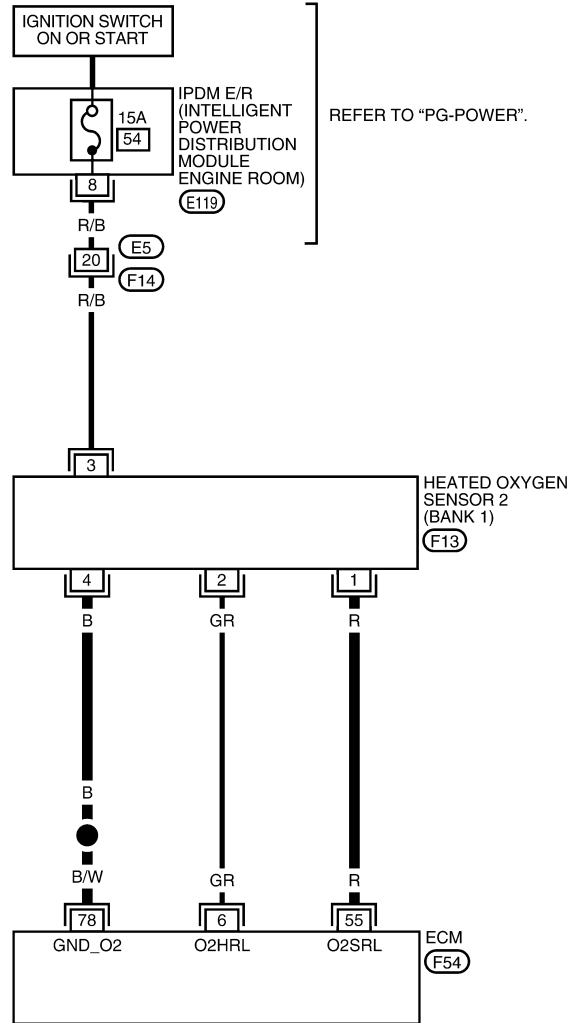
## Wiring Diagram

INFOID:000000003531779

BANK 1

EC-O2S2B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2800E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

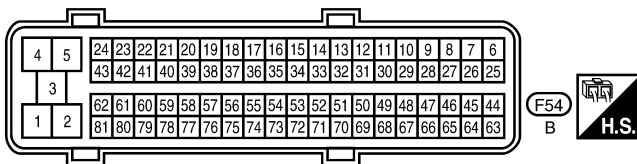
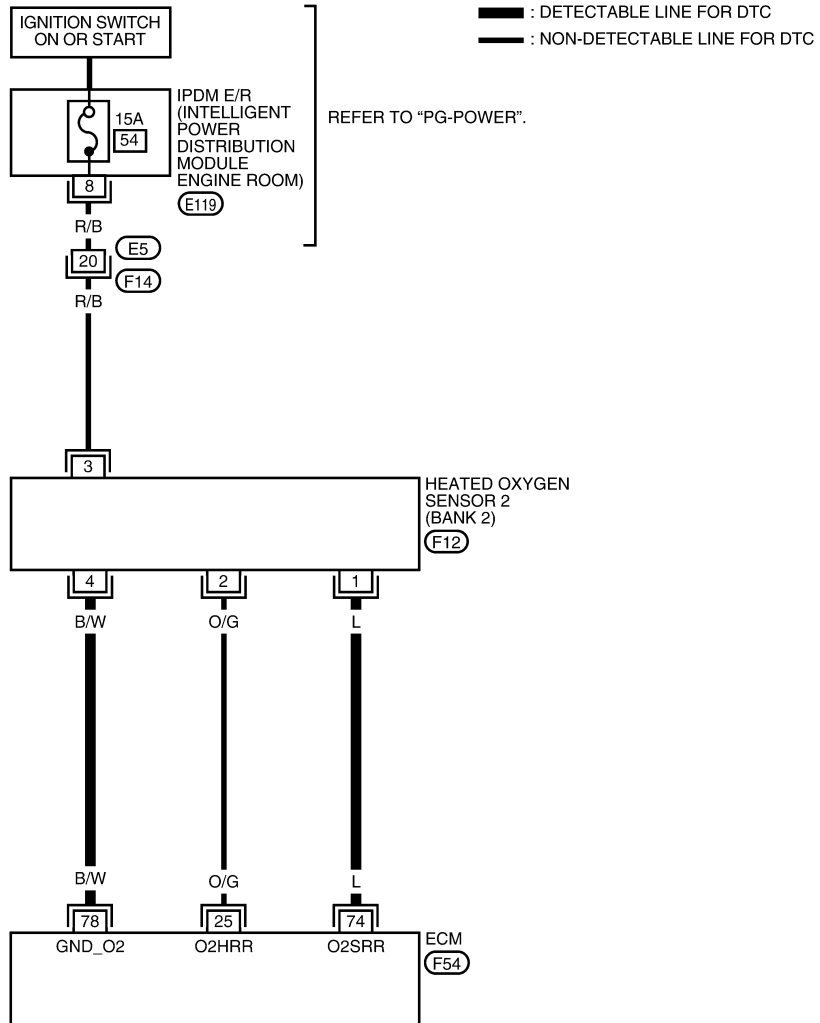
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	GR	Heated oxygen sensor 2 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
55	R	Heated oxygen sensor 2 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	Approximately 0V

# DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



BBWA2801E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0138, P0158 HO2S2

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	O/G	Heated oxygen sensor 2 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
74	L	Heated oxygen sensor 2 (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Revvng engine from idle to 3,000 rpm quickly after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li><b>Warm-up condition</b></li> <li>Idle speed</li> </ul>	Approximately 0V

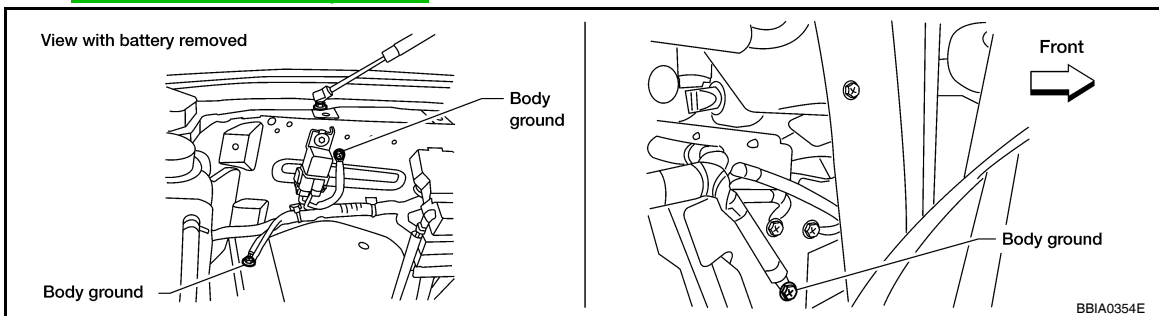
## Diagnosis Procedure

INFOID:000000003531780

### PROCEDURE FOR MALFUNCTION A

#### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten two ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

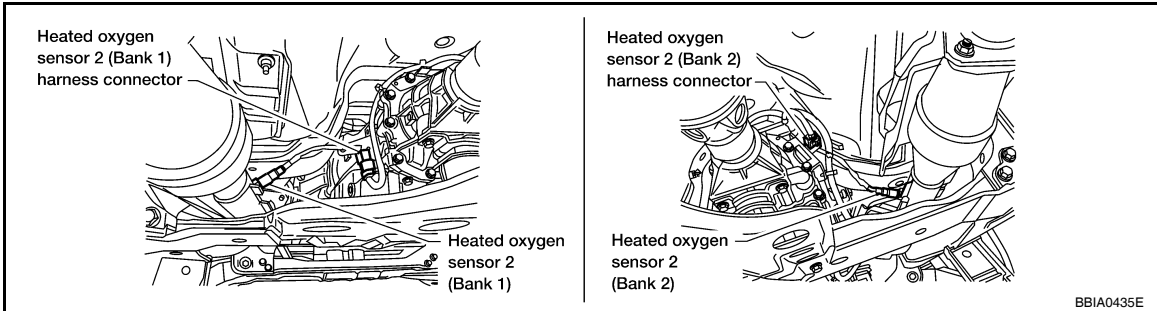
- OK >> GO TO 2.  
 NG >> Repair or replace ground connections.

#### 2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

1. Disconnect heated oxygen sensor 2 harness connector.



2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 3.

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

### 3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	55	1	1
P0158	74	1	2

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	55	1	1
P0158	74	1	2

**Continuity should not exist.**

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 4.

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

### 4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

**Water should not exist.**

#### OK or NG

OK >> GO TO 5.

NG >> Repair or replace harness or connectors.

### 5. CHECK HEATED OXYGEN SENSOR 2

## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

Refer to [EC-280, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 6.
- NG >> Replace malfunctioning heated oxygen sensor 2.

### 6.CHECK INTERMITTENT INCIDENT

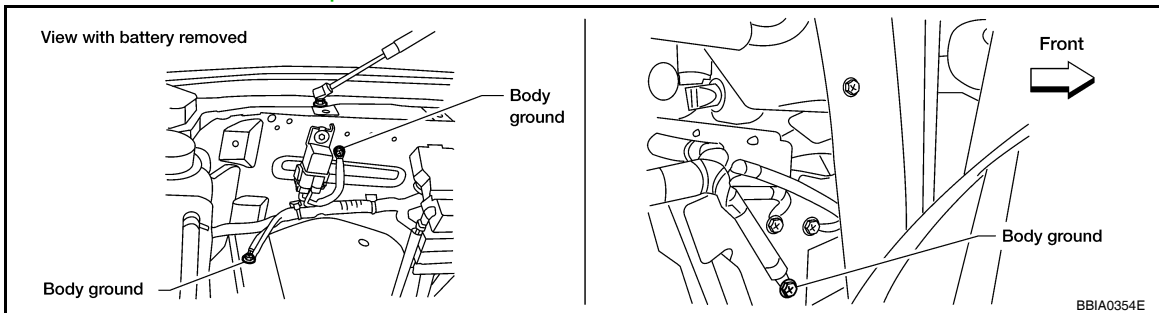
Refer to [EC-138](#).

#### >> INSPECTION END

### PROCEDURE FOR MALFUNCTION B

#### 1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



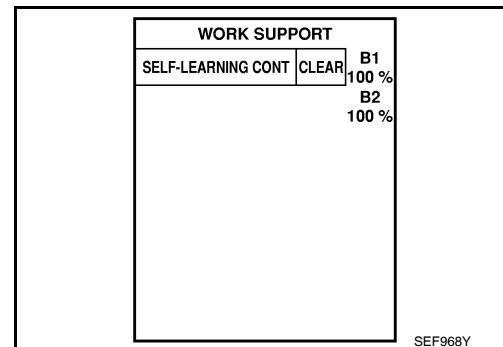
#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

#### 2.CLEAR THE SELF-LEARNING DATA

##### Ⓜ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0172 or P0175 detected?**  
**Is it difficult to start engine?**



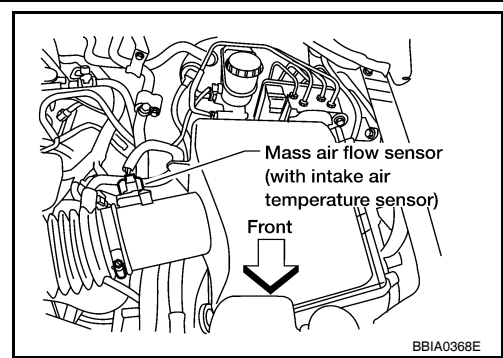
##### ⓧ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.

## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-49. "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0172 or P0175 detected?**  
**Is it difficult to start engine?**

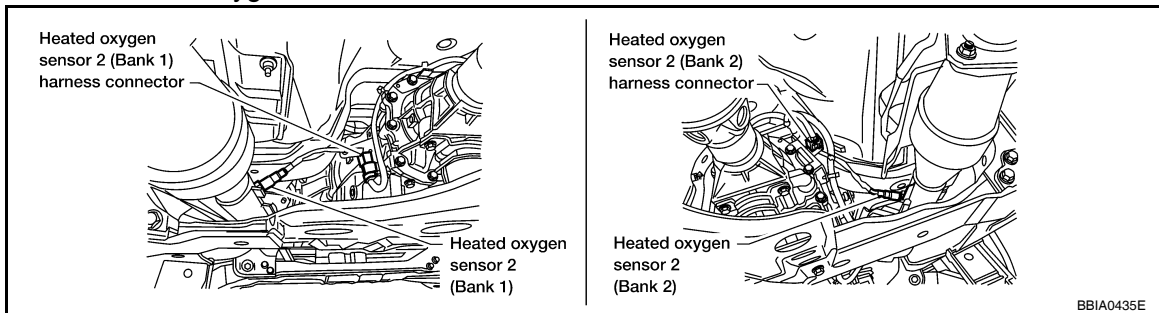


#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to [EC-301](#).  
 No >> GO TO 3.

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

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 4.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	55	1	1
P0158	74	1	2

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	55	1	1
P0158	74	1	2

# DTC P0138, P0158 HO2S2

## < SERVICE INFORMATION >

**Continuity should not exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

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

### 5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-280, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

### 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531781

### HEATED OXYGEN SENSOR 2

④ With CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

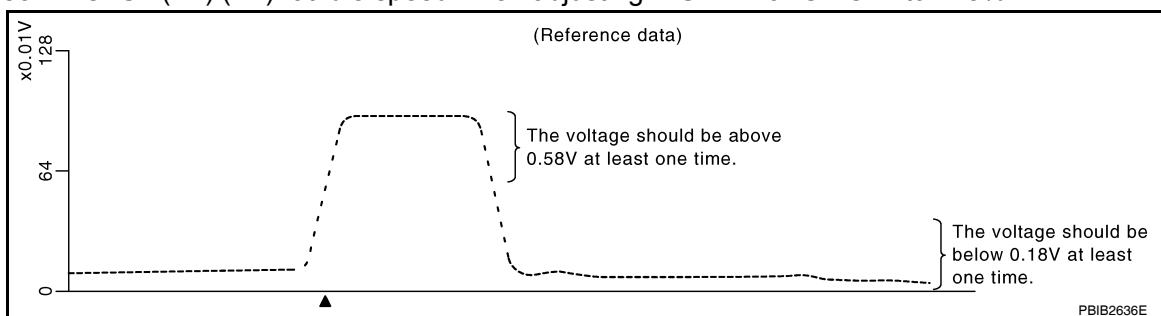
SEF174Y

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V
HO2S2 (B2)	XXX V

PBIB1672E

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%$ .





## DTC P0138, P0158 HO2S2

### < SERVICE INFORMATION >

“HO2S2 (B1)/(B2)” should be above 0.58V at least once when the “FUEL INJECTION” is +25%.

“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is -25%.

#### CAUTION:

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

⊗ Without CONSULT-II

1. Start engine and warm it up to the 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. Set voltmeter probes between ECM terminal 55 [HO2S2 (B2) signal] or 74 [HO2S2 (B1) signal] and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

**The voltage should be above 0.58V at least once during this procedure.**

**If the voltage is above 0.58V at step 6, step 7 is not necessary.**

7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.

**The voltage should be below 0.18V at least once during this procedure.**

8. If NG, replace heated oxygen sensor 2.

#### CAUTION:

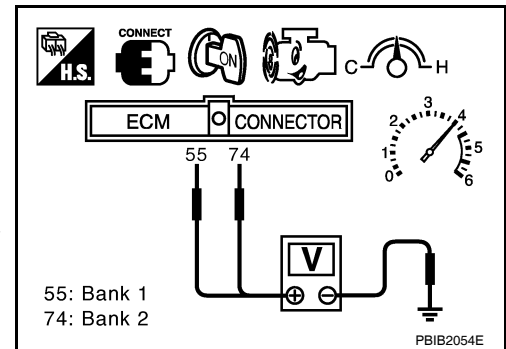
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads (using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12) and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

### Removal and Installation

INFOID:000000003531782

### HEATED OXYGEN SENSOR 2

Refer to [EM-21](#).



# DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

## DTC P0139, P0159 HO2S2

### Component Description

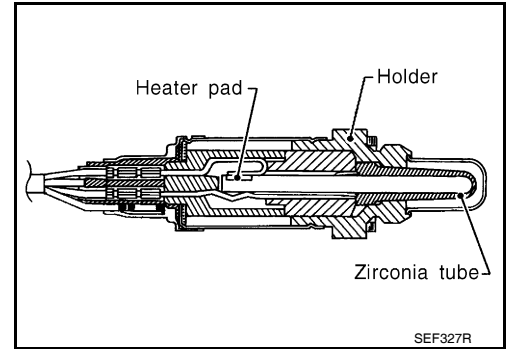
INFOID:000000003531783

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

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

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531784

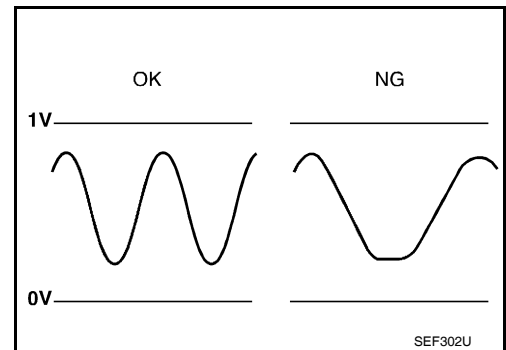
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> <li>Revsing engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

### On Board Diagnosis Logic

INFOID:000000003531785

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139 (Bank 1)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>
P0159 0159 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531786

#### NOTE:

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

Ⓜ WITH CONSULT-II

#### TESTING CONDITION:

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

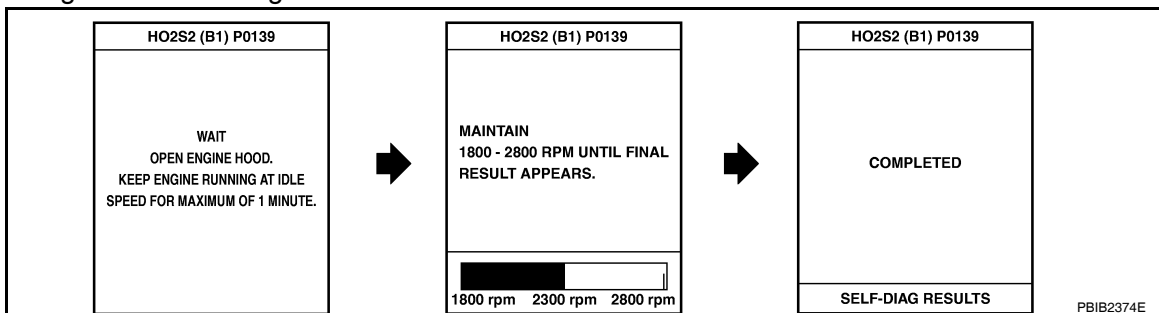
# DTC P0139, P0159 HO2S2

## < SERVICE INFORMATION >

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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 "COOLAN TEMP/S" indicates more than 70°C (158°F).  
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y



### NOTE:

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

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-287, "Diagnosis Procedure"](#).  
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
  - b. Return to step 1.

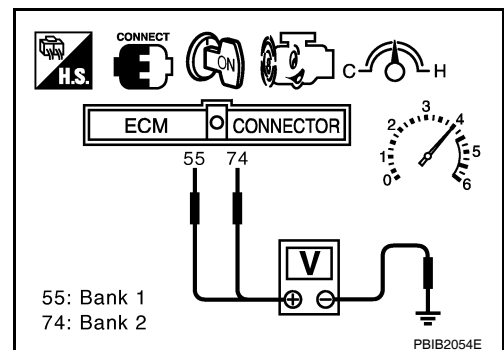
## Overall Function Check

INFOID:000000003531787

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

### WITH GST

1. Start engine and warm it up to the 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. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**A change of voltage should be more than 0.12V for 1 second during this procedure.**  
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.



# DTC P0139, P0159 HO2S2

## < SERVICE INFORMATION >

A change of voltage should be more than 0.12V for 1 second during this procedure.

8. If NG, go to [EC-287, "Diagnosis Procedure"](#).

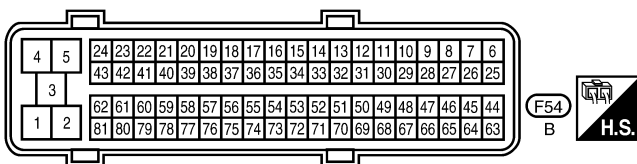
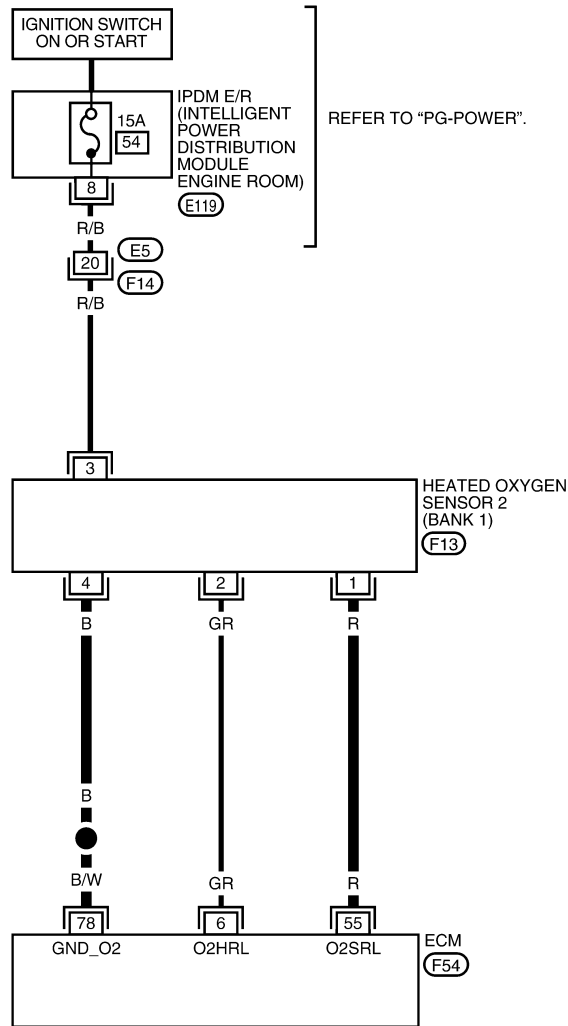
## Wiring Diagram

INFOID:000000003531788

BANK 1

### EC-O2S2B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2800E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

## DTC P0139, P0159 HO2S2

### < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	GR	Heated oxygen sensor 2 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
55	R	Heated oxygen sensor 2 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	Approximately 0V

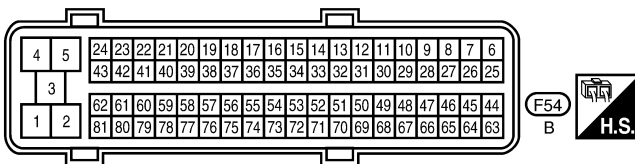
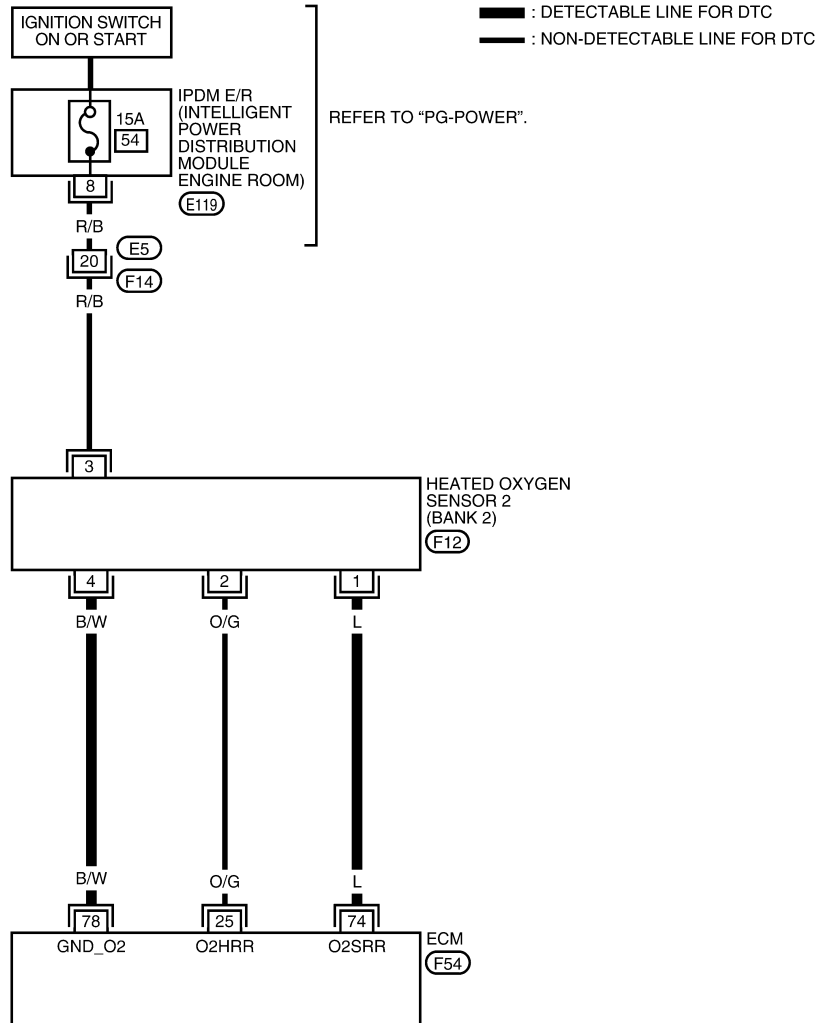
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# DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



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Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

# DTC P0139, P0159 HO2S2

## < SERVICE INFORMATION >

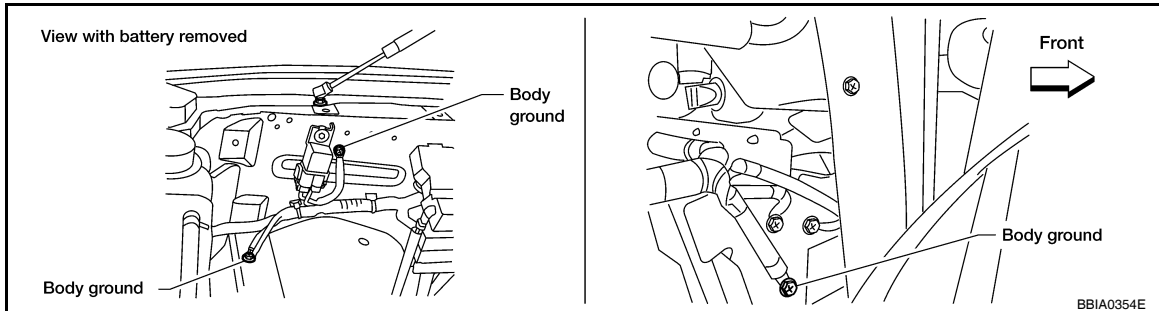
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	O/G	Heated oxygen sensor 2 heater (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - 1.0V
			<b>[Ignition switch: ON]</b> <ul style="list-style-type: none"> <li>• Engine: Stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Engine speed: Above 3,600 rpm.</li> </ul>	BATTERY VOLTAGE (11 - 14V)
74	L	Heated oxygen sensor 2 (bank 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul> </li> </ul>	0 - Approximately 1.0V
78	B/W	Sensor ground (Heated oxygen sensor 2)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• <b>Warm-up condition</b></li> <li>• Idle speed</li> </ul>	Approximately 0V

## Diagnosis Procedure

INFOID:000000003531789

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CLEAR THE SELF-LEARNING DATA

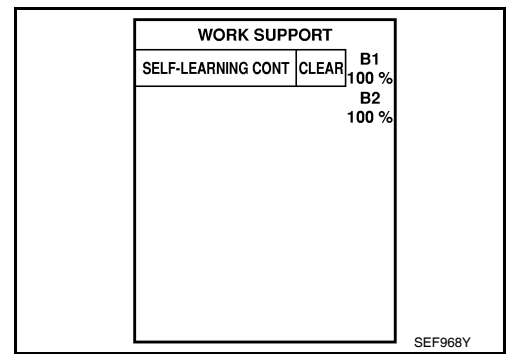
#### With CONSULT-II

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

## DTC P0139, P0159 HO2S2

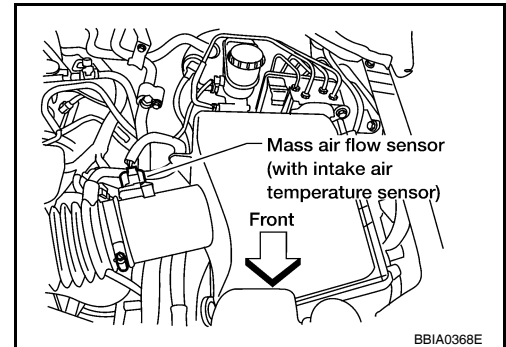
### < SERVICE INFORMATION >

2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



#### ⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-49, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**

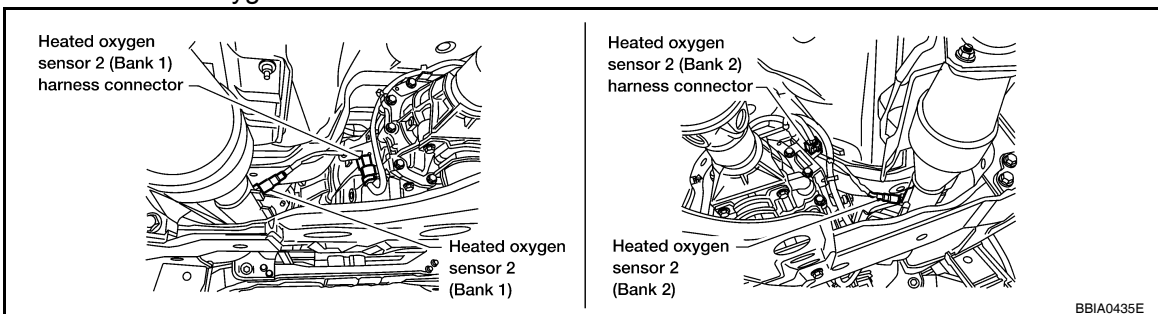


#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-292](#) or [EC-301](#).
- No >> GO TO 3.

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

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.



# DTC P0139, P0159 HO2S2

## < SERVICE INFORMATION >

DTC	Terminals		Bank
	ECM	Sensor	
P0139	55	1	1
P0159	74	1	2

### Continuity should exist.

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	55	1	1
P0159	74	1	2

### Continuity should not exist.

- Also check harness for short to power.

#### OK or NG

OK >> GO TO 5.

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to [EC-289, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531790

### HEATED OXYGEN SENSOR 2

Ⓟ With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

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## DTC P0139, P0159 HO2S2

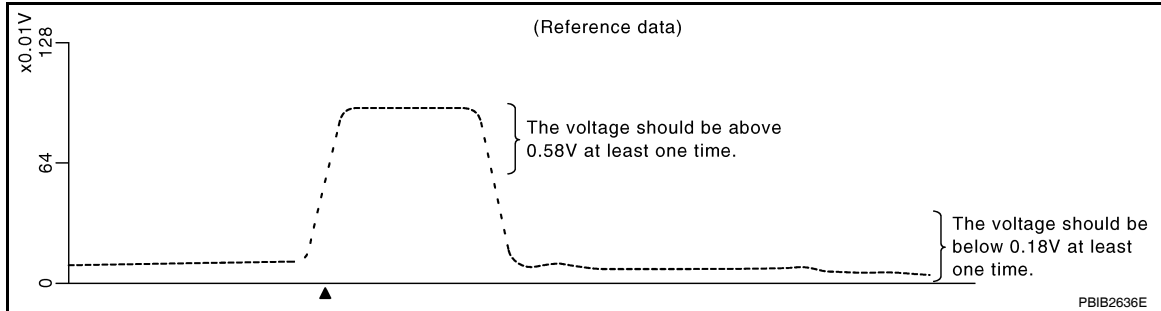
### < SERVICE INFORMATION >

6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V
HO2S2 (B2)	XXX V

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7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%$ .



"HO2S2 (B1)/(B2)" should be above 0.58V at least once when the "FUEL INJECTION" is +25%.  
 "HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

**CAUTION:**

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

⊗ Without CONSULT-II

1. Start engine and warm it up to the 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. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.

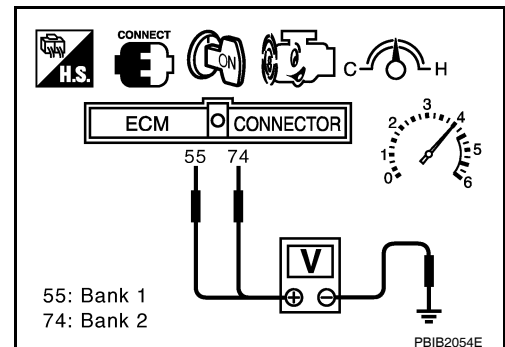
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
 (Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.58V at least once during this procedure.**

**If the voltage is above 0.58V at step 6, step 7 is not necessary.**

7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.

**The voltage should be below 0.18V at least once during this procedure.**

8. If NG, replace heated oxygen sensor 2.



**CAUTION:**

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

# DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

## Removal and Installation

INFOID:000000003531791

HEATED OXYGEN SENSOR 2

Refer to [EM-21](#).

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# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

### On Board Diagnosis Logic

INFOID:000000003531792

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171 (Bank 1)	Fuel injection system too lean	<ul style="list-style-type: none"> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul>	<ul style="list-style-type: none"> <li>Intake air leaks</li> <li>A/F sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> <li>Incorrect PCV hose connection</li> </ul>
P0174 0174 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531793

#### NOTE:

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

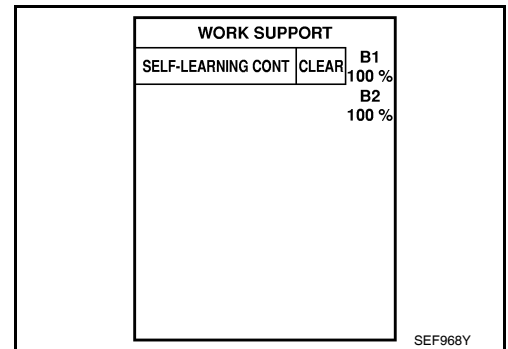
#### Ⓟ WITH CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes.  
The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-297, "Diagnosis Procedure"](#).

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.  
**Hold the accelerator pedal as steady as possible.**



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

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

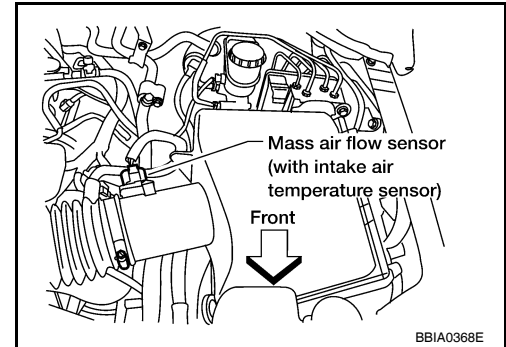
## < SERVICE INFORMATION >

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

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to [EC-297. "Diagnosis Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

### 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. 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 and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service \$07 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-297. "Diagnosis Procedure"](#).



### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

**Hold the accelerator pedal as steady as possible.**

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

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to [EC-297. "Diagnosis Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

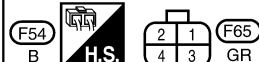
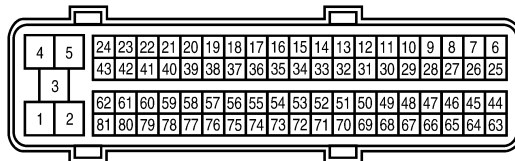
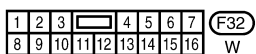
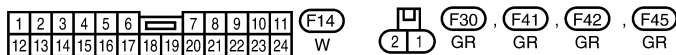
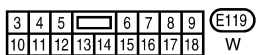
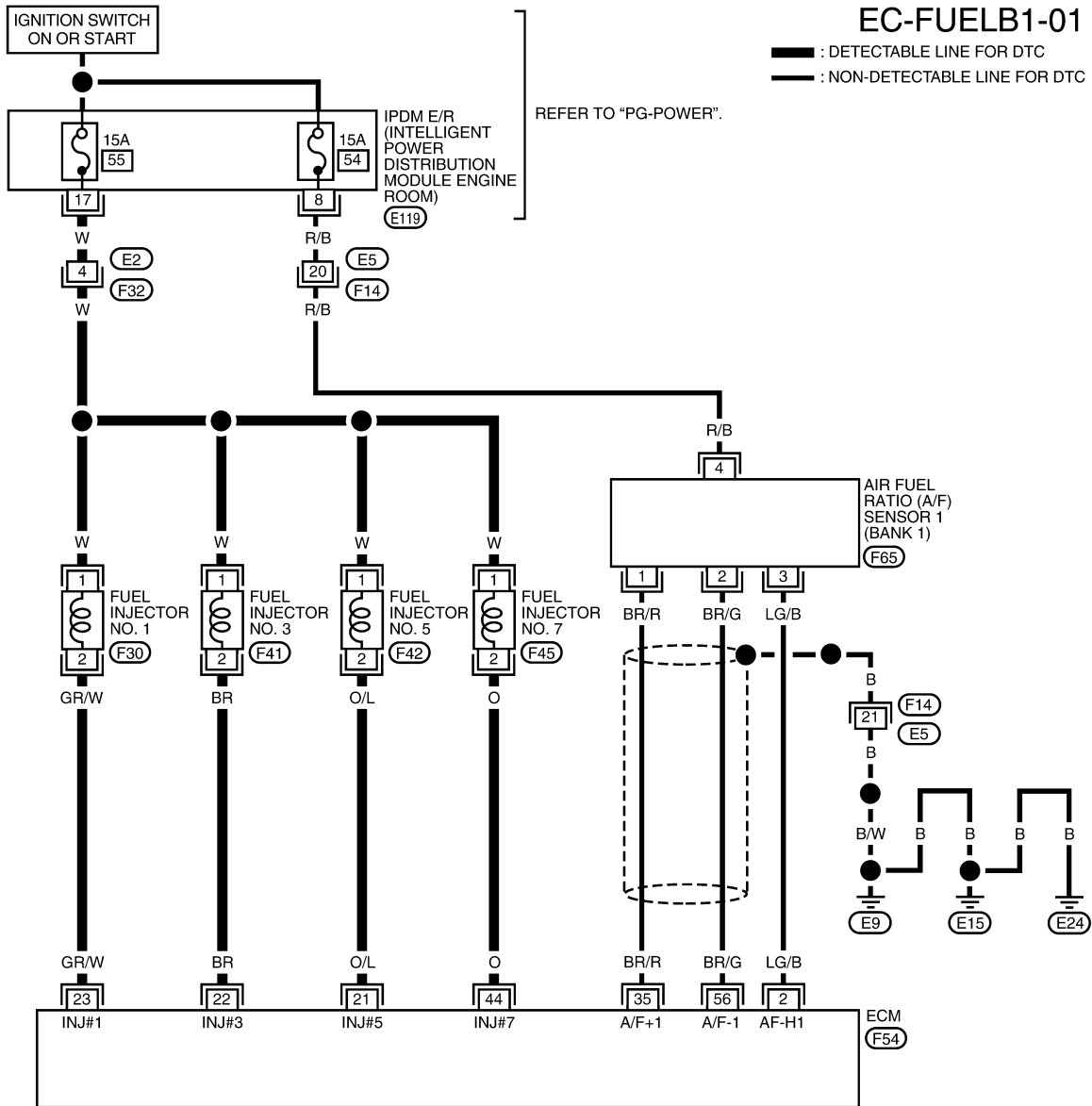
# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531794

### BANK 1



BBWA2792E

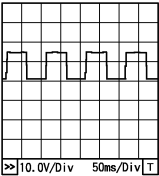
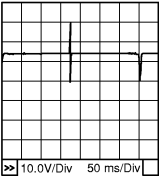
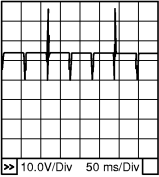
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBIA8148J
21 22 23 44	O/L BR GR/W O	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 7	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  PBIB0042E
			<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0043E
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

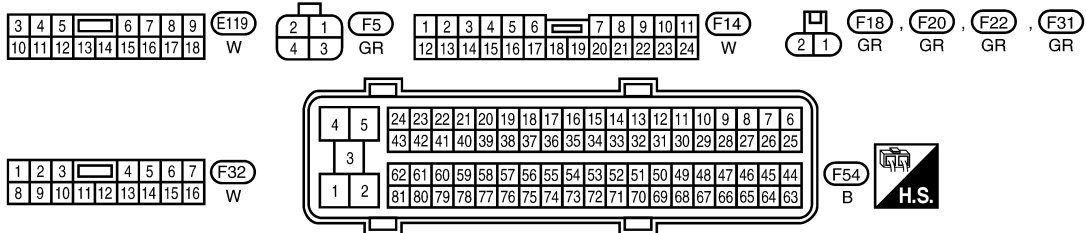
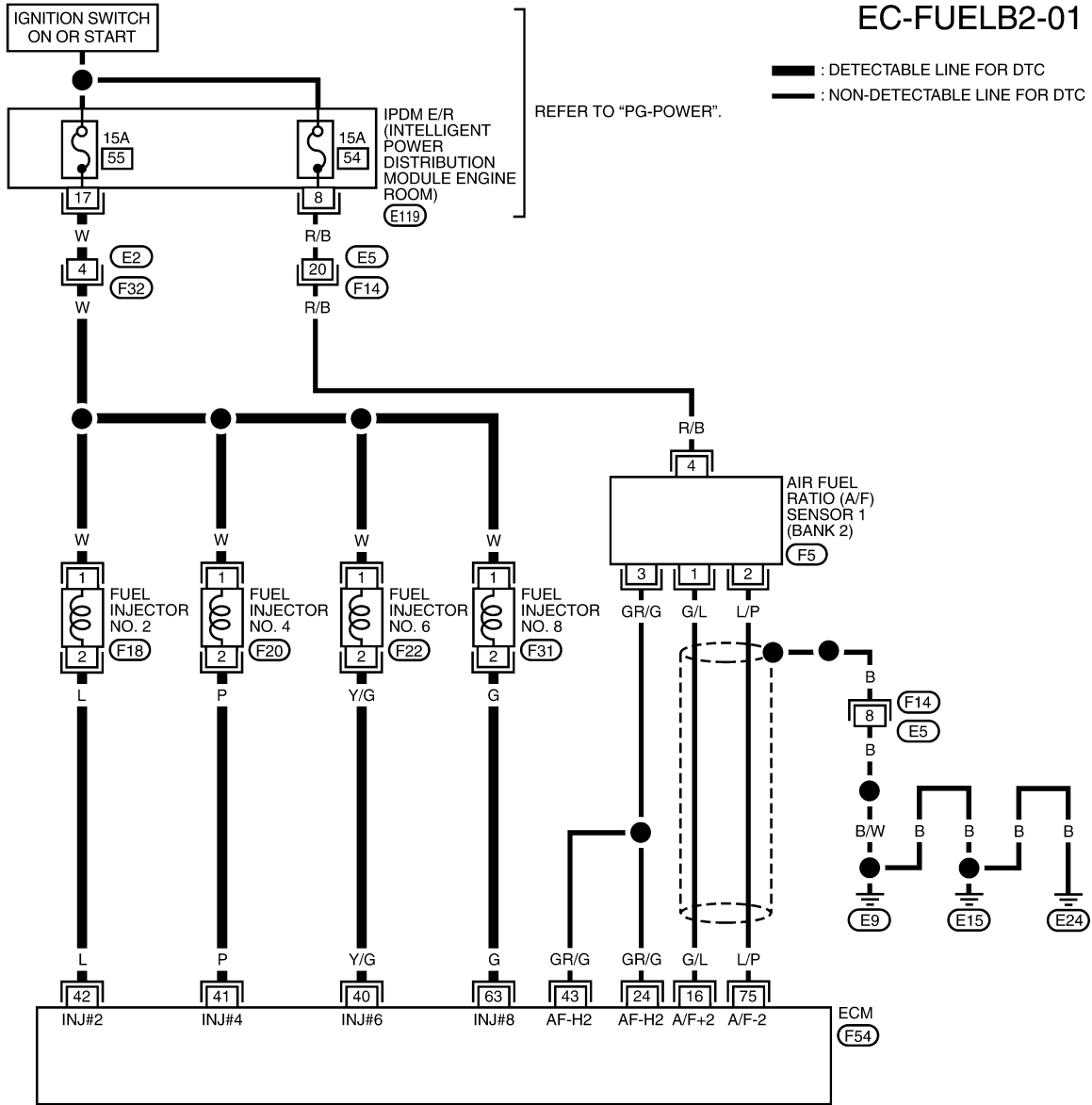
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

BANK 2

EC-FUELB2-01



BBWA2793E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

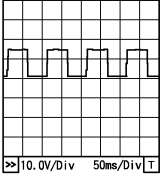
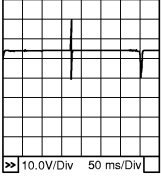
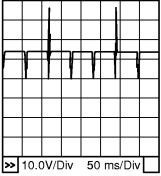
**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBIAB148J
40 41 42 63	Y/G P L G	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2 Fuel injector No. 8	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	<b>BATTERY VOLTAGE</b> (11 - 14V)★  PBIAB0042E
			<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm	<b>BATTERY VOLTAGE</b> (11 - 14V)★  PBIAB0043E
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

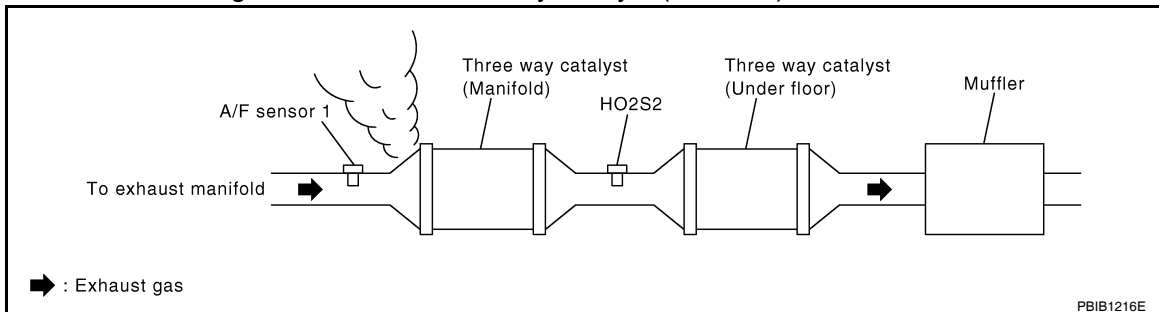
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531795

### 1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



#### OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

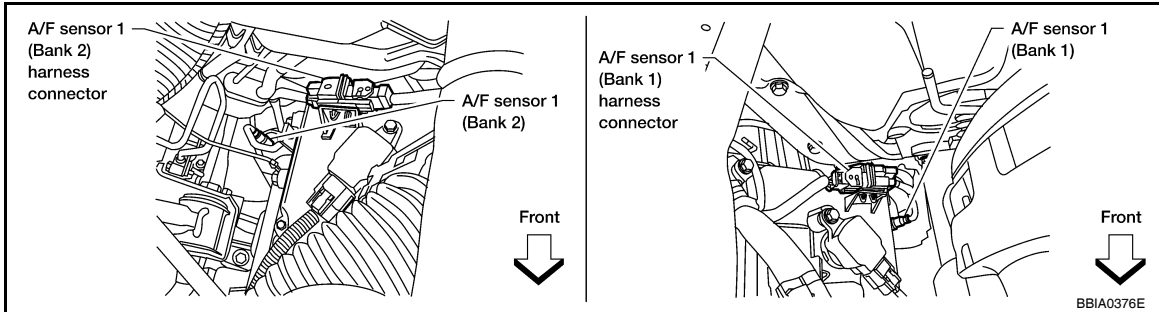
- Check PCV hose connection.

### OK or NG

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

## 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 harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

### Continuity should exist.

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

### Continuity should not exist.

- Also check harness for short to power.

### OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK FUEL PRESSURE

- Release fuel pressure to zero. Refer to [EC-80. "Fuel Pressure Check"](#).
- Install fuel pressure gauge and check fuel pressure. Refer to [EC-80. "Fuel Pressure Check"](#).

**At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)**

### OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

- Fuel pump and circuit (Refer to [EC-613](#).)
- Fuel pressure regulator (Refer to [EC-80](#), "Fuel Pressure Check".)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

## 6. CHECK MASS AIR FLOW SENSOR

### With CONSULT-II

1. Install all removed parts.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.

**3.0 - 9.0 g-m/sec: at idling**

**9.0 - 28.0 g-m/sec: at 2,500 rpm**

### With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service \$01 with GST.

**3.0 - 9.0 g-m/sec: at idling**

**9.0 - 28.0 g-m/sec: at 2,500 rpm**

### OK or NG

OK >> GO TO 7.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-186](#).

## 7. CHECK FUNCTION OF FUEL INJECTOR

### With CONSULT-II

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

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

### Without CONSULT-II

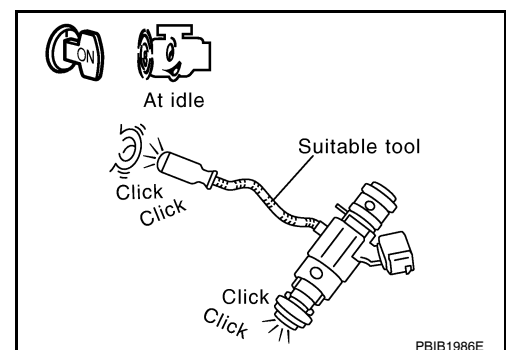
1. Start engine.
2. Listen to each fuel injector operating sound.

**Clicking noise should be heard.**

### OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-608](#).



## 8. CHECK FUEL INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.

## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

### < SERVICE INFORMATION >

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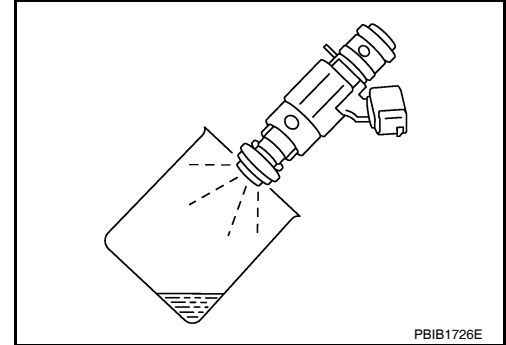
3. Disconnect all fuel injector harness connectors.
4. Remove fuel injector gallery assembly. Refer to [EM-31](#).  
Keep fuel hose and all fuel injectors connected to fuel injector gallery.
5. For DTC P0171, reconnect fuel injector harness connectors on bank 1.  
For DTC P0174, reconnect fuel injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each fuel injector.
8. Crank engine for about 3 seconds.  
For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1.  
For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.

**Fuel should be sprayed evenly for each fuel injector.**

#### OK or NG

OK >> GO TO 9.

NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



### 9. CHECK INTERMITTENT INCIDENT

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Refer to [EC-138](#).

**>> INSPECTION END**

# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

### On Board Diagnosis Logic

INFOID:000000003531796

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172 (Bank 1)	Fuel injection system too rich	<ul style="list-style-type: none"> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul>	<ul style="list-style-type: none"> <li>A/F sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Mass air flow sensor</li> </ul>
P0175 0175 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531797

#### NOTE:

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

#### WITH CONSULT-II

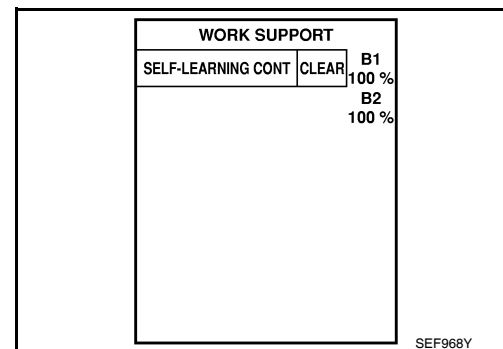
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to [EC-306. "Diagnosis Procedure"](#).

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

**Hold the accelerator pedal as steady as possible.**



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

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

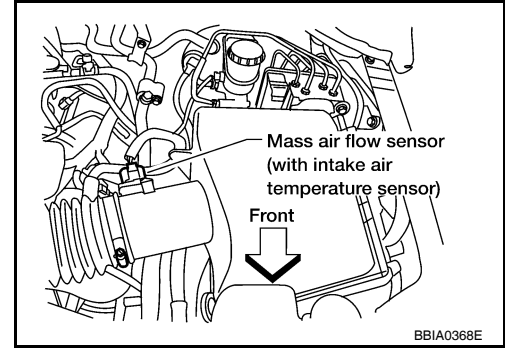
## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

### < SERVICE INFORMATION >

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.  
If engine starts, go to [EC-306, "Diagnosis Procedure"](#). If engine does not start, remove spark plugs and check for fouling, etc.

#### 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. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service \$03 with GST. Make sure DTC P0102 is detected.
6. Select Service \$04 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select Service \$07 with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to [EC-306, "Diagnosis Procedure"](#).



#### **NOTE:**

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

**Hold the accelerator pedal as steady as possible.**

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

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.  
If engine starts, go to [EC-306, "Diagnosis Procedure"](#). If engine does not start, remove spark plugs and check for fouling, etc.

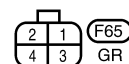
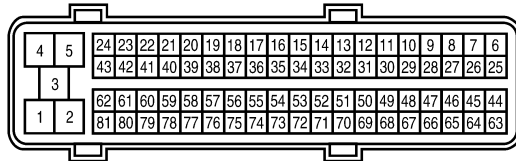
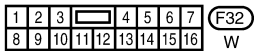
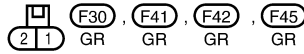
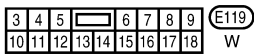
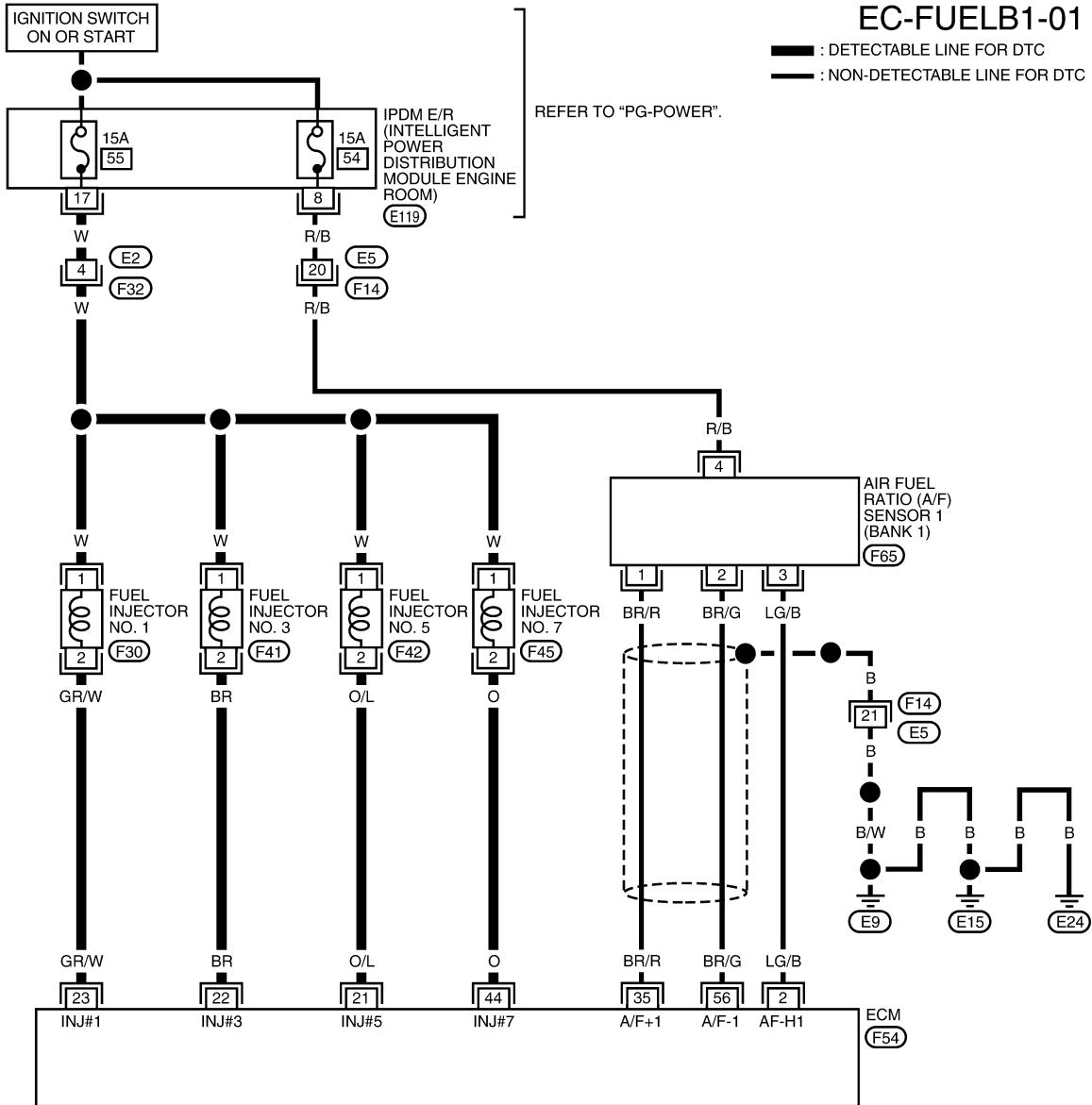
# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531798

### BANK 1



BBWA2792E

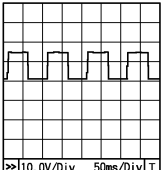
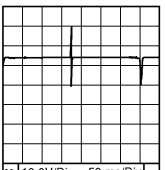
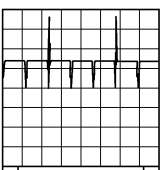
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★  <small>PBIA8148J</small>
21 22 23 44	O/L BR GR/W O	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 7	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  <small>PBIB0042E</small>
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14V)★  <small>PBIB0043E</small>
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

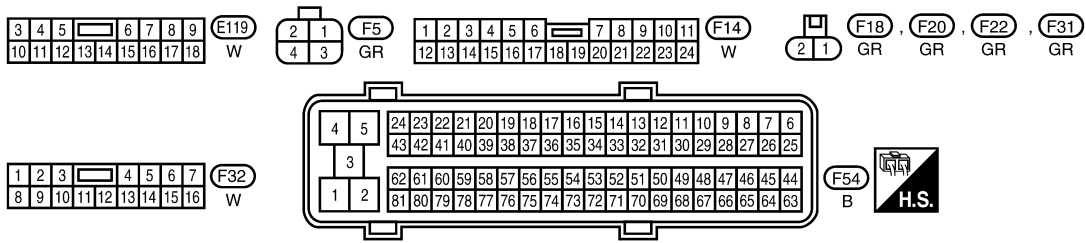
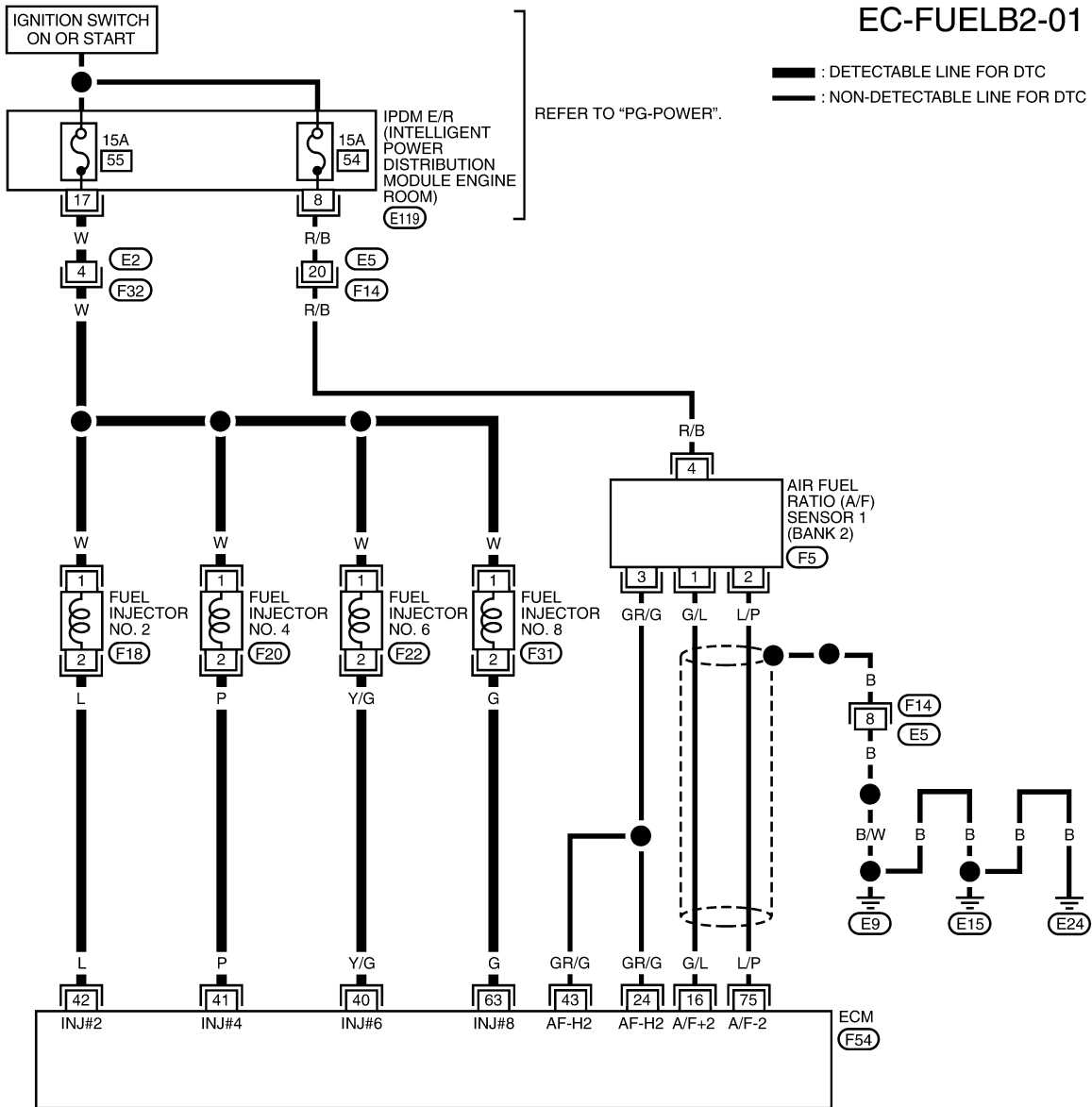


# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

BANK 2

EC-FUELB2-01



BBWA2793E

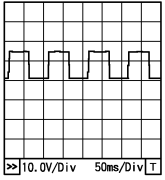
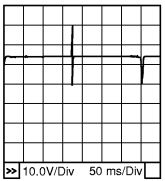
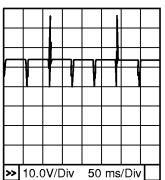
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

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# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  10.0V/Div 50ms/Div T PBIA8148J
40 41 42 63	Y/G P L G	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2 Fuel injector No. 8	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	<b>BATTERY VOLTAGE</b> (11 - 14V)★  10.0V/Div 50 ms/Div PBIB0042E
			<b>[Engine is running]</b> • <b>Warm-up condition</b> • Engine speed: 2,000 rpm	<b>BATTERY VOLTAGE</b> (11 - 14V)★  10.0V/Div 50 ms/Div PBIB0043E
75	L/P	A/F sensor 1 (bank 2)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

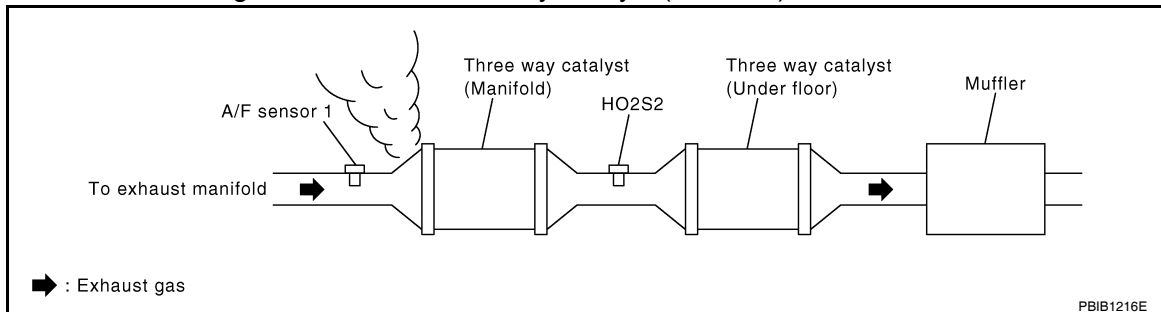
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531799

### 1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

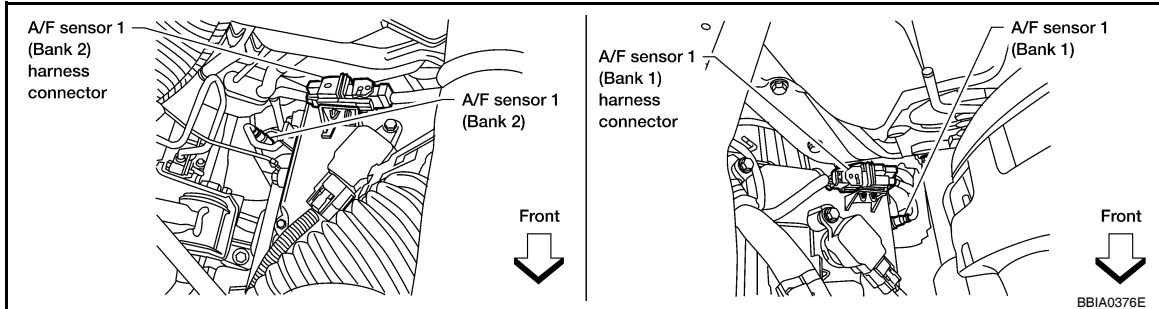
## < SERVICE INFORMATION >

### OK or NG

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

## 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 harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

- Also check harness for short to power.

### OK or NG

- OK >> GO TO 4.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK FUEL PRESSURE

- Release fuel pressure to zero. Refer to [EC-80, "Fuel Pressure Check"](#).
- Install fuel pressure gauge and check fuel pressure. Refer to [EC-80, "Fuel Pressure Check"](#).

**At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)**

### OK or NG

- OK >> GO TO 6.  
 NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-613.](#))

# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

## < SERVICE INFORMATION >

- Fuel pressure regulator (Refer to [EC-80, "Fuel Pressure Check"](#).)

>> Repair or replace.

## 6. CHECK MASS AIR FLOW SENSOR

### With CONSULT-II

- Install all removed parts.
- Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.

**3.0 - 9.0 g·m/sec: at idling**

**9.0 - 28.0 g·m/sec: at 2,500 rpm**

### With GST

- Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST.

**3.0 - 9.0 g·m/sec: at idling**

**9.0 - 28.0 g·m/sec: at 2,500 rpm**

### OK or NG

OK >> GO TO 7.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to [EC-186](#).

## 7. CHECK FUNCTION OF FUEL INJECTOR

### With CONSULT-II

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

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

### Without CONSULT-II

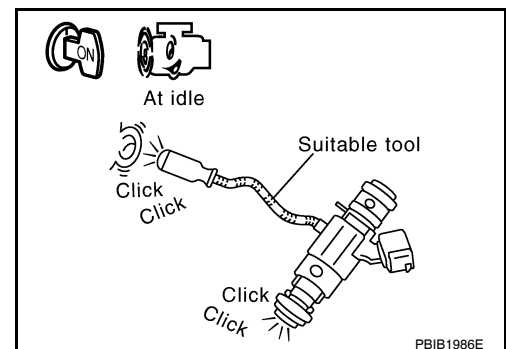
- Start engine.
- Listen to each fuel injector operating sound.

**Clicking noise should be heard.**

### OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-608](#).



## 8. CHECK FUEL INJECTOR

- Remove fuel injector assembly. Refer to [EM-31](#).  
Keep fuel hose and all fuel injectors connected to fuel injector gallery.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Disconnect all fuel injector harness connectors.
- Disconnect all ignition coil harness connectors.

## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

### < SERVICE INFORMATION >

---

5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.  
Make sure fuel does not drip from fuel injector.

#### OK or NG

OK (Does not drip.)>>GO TO 9.

NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

### 9.CHECK INTERMITTENT INCIDENT

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Refer to [EC-138](#).

>> **INSPECTION END**

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# DTC P0181 FTT SENSOR

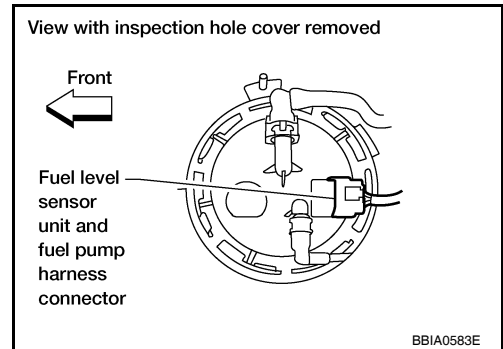
< SERVICE INFORMATION >

## DTC P0181 FTT SENSOR

### Component Description

INFOID:000000003531800

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



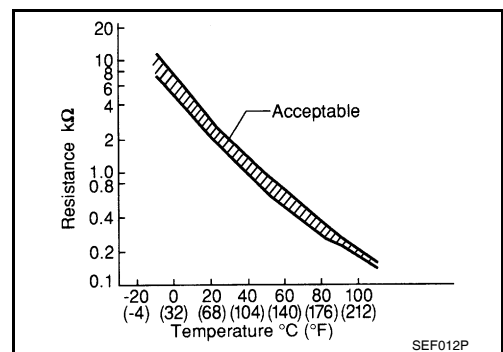
### <Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

\*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

#### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



### On Board Diagnosis Logic

INFOID:000000003531801

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Fuel tank temperature sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531802

#### NOTE:

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

#### WITH CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- Wait at least 10 seconds.  
If the result is NG, go to [EC-312, "Diagnosis Procedure"](#).  
If the result is OK, go to following step.
- Check "COOLAN TEMP/S" value.  
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.  
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

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# DTC P0181 FTT SENSOR

## < SERVICE INFORMATION >

6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to [EC-312, "Diagnosis Procedure"](#).

### WITH GST

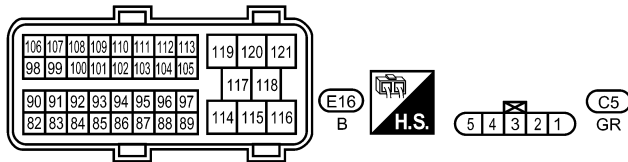
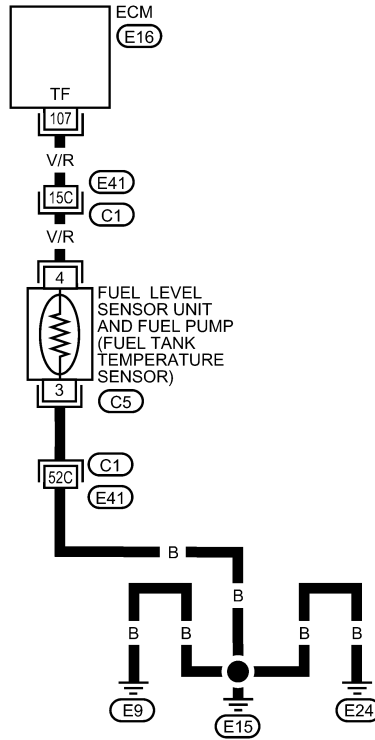
Follow the procedure "WITH CONSULT-II" above.

## Wiring Diagram

INFOID:000000003531803

### EC-FTTS-01

— : DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

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# DTC P0181 FTT SENSOR

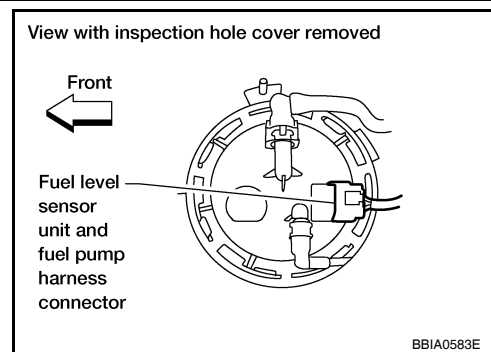
< SERVICE INFORMATION >

## Diagnosis Procedure

INFOID:000000003531804

### 1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Turn ignition switch ON.

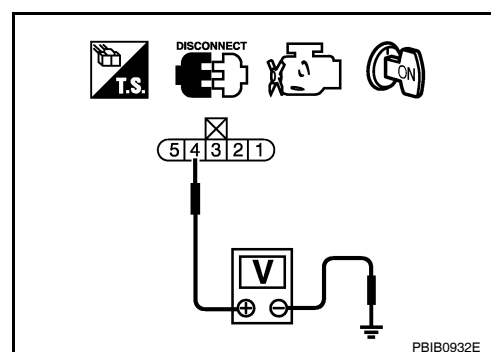


3. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



### 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair harness or connector.

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

1. Turn ignition switch OFF.
2. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 3 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness for open or short between "fuel level sensor unit and fuel pump" and ground

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

### 5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-313. "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.



# DTC P0181 FTT SENSOR

## < SERVICE INFORMATION >

NG >> Replace "fuel level sensor unit and fuel pump".

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

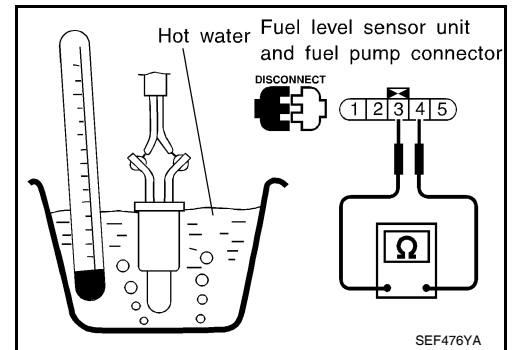
INFOID:000000003531805

### FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between "fuel level sensor unit and fuel pump" terminals 3 and 4 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel level sensor unit.



INFOID:000000003531806

## Removal and Installation

### FUEL TANK TEMPERATURE SENSOR

Refer to [FL-5](#).

# DTC P0182, P0183 FTT SENSOR

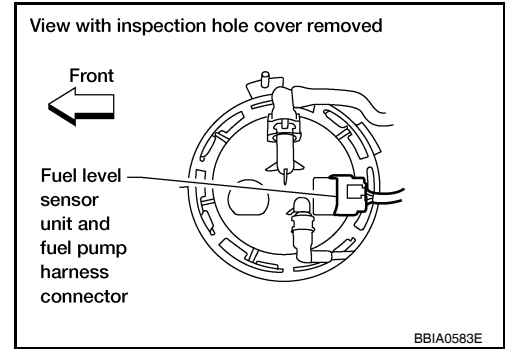
< SERVICE INFORMATION >

## DTC P0182, P0183 FTT SENSOR

### Component Description

INFOID:000000003531807

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



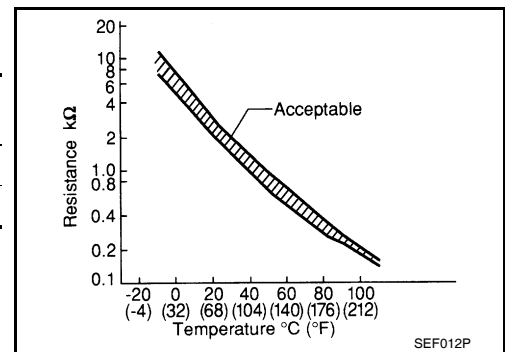
### <Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

\*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

#### CAUTION:

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



### On Board Diagnosis Logic

INFOID:000000003531808

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Fuel tank temperature sensor</li> </ul>
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

### DTC Confirmation Procedure

INFOID:000000003531809

#### NOTE:

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

#### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to [EC-315. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

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# DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

WITH GST

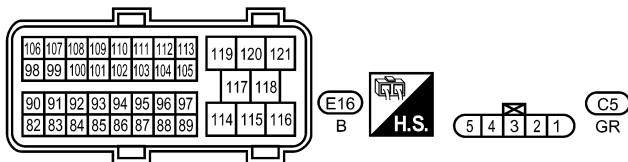
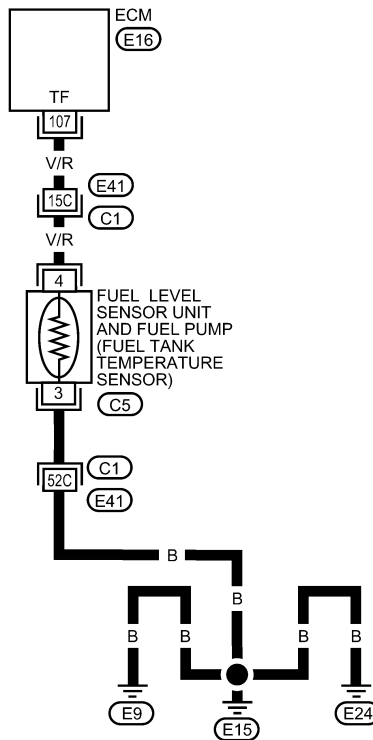
Follow the procedure "WITH CONSULT-II" above.

## Wiring Diagram

INFOID:000000003531810

EC-FTTS-01

: DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

- SUPER MULTIPLE JUNCTION (SMJ)

AWBWA0159G

## Diagnosis Procedure

1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

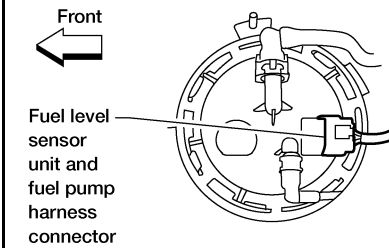
INFOID:000000003531811

## DTC P0182, P0183 FTT SENSOR

### < SERVICE INFORMATION >

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Turn ignition switch ON.

View with inspection hole cover removed



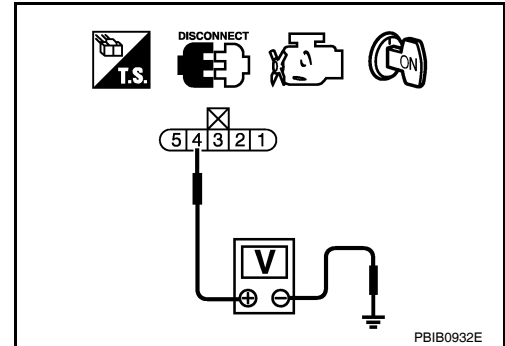
BBIA0583E

3. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair harness or connector.

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

1. Turn ignition switch OFF.
2. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 3 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

#### OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness for open or short between "fuel level sensor unit and fuel pump" and ground

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

## 5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-317, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 6.  
NG >> Replace "fuel level sensor unit and fuel pump".

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

# DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

>> INSPECTION END

## Component Inspection

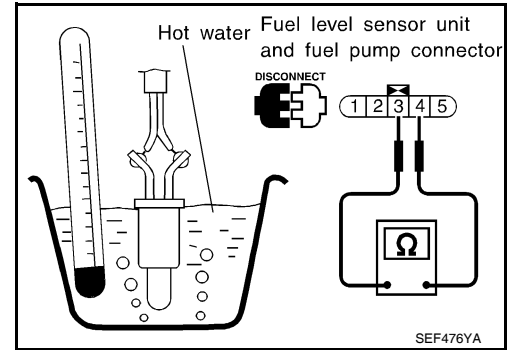
INFOID:000000003531812

### FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 3 and 4 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel level sensor unit.



INFOID:000000003531813

## Removal and Installation

### FUEL TANK TEMPERATURE SENSOR

Refer to [FL-5](#).

# DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

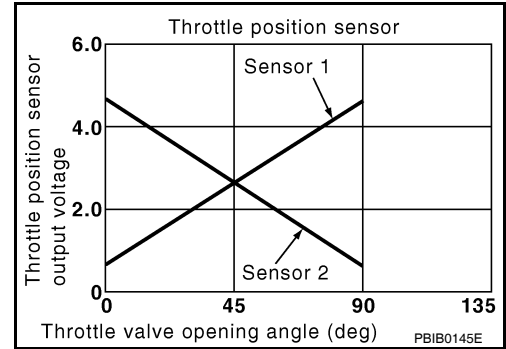
## DTC P0222, P0223 TP SENSOR

### Component Description

INFOID:000000003531814

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

The throttle position sensor has the 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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531815

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Selector lever: D	Accelerator pedal: Fully released More than 0.36V
	Accelerator pedal: Fully depressed Less than 4.75V	

\*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

### On Board Diagnosis Logic

INFOID:000000003531816

**These self-diagnoses have the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.)</li> <li>• Electric throttle control actuator (TP sensor 1)</li> <li>• Accelerator pedal position sensor (APP sensor 2)</li> </ul>
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:000000003531817

#### NOTE:

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 8V at idle.**

#### WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P0222, P0223 TP SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-321, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

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### WITH GST

Follow the procedure "WITH CONSULT-II" above.

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# DTC P0222, P0223 TP SENSOR

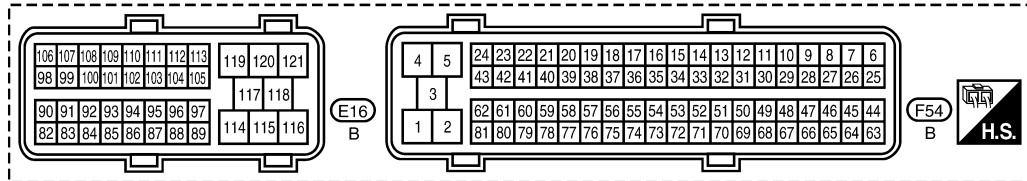
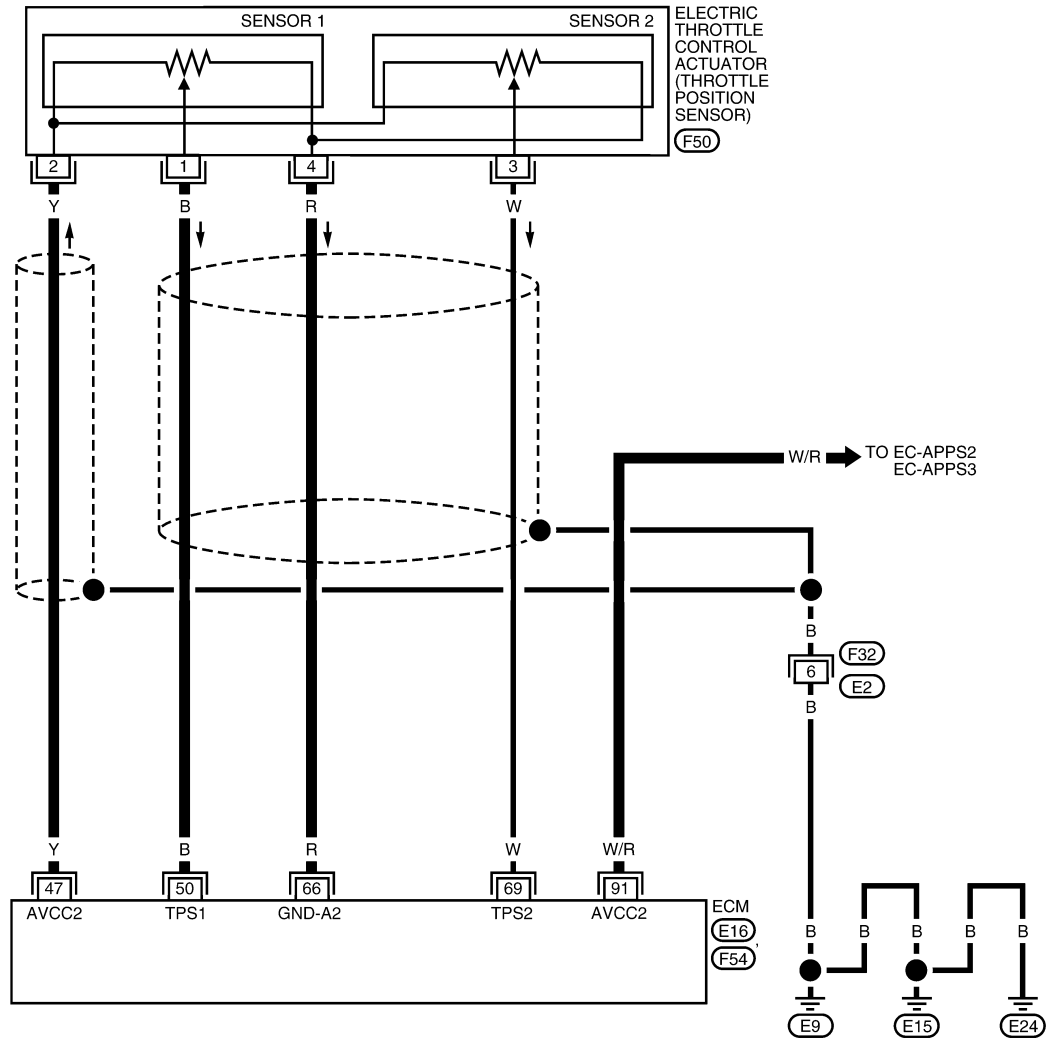
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531818

### EC-TPS1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA1683E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P0222, P0223 TP SENSOR

## < SERVICE INFORMATION >

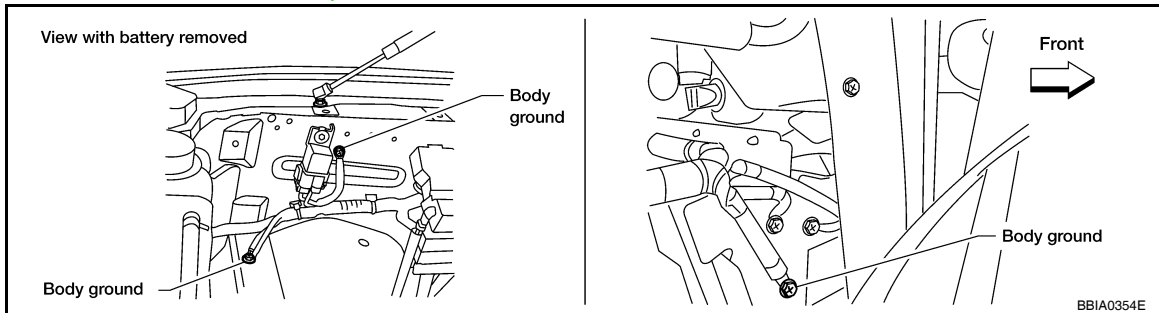
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	Y	Sensor power supply (Throttle position sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
50	B	Throttle position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
69	W	Throttle position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V

## Diagnosis Procedure

INFOID:000000003531819

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

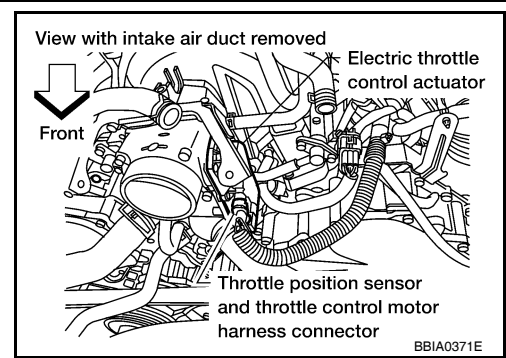
- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

## DTC P0222, P0223 TP SENSOR

### < SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
  - Illustration shows the view with intake air duct removed.
2. Turn ignition switch ON.

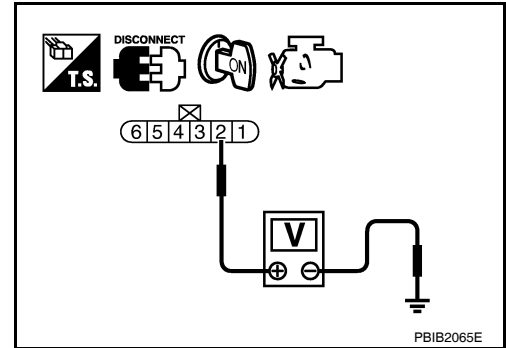


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 3.



### 3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit.

### 4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	<a href="#">EC-320</a>
91	APP sensor terminal 6	<a href="#">EC-583</a>

OK or NG

- OK >> GO TO 5.
- NG >> Repair short to ground or short to power in harness or connectors.

### 5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-587, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 6.

### 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-78, "Idle Air Volume Learning"](#).

# DTC P0222, P0223 TP SENSOR

< SERVICE INFORMATION >

---

>> **INSPECTION END**

## 7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

---

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

## 8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 9.

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

## 9. CHECK THROTTLE POSITION SENSOR

---

Refer to [EC-323. "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

---

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78. "Idle Air Volume Learning"](#).

>> **INSPECTION END**

## 11. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531820

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position.

## DTC P0222, P0223 TP SENSOR

### < SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

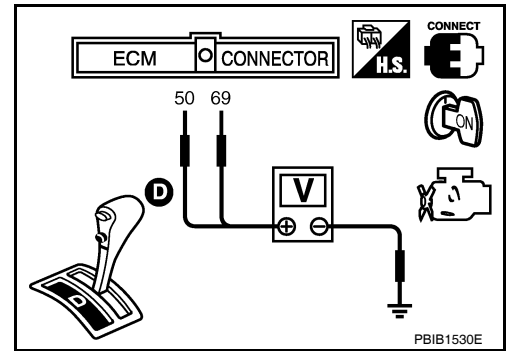
7. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-78, "Idle Air Volume Learning"](#).

### Removal and Installation

#### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#).



INFOID:000000003531821

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

< SERVICE INFORMATION >

## DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

### On Board Diagnosis Logic

INFOID:000000003531822

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**  
 On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.  
 When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.  
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.  
 If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.  
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.  
 If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
- Two Trip Detection Logic (Exhaust quality deterioration)**  
 For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.  
 A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	<ul style="list-style-type: none"> <li>• Improper spark plug</li> <li>• Insufficient compression</li> <li>• Incorrect fuel pressure</li> <li>• The injector circuit is open or shorted</li> <li>• Fuel injector</li> <li>• Intake air leak</li> <li>• The ignition signal circuit is open or shorted</li> <li>• Lack of fuel</li> <li>• Signal plate</li> <li>• Air fuel ratio (A/F) sensor 1</li> <li>• Incorrect PCV hose connection</li> </ul>
P0301 0301	No. 1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305 0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306 0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	
P0307 0307	No. 7 cylinder misfire detected	No. 7 cylinder misfires.	
P0308 0308	No. 8 cylinder misfire detected	No. 8 cylinder misfires.	

### DTC Confirmation Procedure

INFOID:000000003531823

#### **CAUTION:**

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

#### **NOTE:**

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

Ⓜ WITH CONSULT-II

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

## < SERVICE INFORMATION >

1. Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to [EC-326, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec
PBIB0164E	

**NOTE:**

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

**Hold the accelerator pedal as steady as possible.**

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

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °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

**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

## Diagnosis Procedure

INFOID:000000003531824

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

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

OK or NG

- OK >> GO TO 2.
- NG >> Discover air leak location and repair.

### 2. CHECK FOR EXHAUST SYSTEM CLOGGING

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

OK or NG

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

### 3. PERFORM POWER BALANCE TEST

**With CONSULT-II**

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

## < SERVICE INFORMATION >

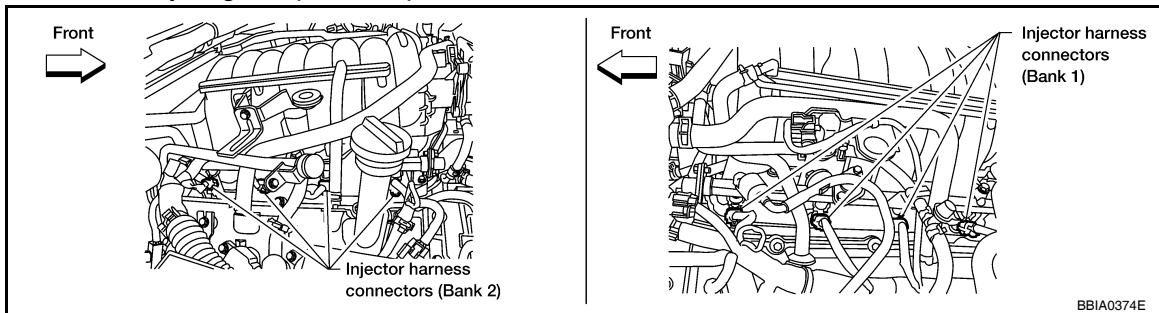
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

### ⊗ Without CONSULT-II

When disconnecting each fuel injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



### Yes or No

Yes >> GO TO 4.

No >> GO TO 7.

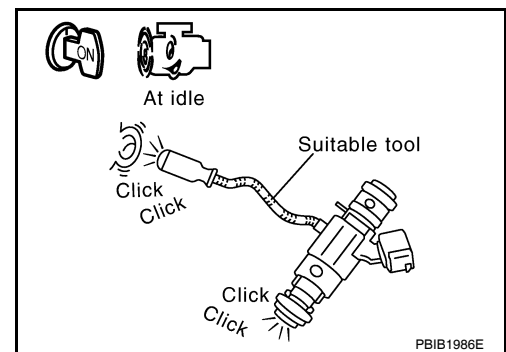
## 4.CHECK FUEL INJECTOR

Does each fuel injector make an operating sound at idle?

### Yes or No

Yes >> GO TO 5.

No >> Check fuel injector(s) and circuit(s). Refer to [EC-608](#).



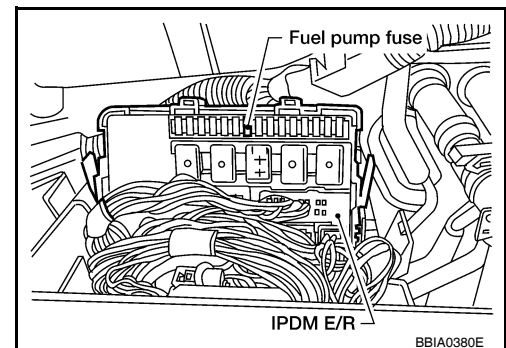
## 5.CHECK FUNCTION OF IGNITION COIL-I

### CAUTION:

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

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
 

**NOTE:**  
Do not use CONSULT-II 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.



# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

## < SERVICE INFORMATION >

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 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.

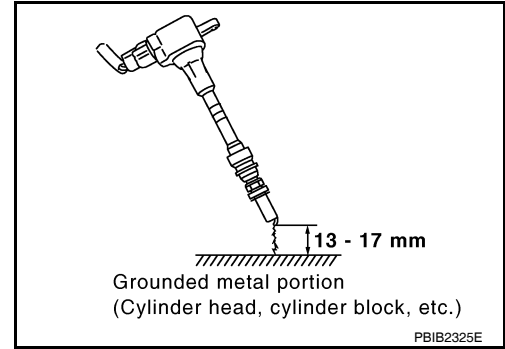
**Spark should be generated.**

### CAUTION:

- Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

### NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.



### OK or NG

- OK >> GO TO 9.  
NG >> GO TO 6.

## 6. CHECK FUNCTION OF IGNITION COIL-II

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

**Spark should be generated.**

### OK or NG

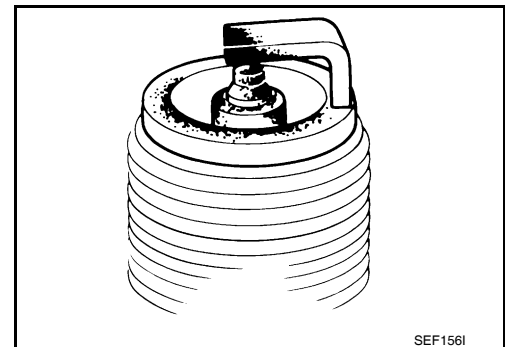
- OK >> GO TO 7.  
NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-626](#).

## 7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

### OK or NG

- OK >> Replace malfunctioning spark plug(s) with standard type one(s). For spark plug type, refer to [EM-29](#).
- NG >> 1. Repair or clean spark plug.  
2. GO TO 8.



## 8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

**Spark should be generated.**

### OK or NG

- OK >> **INSPECTION END**  
NG >> Replace malfunctioning spark plug(s) with standard type one(s). For spark plug type, refer to [EM-29](#), "Removal and Installation".

## 9. CHECK COMPRESSION PRESSURE



# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

## < SERVICE INFORMATION >

Check compression pressure. Refer to [EM-64. "On-Vehicle Service"](#).

### OK or NG

OK >> GO TO 10.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

## 10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to [EC-80. "Fuel Pressure Check"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-80. "Fuel Pressure Check"](#).

**At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)**

### OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-613](#).)
- Fuel pressure regulator (Refer to [EC-80. "Fuel Pressure Check"](#).)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

## 12. CHECK IGNITION TIMING

Check the following items. Refer to [EC-71. "Basic Inspection"](#).

Items	Specifications
Target idle speed	650 ± 50 rpm (in P or N position)
Ignition timing	15 ± 5° BTDC (in P or N position)

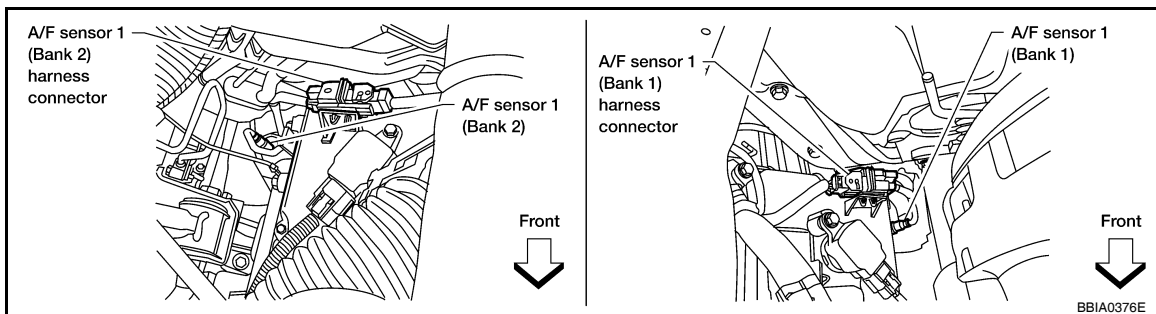
### OK or NG

OK >> GO TO 13.

NG >> Follow the [EC-71. "Basic Inspection"](#).

## 13. CHECK A/F SENSOR 1 INPUT SIGNAL

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

## < SERVICE INFORMATION >

Bank 2	1	16
	2	75

**Continuity should exist.**

5. Check harness continuity between the following terminals and ground.  
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

6. Also check harness for short to power.

### OK or NG

OK >> GO TO 14.

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

## 14. CHECK A/F SENSOR 1 HEATER

Refer to [EC-168, "Component Inspection"](#).

### OK or NG

OK >> GO TO 16.

NG >> GO TO 15.

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

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

### **CAUTION:**

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

>> **INSPECTION END**

## 16. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II.

**3.0 - 9.0 g·m/sec: at idling**

**9.0 - 28.0 g·m/sec: at 2,500 rpm**

### **With GST**

Check mass air flow sensor signal in Service \$01 with GST.

**3.0 - 9.0 g·m/sec: at idling**

**9.0 - 28.0 g·m/sec: at 2,500 rpm**

### OK or NG

OK >> GO TO 17.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-186](#).

## 17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-90, "Symptom Matrix Chart"](#).

### OK or NG

OK >> GO TO 18.

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

< SERVICE INFORMATION >

---

NG >> Repair or replace.

**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 [EC-49. "Emission-related Diagnostic Information"](#) .

>> GO TO 19.

**19**.CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

>> INSPECTION END

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# DTC P0327, P0328, P0332, P0333 KS

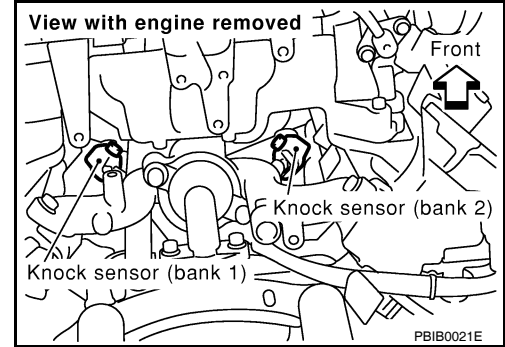
< SERVICE INFORMATION >

## DTC P0327, P0328, P0332, P0333 KS

### Component Description

INFOID:000000003531825

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.



### On Board Diagnosis Logic

INFOID:000000003531826

**The MIL will not light up for these self-diagnoses.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (bank 1)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Knock sensor</li> </ul>
P0332 0332 (bank 2)			
P0328 0328 (bank 1)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	
P0333 0333 (bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531827

**NOTE:**

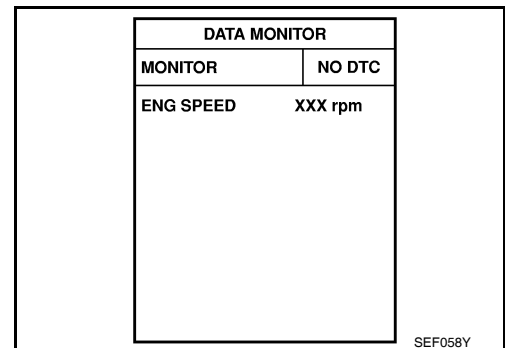
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

Ⓟ WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-334. "Diagnosis Procedure"](#)



Ⓟ With GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P0327, P0328, P0332, P0333 KS

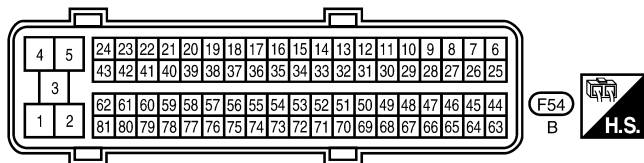
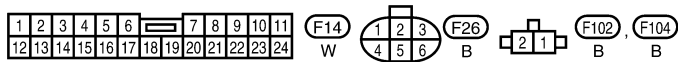
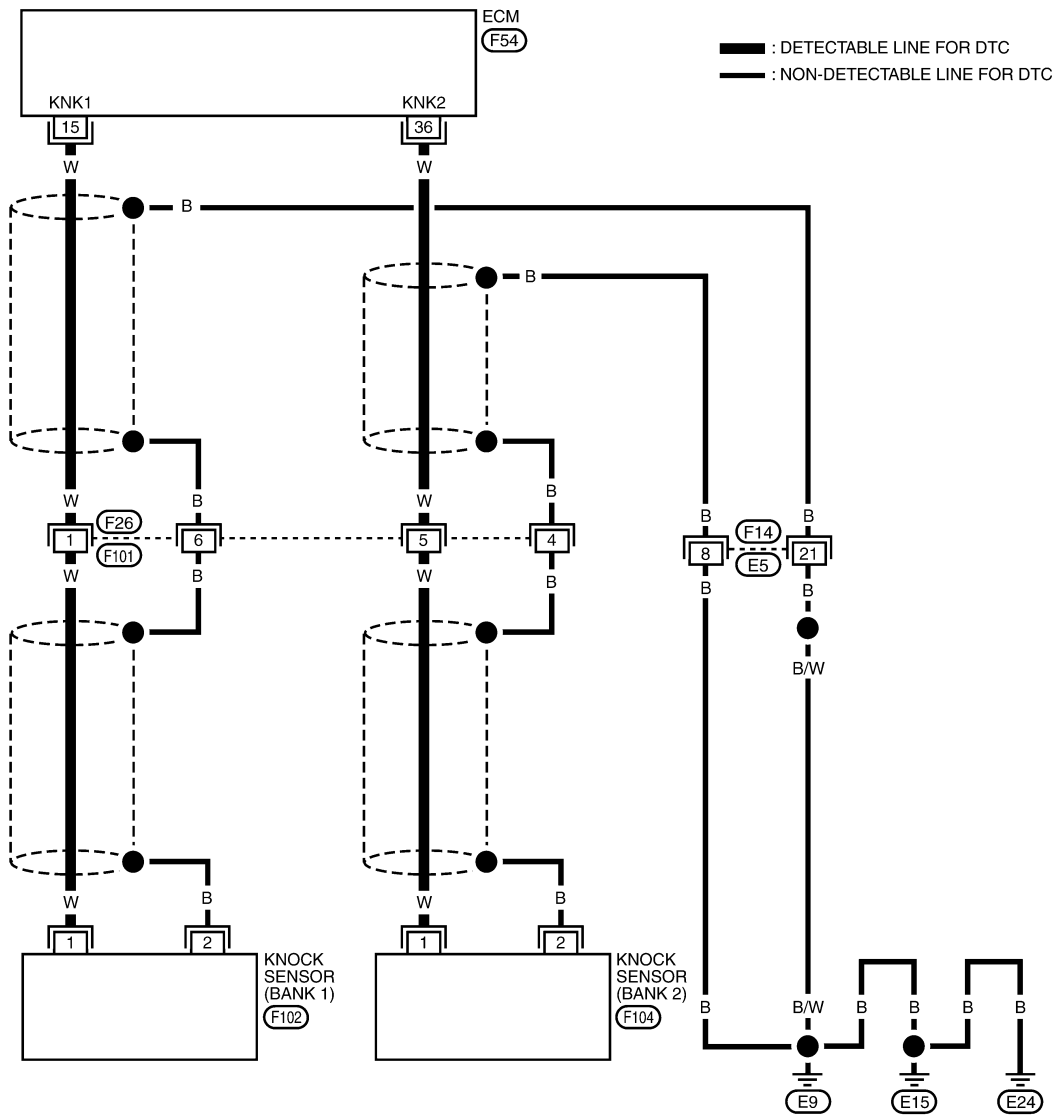
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531828

EC-KS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P



BBWA2094E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0327, P0328, P0332, P0333 KS

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W W	Knock sensor (bank 1) Knock sensor (bank 2)	<b>[Engine is running]</b> • Idle speed	Approximately 2.5V

## Diagnosis Procedure

INFOID:000000003531829

### 1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

**NOTE:**

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

**Resistance: Approximately 532 - 588 k $\Omega$  [at 20°C (68°F)]**

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

OK or NG

- OK >> GO TO 5.  
NG >> GO TO 2.

### 2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

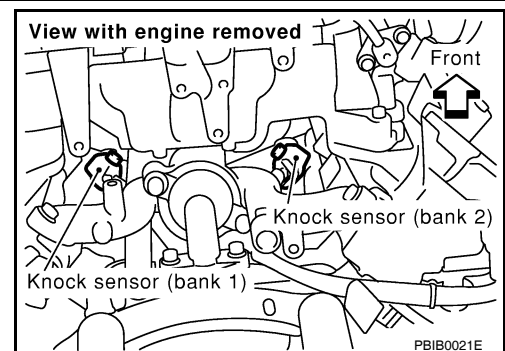
1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor (bank 1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, F101
- Harness for open or short between ECM and knock sensor

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

### 4. CHECK KNOCK SENSOR

Refer to [EC-335, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.  
NG >> Replace malfunctioning knock sensor.

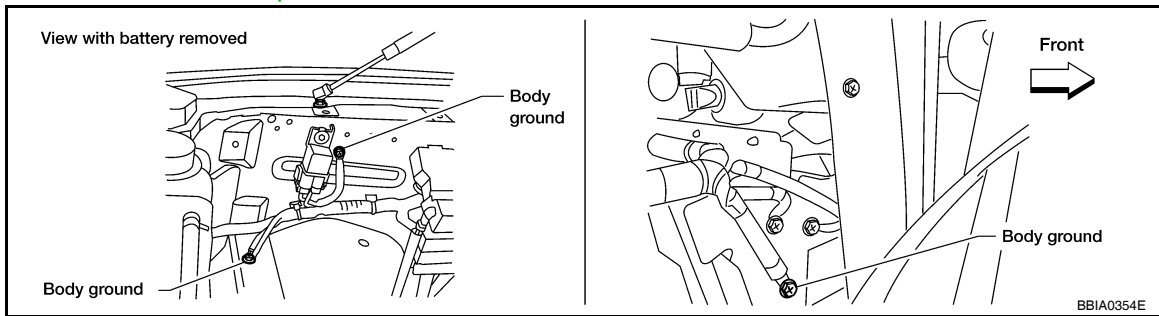
### 5. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body.

## DTC P0327, P0328, P0332, P0333 KS

### < SERVICE INFORMATION >

Refer to [EC-143](#), "Ground Inspection".



#### OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace ground connections.

### 6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

#### OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

### 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, F101
- Harness connectors F14, E5
- Harness for open or short between knock sensor terminal 2 and ground

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

### 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531830

### KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

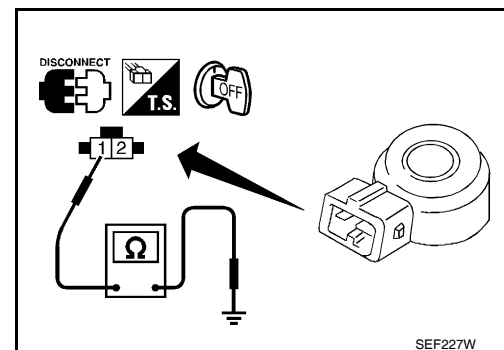
#### NOTE:

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

**Resistance: Approximately 532 - 588 k $\Omega$  [at 20°C (68°F)]**

#### CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



## Removal and Installation

INFOID:000000003531831

### KNOCK SENSOR

Refer to [EM-78](#).

# DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

## DTC P0335 CKP SENSOR (POS)

### Component Description

INFOID:000000003531832

The crankshaft position sensor (POS) is located on the A/T assembly facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

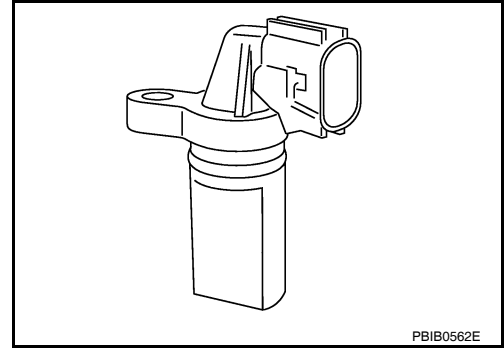
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

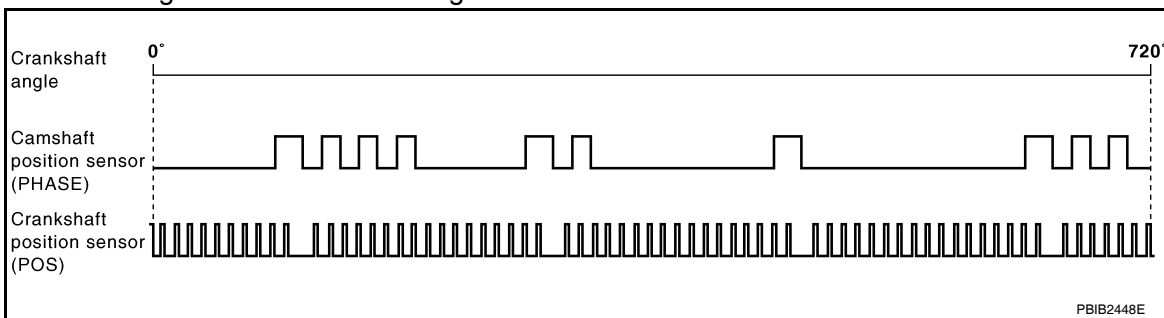
Due to the changing magnetic field, the voltage from the sensor changes.

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

ECM receives the signals as shown in the figure.



PBIB0562E



PBIB2448E

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531833

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

### On Board Diagnosis Logic

INFOID:000000003531834

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	<ul style="list-style-type: none"> <li>• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.</li> <li>• The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.</li> <li>• The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.</li> </ul>	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Crankshaft position sensor (POS)</li> <li>• Signal plate</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531835

#### NOTE:

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

#### TESTING CONDITION:

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

④ WITH CONSULT-II



## DTC P0335 CKP SENSOR (POS)

### < SERVICE INFORMATION >

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-339, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

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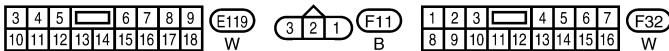
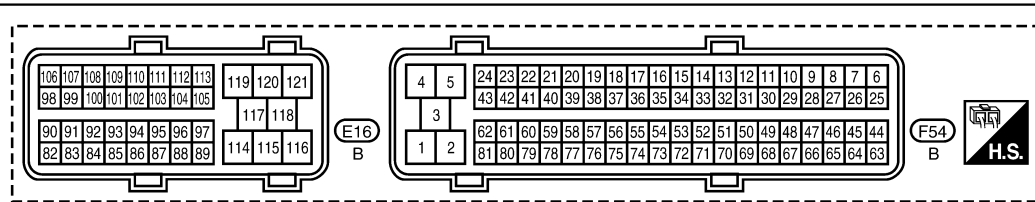
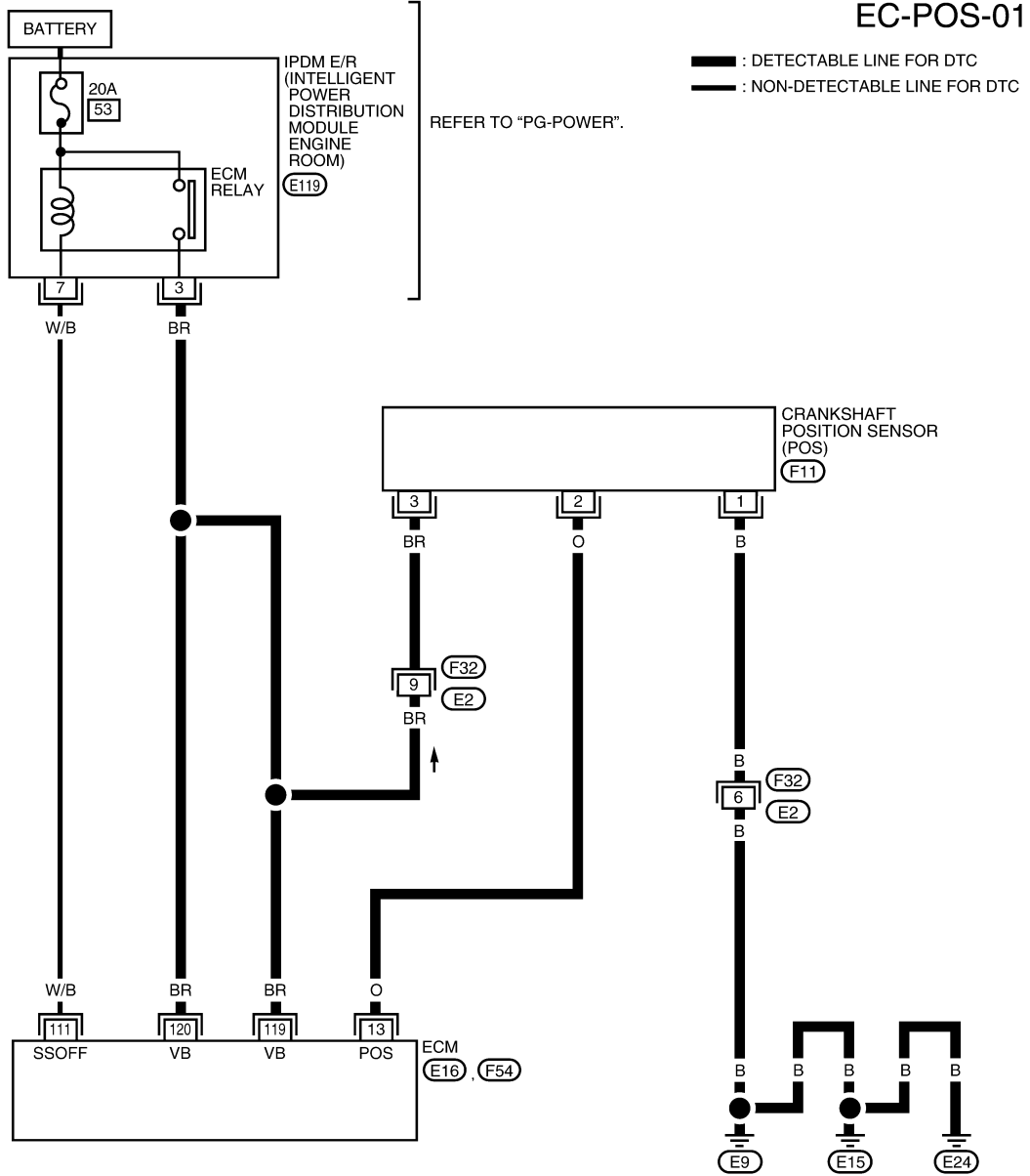
P

# DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531836



BBWA1685E

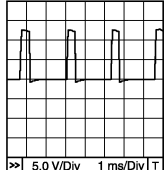
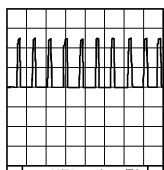
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0335 CKP SENSOR (POS)

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	O	Crankshaft position sensor (POS)	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	1.0 - 2.0V ★  PBIB1041E
			<b>[Engine is running]</b> • Engine speed: 2,000 rpm.	1.0 - 2.0V ★  PBIB1042E
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

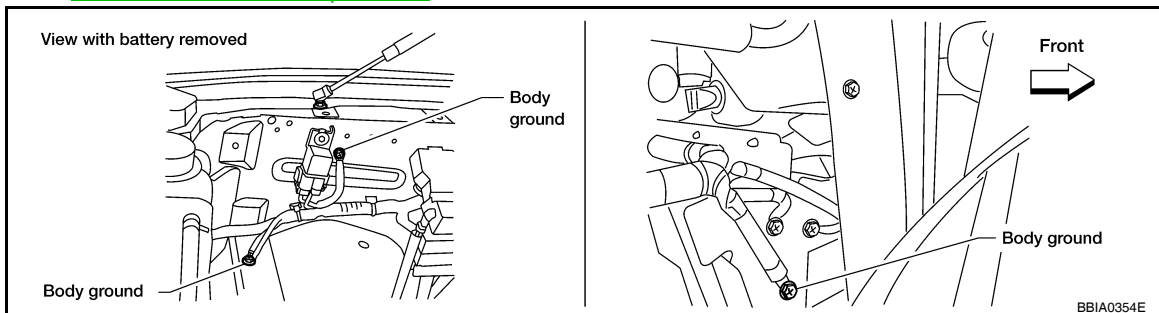
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531837

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



**OK or NG**

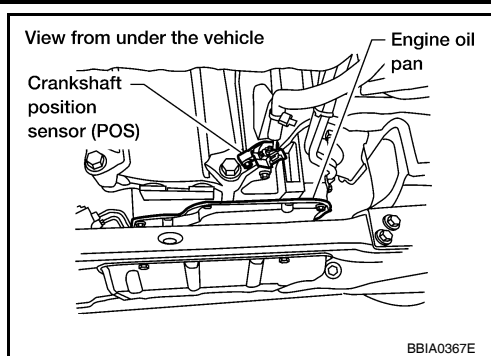
- OK >> GO TO 2.  
 NG >> Repair or replace ground connections.

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

## DTC P0335 CKP SENSOR (POS)

### < SERVICE INFORMATION >

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.

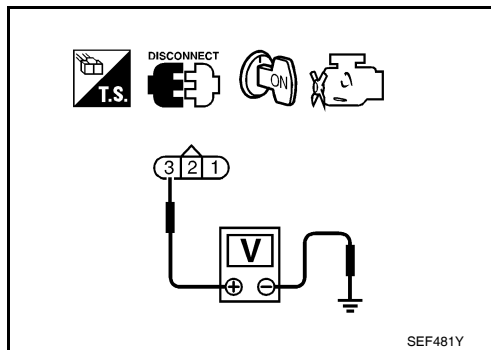


3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

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

### 4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 1 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between crankshaft position sensor (POS) and ground

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

### 6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

# DTC P0335 CKP SENSOR (POS)

## < SERVICE INFORMATION >

### OK or NG

OK >> GO TO 7.

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

## 7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-341](#), "Component Inspection".

### OK or NG

OK >> GO TO 8.

NG >> Replace crankshaft position sensor (POS).

## 8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

### OK or NG

OK >> GO TO 9.

NG >> Replace the signal plate.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

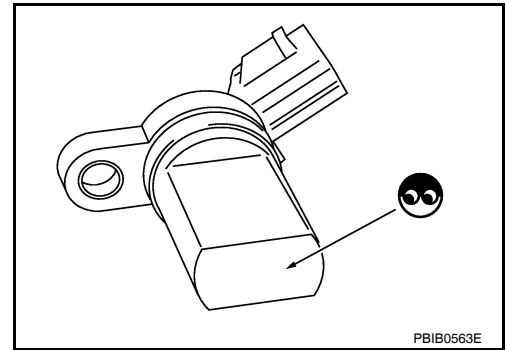
>> **INSPECTION END**

## Component Inspection

INFOID:000000003531838

### CRANKSHAFT POSITION SENSOR (POS)

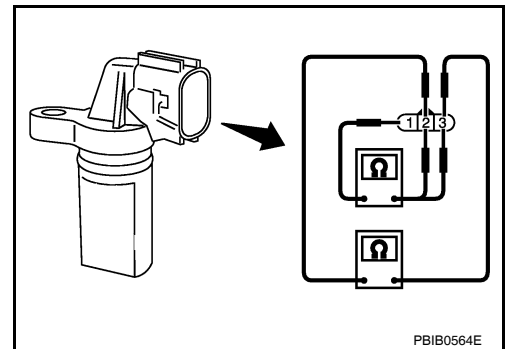
1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



PBIB0563E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance $\Omega$ [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or $\infty$
1 (+) - 3 (-)	
2 (+) - 3 (-)	



PBIB0564E

## Removal and Installation

INFOID:000000003531839

### CRANKSHAFT POSITION SENSOR (POS)

Refer to [AT-223](#).

# DTC P0340 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

## DTC P0340 CMP SENSOR (PHASE)

### Component Description

INFOID:000000003531840

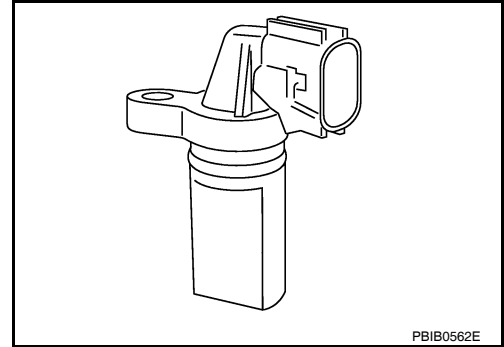
The camshaft position sensor (PHASE) senses the protrusion of exhaust valve cam sprocket to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

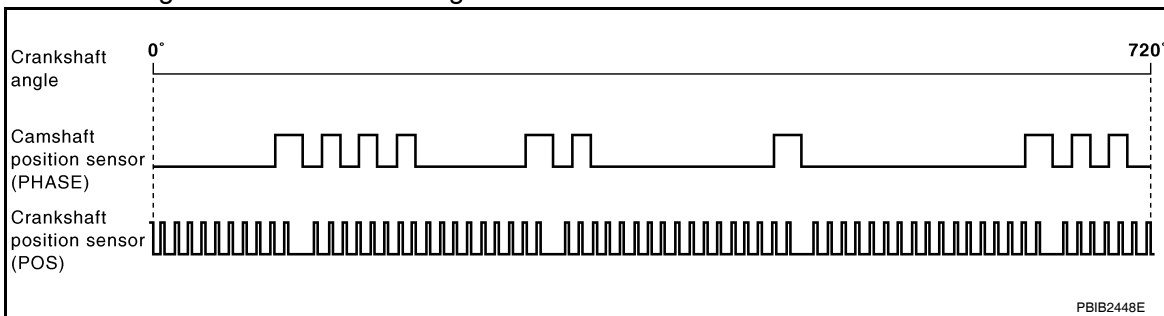
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.



PBIB0562E



PBIB2448E

### On Board Diagnosis Logic

INFOID:000000003531841

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	<ul style="list-style-type: none"> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Camshaft position sensor (PHASE)</li> <li>Camshaft (Exhaust)</li> <li>Starter motor (Refer to <a href="#">SC-9.</a>)</li> <li>Starting system circuit (Refer to <a href="#">SC-9.</a>)</li> <li>Dead (Weak) battery</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531842

#### NOTE:

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

#### TESTING CONDITION:

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

④ WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P0340 CMP SENSOR (PHASE)

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to [EC-345, "Diagnosis Procedure"](#).  
If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to [EC-345, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

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# DTC P0340 CMP SENSOR (PHASE)

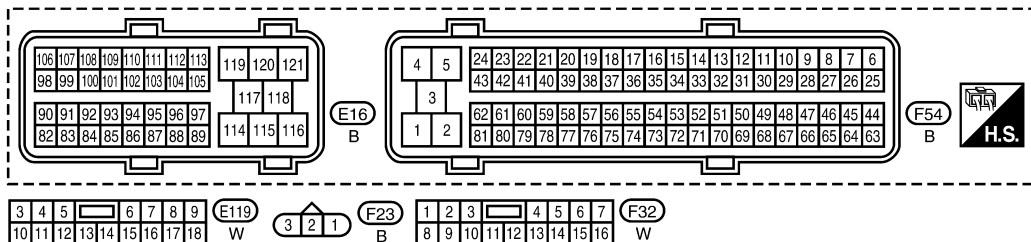
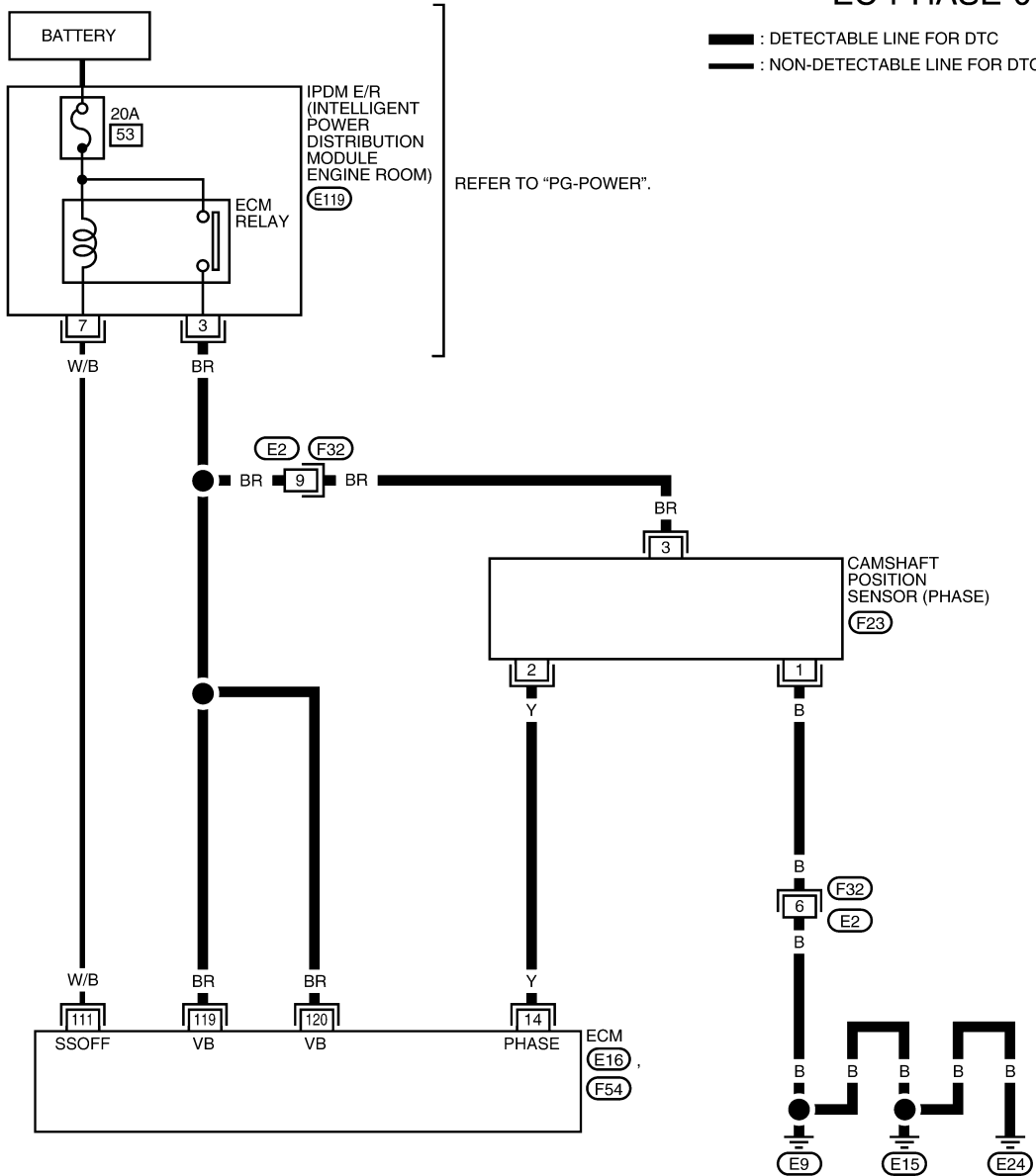
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531843

### EC-PHASE-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA1686E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

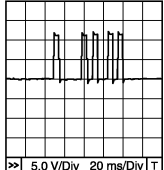
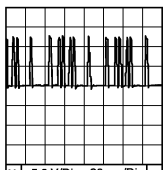
**CAUTION:**



# DTC P0340 CMP SENSOR (PHASE)

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE)	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V ★  <small>PBIB1039E</small>
			<b>[Engine is running]</b> • Engine speed: 2,000 rpm.	1.0 - 4.0V ★  <small>PBIB1040E</small>
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531844

### 1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

**Does the engine turn over?**

**Does the starter motor operate?**

Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to [SC-9](#).)

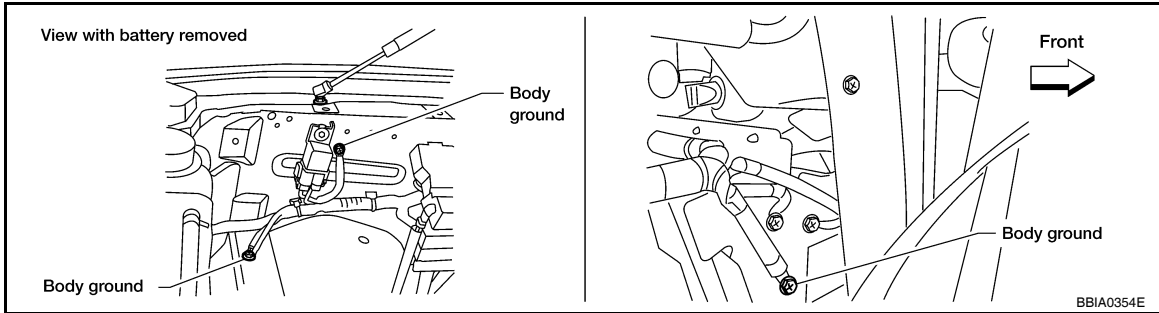
### 2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

## DTC P0340 CMP SENSOR (PHASE)

### < SERVICE INFORMATION >

Refer to [EC-143, "Ground Inspection"](#).



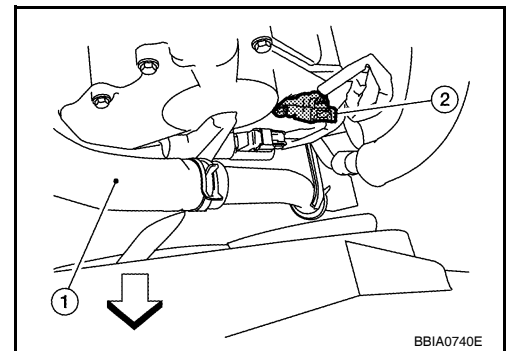
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

### 3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) (2) harness connector.
  - Radiator hose (1)
2. Turn ignition switch ON.



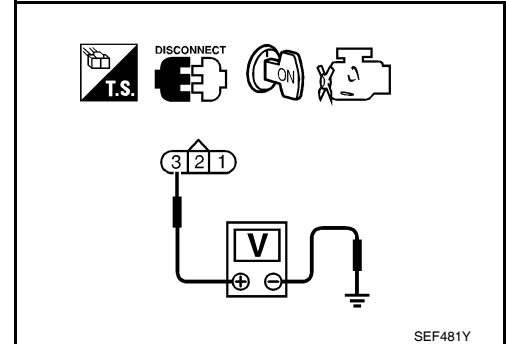
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

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

### 5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.  
Refer to wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

# DTC P0340 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F32, E2
- Harness for open or short between CMP sensor (PHASE) and ground

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

## 7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

## 8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-347. "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace camshaft position sensor (PHASE). Refer to [EC-348. "Removal and Installation"](#).

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

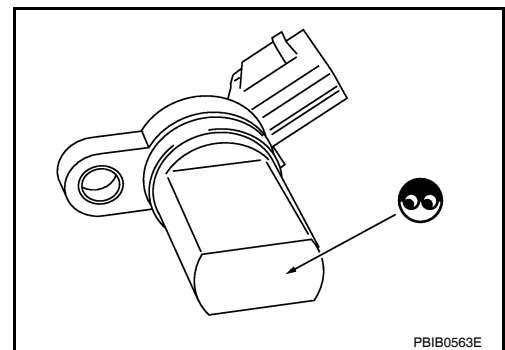
>> **INSPECTION END**

## Component Inspection

INFOID:000000003531845

### CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor. Refer to [EC-348. "Removal and Installation"](#).
4. Visually check the sensor for chipping.

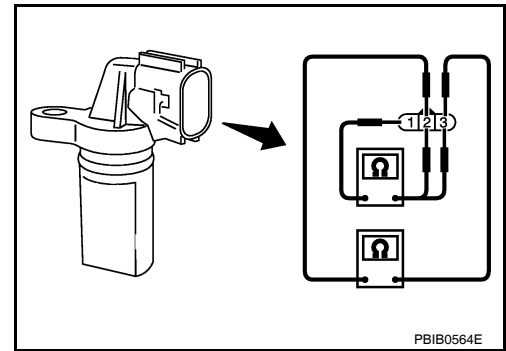


## DTC P0340 CMP SENSOR (PHASE)

### < SERVICE INFORMATION >

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance $\Omega$ [at 25°C (77°F)]
3(+) - 1(-)	Except 0 or $\infty$
2(+) - 1(-)	
3(+) - 2(-)	



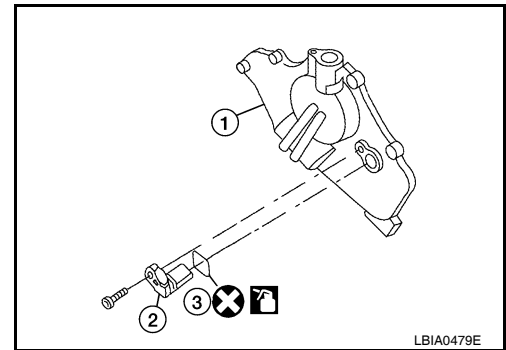
## Removal and Installation

INFOID:000000003531846

### CAMSHAFT POSITION SENSOR (PHASE)

#### Removal

1. Remove engine room cover using power tool. Refer to [EM-12. "Removal and Installation"](#).
2. Remove air duct and resonator assembly. Refer to [EM-15. "Removal and Installation"](#).
3. Disconnect camshaft position sensor connector.
4. Remove camshaft position sensor (2) from intake valve timing control solenoid valve cover (LH) (1).



#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

Replace the O-ring (3) of the camshaft position sensor with a new one, then lubricate o-ring with engine oil before installing.

**Camshaft position sensor : 9.6 N·m (0.98 kg-m, 5 in-lb)**

# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

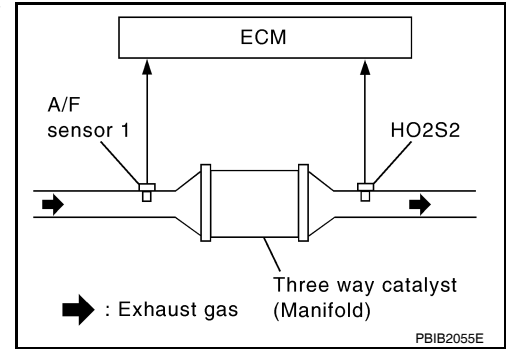
### On Board Diagnosis Logic

INFOID:000000003531847

The ECM monitors the switching frequency ratio of air fuel sensor (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.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420 (Bank 1)	Catalyst system efficiency below threshold	<ul style="list-style-type: none"> <li>• Three way catalyst (manifold) does not operate properly.</li> <li>• Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Three way catalyst (manifold)</li> <li>• Exhaust tube</li> <li>• Intake air leaks</li> <li>• Fuel injector</li> <li>• Fuel injector leaks</li> <li>• Spark plug</li> <li>• Improper ignition timing</li> </ul>
P0430 0430 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531848

#### NOTE:

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

#### WITH CONSULT-II

#### TESTING CONDITION:

**Do not hold engine speed for more than the specified minutes below.**

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the 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 "COOLAN TEMP/S" indicates more than 70°C (158°F).  
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
7. Open engine hood.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

### < SERVICE INFORMATION >

8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely. If "INCMP" of "CATALYST" changed to "CMPLT", go to step 12.
10. Wait 5 seconds at idle.

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
A/F SEN1 (B1)	XXX V

PBIB1784E

11. 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). If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
A/F SEN1 (B1)	XXX V

PBIB1785E

12. Select "SELF-DIAG RESULTS" mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected. If the 1st trip DTC is detected, go to [EC-351. "Diagnosis Procedure"](#).

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

### Overall Function Check

INFOID:000000003531849

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

#### WITH GST

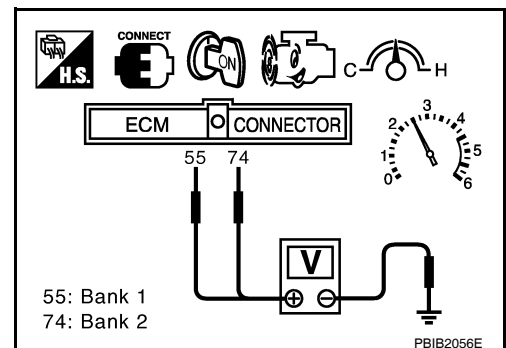
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.

6. Set voltmeter probes between ECM terminals ECM terminals 55 [HO2S2 (bank 1) signal], 74 [HO2S2 (bank 2) signal] and ground.

7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.

If the voltage fluctuation cycle takes less than 5 seconds, go to [EC-351. "Diagnosis Procedure"](#).

- 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

## Diagnosis Procedure

INFOID:00000003531850

### 1. CHECK EXHAUST SYSTEM

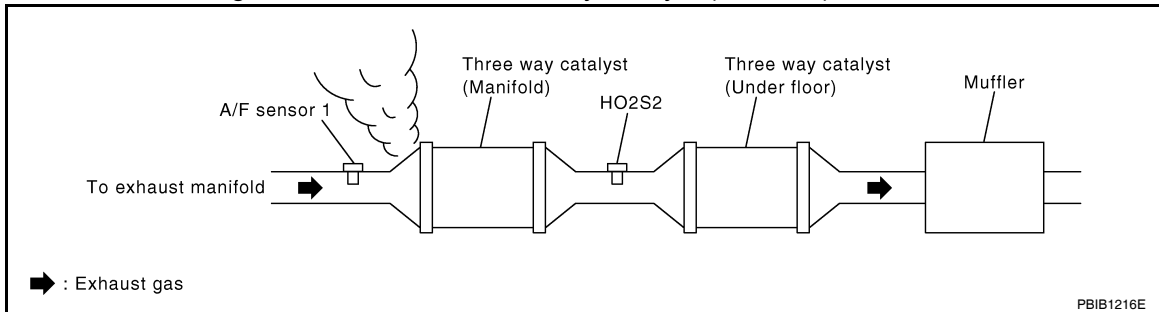
Visually check exhaust tubes and muffler for dent.

OK or NG

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

### 2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

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

### 3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

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

### 4. CHECK IGNITION TIMING

Check the following items. Refer to [EC-71. "Basic Inspection"](#).

Items	Specifications
Target idle speed	650 ± 50 rpm (in P or N position)
Ignition timing	15 ± 5° BTDC (in P or N position)

OK or NG

- OK >> GO TO 5.
- NG >> Follow the [EC-71. "Basic Inspection"](#).

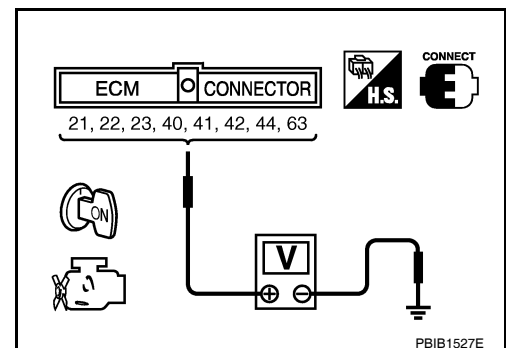
### 5. CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42, 44, 63 and ground with CONSULT-II or tester. Refer to Wiring Diagram for fuel injector, [EC-609. "Wiring Diagram"](#).

**Battery voltage should exist.**

OK or NG

- OK >> GO TO 6.
- NG >> Perform [EC-610. "Diagnosis Procedure"](#).



### 6. CHECK FUNCTION OF IGNITION COIL-I

## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

### 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-II 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 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 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

### NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

### OK or NG

- OK >> GO TO 10.  
NG >> GO TO 7.

## 7. CHECK FUNCTION OF IGNITION COIL-II

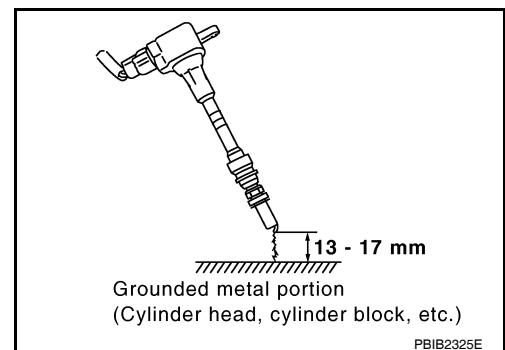
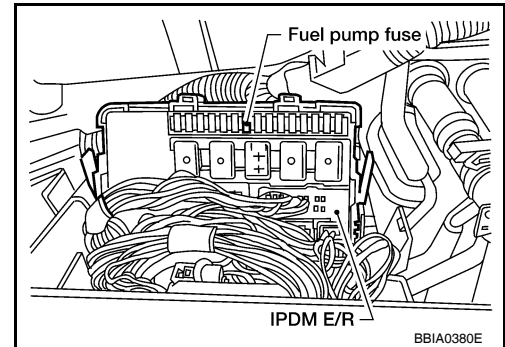
1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

**Spark should be generated.**

### OK or NG

- OK >> GO TO 8.  
NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-626](#).

## 8. CHECK SPARK PLUG





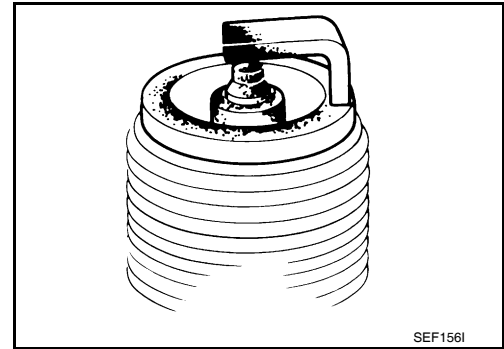
## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

### < SERVICE INFORMATION >

Check the initial spark plug for fouling, etc.

#### OK or NG

- OK >> Replace malfunctioning spark plug(s) with standard type one(s). For spark plug type, refer to [EM-29, "Removal and Installation"](#).
- NG >> 1. Repair or clean spark plug.  
2. GO TO 9.



### 9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

**Spark should be generated.**

#### OK or NG

- OK >> **INSPECTION END**
- NG >> Replace malfunctioning spark plug(s) with standard type one(s). For spark plug type, refer to [EM-29, "Removal and Installation"](#).

### 10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.  
Refer to [EM-31](#).  
Keep fuel hose and all fuel injectors connected to fuel injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.  
Make sure fuel does not drip from fuel injector.

#### OK or NG

- OK (Does not drip.)>>GO TO 11.
- NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

### 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

- Trouble is fixed.>>**INSPECTION END**
- Trouble is not fixed.>>Replace three way catalyst assembly.

# DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

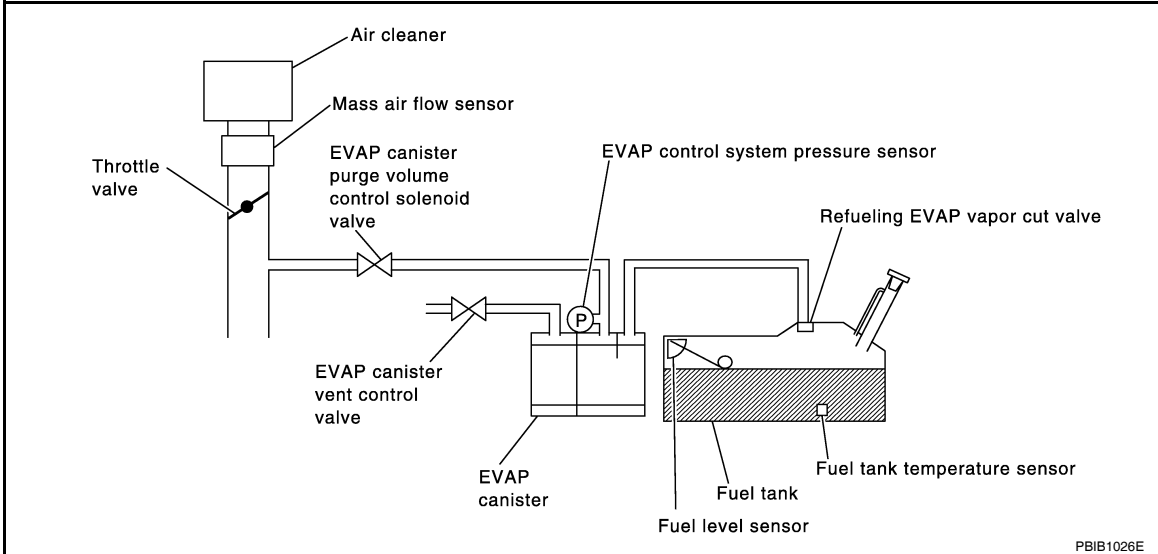
## DTC P0441 EVAP CONTROL SYSTEM

### System Description

INFOID:000000003531851

**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.

### On Board Diagnosis Logic

INFOID:000000003531852

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system 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.	<ul style="list-style-type: none"> <li>• EVAP canister purge volume control solenoid valve stuck closed</li> <li>• EVAP control system pressure sensor and the circuit</li> <li>• Loose, disconnected or improper connection of rubber tube</li> <li>• Blocked rubber tube</li> <li>• Cracked EVAP canister</li> <li>• EVAP canister purge volume control solenoid valve circuit</li> <li>• Accelerator pedal position sensor</li> <li>• Blocked purge port</li> <li>• EVAP canister vent control valve</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531853

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

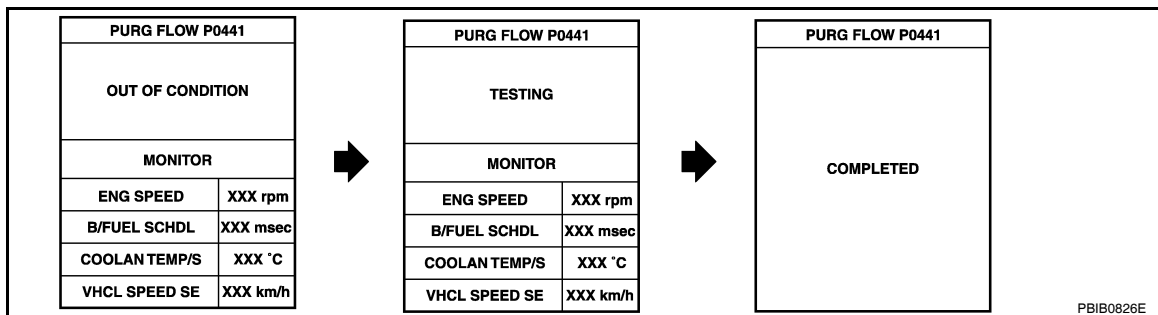
1. Start engine and warm it up to normal operating temperature.

# DTC P0441 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-II.
5. Touch "START".  
If "COMPLETED" is displayed, go to step 7.
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 12.0 msec
COOLAN TEMP/S	0 - 119°C (32 - 246°F)



If "TESTING" is not changed for a long time, retry from step 2.

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-356, "Diagnosis Procedure"](#).

## Overall Function Check

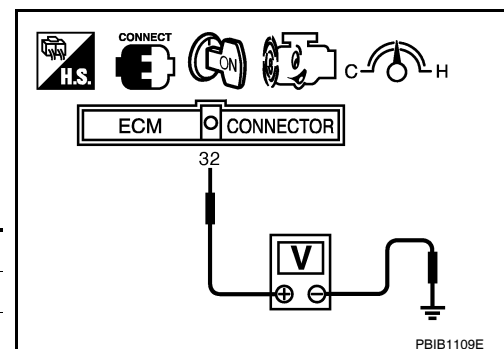
INFOID:000000003531854

Use this procedure 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.

### Ⓢ WITH GST

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

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



8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to [EC-356, "Diagnosis Procedure"](#).

# DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

## Diagnosis Procedure

INFOID:000000003531855

### 1. CHECK EVAP CANISTER

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

#### OK or NG

- OK (With CONSULT-II) >> GO TO 2.
- OK (Without CONSULT-II) >> GO TO 3.
- NG >> Replace EVAP canister.

### 2. CHECK PURGE FLOW

#### Ⓜ With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-33. "Description"](#).
2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Should exist.
0%	Should not exist.

#### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 4.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

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### 3. CHECK PURGE FLOW

#### ⓧ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to [EC-33. "Description"](#).
4. Start engine and let it idle.  
**Do not depress accelerator pedal even slightly.**
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

**Vacuum should not exist.**

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

**Vacuum should exist.**

#### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 4.

### 4. CHECK EVAP PURGE LINE

1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.  
Refer to [EC-33. "Description"](#).

#### OK or NG

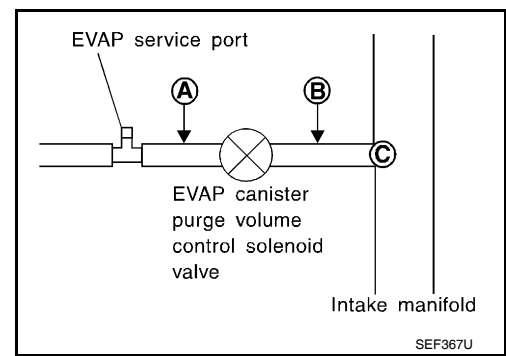
- OK >> GO TO 5.
- NG >> Repair it.

### 5. CHECK EVAP PURGE HOSE AND PURGE PORT

# DTC P0441 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

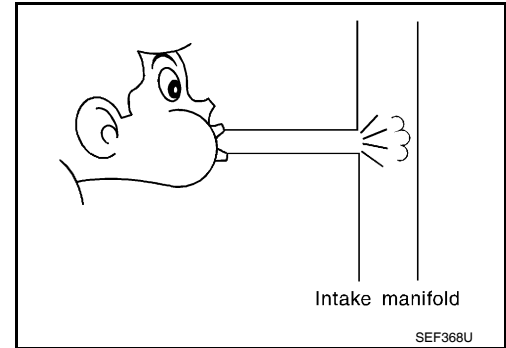
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

### OK or NG

- OK (With CONSULT-II)>>GO TO 6.
- OK (Without CONSULT-II)>>GO TO 7.
- NG >> Repair or clean hoses and/or purge port.



## 6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

### OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

## 7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-378, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP canister purge volume control solenoid valve.

## 8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

**Water should not exist.**

### OK or NG

- OK >> GO TO 9.
- NG >> Replace EVAP control system pressure sensor.

## 9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to DTC Confirmation Procedure for DTC P0452, [EC-395, "DTC Confirmation Procedure"](#) and P0453, [EC-401, "DTC Confirmation Procedure"](#).

### OK or NG

## DTC P0441 EVAP CONTROL SYSTEM

### < SERVICE INFORMATION >

---

- OK >> GO TO 10.
- NG >> Replace EVAP control system pressure sensor.

### 10.CHECK RUBBER TUBE FOR CLOGGING

---

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

#### OK or NG

- OK >> GO TO 11.
- NG >> Clean the rubber tube using an air blower.

### 11.CHECK EVAP CANISTER VENT CONTROL VALVE

---

Refer to [EC-384, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 12.
- NG >> Replace EVAP canister vent control valve.

### 12.CHECK EVAP PURGE LINE

---

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to [EC-33, "Description"](#).

#### OK or NG

- OK >> GO TO 13.
- NG >> Replace it.

### 13.CLEAN EVAP PURGE LINE

---

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

>> GO TO 14.

### 14.CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

>> **INSPECTION END**

# DTC P0442 EVAP CONTROL SYSTEM

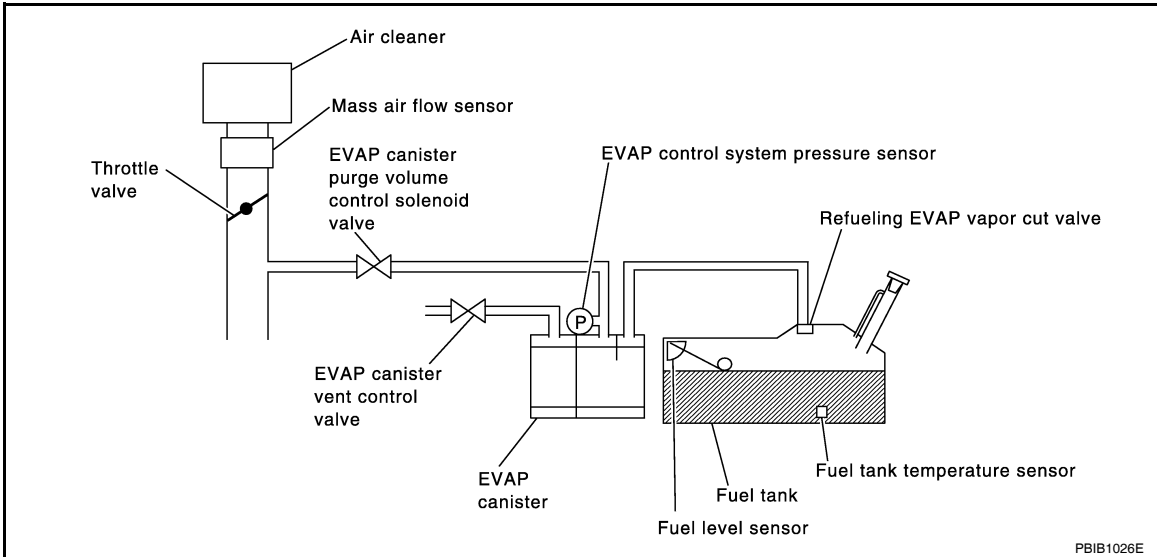
< SERVICE INFORMATION >

## DTC P0442 EVAP CONTROL SYSTEM

### On Board Diagnosis Logic

INFOID:000000003531856

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum. If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions. The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	<ul style="list-style-type: none"> <li>• Incorrect fuel tank vacuum relief valve</li> <li>• Incorrect fuel filler cap used</li> <li>• Fuel filler cap remains open or fails to close.</li> <li>• Foreign matter caught in fuel filler cap.</li> <li>• Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>• Foreign matter caught in EVAP canister vent control valve.</li> <li>• EVAP canister or fuel tank leaks</li> <li>• EVAP purge line (pipe and rubber tube) leaks</li> <li>• EVAP purge line rubber tube bent</li> <li>• Loose or disconnected rubber tube</li> <li>• EVAP canister vent control valve and the circuit</li> <li>• EVAP canister purge volume control solenoid valve and the circuit</li> <li>• Fuel tank temperature sensor</li> <li>• O-ring of EVAP canister vent control valve is missing or damaged</li> <li>• EVAP canister is saturated with water</li> <li>• EVAP control system pressure sensor</li> <li>• Fuel level sensor and the circuit</li> <li>• Refueling EVAP vapor cut valve</li> <li>• ORVR system leaks</li> </ul>

**CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

### DTC Confirmation Procedure

INFOID:000000003531857

**NOTE:**

# DTC P0442 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

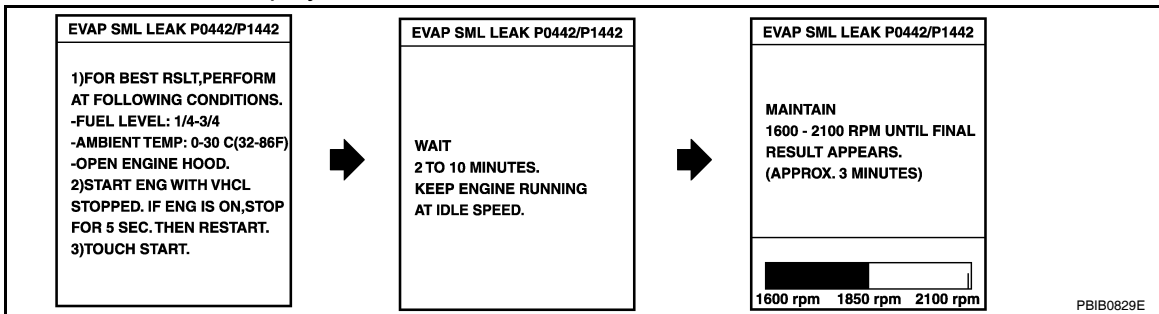
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

### CONSULT-II

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.  
**COOLANT TEMP/S: 0 - 70°C (32 - 158°F)**  
**INT/A TEMP SE: 0 - 30°C (32 - 86°F)**
5. Select “EVP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.  
Follow the instruction displayed.



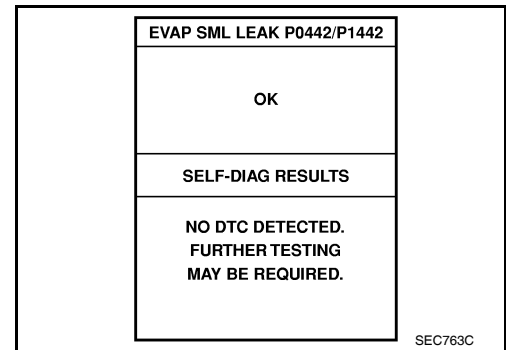
### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to [EC-71, "Basic Inspection"](#).

6. Make sure that “OK” is displayed.  
If “NG” is displayed, refer to [EC-360, "Diagnosis Procedure"](#).

### NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.



### GST WITH GST

### NOTE:

Be sure to read the explanation of [EC-49, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to [EC-49, "Emission-related Diagnostic Information"](#).
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select Service \$07 with GST.
  - If P0442 is displayed on the screen, go to [EC-360, "Diagnosis Procedure"](#).
  - If P0441 is displayed on the screen, go to [EC-356, "Diagnosis Procedure"](#).

## Diagnosis Procedure

INFOID:000000003531858

### 1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.



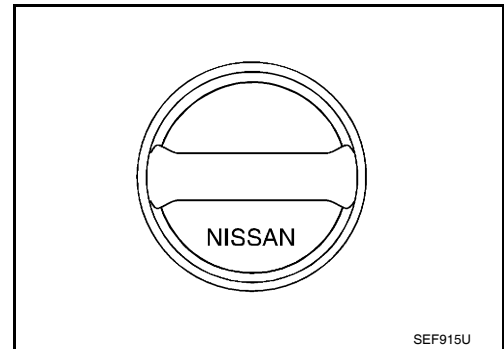
# DTC P0442 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

2. Check for genuine NISSAN fuel filler cap design.

### OK or NG

- OK >> GO TO 2.
- NG >> 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.

### OK or NG

- OK >> GO TO 3.
- NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.  
2. Retighten until ratcheting sound is heard.

## 3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

## 4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-35. "Component Inspection"](#) .

### OK or NG

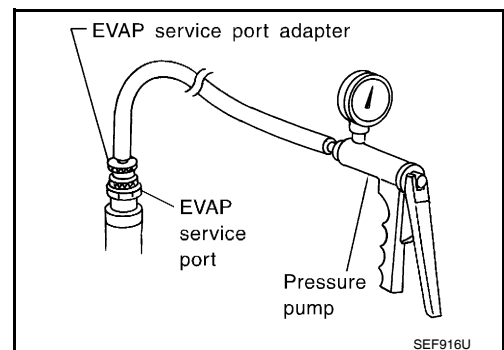
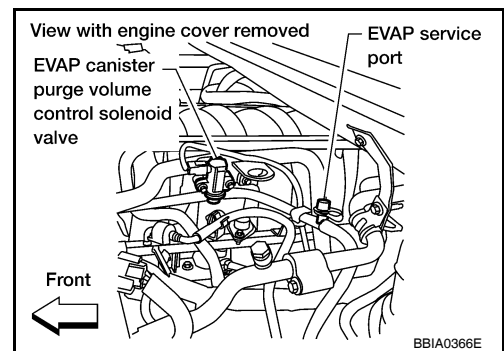
- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

### NOTE:

**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**



With CONSULT-II>>GO TO 6.  
Without CONSULT-II>>GO TO 7.

# DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

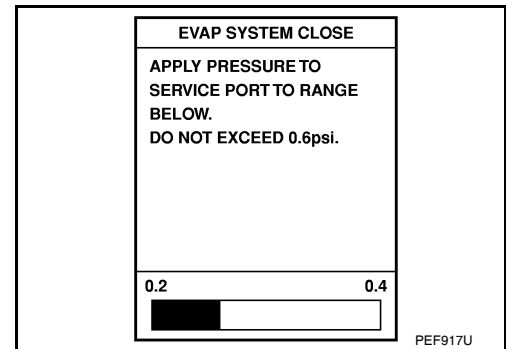
## 6. CHECK FOR EVAP LEAK

### With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

#### CAUTION:

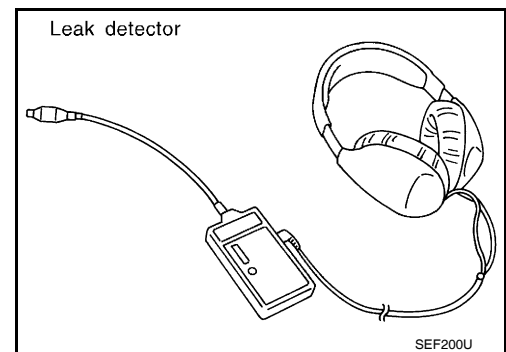
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33, "Description"](#).

### OK or NG

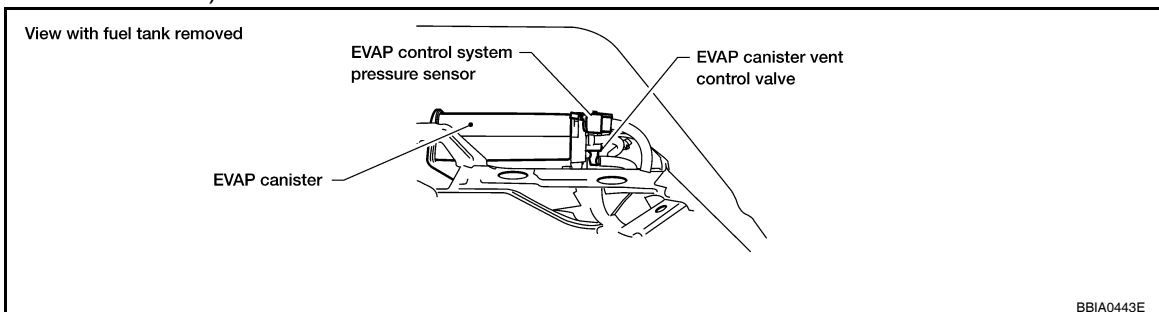
- OK >> GO TO 8.  
NG >> Repair or replace.



## 7. CHECK FOR EVAP LEAK

### Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

#### CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.

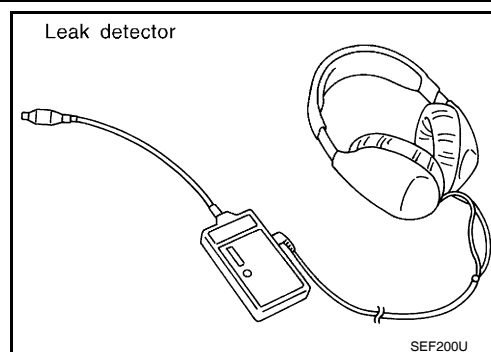
## DTC P0442 EVAP CONTROL SYSTEM

### < SERVICE INFORMATION >

- Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33. "Description"](#).

#### OK or NG

- OK >> GO TO 8.  
NG >> Repair or replace.



### 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.  
Refer to [EC-37. "Removal and Installation"](#).
- EVAP canister vent control valve.  
Refer to [EC-384. "Component Inspection"](#).

#### OK or NG

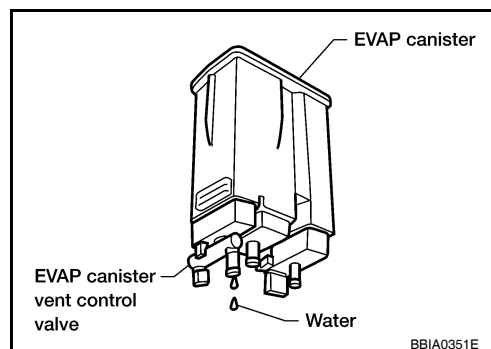
- OK >> GO TO 9.  
NG >> Repair or replace EVAP canister vent control valve and O-ring.

### 9. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Does water drain from the EVAP canister?

#### Yes or No

- Yes >> GO TO 10.  
No (With CONSULT-II) >> GO TO 12.  
No (Without CONSULT-II) >> GO TO 13.



### 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 2.5 kg (5.5 lb).**

#### OK or NG

- OK (With CONSULT-II) >> GO TO 12.  
OK (Without CONSULT-II) >> GO TO 13.  
NG >> 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

>> Repair hose or replace EVAP canister.

### 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

#### With CONSULT-II

- Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine.

# DTC P0442 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

### OK or NG

- OK >> GO TO 15.
- NG >> GO TO 14.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

## 13.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

### OK or NG

- OK >> GO TO 16.
- NG >> GO TO 14.

## 14.CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-100. "Vacuum Hose Drawing"](#) .

### OK or NG

- OK >> GO TO 15.
- NG >> Repair or reconnect the hose.

## 15.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-378. "Component Inspection"](#) .

### OK or NG

- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.

## 16.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-313. "Component Inspection"](#) .

### OK or NG

- OK >> GO TO 17.
- NG >> Replace fuel level sensor unit.

## 17.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394. "Component Inspection"](#) .

### OK or NG

- OK >> GO TO 18.
- NG >> Replace EVAP control system pressure sensor.

## 18.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to [EC-33. "Description"](#) .

### OK or NG

- OK >> GO TO 19.
- NG >> Repair or reconnect the hose.

## 19.CLEAN EVAP PURGE LINE

# DTC P0442 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

---

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

>> GO TO 20.

### 20. 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 [EC-40](#).

#### OK or NG

OK >> GO TO 21.

NG >> Repair or replace hoses and tubes.

### 21. CHECK RECIRCULATION LINE

---

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

#### OK or NG

OK >> GO TO 22.

NG >> Repair or replace hose, tube or filler neck tube.

### 22. CHECK REFUELING EVAP VAPOR CUT VALVE

---

Refer to [EC-42. "Component Inspection"](#).

#### OK or NG

OK >> GO TO 23.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

### 23. CHECK FUEL LEVEL SENSOR

---

Refer to [DI-18. "Fuel Level Sensor Unit Inspection"](#).

#### OK or NG

OK >> GO TO 24.

NG >> Replace fuel level sensor unit.

### 24. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

>> **INSPECTION END**

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# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### Description

INFOID:000000003531859

### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* <sup>1</sup>	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* <sup>1</sup>		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor	Vehicle speed* <sup>2</sup>		

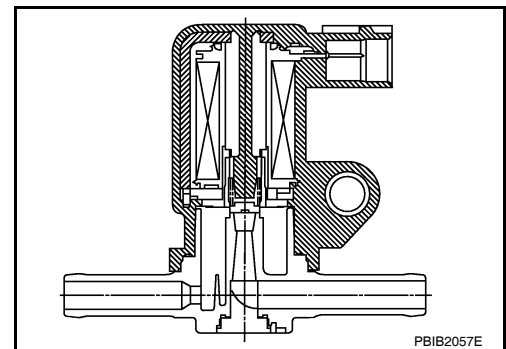
\*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

### COMPONENT DESCRIPTION

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531860

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle (Accelerator pedal: Not depressed even slightly, after starting engine)
		2,000 rpm

# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## On Board Diagnosis Logic

INFOID:000000003531861

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0443 0443	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul style="list-style-type: none"> <li>• EVAP control system pressure sensor</li> <li>• EVAP canister purge volume control solenoid valve (The valve is stuck open.)</li> <li>• EVAP canister vent control valve</li> <li>• EVAP canister</li> <li>• Hoses (Hoses are connected incorrectly or clogged.)</li> </ul>

## DTC Confirmation Procedure

INFOID:000000003531862

### NOTE:

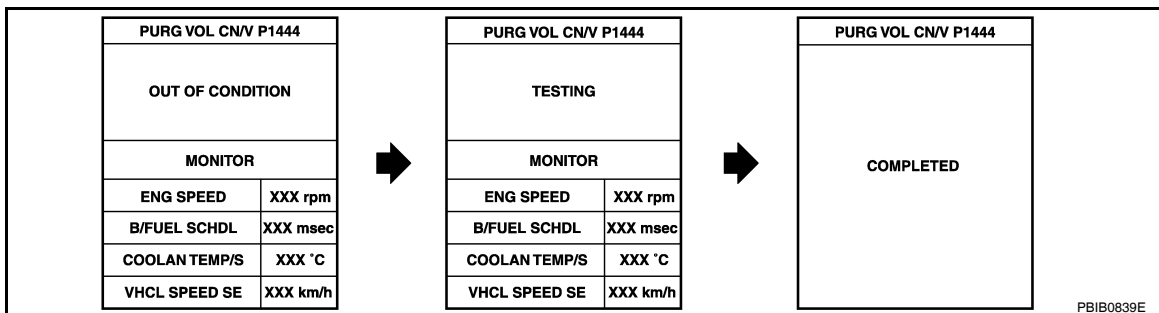
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### TESTING CONDITION:

**Always perform test at a temperature of 5°C (41°F) or more.**

#### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5. Touch "START".



6. Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take approximately 10 seconds.)  
If "TESTING" is not displayed after 5 minutes, retry from step 2.
7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-369, "Diagnosis 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. Select Service \$07 with GST.
5. If 1st trip DTC is detected, go to [EC-369, "Diagnosis Procedure"](#).

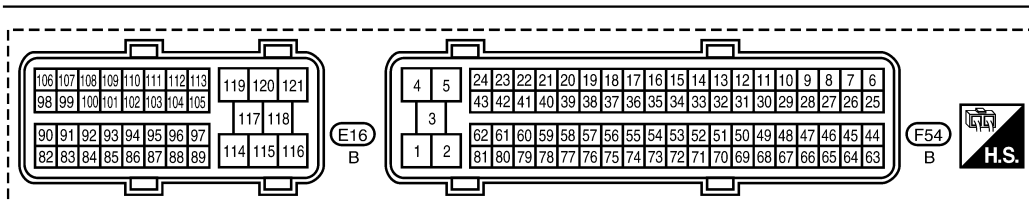
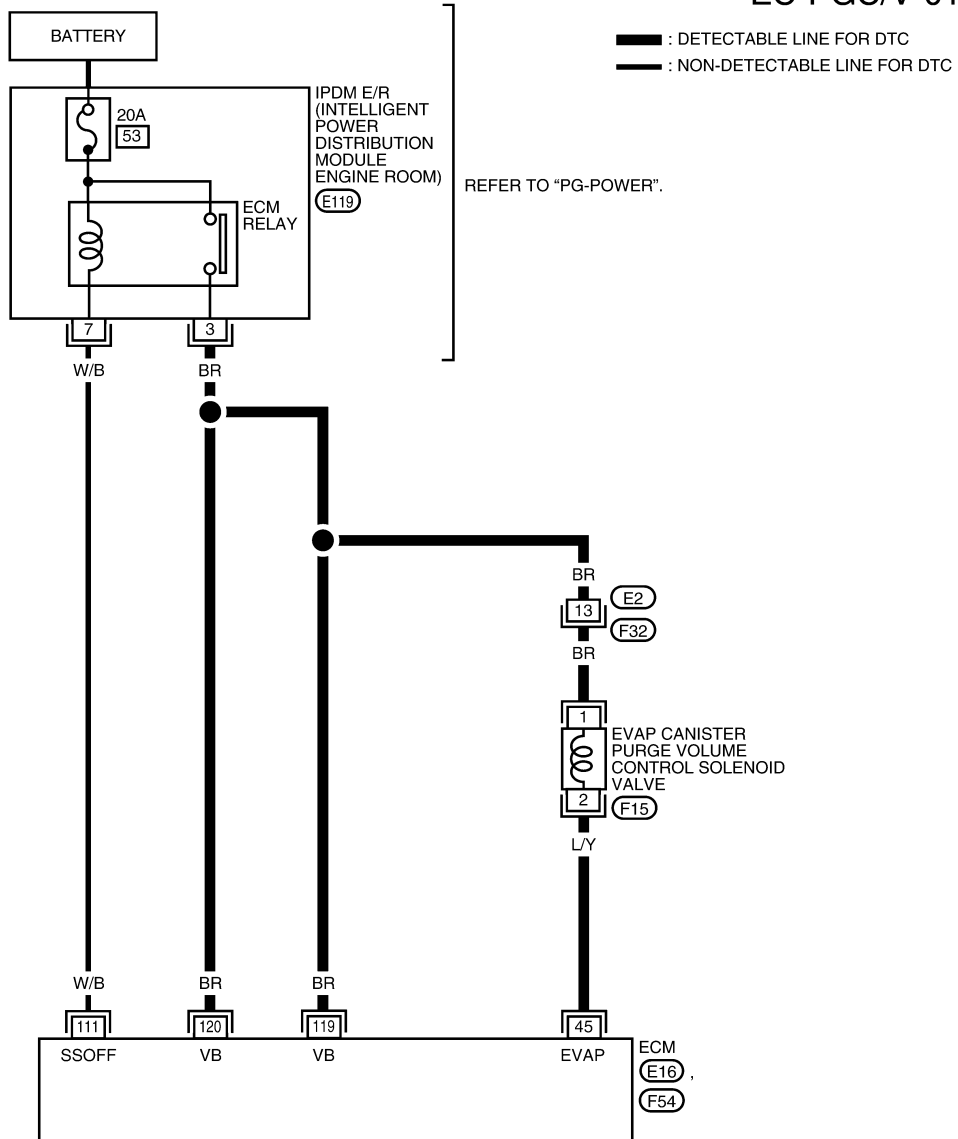
# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531863

### EC-PGC/V-01



BBWA1687E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

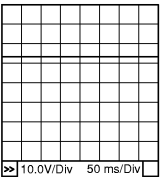
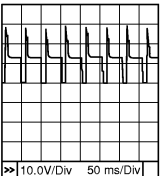
**CAUTION:**



# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	L/Y	EVAP canister purge volume control solenoid valve	<b>[Engine is running]</b> • Idle speed • Accelerator pedal: Not depressed even slightly, after starting engine	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			<b>[Engine is running]</b> • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	11 - 14V★  PBIB0051E
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

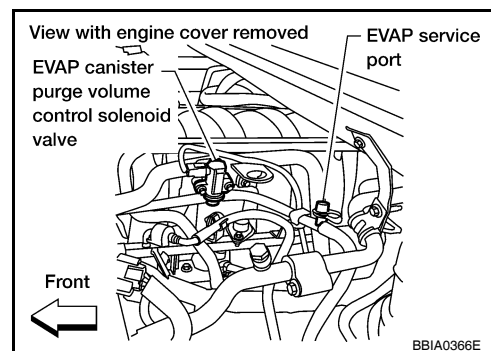
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531864

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

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON.



# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

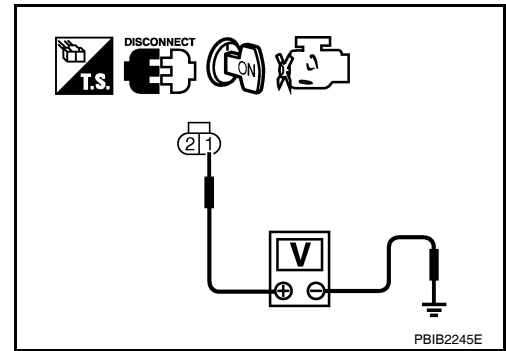
## < SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

## 3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 4.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

**Water should not exist.**

### OK or NG

- OK >> GO TO 5.  
NG >> Replace EVAP control system pressure sensor.

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394, "Component Inspection"](#).

### OK or NG

- OK (With CONSULT-II) >> GO TO 6.  
OK (Without CONSULT-II) >> GO TO 7.  
NG >> Replace EVAP control system pressure sensor.

## 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### **With CONSULT-II**

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine.

# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

## < SERVICE INFORMATION >

4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

### OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

## 7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-372. "Component Inspection"](#).

### OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP canister purge volume control solenoid valve.

## 8. CHECK RUBBER TUBE FOR CLOGGING

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

### OK or NG

- OK >> GO TO 9.
- NG >> Clean the rubber tube using an air blower.

## 9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-384. "Component Inspection"](#).

### OK or NG

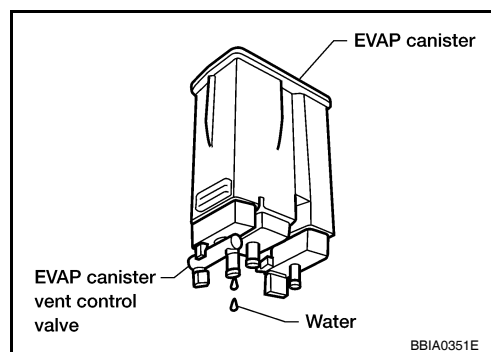
- OK >> GO TO 10.
- NG >> Replace EVAP canister vent control valve.

## 10. CHECK IF EVAP CANISTER 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.

### Yes or No

- Yes >> GO TO 11.
- No >> GO TO 13.



## 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 2.5 kg (5.5 lb).**

### OK or NG

- OK >> GO TO 13.
- NG >> 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

# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

>> Repair hose or replace EVAP canister.

## 13. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

### Component Inspection

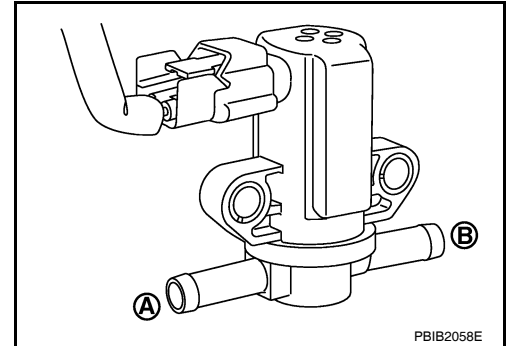
INFOID:000000003531865

#### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

④ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

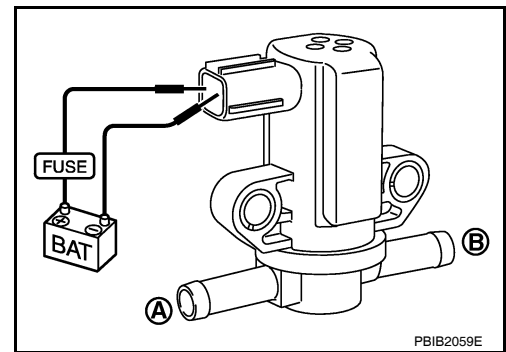
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



⊗ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



### Removal and Installation

INFOID:000000003531866

#### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-17](#).

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### Description

INFOID:000000003531867

### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* <sup>1</sup>	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* <sup>1</sup>		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor	Vehicle speed* <sup>2</sup>		

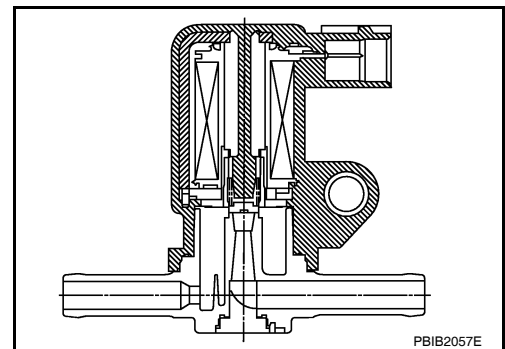
\*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

### COMPONENT DESCRIPTION

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531868

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Selector lever: P or N</li> <li>No load</li> </ul>	Idle (Accelerator pedal: Not depressed even slightly, after starting engine)
		2,000 rpm

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## On Board Diagnosis Logic

INFOID:000000003531869

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>• EVAP canister purge volume control solenoid valve</li> </ul>
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid valve circuit is shorted.)</li> <li>• EVAP canister purge volume control solenoid valve</li> </ul>

## DTC Confirmation Procedure

INFOID:000000003531870

### NOTE:

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

### TESTING CONDITION:

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

#### Ⓜ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to [EC-376, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓜ WITH GST

Follow the procedure "WITH CONSULT-II" above.

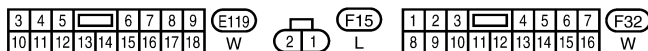
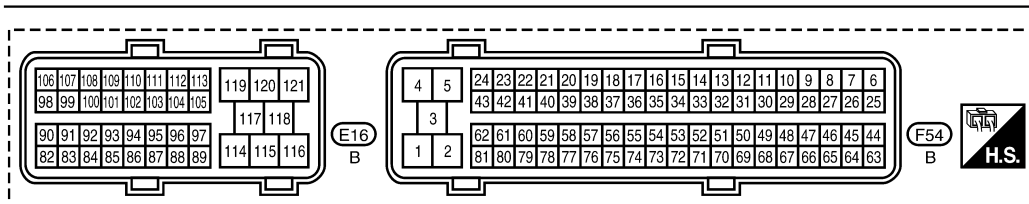
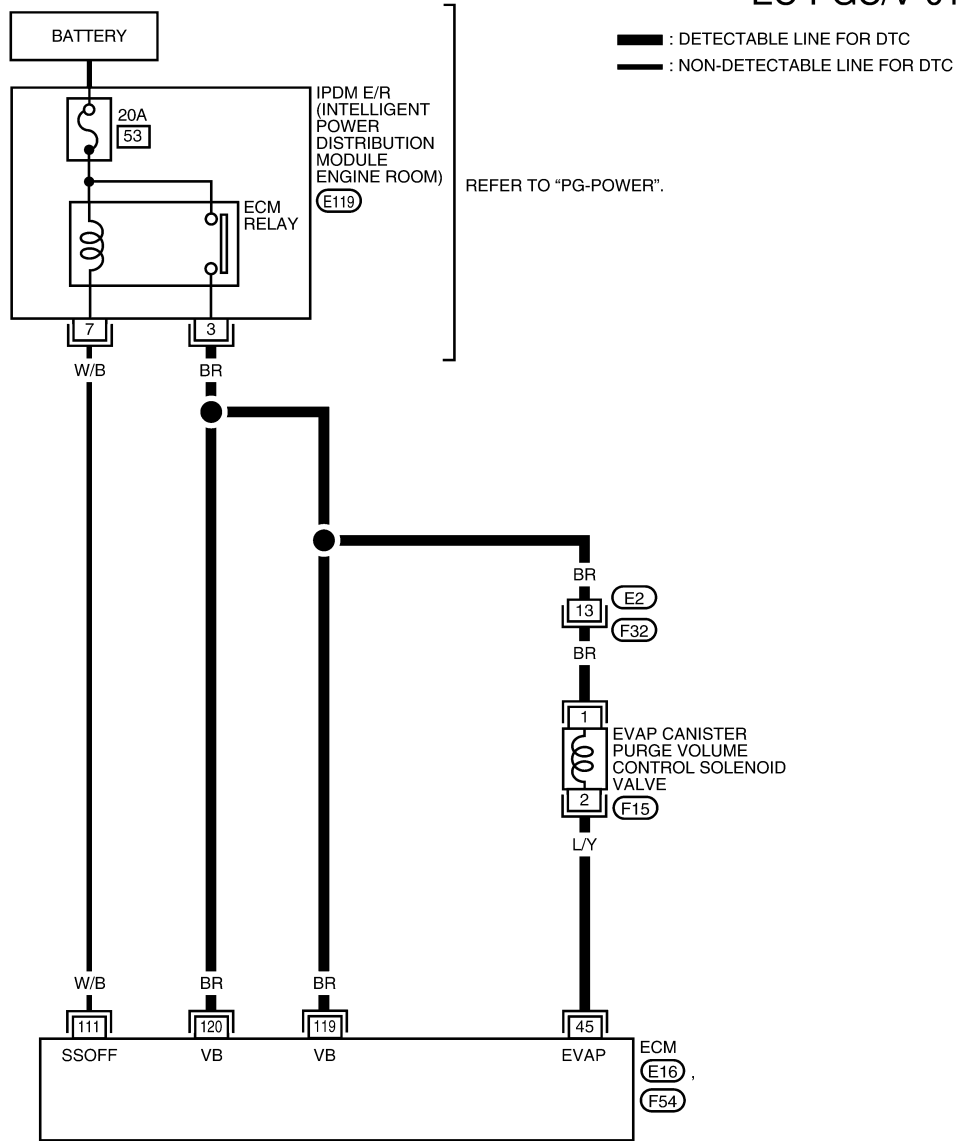
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531871

EC-PGC/V-01



BBWA1687E

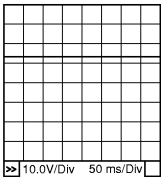
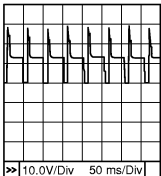
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	L/Y	EVAP canister purge volume control solenoid valve	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Idle speed</li> <li>Accelerator pedal: Not depressed even slightly, after starting engine.</li> </ul>	BATTERY VOLTAGE (11 - 14V) ★  <small>10.0V/Div 50 ms/Div</small> PBIB0050E
			<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed: About 2,000 rpm (More than 100 seconds after starting engine).</li> </ul>	11 - 14V ★  <small>10.0V/Div 50 ms/Div</small> PBIB0051E
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>For a few seconds after turning ignition switch OFF</li> </ul>	0 - 1.5V
			<b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

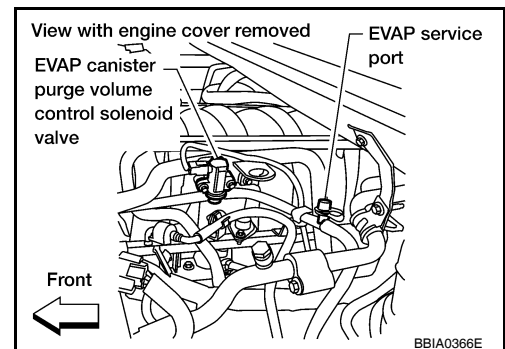
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531872

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

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON.





# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

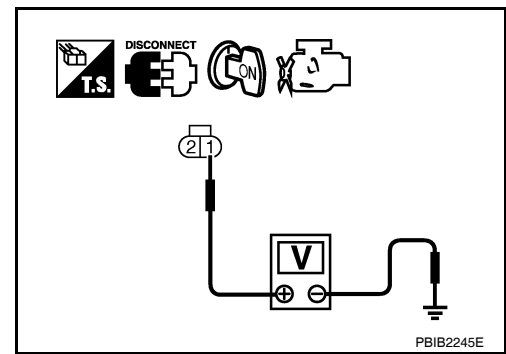
## < SERVICE INFORMATION >

- Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 3.
- NG >> GO TO 2.



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

## 3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK (With CONSULT-II) >> GO TO 4.
- OK (Without CONSULT-II) >> GO TO 5.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### Ⓜ With CONSULT-II

- Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

### OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

## 5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-378, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 6.
- NG >> Replace EVAP canister purge volume control solenoid valve.

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

>> INSPECTION END

## Component Inspection

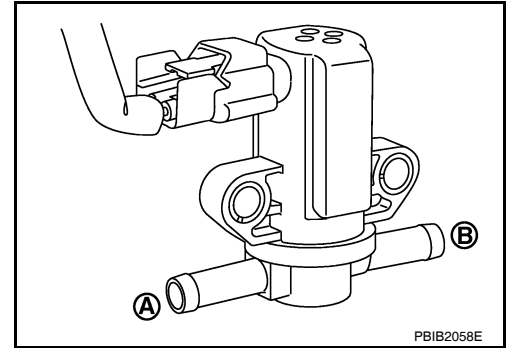
INFOID:000000003531873

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

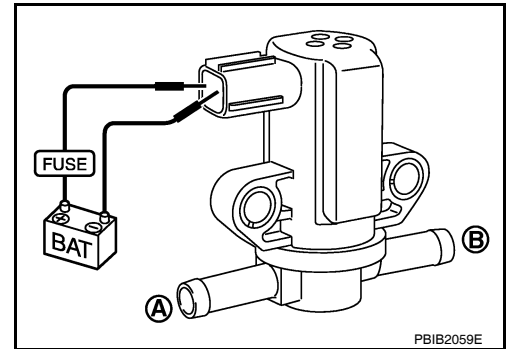
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



## Removal and Installation

INFOID:000000003531874

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-17](#).

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

## DTC P0447 EVAP CANISTER VENT CONTROL VALVE

### Component Description

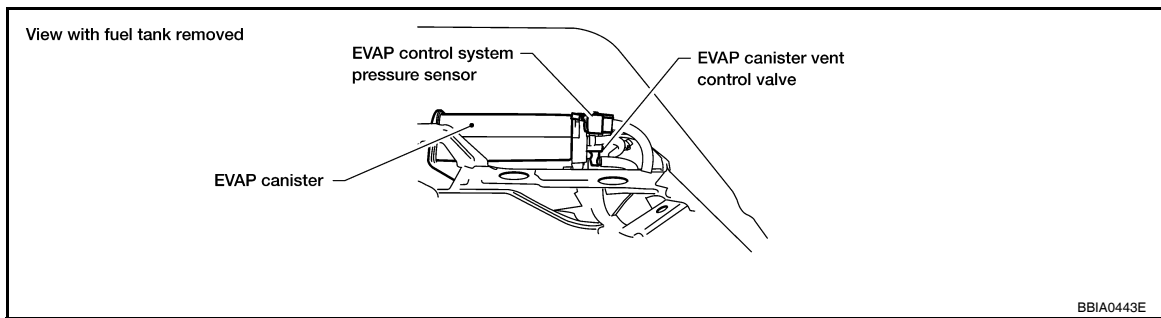
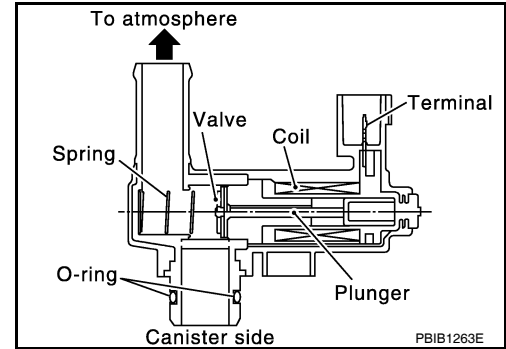
INFOID:000000003531875

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531876

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

### On Board Diagnosis Logic

INFOID:000000003531877

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	<ul style="list-style-type: none"> <li>• Harness or connectors (The valve circuit is open or shorted.)</li> <li>• EVAP canister vent control valve</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531878

#### NOTE:

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

#### TESTING CONDITION:

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

#### ⓐ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.

## DTC P0447 EVAP CANISTER VENT CONTROL VALVE

### < SERVICE INFORMATION >

3. Start engine and wait at least 8 seconds.
4. If 1st trip DTC is detected, go to [EC-382, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

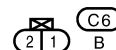
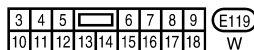
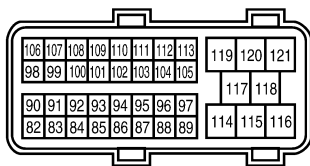
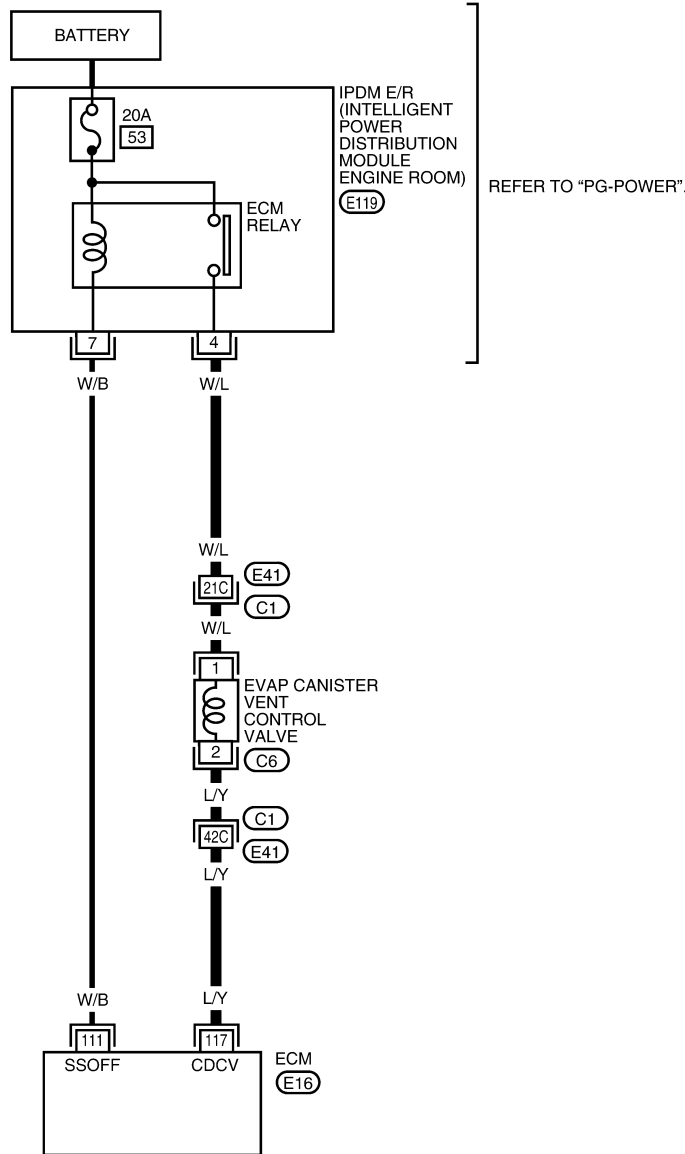
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531879

### EC-VENT/V-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2095E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531880

### 1. INSPECTION START

Do you have CONSULT-II?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

### 2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

#### With CONSULT-II

1. Turn ignition switch OFF and then turn ON.
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.  
**Clicking noise should be heard.**

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

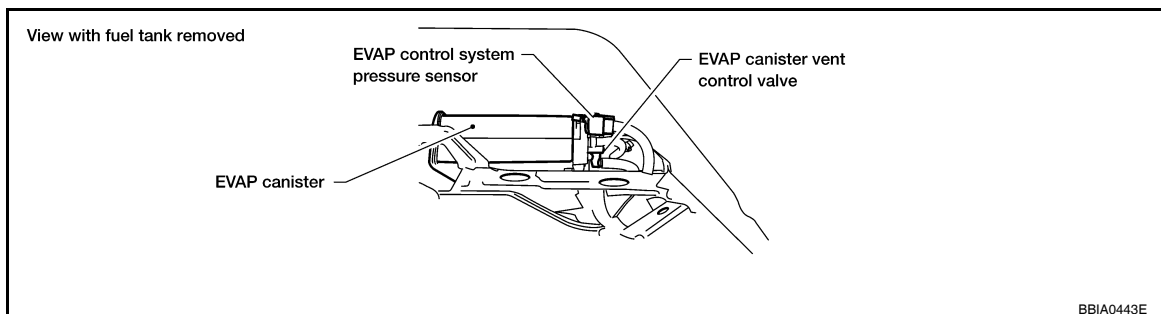
PBIB1679E

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 3.

### 3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



3. Turn ignition switch ON.

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

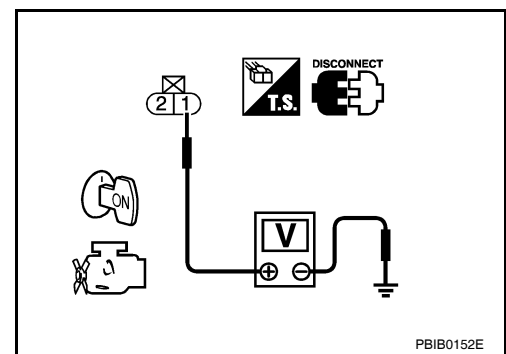
## < SERVICE INFORMATION >

4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E41, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair harness or connectors.

## 5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E41, C1
- Harness for open or short between EVAP canister vent control valve and ECM

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

## 7. CHECK RUBBER TUBE FOR CLOGGING

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

### OK or NG

- OK >> GO TO 8.
- NG >> Clean the rubber tube using an air blower.

## 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-384, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 9.
- NG >> Replace EVAP canister vent control valve.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

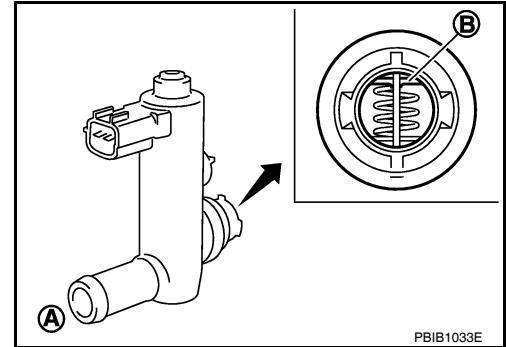
## Component Inspection

INFOID:000000003531881

### EVAP CANISTER VENT CONTROL VALVE

④ With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.  
If NG, replace EVAP canister vent control valve.  
If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
6. Check air passage continuity and operation delay time.  
**Make sure new O-ring is installed properly.**

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.

If OK, go to next step.

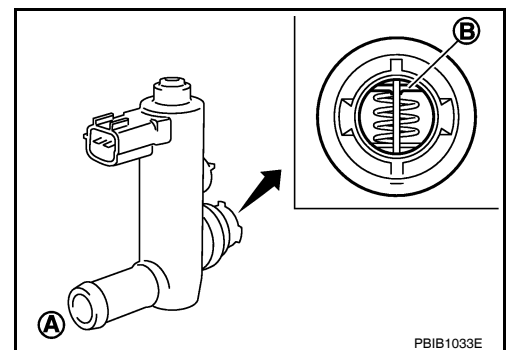
7. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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⊗ Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

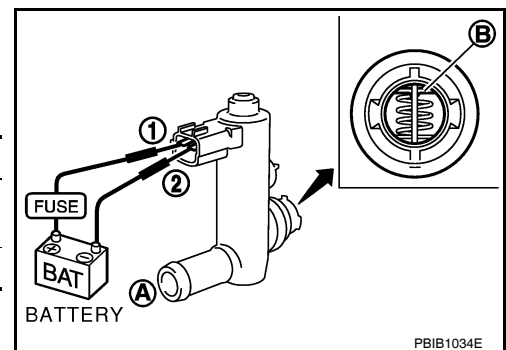


3. Check air passage continuity and operation delay time under the following conditions.  
**Make sure new O-ring is installed properly.**

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.





## DTC P0447 EVAP CANISTER VENT CONTROL VALVE

### < SERVICE INFORMATION >

---

If OK, go to next step.

4. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

## DTC P0448 EVAP CANISTER VENT CONTROL VALVE

### Component Description

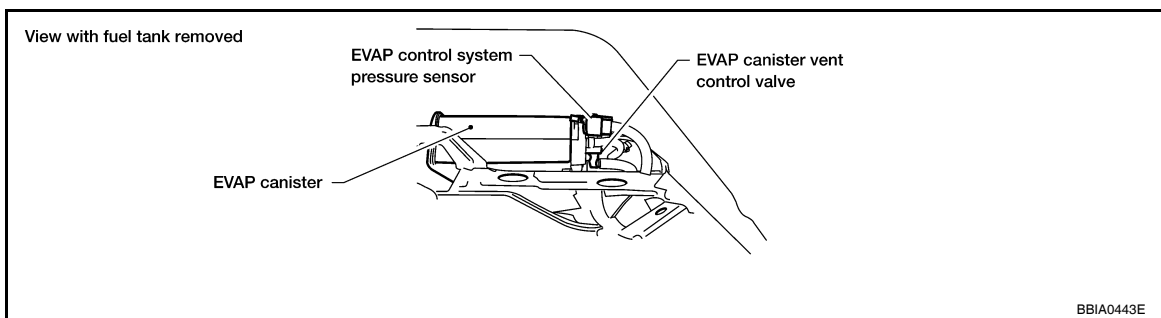
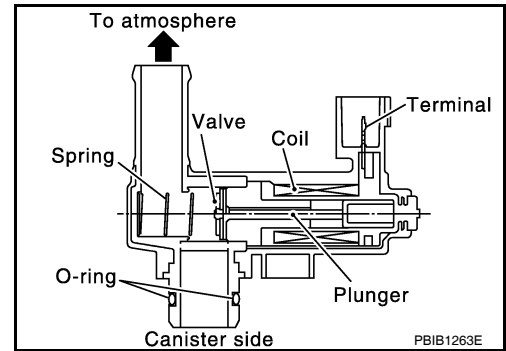
INFOID:000000003531882

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531883

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

### On Board Diagnosis Logic

INFOID:000000003531884

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448 0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	<ul style="list-style-type: none"> <li>• EVAP canister vent control valve</li> <li>• EVAP control system pressure sensor and the circuit</li> <li>• Blocked rubber tube to EVAP canister vent control valve</li> <li>• EVAP canister is saturated with water</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531885

#### NOTE:

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

#### Ⓟ WITH CONSULT-II

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

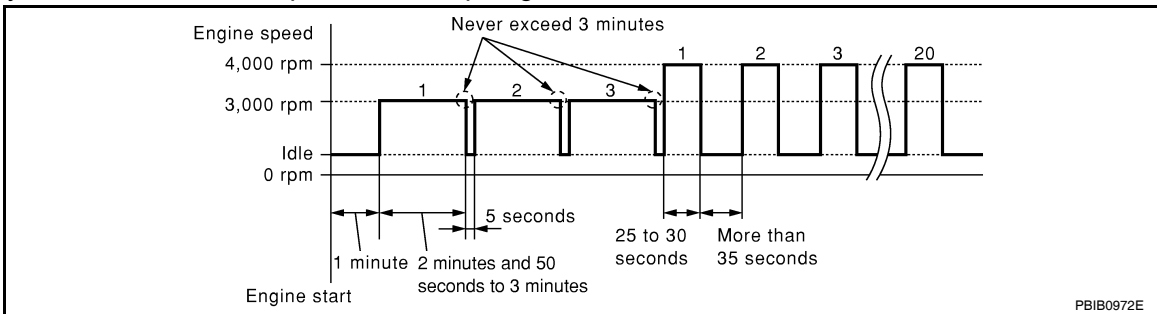
# DTC P0448 EVAP CANISTER VENT CONTROL VALVE

## < SERVICE INFORMATION >

3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures 3 times.
  - a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.  
**Never exceed 3 minutes.**
  - b. Fully released accelerator pedal and keep engine idle for about 5 seconds.
6. If 1st trip DTC is detected, go to [EC-389. "Diagnosis Procedure"](#).  
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.
  - a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
  - b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y



8. If 1st trip DTC is detected, go to [EC-389. "Diagnosis Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# DTC P0448 EVAP CANISTER VENT CONTROL VALVE

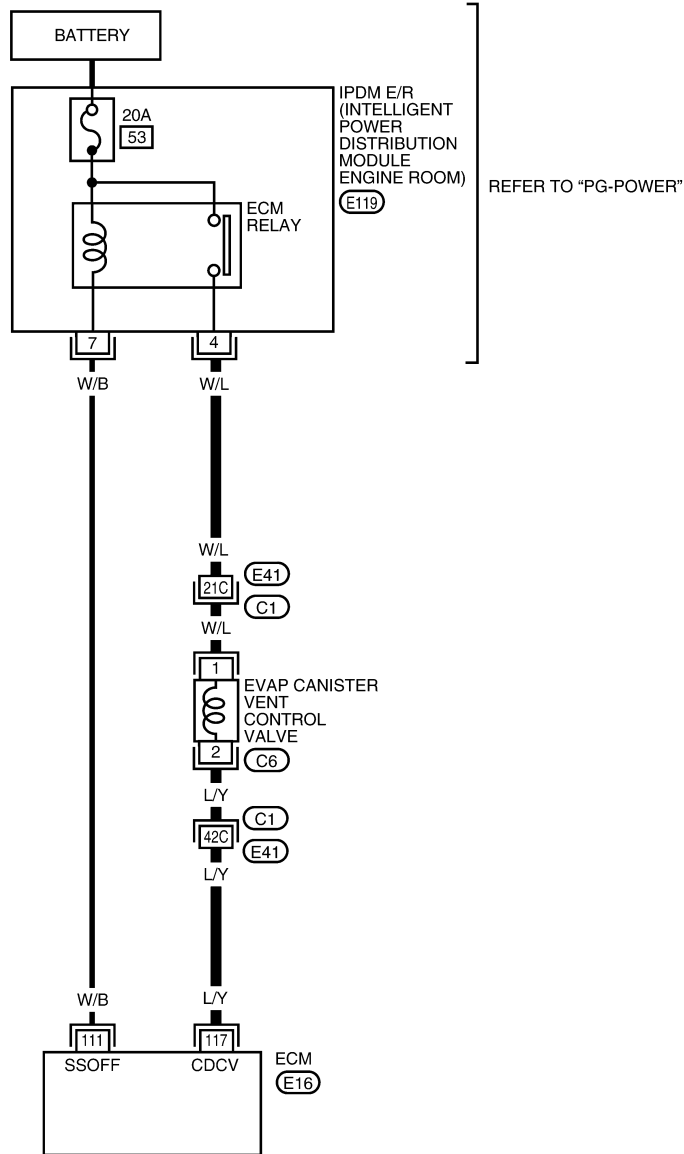
< SERVICE INFORMATION >

INFOID:000000003531886

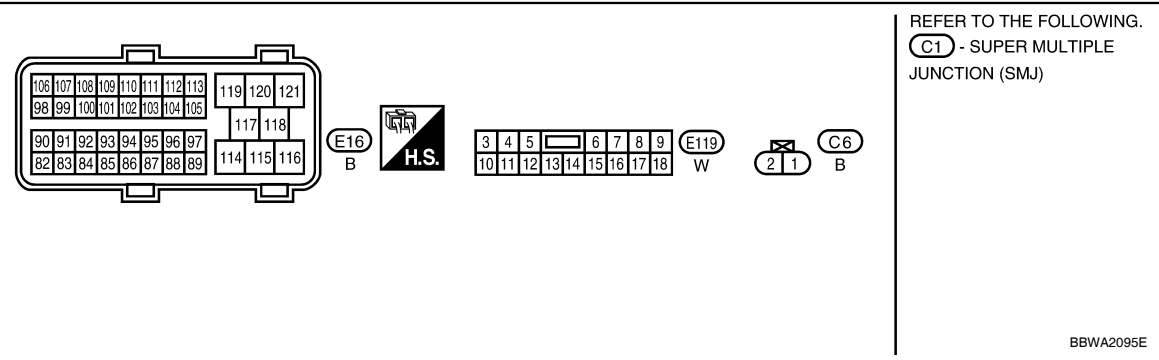
## Wiring Diagram

### EC-VENT/V-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.  
 (C1) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2095E

Specification data are reference values and are measured between each terminal and ground.  
**CAUTION:**  
 Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

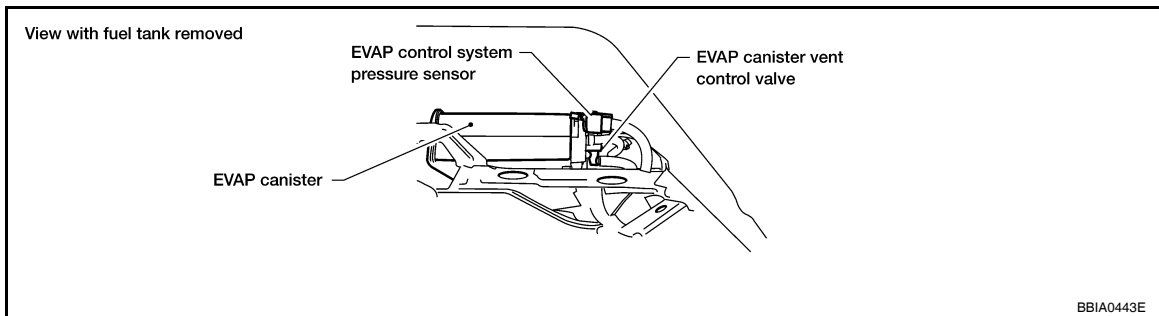
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> • For a few seconds after turning ignition switch OFF	0 - 1.5V
			<b>[Ignition switch: OFF]</b> • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531887

### 1. CHECK RUBBER TUBE

- Turn ignition switch OFF.
- Disconnect rubber tube connected to EVAP canister vent control valve.



- Check the rubber tube for clogging.

OK or NG

- OK >> GO TO 2.  
NG >> Clean rubber tube using an air blower.

### 2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-390. "Component Inspection"](#).

OK or NG

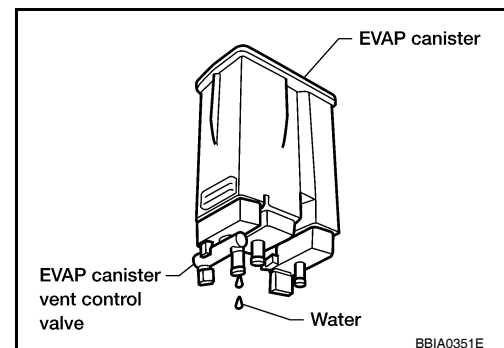
- OK >> GO TO 3.  
NG >> Replace EVAP canister vent control valve.

### 3. CHECK IF EVAP CANISTER SATURATED WITH WATER

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

Yes or No

- 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.

## DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

The weight should be less than 2.5 kg (5.5 lb).

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair hose or replace EVAP canister.

### 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

**Water should not exist.**

OK or NG

- OK >> GO TO 7.
- NG >> Replace EVAP control system pressure sensor.

### 7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Replace EVAP control system pressure sensor.

### 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

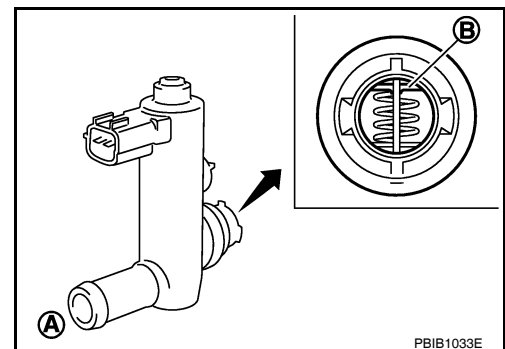
## Component Inspection

INFOID:000000003531888

### EVAP CANISTER VENT CONTROL VALVE

Ⓟ With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.  
If NG, replace EVAP canister vent control valve.  
If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



# DTC P0448 EVAP CANISTER VENT CONTROL VALVE

## < SERVICE INFORMATION >

5. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
6. Check air passage continuity and operation delay time.  
**Make sure that new O-ring is installed properly.**

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.

If OK, go to next step.

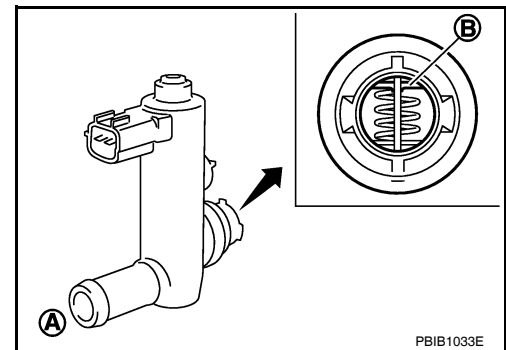
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

⊗ Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PBIB1679E



3. Check air passage continuity and operation delay time under the following conditions.  
**Make sure that new O-ring is installed properly.**

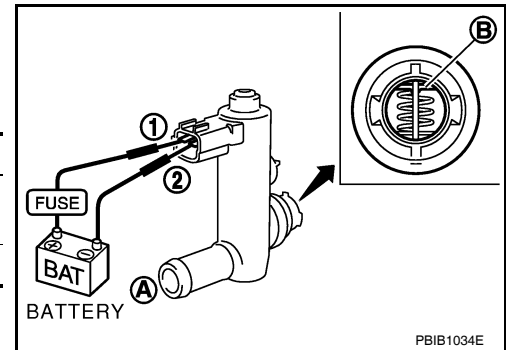
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.

If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.



# DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

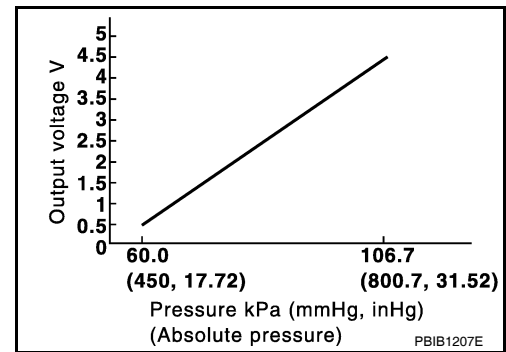
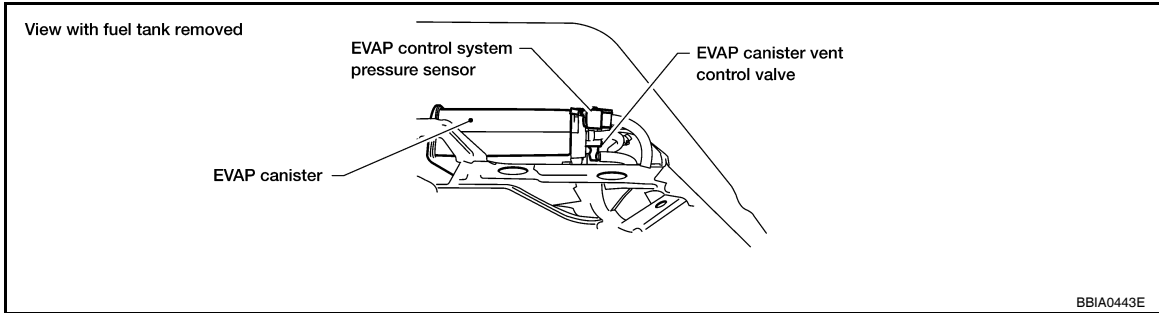
< SERVICE INFORMATION >

## DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Component Description

INFOID:000000003531889

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531890

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

### On Board Diagnosis Logic

INFOID:000000003531891

#### NOTE:

If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	<ul style="list-style-type: none"> <li>• Harness or connectors</li> <li>• EVAP control system pressure sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531892

#### NOTE:

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

#### Ⓟ WITH CONSULT-II

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



# DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

## < SERVICE INFORMATION >

2. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.

3. Start engine and wait at least 40 seconds.

### NOTE:

**Do not depress accelerator pedal even slightly.**

If 1st trip DTC is detected, go to [EC-393, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

## WITH GST

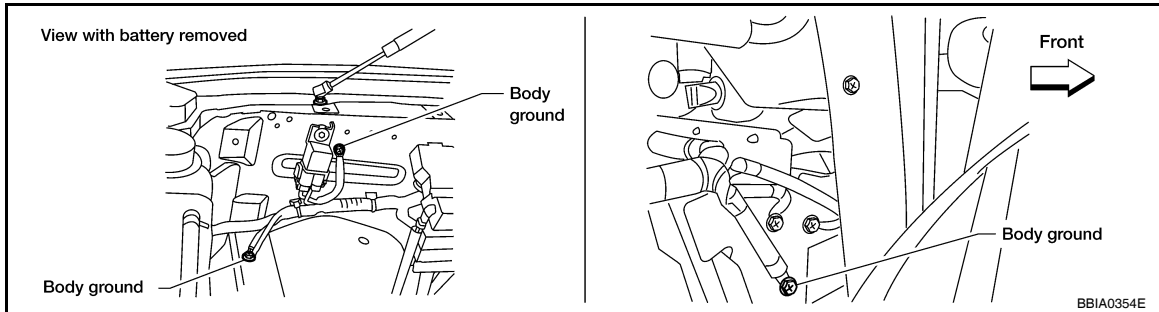
Follow the procedure "WITH CONSULT-II" above.

## Diagnosis Procedure

INFOID:000000003531893

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



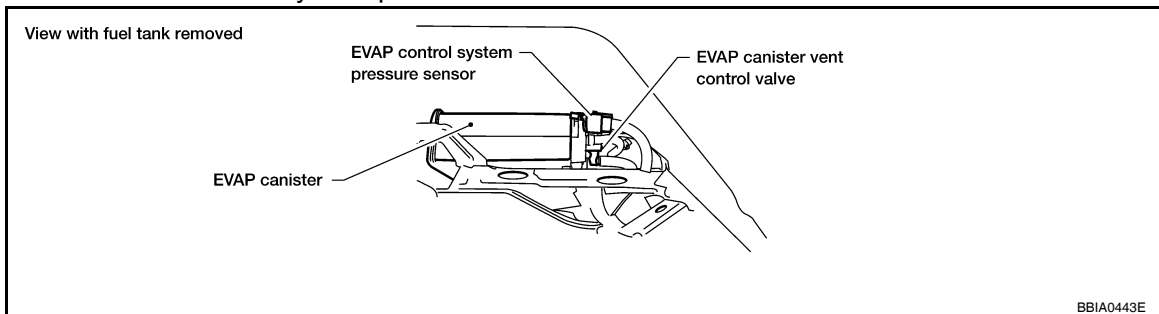
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

### 2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

**Water should not exist.**

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace harness connector.

### 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 4.

# DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

## < SERVICE INFORMATION >

NG >> Replace EVAP control system pressure sensor.

### 4. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

For wiring diagram, refer to [EC-397, "Wiring Diagram"](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531894

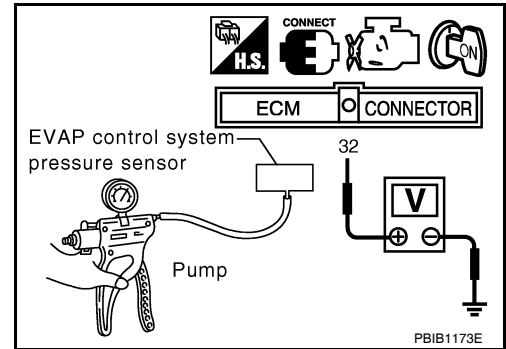
### EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.  
**Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

**CAUTION:**

- **Always calibrate the vacuum pump gauge when using it.**
  - **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**
4. If NG, replace EVAP control system pressure sensor.



# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

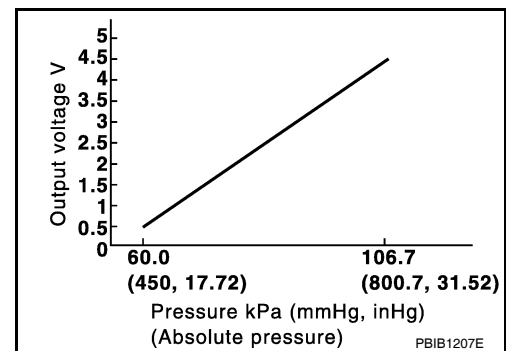
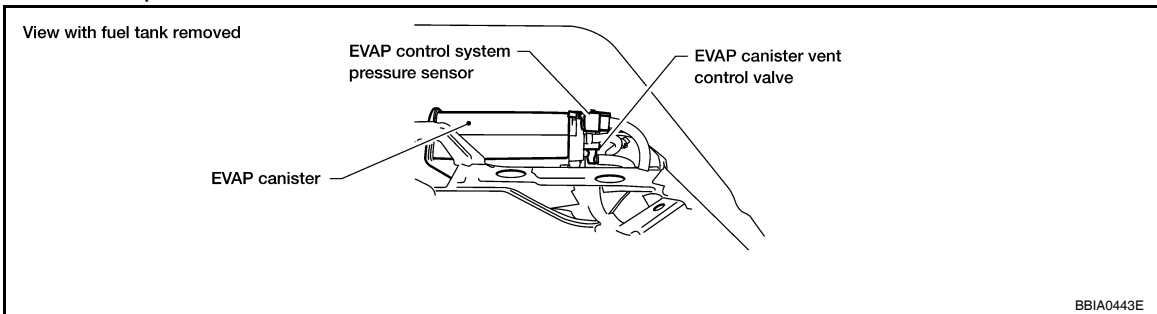
< SERVICE INFORMATION >

## DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Component Description

INFOID:000000003531895

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531896

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

### On Board Diagnosis Logic

INFOID:000000003531897

#### NOTE:

If DTC P0452 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• EVAP control system pressure sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531898

#### NOTE:

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

#### TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

#### WITH CONSULT-II

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.

## DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

### < SERVICE INFORMATION >

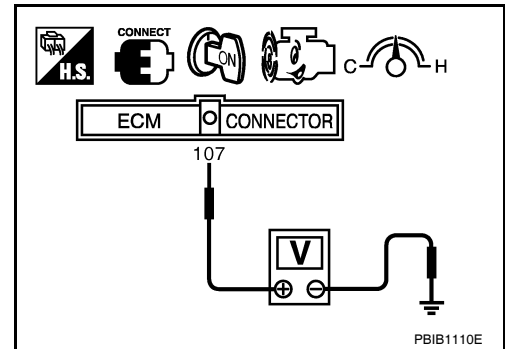
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.  
If 1st trip DTC is detected, go to [EC-398. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service \$07 with GST.  
If 1st trip DTC is detected, go to [EC-398. "Diagnosis Procedure"](#).



# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

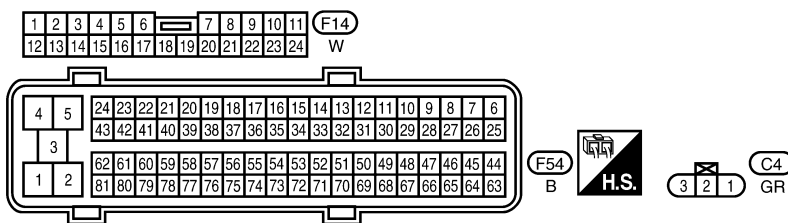
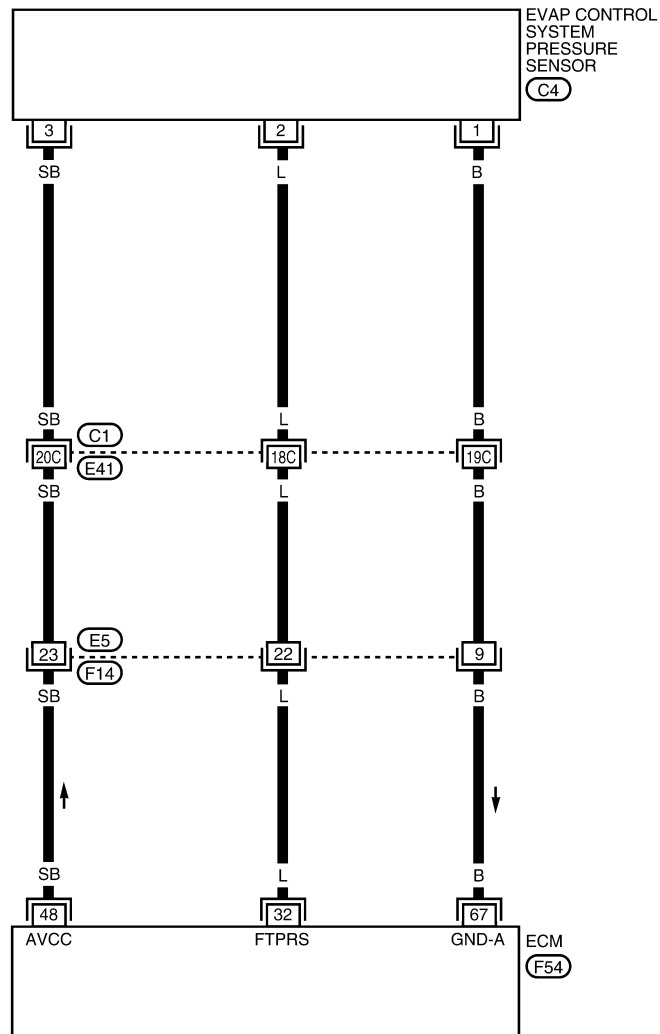
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:00000003531899

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2096E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

## < SERVICE INFORMATION >

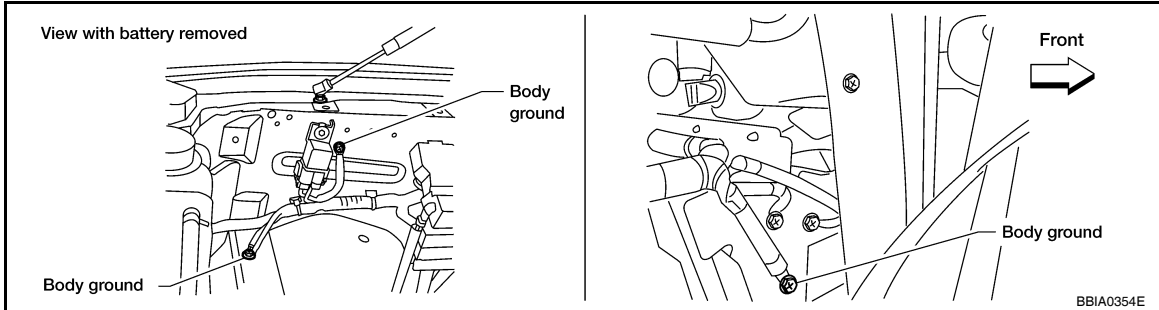
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
67	B	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

## Diagnosis Procedure

INFOID:000000003531900

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

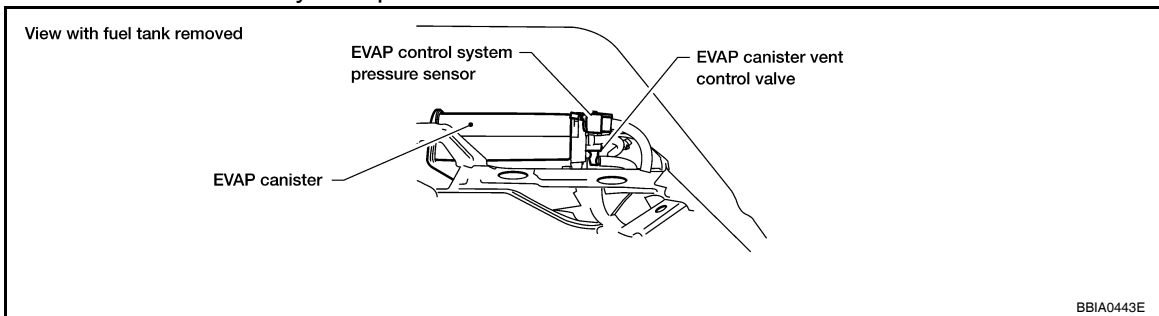


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

**Water should not exist.**

#### OK or NG

- OK >> GO TO 3.  
NG >> Repair or replace harness connector.

### 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

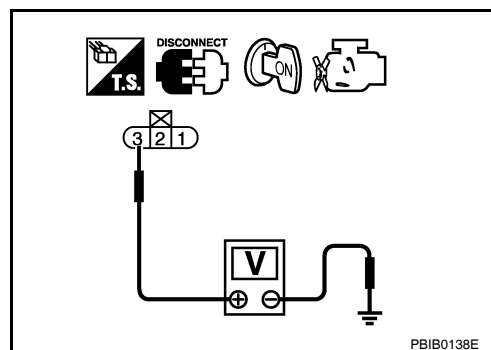
## < SERVICE INFORMATION >

2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 9.
- NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

## < SERVICE INFORMATION >

- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-400, "Component Inspection"](#).

### OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

## 10. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531901

### EVAP CONTROL SYSTEM PRESSURE SENSOR

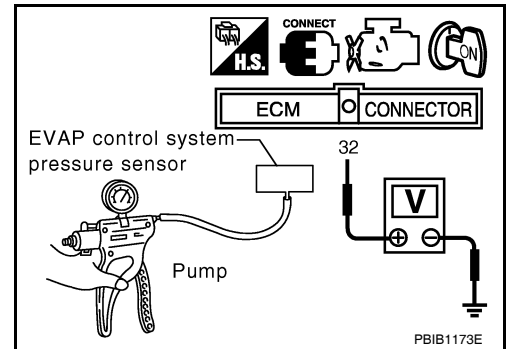
1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.  
**Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

### CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).

4. If NG, replace EVAP control system pressure sensor.





# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

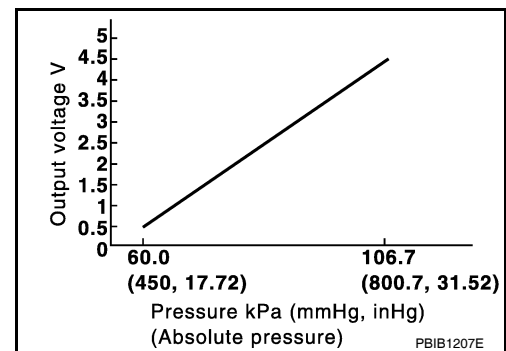
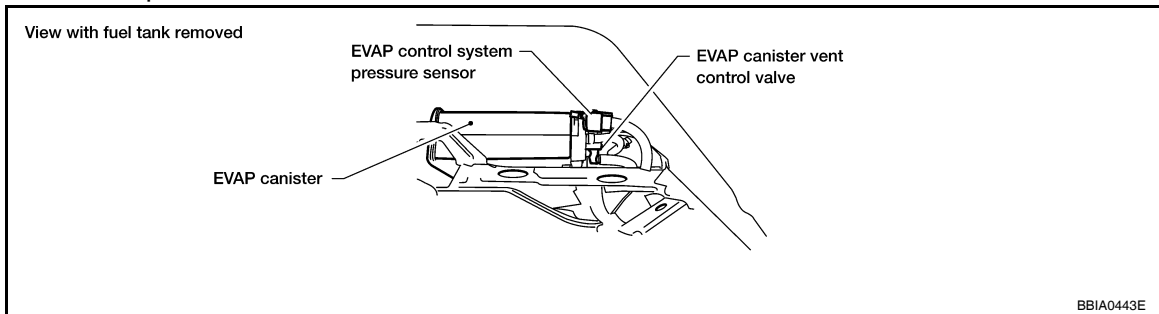
< SERVICE INFORMATION >

## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Component Description

INFOID:000000003531902

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



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531903

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

### On Board Diagnosis Logic

INFOID:000000003531904

#### NOTE:

If DTC P0453 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• EVAP control system pressure sensor</li> <li>• EVAP canister vent control valve</li> <li>• EVAP canister</li> <li>• Rubber hose from EVAP canister vent control valve to vehicle frame</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531905

#### NOTE:

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

#### TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

Ⓜ WITH CONSULT-II

## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

### < SERVICE INFORMATION >

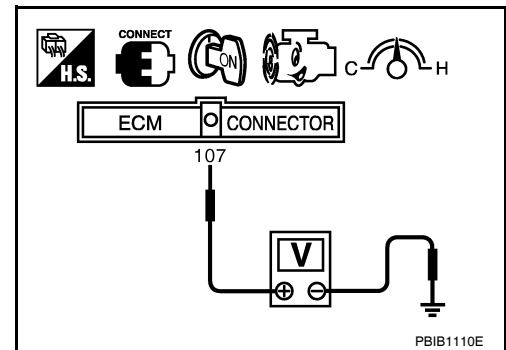
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to [EC-404. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service \$07 with GST.  
If 1st trip DTC is detected, go to [EC-404. "Diagnosis Procedure"](#).



# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

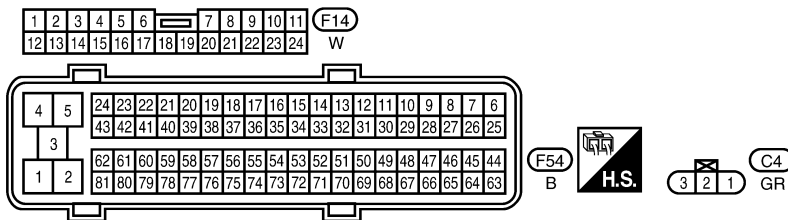
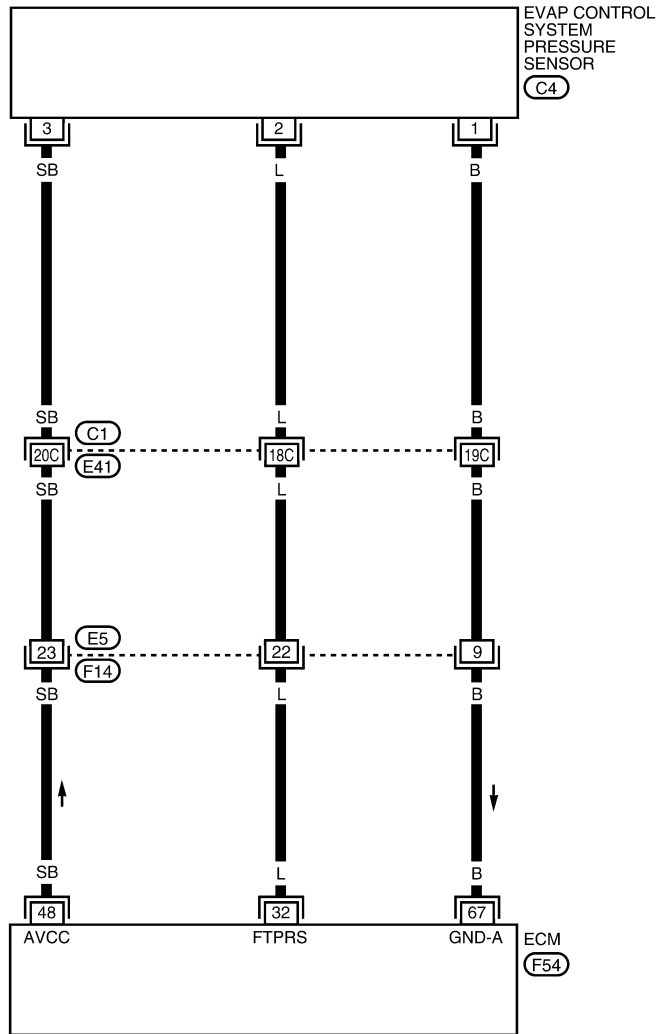
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:00000003531906

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2096E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

## < SERVICE INFORMATION >

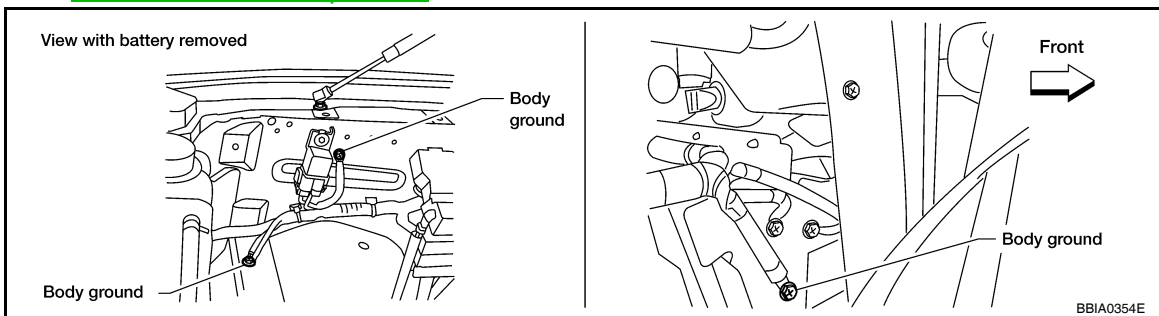
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	<b>[Ignition switch: ON]</b>	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground	<b>[Engine is running]</b> <ul style="list-style-type: none"><li>• Warm-up condition</li><li>• Idle speed</li></ul>	Approximately 0V

## Diagnosis Procedure

INFOID:000000003531907

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

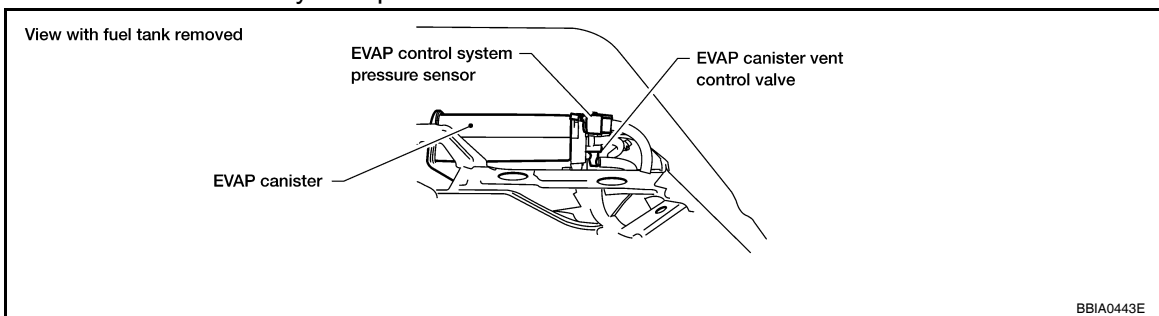


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

**Water should not exist.**

#### OK or NG

- OK >> GO TO 3.  
NG >> Repair or replace harness connector.

### 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

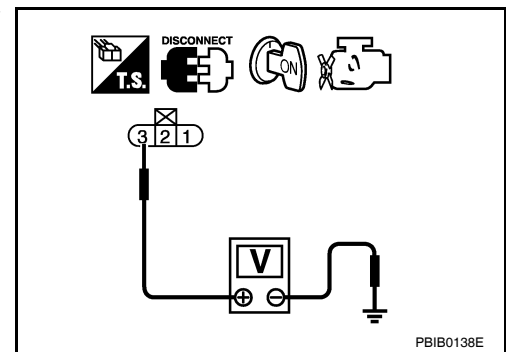
## < SERVICE INFORMATION >

2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 9.
- NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14

## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

### < SERVICE INFORMATION >

- Harness for open or short between EVAP control system pressure sensor and ECM

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

### 9. CHECK RUBBER TUBE

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

#### OK or NG

OK >> GO TO 10.

NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

### 10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-384, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 11.

NG >> Replace EVAP canister vent control valve.

### 11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-407, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 12.

NG >> Replace EVAP control system pressure sensor.

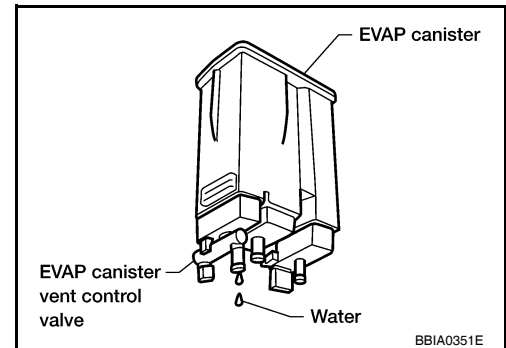
### 12. CHECK IF EVAP CANISTER SATURATED WITH WATER

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.

#### Yes or No

Yes >> GO TO 13.

No >> GO TO 15.



### 13. 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 2.5 kg (5.5 lb).**

#### OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

### 14. 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.

### 15. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

## Component Inspection

INFOID:000000003531908

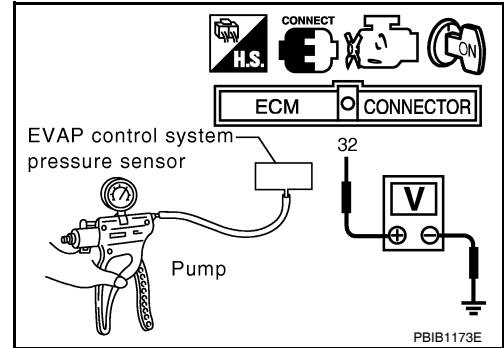
### EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.  
**Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

**CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
  - Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
4. If NG, replace EVAP control system pressure sensor.



# DTC P0455 EVAP CONTROL SYSTEM

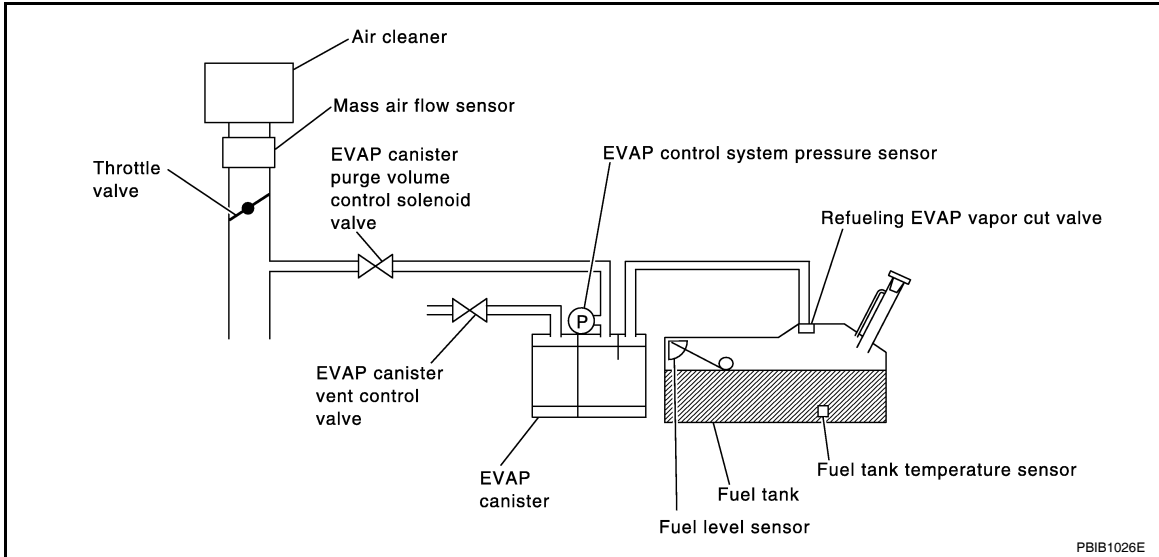
< SERVICE INFORMATION >

## DTC P0455 EVAP CONTROL SYSTEM

### On Board Diagnosis Logic

INFOID:000000003531909

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	<ul style="list-style-type: none"> <li>Fuel filler cap remains open or fails to close.</li> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent.</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>EVAP control system pressure sensor</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> </ul>

**CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

### DTC Confirmation Procedure

INFOID:000000003531910

**CAUTION:**

Never remove fuel filler cap during the DTC Confirmation Procedure.

**NOTE:**



# DTC P0455 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

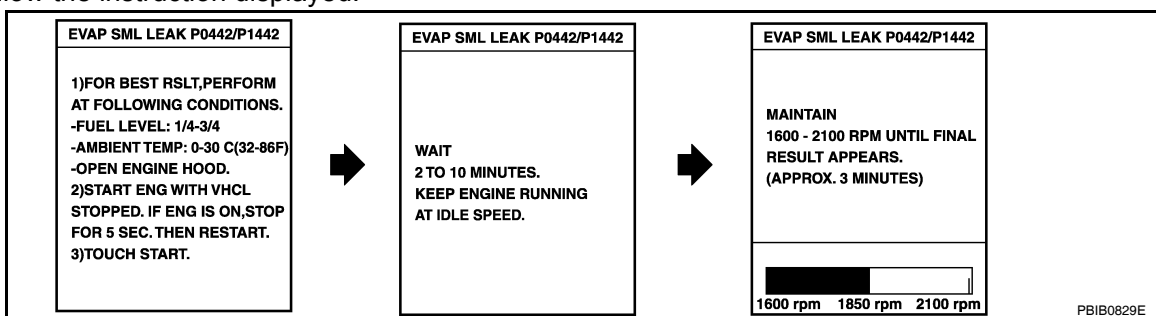
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

### Ⓜ WITH CONSULT-II

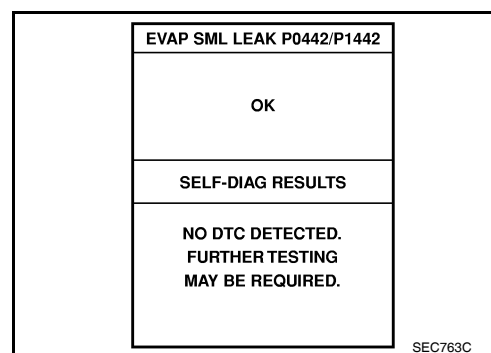
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that the following conditions are met.  
**COOLAN TEMP/S: 0 - 70°C (32 - 158°F)**  
**INT/A TEMP SE: 0 - 60°C (32 - 140°F)**
6. Select “EVP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.  
Follow the instruction displayed.



### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to [EC-71, "Basic Inspection"](#).

7. Make sure that “OK” is displayed.  
If “NG” is displayed, select “SELF-DIAG RESULTS” mode and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to [EC-410, "Diagnosis Procedure"](#).  
If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, [EC-360, "Diagnosis Procedure"](#).



### Ⓜ WITH GST

### NOTE:

Be sure to read the explanation of [EC-49, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to [EC-49, "Emission-related Diagnostic Information"](#).
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select Service \$07 with GST.
  - If P0441 is displayed on the screen, go to [EC-356, "Diagnosis Procedure"](#).
  - If P0442 is displayed on the screen, go to [EC-360, "Diagnosis Procedure"](#).
  - If P0455 is displayed on the screen, go to [EC-410, "Diagnosis Procedure"](#).

# DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

## Diagnosis Procedure

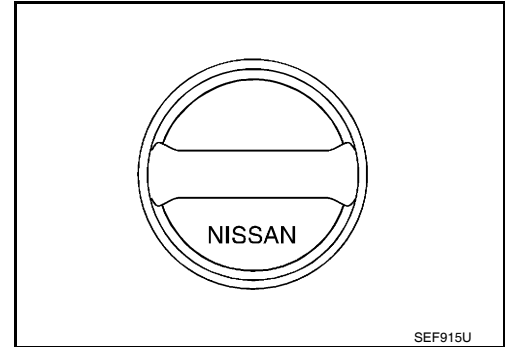
INFOID:000000003531911

### 1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

#### OK or NG

- OK >> GO TO 2.  
NG >> 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.

#### OK or NG

- OK >> GO TO 3.  
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.  
2. Retighten until ratcheting sound is heard.

### 3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

#### OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

### 4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-35, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 5.  
NG >> Replace fuel filler cap with a genuine one.

### 5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to [EC-33, "Description"](#).

#### OK or NG

- OK >> GO TO 6.  
NG >> Repair or reconnect the hose.

### 6. CLEAN EVAP PURGE LINE

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

>> GO TO 7.

### 7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.  
Refer to [EC-37, "Removal and Installation"](#).
- EVAP canister vent control valve.  
Refer to [EC-384, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 8.  
NG >> Repair or replace EVAP canister vent control valve and O-ring.

# DTC P0455 EVAP CONTROL SYSTEM

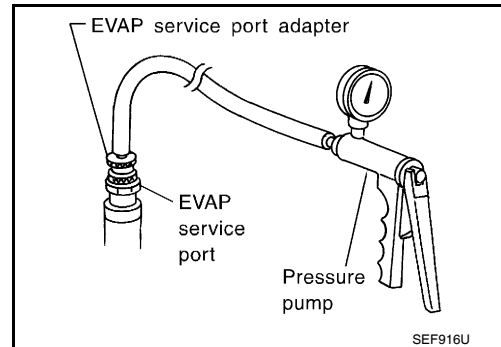
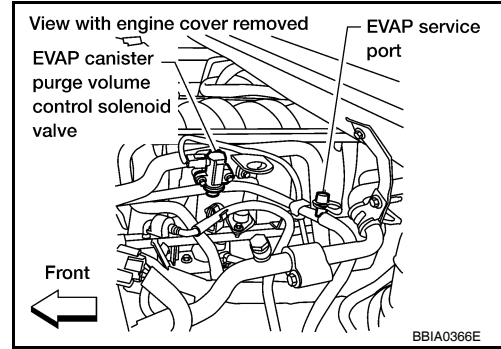
< SERVICE INFORMATION >

## 8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

**NOTE:**

**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**



With CONSULT-II>>GO TO 9.  
Without CONSULT-II>>GO TO 10.

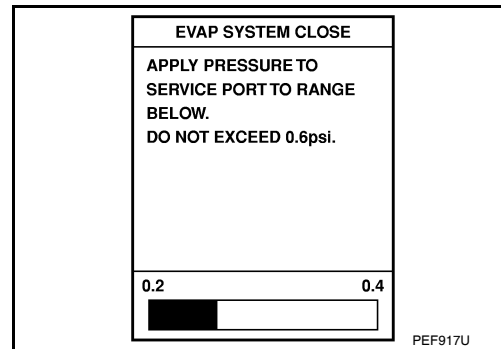
## 9. CHECK FOR EVAP LEAK

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**CAUTION:**

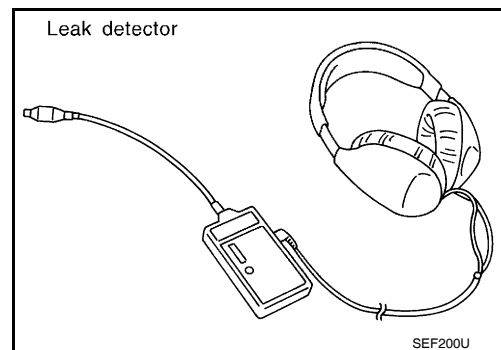
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33. "Description"](#).

**OK or NG**

- OK >> GO TO 11.  
NG >> Repair or replace.



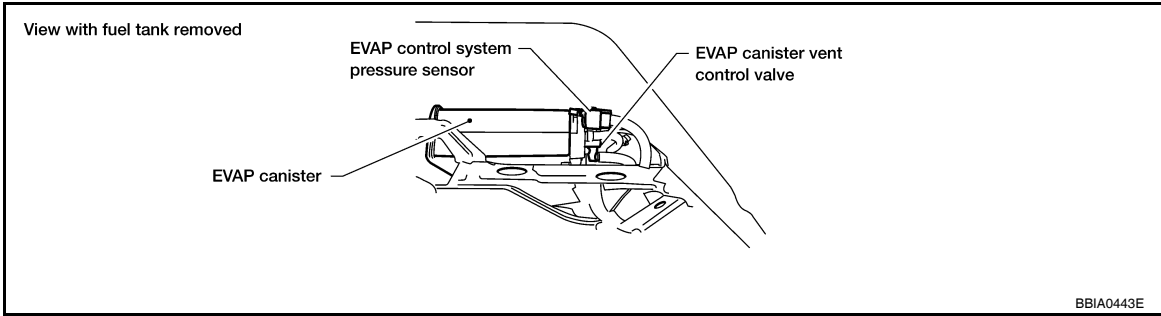
## 10. CHECK FOR EVAP LEAK

**Without CONSULT-II**

# DTC P0455 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

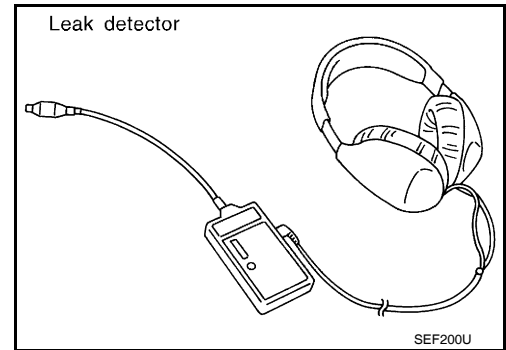


3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

**CAUTION:**

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33. "Description"](#).



OK or NG

- OK >> GO TO 12.  
 NG >> Repair or replace.

## 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

OK or NG

- OK >> GO TO 14.  
 NG >> GO TO 13.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

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## 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

OK or NG

- OK >> GO TO 15.  
 NG >> GO TO 13.

# DTC P0455 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

### 13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-100. "Vacuum Hose Drawing"](#).

OK or NG

- OK (With CONSULT-II) >> GO TO 14.
- OK (Without CONSULT-II) >> GO TO 15.
- NG >> Repair or reconnect the hose.

### 14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **With CONSULT-II**

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

- OK >> GO TO 16.
- NG >> GO TO 15.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

### 15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-378. "Component Inspection"](#).

OK or NG

- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.

### 16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-313. "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
- NG >> Replace fuel level sensor unit.

### 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394. "Component Inspection"](#).

OK or NG

- OK >> GO TO 18.
- NG >> Replace EVAP control system pressure sensor.

### 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 [EC-40](#).

OK or NG

- OK >> GO TO 19.
- NG >> Repair or replace hoses and tubes.

### 19. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

- OK >> GO TO 20.
- NG >> Repair or replace hose, tube or filler neck tube.

### 20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-42. "Component Inspection"](#).

## DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

---

OK or NG

OK >> GO TO 21.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

**21**.CHECK INTERMITTENT INCIDENT

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Refer to [EC-138](#).

>> **INSPECTION END**

# DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

## DTC P0456 EVAP CONTROL SYSTEM

### On Board Diagnosis Logic

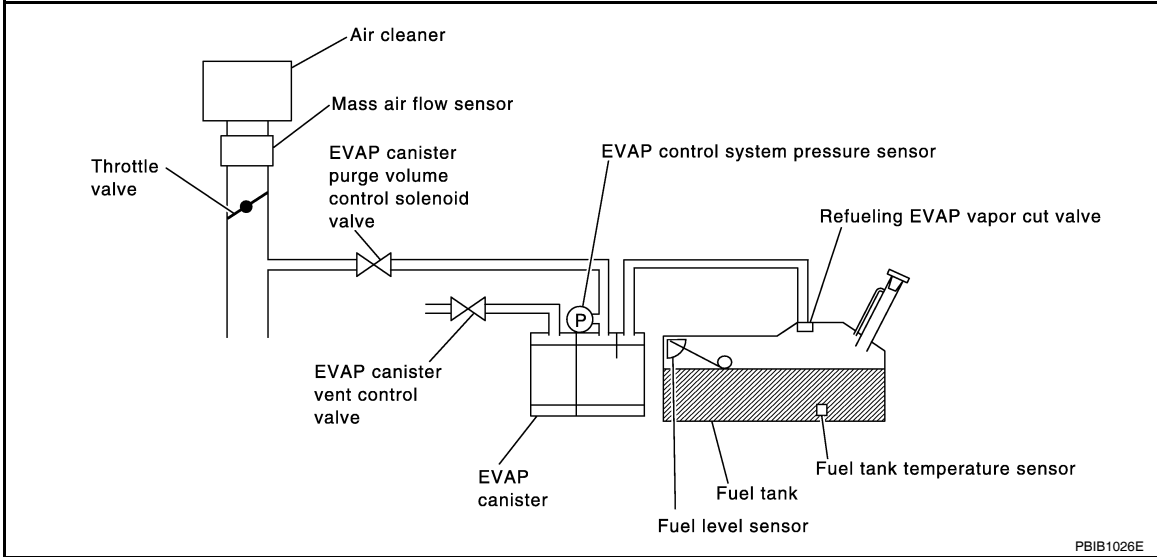
INFOID:000000003531912

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.

If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	<ul style="list-style-type: none"> <li>EVAP system has a very small leak.</li> <li>EVAP system does not operate properly.</li> </ul>	<ul style="list-style-type: none"> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or fails to close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> <li>Fuel level sensor and the circuit</li> <li>Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul>

#### CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

# DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

## DTC Confirmation Procedure

INFOID:000000003531913

### NOTE:

- If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.
- After repair, make sure that the hoses and clips are installed properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

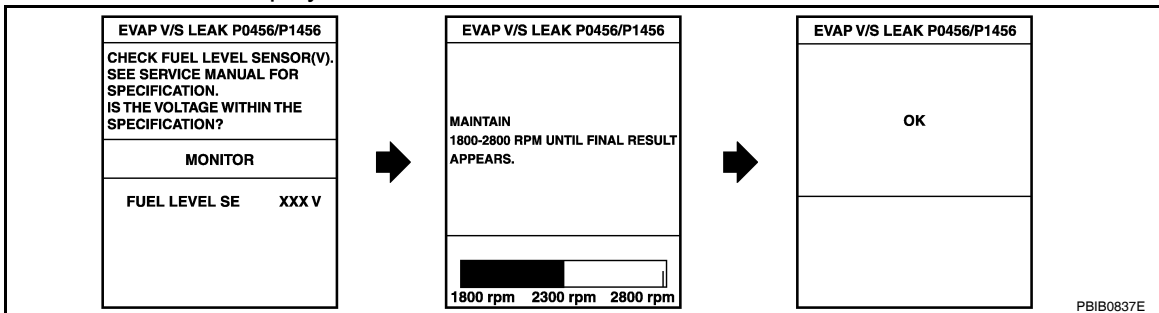
### TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
  - Fuel filler cap is removed.
  - Fuel is refilled or drained.
  - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

### ④ WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Make sure the following conditions are met.
  - FUEL LEVEL SE: 0.25 - 1.4V**
  - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
  - FUEL T/TMP SE: 0 - 35°C (32 - 95°F)**
  - INT/A TEMP SE: More than 0°C (32°F)**If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.

Follow the instruction displayed.



5. Make sure that "OK" is displayed.  
If "NG" is displayed, refer to [EC-417, "Diagnosis Procedure"](#).

### NOTE:

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-71, "Basic Inspection"](#).
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

## Overall Function Check

INFOID:000000003531914

### ④ WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

### CAUTION:

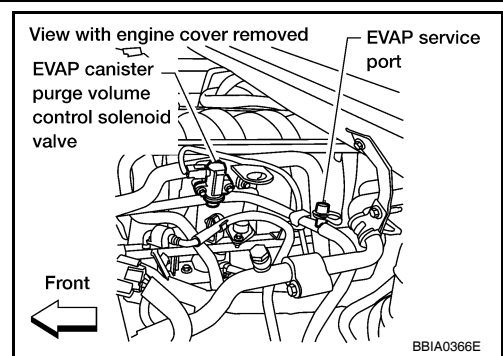
- Do not use compressed air, doing so may damage the EVAP system.
- Do not start engine.
- Do not exceeded 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi).



# DTC P0456 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

1. Attach the EVAP service port adapter securely to the EVAP service port.



2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select Service \$08.
6. Using Service \$08, control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.

**Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)**

**Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).**

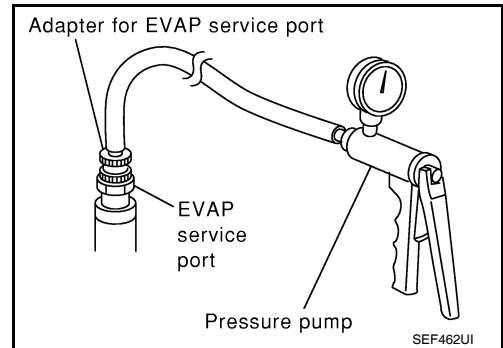
If NG, go to [EC-417, "Diagnosis Procedure"](#).

If OK, go to next step.

8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

### NOTE:

For more information, refer to GST Instruction Manual.



## Diagnosis Procedure

INFOID:000000003531915

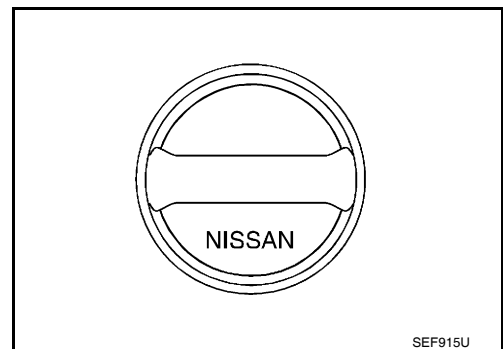
### 1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

#### OK or NG

OK >> GO TO 2.

NG >> 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.

#### OK or NG

OK >> GO TO 3.

- NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until ratcheting sound is heard.

# DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

## 3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

## 4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to [EC-35, "Component Inspection"](#).

OK or NG

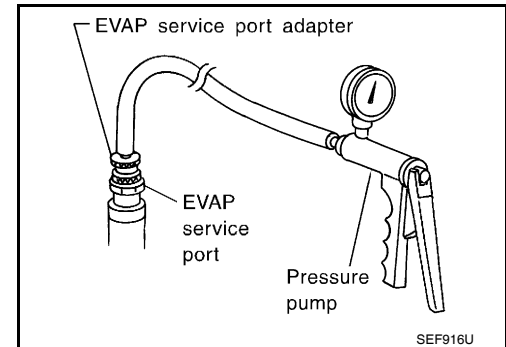
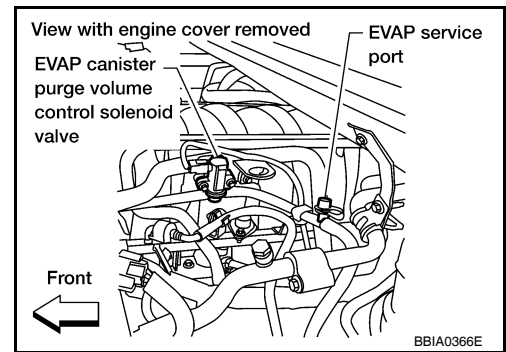
- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

**NOTE:**

**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**



With CONSULT-II >> GO TO 6.

Without CONSULT-II >> GO TO 7.

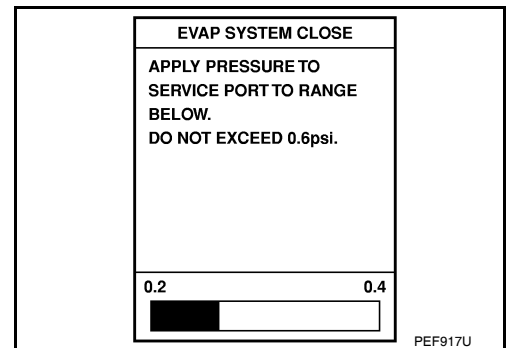
## 6. CHECK FOR EVAP LEAK

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**CAUTION:**

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.



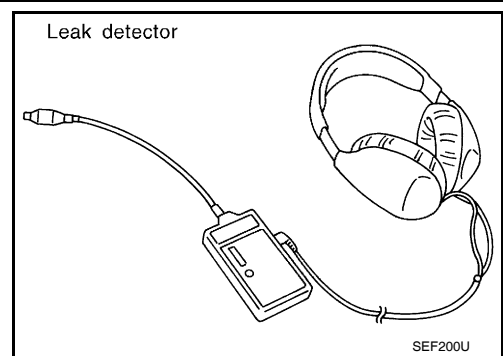
## DTC P0456 EVAP CONTROL SYSTEM

### < SERVICE INFORMATION >

- Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33. "Description"](#).

#### OK or NG

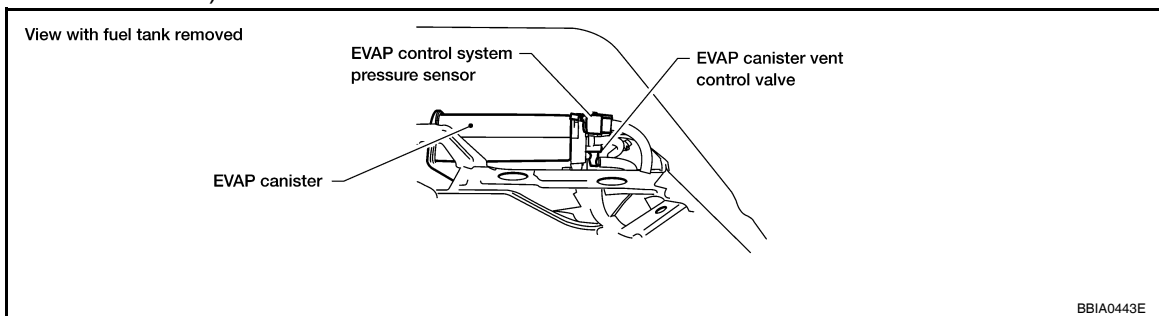
- OK >> GO TO 8.  
NG >> Repair or replace.



## 7. CHECK FOR EVAP LEAK

### ⊗ Without CONSULT-II

- Turn ignition switch OFF.
- Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



- Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

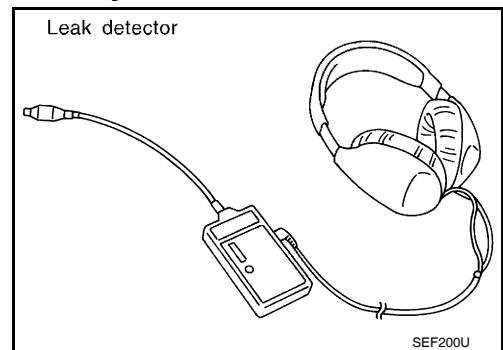
#### CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.

- Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-33. "Description"](#).

#### OK or NG

- OK >> GO TO 8.  
NG >> Repair or replace.



## 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to [EC-37. "Removal and Installation"](#).
- EVAP canister vent control valve. Refer to [EC-384. "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 9.  
NG >> Repair or replace EVAP canister vent control valve and O-ring.

## 9. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

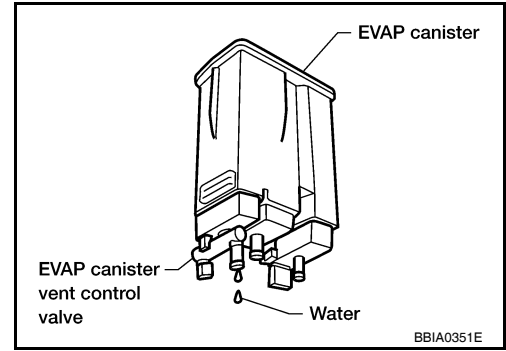
# DTC P0456 EVAP CONTROL SYSTEM

## < SERVICE INFORMATION >

2. Does water drain from the EVAP canister?

### Yes or No

- Yes >> GO TO 10.
- No (With CONSULT-II)>>GO TO 12.
- No (Without CONSULT-II)>>GO TO 13.



## 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 2.5 kg (5.5 lb).**

### OK or NG

- OK (With CONSULT-II)>>GO TO 12.
- OK (Without CONSULT-II)>>GO TO 13.
- NG >> 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

>> Repair hose or replace EVAP canister.

## 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### Ⓟ With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

### OK or NG

- OK >> GO TO 15.
- NG >> GO TO 14.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

## 13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### ⓧ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

**Vacuum should exist.**

### OK or NG

- OK >> GO TO 16.
- NG >> GO TO 14.

## 14. CHECK VACUUM HOSE

## DTC P0456 EVAP CONTROL SYSTEM

### < SERVICE INFORMATION >

Check vacuum hoses for clogging or disconnection. Refer to [EC-100. "Vacuum Hose Drawing"](#) .

#### OK or NG

- OK >> GO TO 15.
- NG >> Repair or reconnect the hose.

### 15.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-378. "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.

### 16.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-313. "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 17.
- NG >> Replace fuel level sensor unit.

### 17.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-394. "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 18.
- NG >> Replace EVAP control system pressure sensor.

### 18.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to [EC-33. "Description"](#) .

#### OK or NG

- OK >> GO TO 19.
- NG >> Repair or reconnect the hose.

### 19.CLEAN EVAP PURGE LINE

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

>> GO TO 20.

### 20.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 [EC-40](#) .

#### OK or NG

- OK >> GO TO 21.
- NG >> Repair or replace hoses and tubes.

### 21.CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

#### OK or NG

- OK >> GO TO 22.
- NG >> Repair or replace hose, tube or filler neck tube.

### 22.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to [EC-42. "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 23.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

### 23.CHECK FUEL LEVEL SENSOR

Refer to [DI-18. "Fuel Level Sensor Unit Inspection"](#) .

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## DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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OK or NG

OK >> GO TO 24.

NG >> Replace fuel level sensor unit.

**24**.CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

>> **INSPECTION END**

# DTC P0460 FUEL LEVEL SENSOR

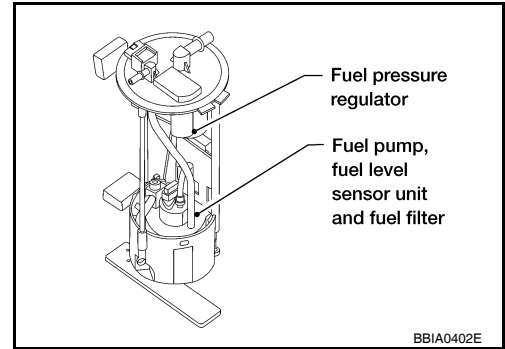
< SERVICE INFORMATION >

## DTC P0460 FUEL LEVEL SENSOR

### Component Description

INFOID:000000003531916

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

INFOID:000000003531917

**NOTE:**

- If DTC P0460 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P0460 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The CAN communication line is open or shorted)</li> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Combination meter</li> <li>• Fuel level sensor</li> </ul>

### DTC Confirmation Procedure

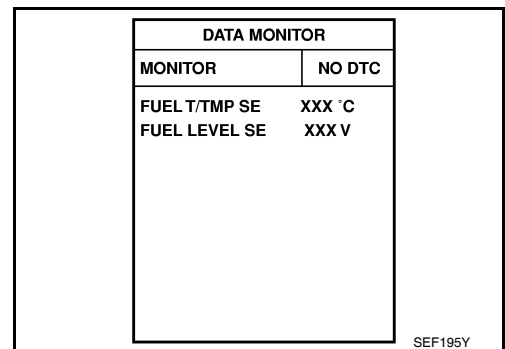
INFOID:000000003531918

**NOTE:**

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to [EC-424, "Diagnosis Procedure"](#)



WITH GST

Follow the procedure "WITH CONSULT-II" above.

## DTC P0460 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

---

### Diagnosis Procedure

INFOID:000000003531919

#### 1. CHECK COMBINATION METER FUNCTION

---

Refer to [DI-5](#).

##### OK or NG

OK >> GO TO 2.

NG >> Go to [DI-18, "Fuel Level Sensor Unit Inspection"](#).

#### 2. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

>> **INSPECTION END**

### Removal and Installation

INFOID:000000003531920

#### FUEL LEVEL SENSOR

Refer to [FL-5](#).



# DTC P0461 FUEL LEVEL SENSOR

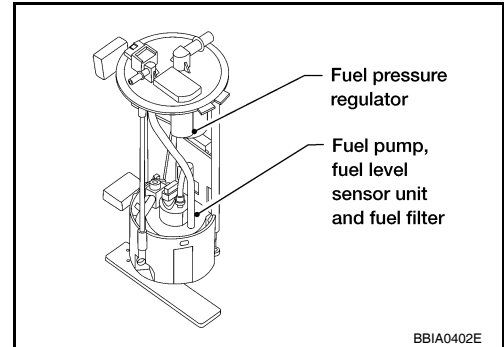
< SERVICE INFORMATION >

## DTC P0461 FUEL LEVEL SENSOR

### Component Description

INFOID:000000003531921

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

INFOID:000000003531922

**NOTE:**

- If DTC P0461 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P0461 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	<ul style="list-style-type: none"> <li>• Harness or connectors (The CAN communication line is open or shorted)</li> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Combination meter</li> <li>• Fuel level sensor</li> </ul>

### Overall Function Check

INFOID:000000003531923

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

**WARNING:**

When performing following procedure, be sure to observe the handling of the fuel. Refer to [FL-10](#).

**TESTING CONDITION:**

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

Ⓜ WITH CONSULT-II

**NOTE:**

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to [EC-80, "Fuel Pressure Check"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.

# DTC P0461 FUEL LEVEL SENSOR

## < SERVICE INFORMATION >

6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check "FUEL LEVEL SE" output voltage and note it.
11. Fill fuel into the fuel tank for 30 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 0.03V during step 7 to 10 and 10 to 12.  
If NG, go to [EC-426, "Diagnosis Procedure"](#) .

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

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## WITH GST

### 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-80, "Fuel Pressure Check"](#) .
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.
10. If NG, go to [EC-426, "Diagnosis Procedure"](#) .

## Diagnosis Procedure

INFOID:000000003531924

### 1. CHECK COMBINATION METER FUNCTION

Refer to [DI-5](#).

#### OK or NG

- OK >> GO TO 2.
- NG >> Go to [DI-18, "Fuel Level Sensor Unit Inspection"](#) .

### 2. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#) .

>> **INSPECTION END**

## Removal and Installation

INFOID:000000003531925

## FUEL LEVEL SENSOR

Refer to [FL-5](#).

# DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

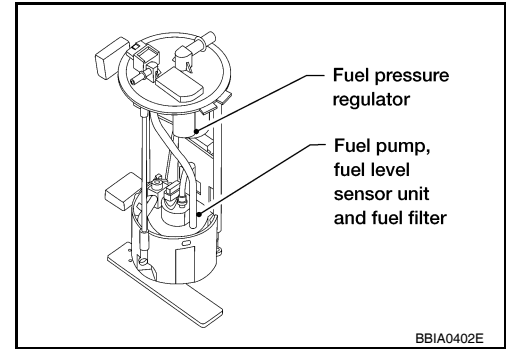
< SERVICE INFORMATION >

## DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

### Component Description

INFOID:000000003531926

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

INFOID:000000003531927

**NOTE:**

- If DTC P0462 or P0463 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P0462 or P0463 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The CAN communication line is open or shorted)</li> <li>• Harness or connectors (The sensor circuit is open or shorted)</li> <li>• Combination meter</li> <li>• Fuel level sensor</li> </ul>
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

### DTC Confirmation Procedure

INFOID:000000003531928

**NOTE:**

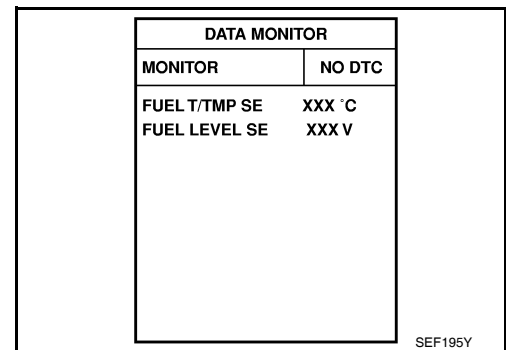
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

**Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.**

**WITH CONSULT-II**

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to [EC-428. "Diagnosis Procedure"](#)



**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

## DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

< SERVICE INFORMATION >

---

### Diagnosis Procedure

INFOID:000000003531929

#### 1. CHECK COMBINATION METER FUNCTION

---

Refer to [DI-5](#).

##### OK or NG

OK >> GO TO 2.

NG >> Go to [DI-18, "Fuel Level Sensor Unit Inspection"](#).

#### 2. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

>> **INSPECTION END**

### Removal and Installation

INFOID:000000003531930

#### FUEL LEVEL SENSOR

Refer to [FL-5](#) .

# DTC P0500 VSS

< SERVICE INFORMATION >

## DTC P0500 VSS

### Description

INFOID:000000003531931

#### NOTE:

- If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

### On Board Diagnosis Logic

INFOID:000000003531932

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	<ul style="list-style-type: none"><li>• Harness or connectors (The CAN communication line is open or shorted)</li><li>• Harness or connectors (The vehicle speed signal circuit is open or shorted)</li><li>• Wheel sensor</li><li>• Combination meter</li><li>• ABS actuator and electric unit (control unit)</li></ul>

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (High) while engine is running.

### DTC Confirmation Procedure

INFOID:000000003531933

#### CAUTION:

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

#### NOTE:

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:

**Steps 1 and 2 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-II

1. Start engine (VDC switch OFF).
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.  
If NG, go to [EC-430. "Diagnosis Procedure"](#).  
If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.

# DTC P0500 VSS

## < SERVICE INFORMATION >

5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,600 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.9 - 31.8 msec
Selector lever	Except P or N position
PW/ST SIGNAL	OFF

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

6. If 1st trip DTC is detected, go to [EC-430. "Diagnosis Procedure"](#).

## Overall Function Check

INFOID:000000003531934

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

### Ⓢ WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service \$01 with GST.  
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to [EC-430. "Diagnosis Procedure"](#).

## Diagnosis Procedure

INFOID:000000003531935

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

Refer to [BRC-11](#).

#### OK or NG

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

### 2. CHECK COMBINATION METER FUNCTION

Refer to [DI-5](#).

>> **INSPECTION END**

# DTC P0506 ISC SYSTEM

< SERVICE INFORMATION >

## DTC P0506 ISC SYSTEM

### Description

INFOID:000000003531936

#### NOTE:

**If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**

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.).

### On Board Diagnosis Logic

INFOID:000000003531937

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	<ul style="list-style-type: none"><li>• Electric throttle control actuator</li><li>• Intake air leak</li></ul>

### DTC Confirmation Procedure

INFOID:000000003531938

#### NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform [EC-78, "Idle Air Volume Learning"](#) , before conducting DTC Confirmation Procedure. For the target idle speed, refer to the [EC-645](#) .**

#### TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).**

#### WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to [EC-431, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLANT TEMP/S	XXX °C

SEF174Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003531939

#### 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.

#### OK or NG

OK >> GO TO 2.

## DTC P0506 ISC SYSTEM

### < SERVICE INFORMATION >

---

NG >> Discover air leak location and repair.

### 2. REPLACE ECM

---

1. Stop engine.
2. Replace ECM.
3. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).
4. Perform [EC-77, "VIN Registration"](#) .
5. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> INSPECTION END



# DTC P0507 ISC SYSTEM

< SERVICE INFORMATION >

## DTC P0507 ISC SYSTEM

### Description

INFOID:000000003531940

#### NOTE:

**If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**

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.).

### On Board Diagnosis Logic

INFOID:000000003531941

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	<ul style="list-style-type: none"> <li>Electric throttle control actuator</li> <li>Intake air leak</li> <li>PCV system</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531942

#### NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- If the target idle speed is out of the specified value, perform [EC-78, "Idle Air Volume Learning"](#), before conducting DTC Confirmation Procedure. For the target idle speed, refer to the [EC-645](#).

#### TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
- Always perform the test at a temperature above -10°C (14°F).

#### WITH CONSULT-II

- Open engine hood.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 1 minute at idle speed.
- If 1st trip DTC is detected, go to [EC-433, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003531943

#### 1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.

## DTC P0507 ISC SYSTEM

### < SERVICE INFORMATION >

---

NG >> Repair or replace.

### 2. CHECK INTAKE AIR LEAK

---

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

#### OK or NG

OK >> GO TO 3.

NG >> Discover air leak location and repair.

### 3. REPLACE ECM

---

1. Stop engine.
2. Replace ECM.
3. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).
4. Perform [EC-77, "VIN Registration"](#) .
5. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
6. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
7. Perform [EC-78, "Idle Air Volume Learning"](#) .

**>> INSPECTION END**

# DTC P0550 PSP SENSOR

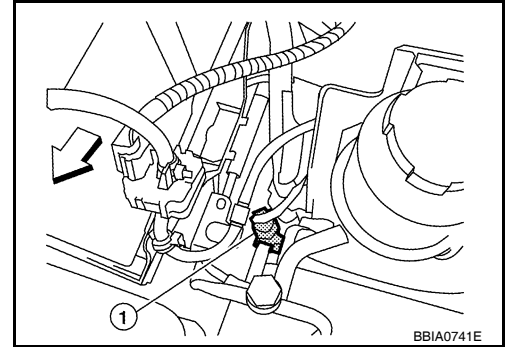
< SERVICE INFORMATION >

## DTC P0550 PSP SENSOR

### Component Description

INFOID:000000003531944

Power steering pressure (PSP) sensor (1) is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531945

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned (Forward direction)	OFF
		Steering wheel: Being turned	ON

### On Board Diagnosis Logic

INFOID:000000003531946

The MIL will not light up for this self-diagnosis.

**NOTE:**

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Power steering pressure sensor</li> </ul>

### DTC Confirmation Procedure

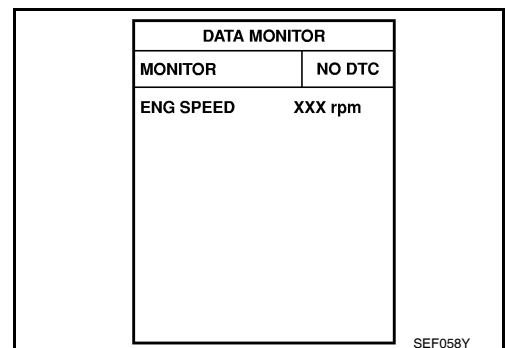
INFOID:000000003531947

**NOTE:**

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

Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to [EC-437. "Diagnosis Procedure"](#).



Ⓟ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P0550 PSP SENSOR

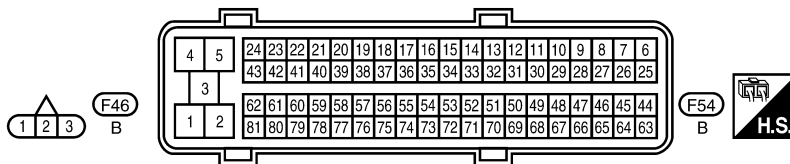
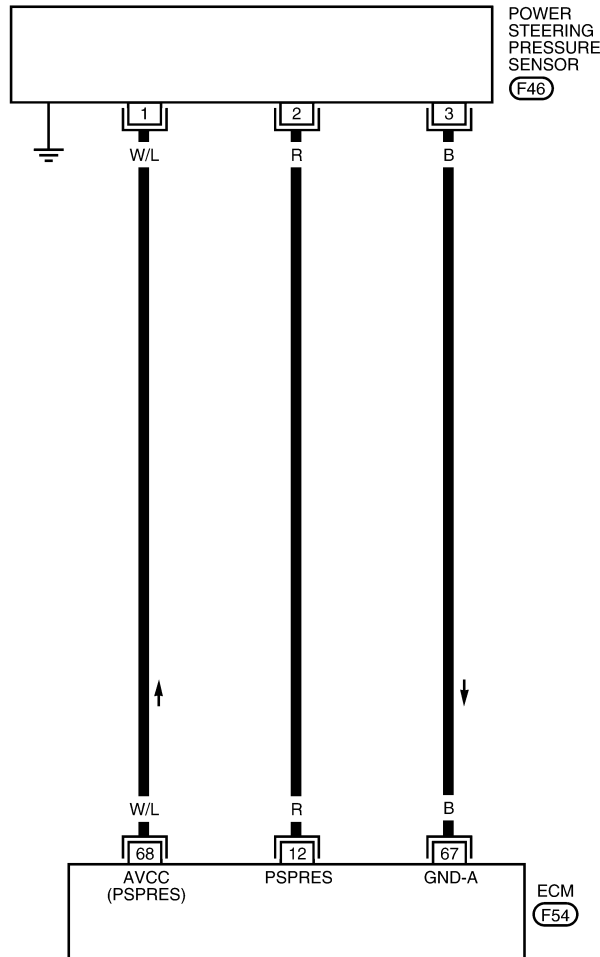
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531948

EC-PS/SEN-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2097E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0550 PSP SENSOR

## < SERVICE INFORMATION >

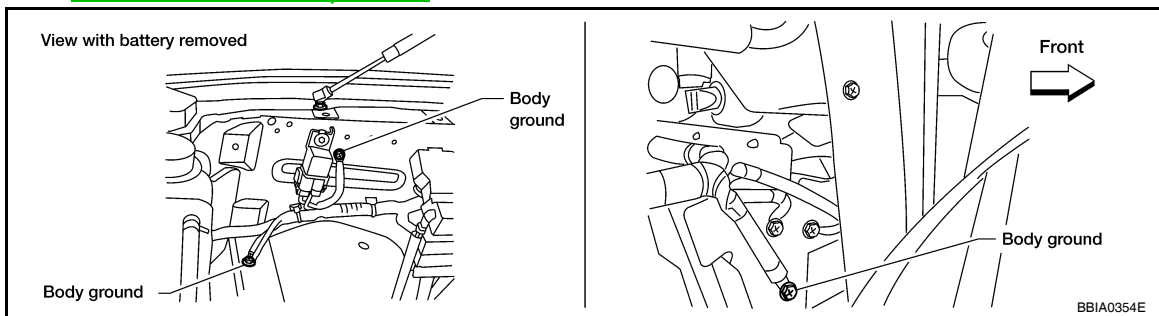
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	R	Power steering pressure sensor	<b>[Engine is running]</b> • Steering wheel: Being turned.	0.5 - 4.5V
			<b>[Engine is running]</b> • Steering wheel: Not being turned.	0.4 - 0.8V
67	B	Sensor ground	<b>[Engine is running]</b> • <b>Warm-up condition</b> • Idle speed	Approximately 0V
68	W/L	Sensor power supply (Power steering pressure sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V

## Diagnosis Procedure

INFOID:000000003531949

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

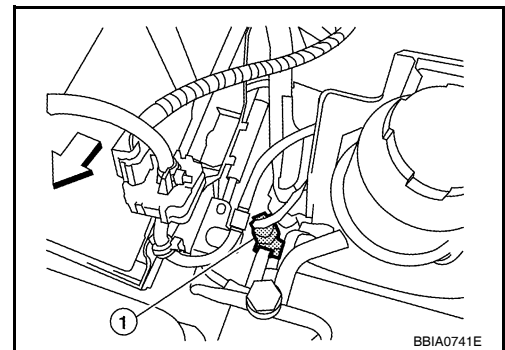


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor (1) harness connector.
2. Turn ignition switch ON.



## DTC P0550 PSP SENSOR

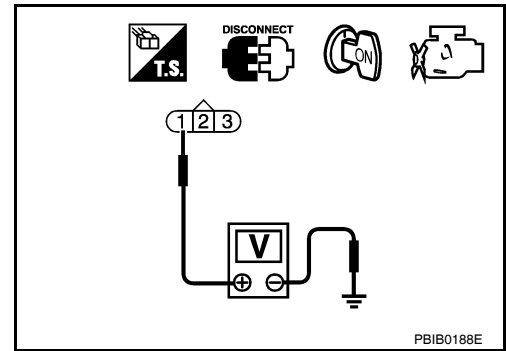
### < SERVICE INFORMATION >

3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 3.  
NG >> Repair harness or connectors.



### 3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 4.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 5.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK PSP SENSOR

Refer to [EC-438, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 6.  
NG >> Replace PSP sensor.

### 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

**>> INSPECTION END**

## Component Inspection

INFOID:000000003531950

### POWER STEERING PRESSURE SENSOR

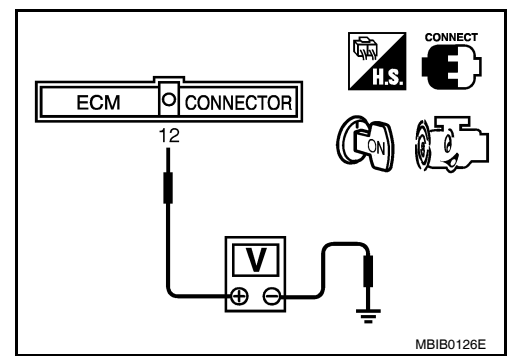
1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.

# DTC P0550 PSP SENSOR

## < SERVICE INFORMATION >

3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned.	0.5 - 4.5V
Steering wheel: Not being turned.	0.4 - 0.8V



INFOID:000000003531951

## Removal and Installation

### POWER STEERING PRESSURE SENSOR

Refer to [PS-23](#).

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# DTC P0603 ECM POWER SUPPLY

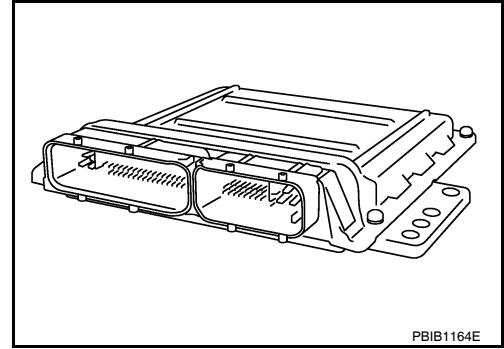
< SERVICE INFORMATION >

## DTC P0603 ECM POWER SUPPLY

### Component Description

INFOID:000000003531952

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



### On Board Diagnosis Logic

INFOID:000000003531953

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603 0603	ECM power supply circuit	ECM back-up RAM system does not function properly.	<ul style="list-style-type: none"> <li>• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.]</li> <li>• ECM</li> </ul>

### DTC Confirmation Procedure

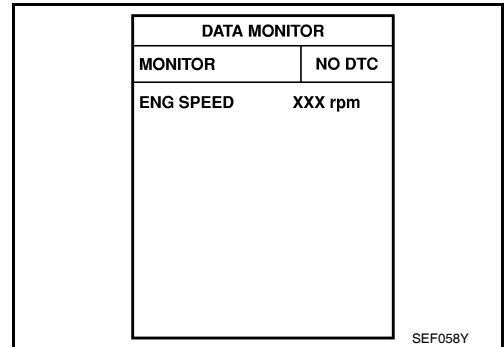
INFOID:000000003531954

#### NOTE:

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

#### ④ WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to [EC-442. "Diagnosis Procedure"](#).



#### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.



# DTC P0603 ECM POWER SUPPLY

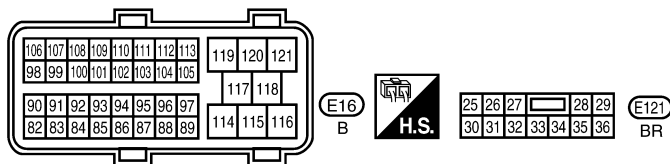
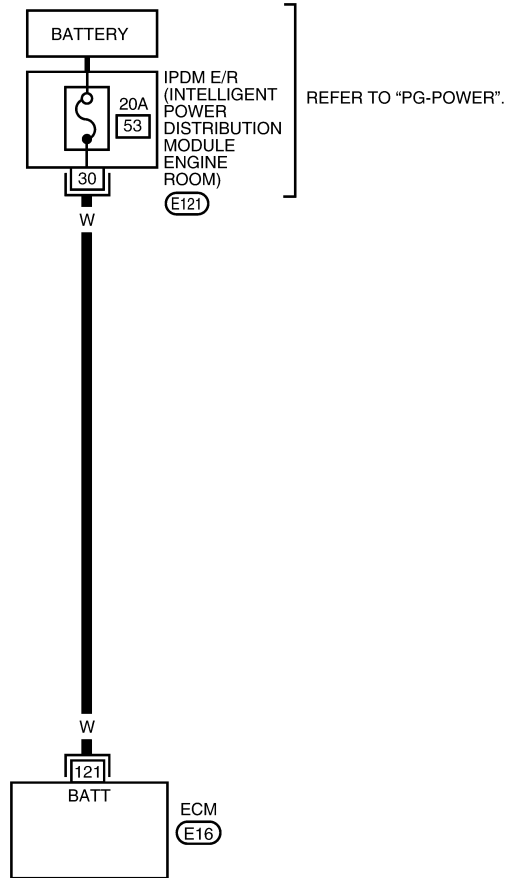
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531955

EC-ECM/PW-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2098E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0603 ECM POWER SUPPLY

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531956

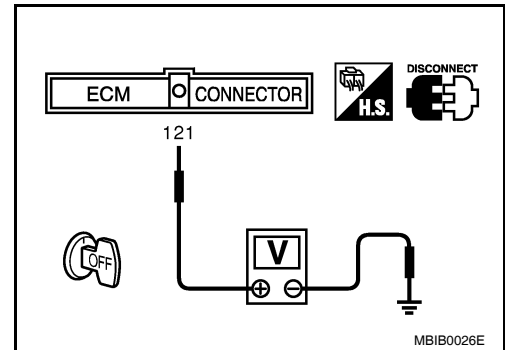
### 1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



### 2. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector E121
- 20A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

### 3. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

#### OK or NG

- OK >> GO TO 4.  
NG >> Repair or replace harness or connectors.

### 4. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**  
See [EC-440. "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P0603 displayed again?

#### With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**  
See [EC-440. "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC P0603 displayed again?

#### Yes or No

- Yes >> GO TO 5.  
No >> **INSPECTION END**

### 5. REPLACE ECM

## DTC P0603 ECM POWER SUPPLY

### < SERVICE INFORMATION >

---

1. Replace ECM.
2. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#). A
3. Perform [EC-77, "VIN Registration"](#).
4. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#). EC
5. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-78, "Idle Air Volume Learning"](#).

>> INSPECTION END

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# DTC P0605 ECM

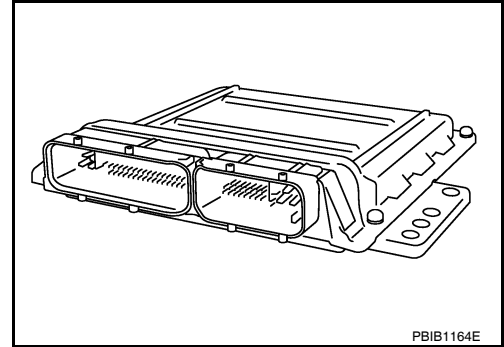
< SERVICE INFORMATION >

## DTC P0605 ECM

### Component Description

INFOID:000000003531957

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



### On Board Diagnosis Logic

INFOID:000000003531958

**This self-diagnosis has one or two trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEPROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

### FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	<ul style="list-style-type: none"> <li>ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</li> <li>ECM deactivates ASCD operation.</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531959

**Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.**

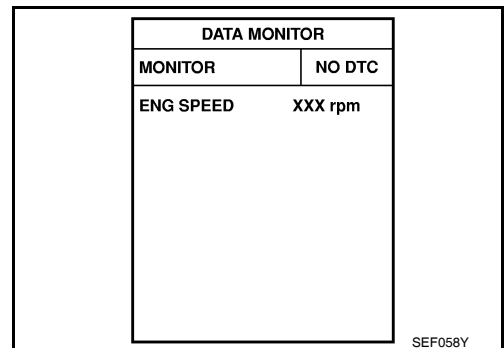
#### NOTE:

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

#### PROCEDURE FOR MALFUNCTION A

① With CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- If 1st trip DTC is detected, go to [EC-445. "Diagnosis Procedure"](#)



② With GST

Follow the procedure "With CONSULT-II" above.

# DTC P0605 ECM

## < SERVICE INFORMATION >

### PROCEDURE FOR MALFUNCTION B

#### With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. If 1st trip DTC is detected, go to [EC-445, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### With GST

Follow the procedure "With CONSULT-II" above.

### PROCEDURE FOR MALFUNCTION C

#### With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to [EC-445, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### With GST

Follow the procedure "With CONSULT-II" above.

## Diagnosis Procedure

INFOID:000000003531960

### 1. INSPECTION START

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**  
See [EC-444, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P0605 displayed again?

#### With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**  
See [EC-444, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC P0605 displayed again?

#### Yes or No

Yes >> GO TO 2.

No >> **INSPECTION END**

### 2. REPLACE ECM

1. Replace ECM.

## DTC P0605 ECM

### < SERVICE INFORMATION >

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2. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to [BL-117, "ECM Re-communicating Function"](#).
3. Perform [EC-77, "VIN Registration"](#) .
4. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
5. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
6. Perform [EC-78, "Idle Air Volume Learning"](#) .

**>> INSPECTION END**

# DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

## DTC P0643 SENSOR POWER SUPPLY

### On Board Diagnosis Logic

INFOID:000000003531961

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643 0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	<ul style="list-style-type: none"> <li>• Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.)</li> <li>• Accelerator pedal position sensor</li> <li>• Power steering pressure sensor</li> <li>• Refrigerant pressure sensor</li> <li>• EVAP control system pressure sensor</li> </ul>

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### DTC Confirmation Procedure

INFOID:000000003531962

#### NOTE:

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 10V at idle.**

#### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-449, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P0643 SENSOR POWER SUPPLY

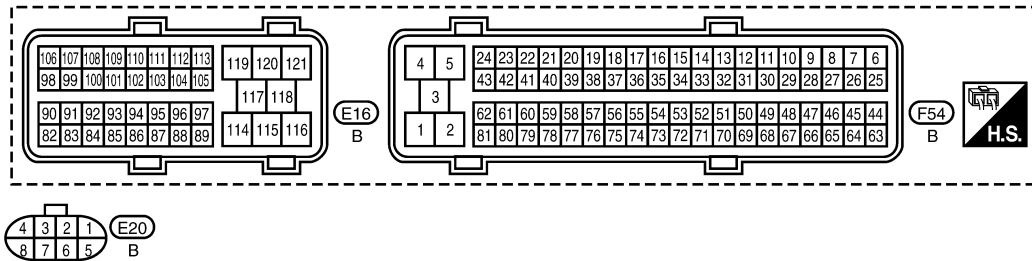
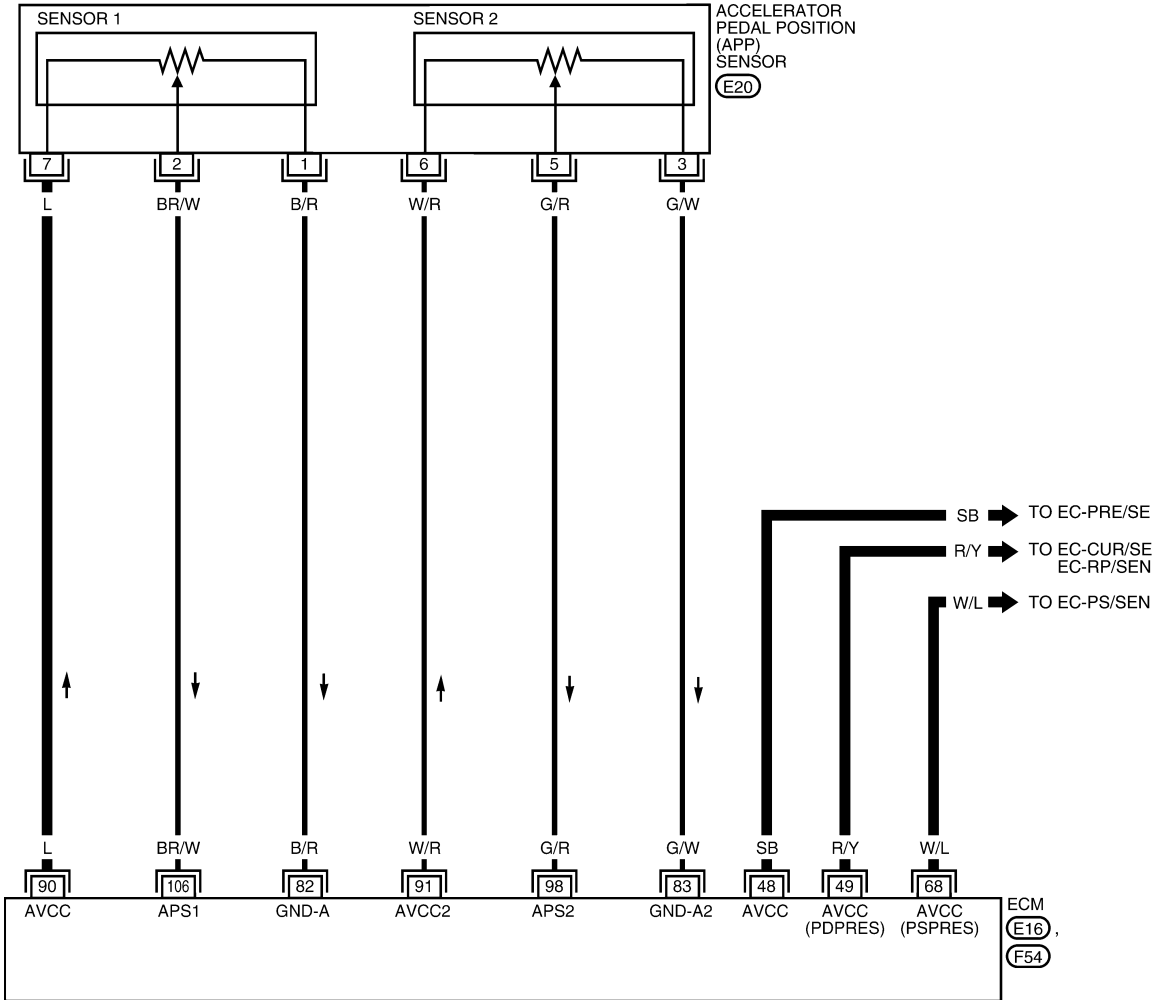
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531963

### EC-SEN/PW-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2990E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P0643 SENSOR POWER SUPPLY

## < SERVICE INFORMATION >

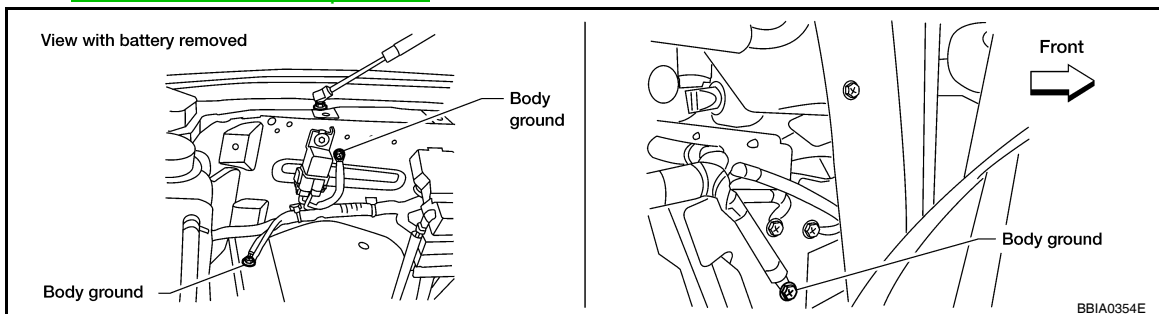
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48	SB	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5V
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5V
68	W/L	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5V
82	B/R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	G/W	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	G/R	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.25 - 0.50V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V
106	BR/W	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V

## Diagnosis Procedure

INFOID:000000003531964

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

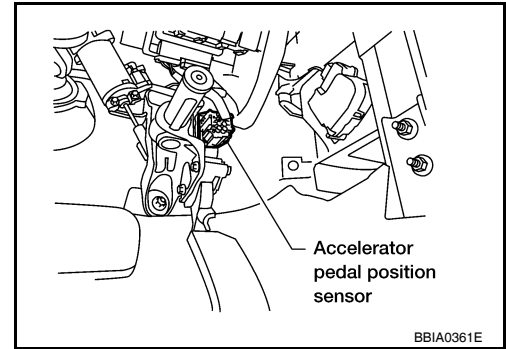
- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

# DTC P0643 SENSOR POWER SUPPLY

## < SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

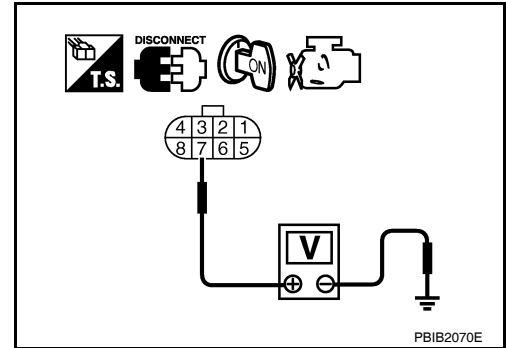


3. Check voltage between APP sensor terminal 7 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 5.  
 NG >> GO TO 3.



## 3. CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
48	EVAP control system pressure sensor terminal 3	<a href="#">EC-397</a>
49	Refrigerant pressure sensor terminal 1	<a href="#">EC-639</a>
	Battery current sensor terminal 1	<a href="#">EC-485</a>
68	Power steering pressure sensor terminal 1	<a href="#">EC-436</a>
90	APP sensor terminal 7	<a href="#">EC-448</a>

### OK or NG

- OK >> GO TO 4.  
 NG >> Repair short to ground or short to power in harness or connectors.

## 4. CHECK COMPONENTS

Check the following.

- EVAP control system pressure sensor (Refer to [EC-400, "Component Inspection"](#).)
- Power steering pressure sensor (Refer to [EC-438, "Component Inspection"](#).)
- Battery current sensor (Refer to [EC-488, "Component Inspection"](#).)
- Refrigerant pressure sensor (Refer to [EC-638](#).)

### OK or NG

- OK >> GO TO 7.  
 NG >> Replace malfunctioning components.

## 5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-587, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 7.  
 NG >> GO TO 6.

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal position assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).

## DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

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3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-78, "Idle Air Volume Learning"](#) .

A

>> INSPECTION END

### 7.CHECK INTERMITTENT INCIDENT

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EC

Refer to [EC-138](#) .

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>> INSPECTION END

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# DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

## DTC P0850 PNP SWITCH

### Component Description

INFOID:000000003531965

When the gear position is P or N, park/neutral position (PNP) switch is ON. TCM detects the position because the continuity of the line (the ON signal) exists. Then the TCM sends the PNP switch signal to the ECM via combination meter.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531966

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Selector lever: P or N	ON
		Selector lever: Except above	OFF

### On Board Diagnosis Logic

INFOID:000000003531967

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	<ul style="list-style-type: none"> <li>• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.]</li> <li>• Park/neutral position (PNP) switch</li> <li>• Combination meter</li> <li>• TCM</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531968

#### CAUTION:

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

#### NOTE:

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

#### ④ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except the above position	OFF

If NG, go to [EC-455, "Diagnosis Procedure"](#).

If OK, go to following step.

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

# DTC P0850 PNP SWITCH

## < SERVICE INFORMATION >

3. Select "DATA MONITOR" mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,000 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

6. If 1st trip DTC is detected, go to [EC-455, "Diagnosis Procedure"](#).

## Overall Function Check

INFOID:000000003531969

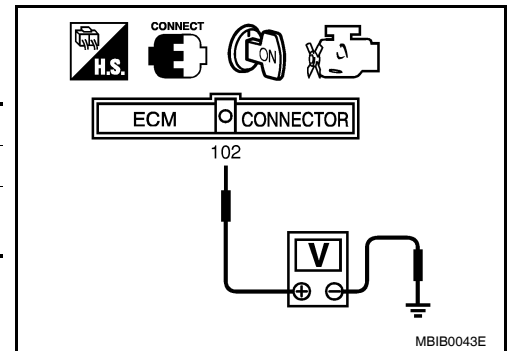
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

### Ⓢ WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
P or N position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to [EC-455, "Diagnosis Procedure"](#).



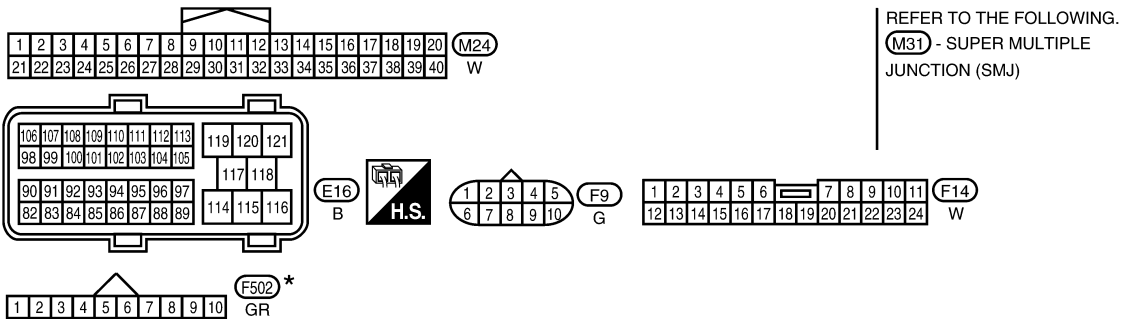
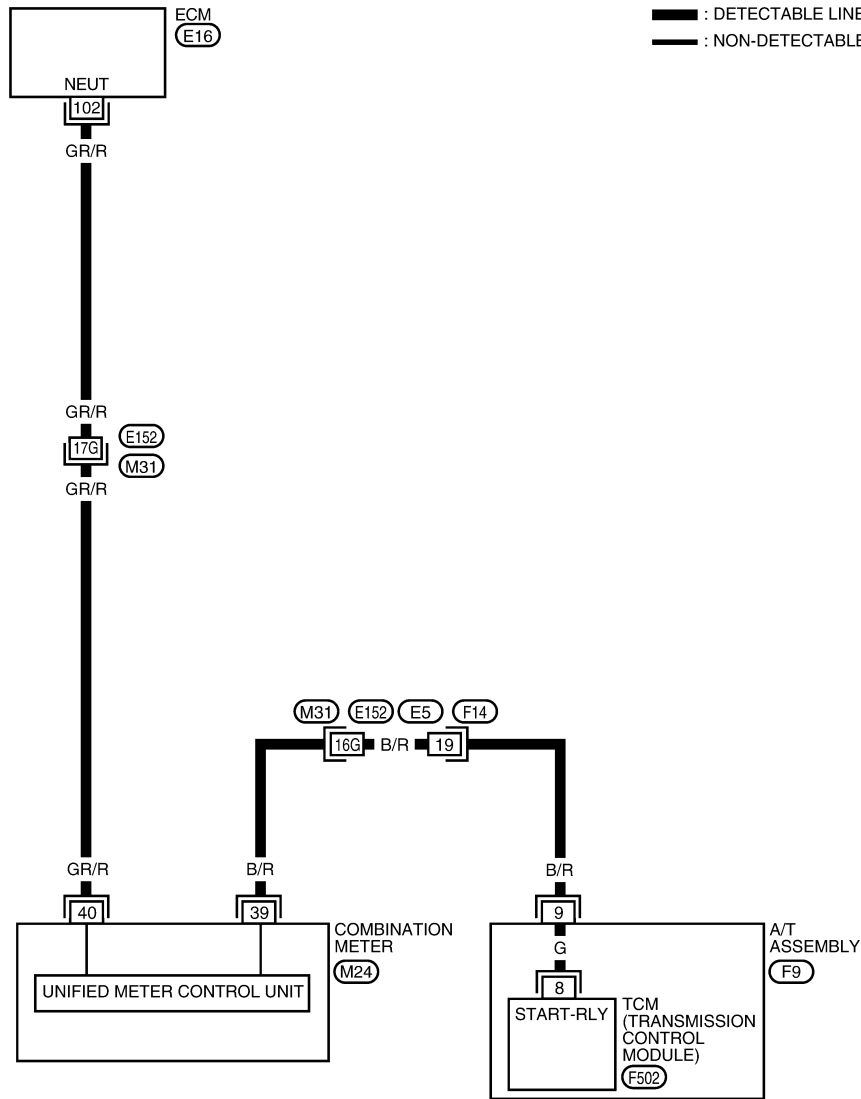
# DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003531970

### EC-PNP/SW-01



\* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

BBWA2105E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P0850 PNP SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	GR/R	PNP switch	[Ignition switch: ON] • Selector lever: P or N	Approximately 0V
			[Ignition switch: ON] • Except the above gear position	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003531971

### 1. CHECK DTC WITH TCM

Refer to [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).

#### OK or NG

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

### 2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

#### Does starter motor operate?

#### Yes or No

- Yes >> GO TO 3.
- No >> Refer to [SC-9](#).

### 3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 39.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F14, E5
- Harness connectors E152, M31
- Harness for open or short between A/T assembly and combination meter

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

### 5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 40.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

---

### 6. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors M31, E152
- Harness for open or short between ECM and combination meter

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

### 7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

---

1. Disconnect TCM harness connector.
2. Check harness continuity between TCM terminal 8 and A/T assembly terminal 9.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

### 8. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

OK or NG

OK >> GO TO 9.

NG >> Repair or replace.

### 9. REPLACE COMBINATION METER

---

Refer to [DI-5](#).

>> **INSPECTION END**



# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

## DTC P1140, P1145 IVT CONTROL POSITION SENSOR

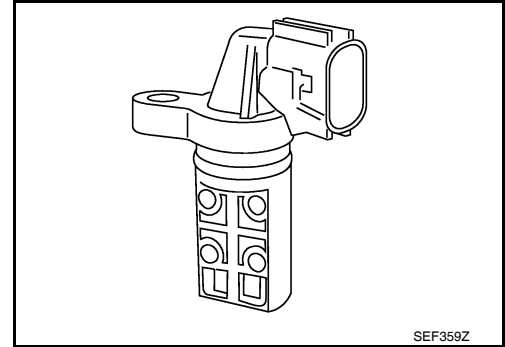
### Component Description

INFOID:000000003531972

Intake valve timing control position sensors are located in the front of cylinder heads in both bank 1 and bank 2.

This sensor uses a Hall IC.

The cam position is determined by the intake camshaft sprocket concave (in four places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531973

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load	Idle
		2,000 rpm
		-5° - 5°C Approx. 0° - 20°C

### On Board Diagnosis Logic

INFOID:000000003531974

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1140 1140 (Bank 1)	Intake valve timing control position sensor circuit	An excessively high or low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (Intake valve timing control position sensor circuit is open or shorted)</li> <li>• Intake valve timing control position sensor</li> <li>• Crankshaft position sensor (POS)</li> <li>• Camshaft position sensor (PHASE)</li> <li>• Accumulation of debris to the signal pick-up portion of the camshaft sprocket</li> </ul>
P1145 1145 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003531975

#### NOTE:

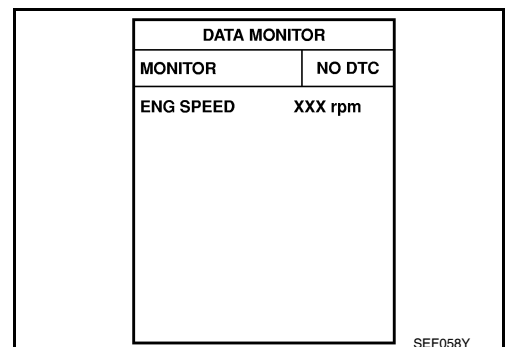
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Maintain the following conditions for at least 10 seconds.

ENG SPEED	More than idle speed
Selector lever	P or N position

4. If 1st trip DTC is detected, go to [EC-461, "Diagnosis Procedure"](#).



# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

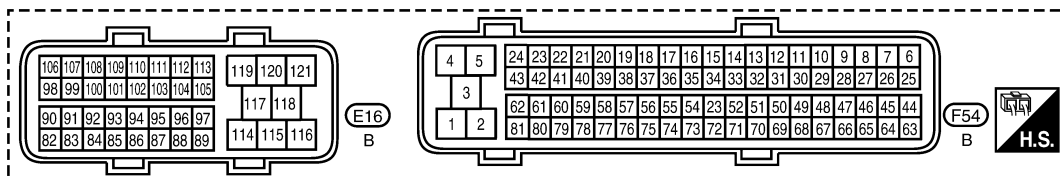
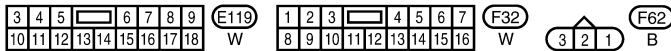
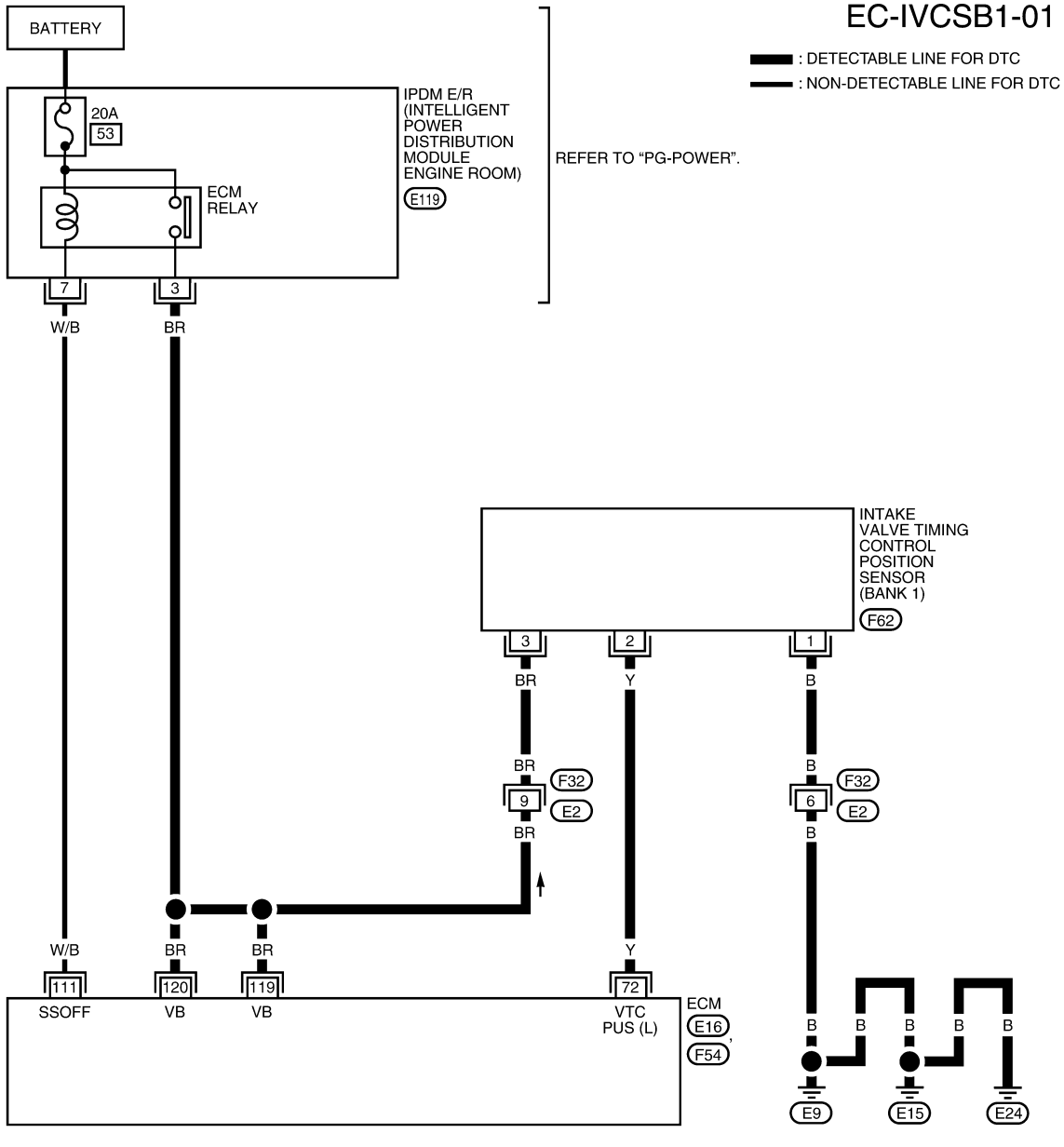
WITH GST

Follow the procedure "WITH CONSULT-II" above.

## Wiring Diagram

INFOID:000000003531976

BANK 1



BBWA2862E

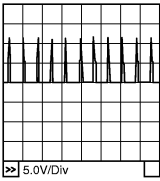
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	Y	Intake valve timing control position sensor (Bank 1)	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0V
			[Engine is running] • Engine speed: 2,000rpm	0 - 1.0V★ 
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

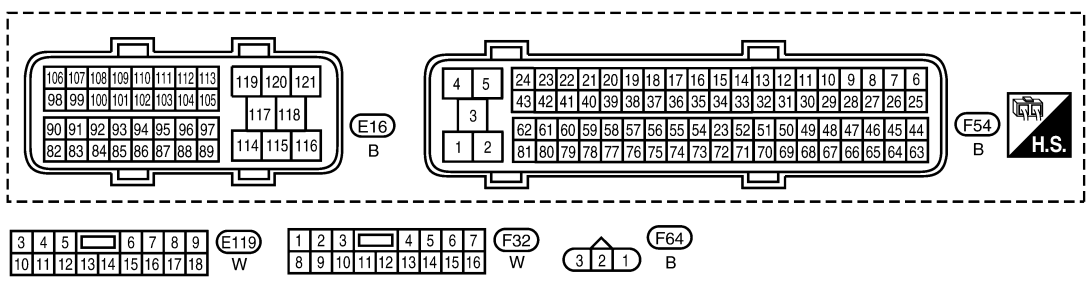
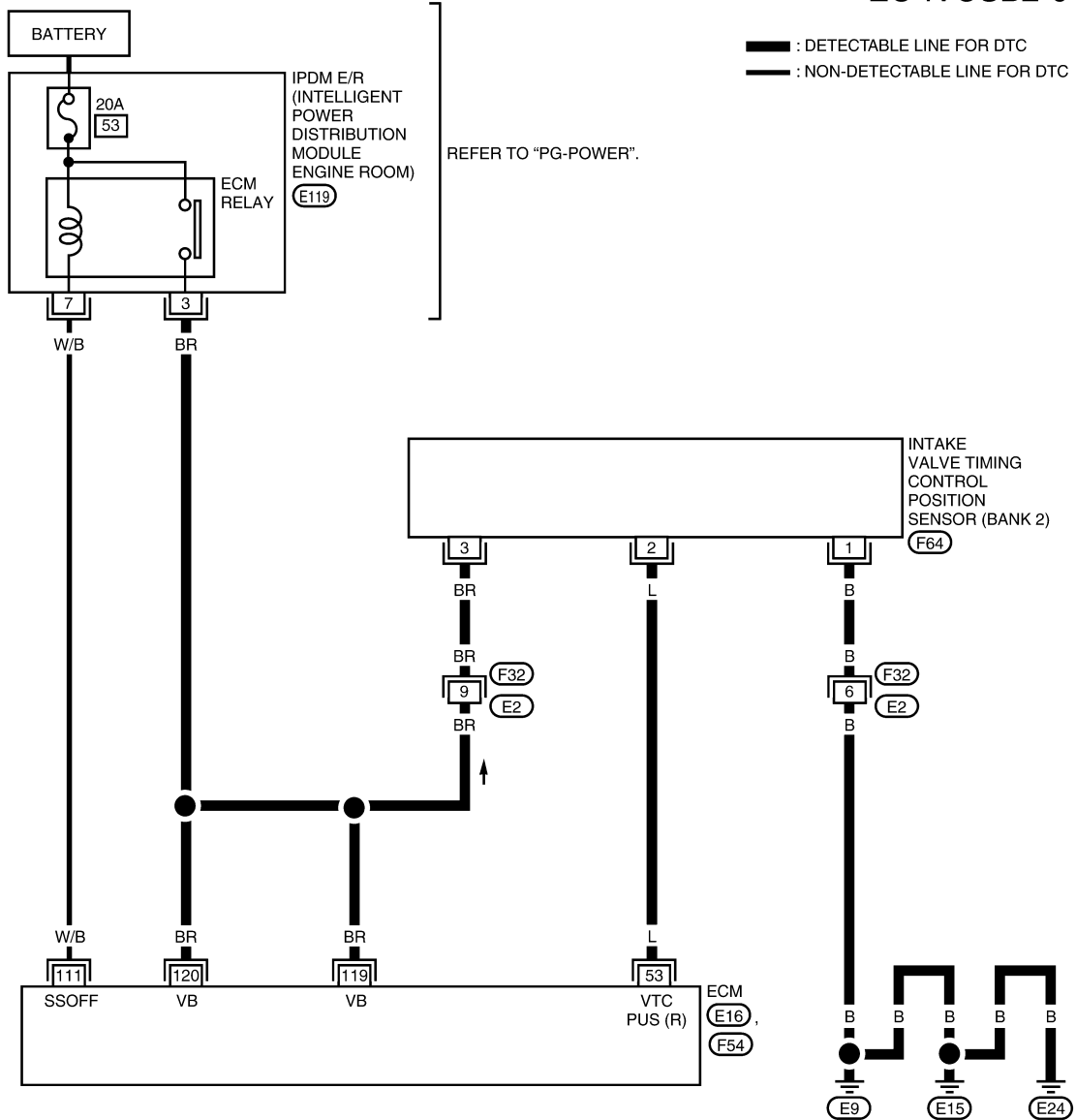
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# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

BANK 2

EC-IVCSB2-01



BBWA2863E

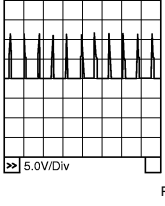
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	L	Intake valve timing control position sensor (Bank 2)	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0V
			[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★ 
111	W/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

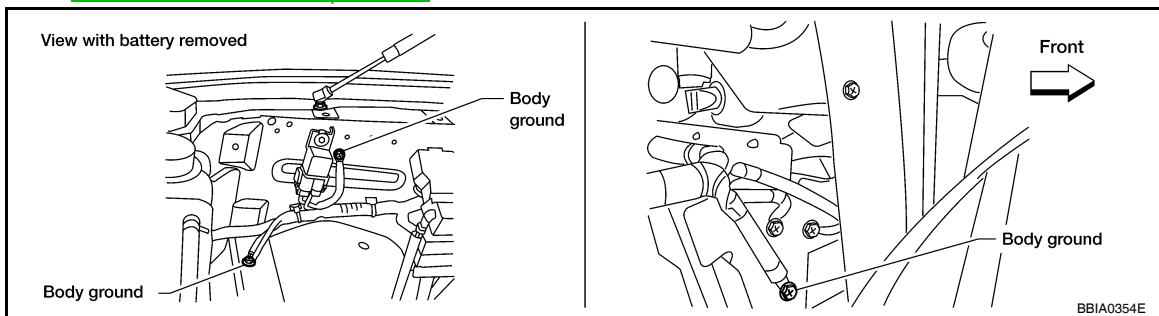
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003531977

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

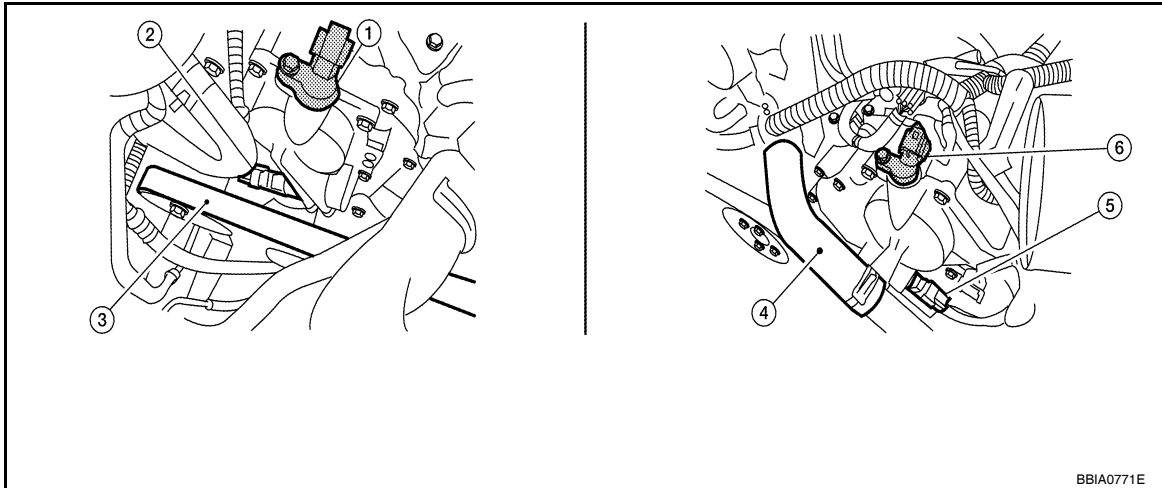
- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

- Disconnect intake valve timing control position sensor harness connector.

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >



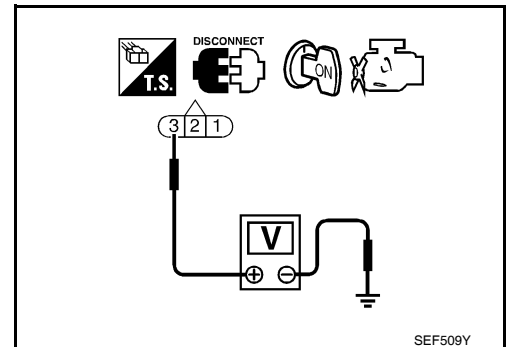
- |   |  |   |
|---|--|---|
| 1. Intake valve timing control position sensor (bank 2) | 2. Intake valve timing control solenoid valve (bank 2) | 3. Drive belt   |
| 4. Radiator hose  | 5. Intake valve timing control solenoid valve (bank 1) | 6. Intake valve timing control position sensor (bank 1) |

2. Turn ignition switch ON.
3. Check voltage between intake valve timing control position sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between intake valve timing control position sensor and IPDM E/R
- Harness for open or short between intake valve timing control position sensor and ECM

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

## 4. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between intake valve timing control position sensor terminal 1 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

## < SERVICE INFORMATION >

- Harness for open or short between intake valve timing control position sensor and ground

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

### 6. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between the following;  
ECM terminal 72 and intake valve timing control position sensor (Bank 1) terminal 2 or  
ECM terminal 53 and intake valve timing control position sensor (Bank 2) terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 7.

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

### 7. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

Refer to [EC-463. "Component Inspection"](#).

#### OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning intake valve timing control position sensor. Refer to [EC-464](#).

### 8. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-341. "Component Inspection"](#).

#### OK or NG

OK >> GO TO 9.

NG >> Replace crankshaft position sensor (POS).

### 9. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-347. "Component Inspection"](#).

#### OK or NG

OK >> GO TO 10.

NG >> Replace camshaft position sensor (PHASE). Refer to [EC-348](#).

### 10. CHECK CAMSHAFT SPROCKET

Check accumulation of debris to the signal pick-up portion of the camshaft sprocket. Refer to [EM-38](#).

#### OK or NG

OK >> GO TO 11.

NG >> Remove debris and clean the signal pick-up cutout of camshaft sprocket.

### 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003531978

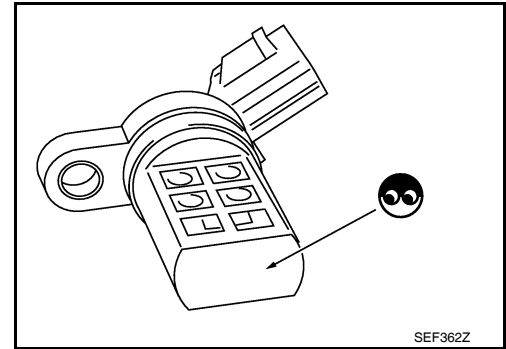
### INTAKE VALVE TIMING CONTROL POSITION SENSOR

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor. Refer to [EC-464](#).

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

## < SERVICE INFORMATION >

4. Visually check the sensor for chipping.

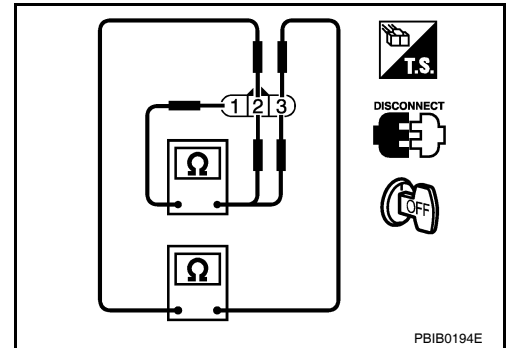


SEF362Z

5. Check resistance as shown below.

Terminal No. (Polarity)	Resistance $\Omega$ [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or $\infty$
2 (+) - 1 (-)	
3 (+) - 2 (-)	

6. If NG, replace intake valve timing control position sensor. Refer to [EC-464](#).



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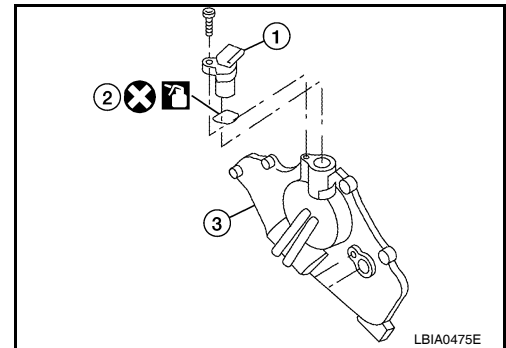
## Removal and Installation

INFOID:000000003531979

### INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 2)

#### Removal

1. Remove engine room cover using power tool. Refer to [EM-12, "Removal and Installation"](#).
2. Remove air duct and resonator assembly. Refer to [EM-15, "Removal and Installation"](#).
3. Disconnect intake valve timing control position sensor (bank 2) connector.
4. Remove intake valve timing control position sensor (bank 2) (1) from intake valve control solenoid cover (bank 2) (3).



#### Installation

Installation is in the reverse order of removal.

#### CAUTION:

Replace the O-ring (2) of the intake valve timing control position sensor with a new one, then lubricate O-ring with engine oil before installing.

**Intake valve timing control position sensor bolt : 9.6 N·m (0.98 kg·m, 85 in·lb)**

### INTAKE VALVE TIMING CONTROL POSITION SENSOR (BANK 1)

#### Removal

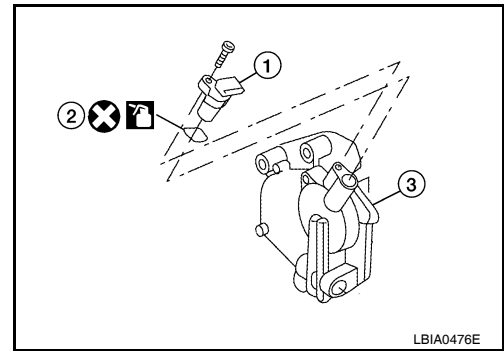
1. Remove engine room cover using power tool. Refer to [EM-12, "Removal and Installation"](#).
2. Disconnect intake valve timing control position sensor (bank 1) connector.



## DTC P1140, P1145 IVT CONTROL POSITION SENSOR

### < SERVICE INFORMATION >

3. Remove intake valve timing control position sensor (bank 1) (1) from intake valve control solenoid cover (bank 1) (3).



#### Installation

Installation is in the reverse order of removal.

#### **CAUTION:**

Replace the O-ring (2) of the intake valve timing control position sensor with a new one, then lubricate O-ring with engine oil before installing.

**Intake valve timing control position sensor bolt : 9.6 N·m (0.98 kg-m, 85 in-lb)**

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## DTC P1148, P1168 CLOSED LOOP CONTROL

< SERVICE INFORMATION >

### DTC P1148, P1168 CLOSED LOOP CONTROL

#### On Board Diagnosis Logic

INFOID:000000003531980

**These self-diagnoses have the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148 (Bank 1)	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	<ul style="list-style-type: none"><li>• Harness or connectors [The air fuel ratio (A/F) sensor 1 circuit is open or shorted.]</li><li>• Air fuel ratio (A/F) sensor 1</li><li>• Air fuel ratio (A/F) sensor 1 heater</li></ul>
P1168 1168 (Bank 2)		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

DTC P1148 or P1168 is displayed with another DTC for air fuel ratio (A/F) sensor 1.  
Perform the trouble diagnosis for the corresponding DTC.

# DTC P1211 TCS CONTROL UNIT

< SERVICE INFORMATION >

## DTC P1211 TCS CONTROL UNIT

### Description

INFOID:000000003531981

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.

**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.**

### On Board Diagnosis Logic

INFOID:000000003531982

**Freeze frame data is not stored in the ECM for this self-diagnosis.  
The MIL will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from “ABS actuator electric unit (control unit)”	<ul style="list-style-type: none"><li>• ABS actuator and electric unit (control unit)</li><li>• TCS related parts</li></ul>

### DTC Confirmation Procedure

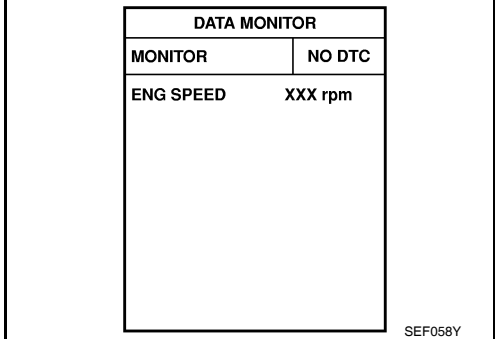
INFOID:000000003531983

#### TESTING CONDITION:

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

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to [EC-467. "Diagnosis Procedure"](#)



DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓟ WITH GST

Follow the procedure “WITH CONSULT-II” above.

### Diagnosis Procedure

INFOID:000000003531984

Go to [BRC-11](#).

# DTC P1212 TCS COMMUNICATION LINE

< SERVICE INFORMATION >

## DTC P1212 TCS COMMUNICATION LINE

### Description

INFOID:000000003531985

#### NOTE:

- If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

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.**

### On Board Diagnosis Logic

INFOID:000000003531986

**Freeze frame data is not stored in the ECM for this self-diagnosis.**

**The MIL will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	<ul style="list-style-type: none"><li>• Harness or connectors (The CAN communication line is open or shorted.)</li><li>• ABS actuator and electric unit (control unit)</li><li>• Dead (Weak) battery</li></ul>

### DTC Confirmation Procedure

INFOID:000000003531987

#### TESTING CONDITION:

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

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If 1st trip DTC is detected, go to [EC-468, "Diagnosis Procedure"](#)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓟ WITH GST

Follow the procedure “WITH CONSULT-II” above.

### Diagnosis Procedure

INFOID:000000003531988

Go to [BRC-11](#).

# DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

## DTC P1217 ENGINE OVER TEMPERATURE

### Description

INFOID:000000003531989

### SYSTEM DESCRIPTION

#### NOTE:

- If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).

### Cooling Fan Control

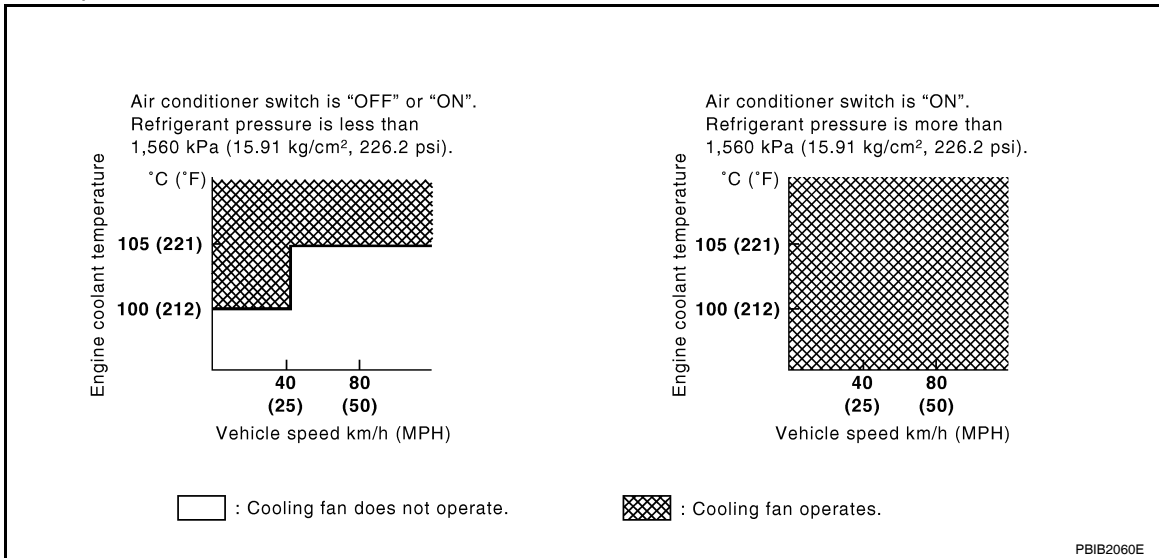
Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relay)
Battery	Battery voltage*1		
Wheel sensor	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

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

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

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 2-step control [HI/OFF].

### Cooling Fan Operation



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003531990

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF OFF
		Air conditioner switch: ON (Compressor operates.) ON

# DTC P1217 ENGINE OVER TEMPERATURE

## < SERVICE INFORMATION >

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> </ul>	Engine coolant temperature: 99°C (210°F) or less	OFF
		Engine coolant temperature: 100°C (212°F) or more	HI

### On Board Diagnosis Logic

INFOID:000000003531991

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.

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	<ul style="list-style-type: none"> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> <li>Engine coolant is not within the specified range.</li> </ul>	<ul style="list-style-type: none"> <li>Harness or connectors (The cooling fan circuit is open or shorted.)</li> <li>Cooling fan</li> <li>Cooling fan (crankshaft driven)</li> <li>IPDM E/R (Cooling fan relay)</li> <li>Radiator hose</li> <li>Radiator</li> <li>Radiator cap</li> <li>Reservoir tank</li> <li>Reservoir tank cap</li> <li>Water pump</li> <li>Thermostat</li> </ul> <p>For more information, refer to <a href="#">EC-476</a>. "<a href="#">Main 13 Causes of Overheating</a>".</p>

### CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to [CO-9, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [LU-9, "Changing Engine Oil"](#).

- 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 [MA-10, "SAE Viscosity Number"](#).
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

### Overall Function Check

INFOID:000000003531992

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

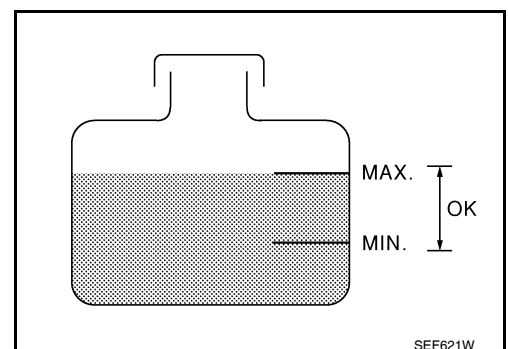
### WARNING:

Never remove the radiator cap and/or reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.

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.

### WITH CONSULT-II

- Check the coolant level in the reservoir tank and radiator.  
**Allow engine to cool before checking coolant level.**  
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-473, "Diagnosis Procedure"](#).
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-473, "Diagnosis Procedure"](#).
- Turn ignition switch ON.



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# DTC P1217 ENGINE OVER TEMPERATURE

## < SERVICE INFORMATION >

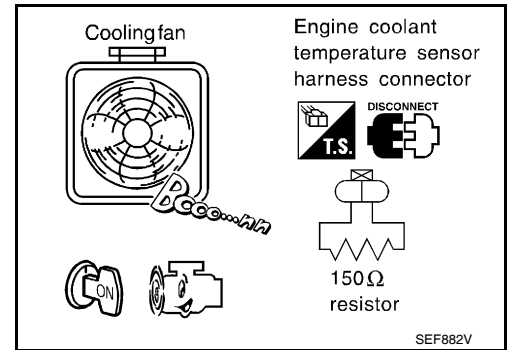
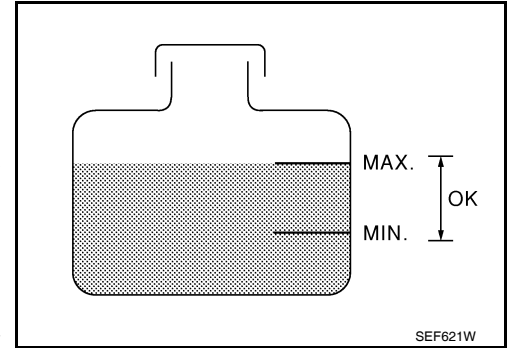
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
5. If the results are NG, go to [EC-473. "Diagnosis Procedure"](#).

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLANT TEMP/S	XXX °C

SEF646X

## WITH GST

1. Check the coolant level in the reservoir tank and radiator.  
**Allow engine to cool before checking coolant level.**  
 If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to [EC-473. "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-473. "Diagnosis Procedure"](#).
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Start engine and make sure that cooling fan operates.  
**CAUTION:**  
**Be careful not to overheat engine.**
6. If NG, go to [EC-473. "Diagnosis Procedure"](#).



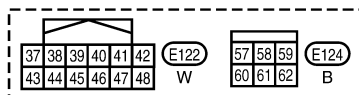
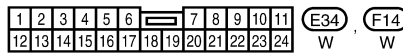
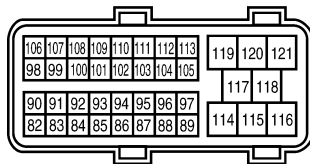
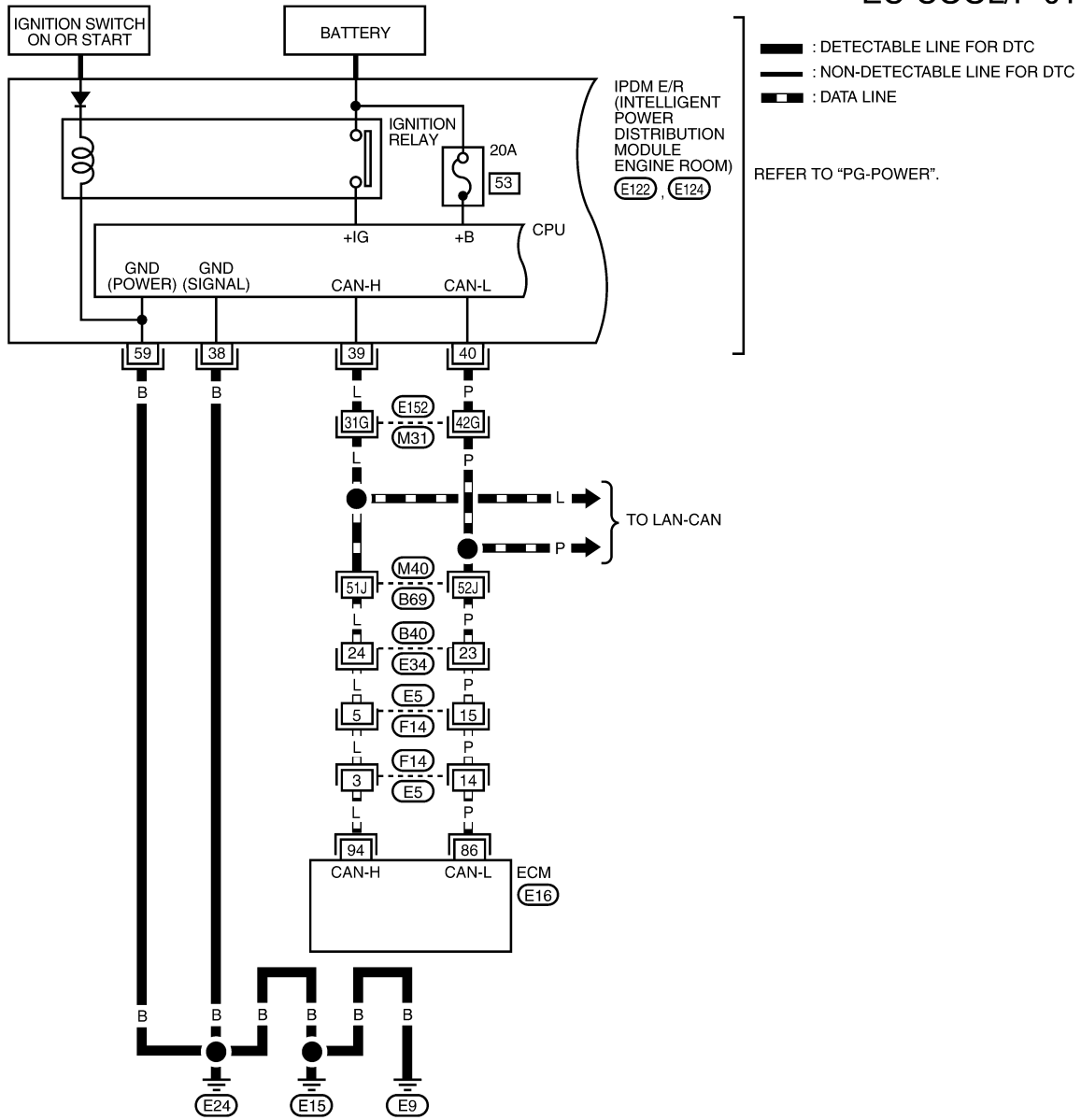
# DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

INFOID:000000003531993

## Wiring Diagram

### EC-COOL/F-01



REFER TO THE FOLLOWING.

(M31) (M40) - SUPER  
MULTIPLE JUNCTION (SMJ)

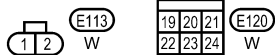
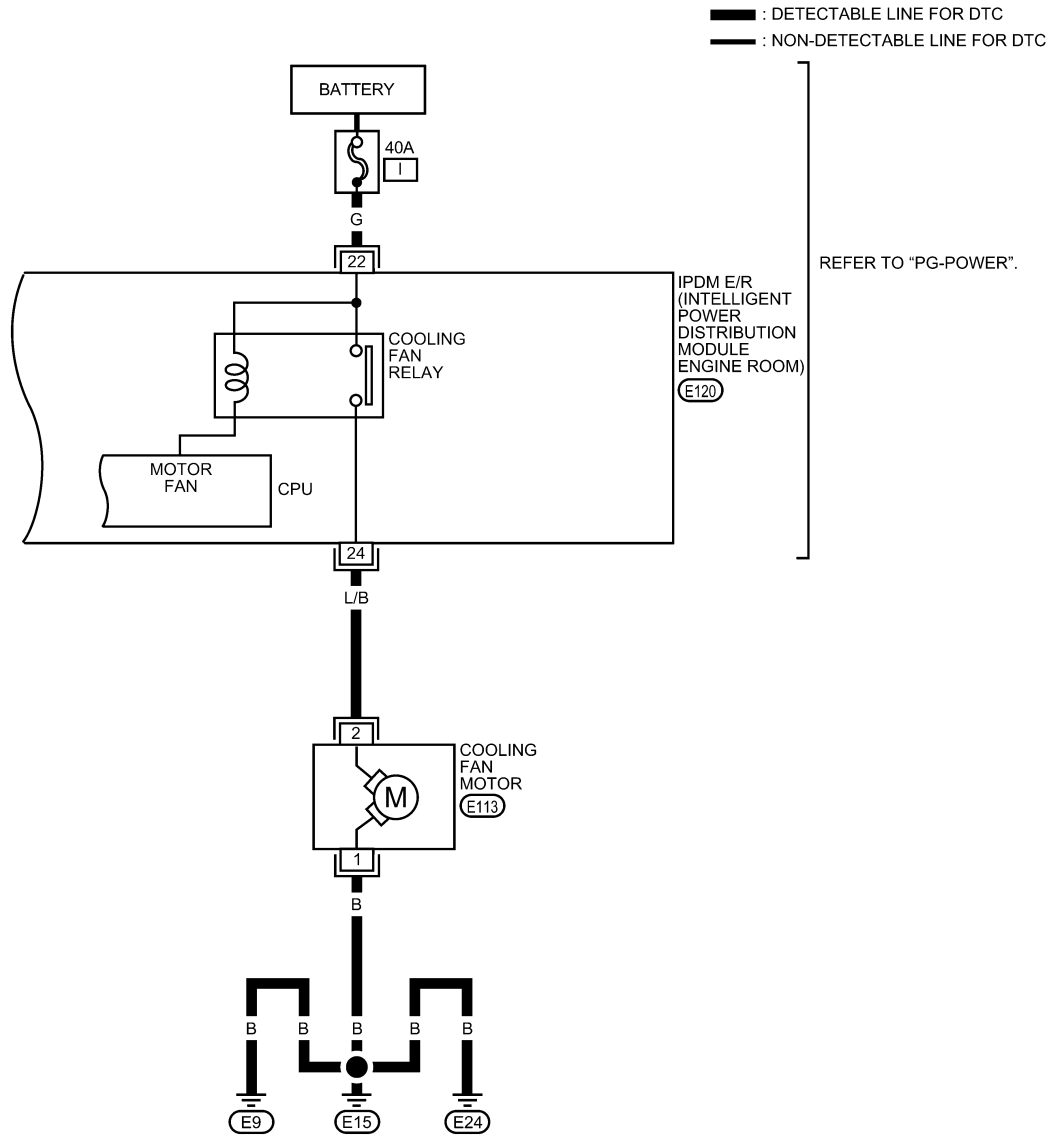
BBWA2102E



# DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

## EC-COOL/F-02



AWBWA0160G

INFOID:000000003531994

### Diagnosis Procedure

#### 1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

**OK or NG**

OK (With CONSULT-II)>>GO TO 2.

# DTC P1217 ENGINE OVER TEMPERATURE

## < SERVICE INFORMATION >

OK (Without CONSULT-II)>>GO TO 3.

NG >> Check cooling fan (crankshaft driven). Refer to [CO-16, "Removal and Installation \(Crankshaft Driven Type\)"](#).

## 2.CHECK COOLING FAN MOTOR OPERATION

### With CONSULT-II

1. Start engine and let it idle.
2. Select "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that cooling fan operates.

#### OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Go to "PROCEDURE A".)

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLANT TEMP/S	XXX °C

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## 3.CHECK COOLING FAN MOTOR OPERATION

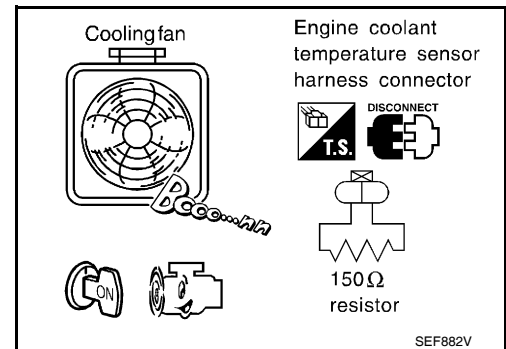
### Without CONSULT-II

1. Disconnect engine coolant temperature sensor harness connector.
2. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
3. Start engine and let it idle.
4. Make sure that cooling fan operates.

#### OK or NG

OK >> GO TO 4.

NG >> Check cooling fan control circuit. (Go to "PROCEDURE A".)



## 4.CHECK COOLING SYSTEM FOR LEAK

Refer to [CO-9, "Inspection"](#).

#### OK or NG

OK >> GO TO 5.

NG >> Check the following for leak.

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

## 5.CHECK COMPONENT PARTS

Check the following.

- RESERVOIR TANK CAP (Refer to [CO-9, "Inspection"](#).)
- Thermostat. (Refer to [CO-20](#).)
- Engine coolant temperature sensor. (Refer to [EC-209, "Component Inspection"](#).)

#### OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning component.

## 6.CHECK MAIN 13 CAUSES

If the cause cannot be isolated, go to [EC-476, "Main 13 Causes of Overheating"](#).

# DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

>> INSPECTION END

## PROCEDURE A

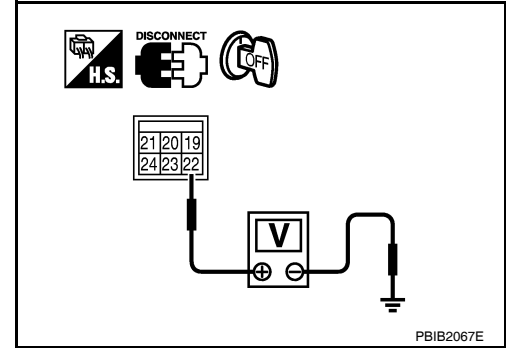
### 1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E120.
3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.



### 2. DETECT MALFUNCTIONING PART

Check the following.

- 40A fusible link
- Harness for open or short between IPDM E/R and battery

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

### 3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN OR SHORT

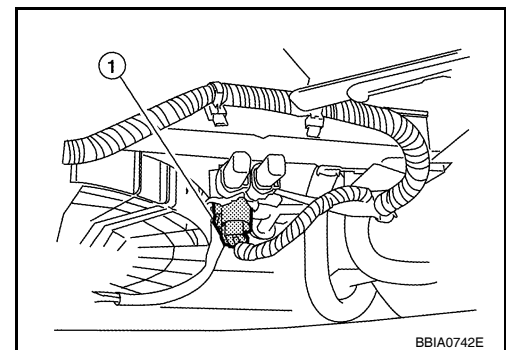
1. Disconnect cooling fan motor harness connector (1).
2. Check harness continuity between cooling fan motor terminal 1 and IPDM E/R terminal 24, cooling fan motor terminal 2 and ground. Refer to wiring diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 4.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



### 4. CHECK COOLING FAN MOTOR

Refer to [EC-476. "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.  
NG >> Replace cooling fan motor.

### 5. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).  
NG >> Repair or replace harness connectors.

# DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

## Main 13 Causes of Overheating

INFOID:000000003531995

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul>	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	<a href="#">MA-10</a>
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	<a href="#">MA-12, "Changing Engine Coolant"</a>
	4	• Reservoir tank cap	• Pressure tester	95 - 125 kPa (0.97 - 1.28 kg/cm <sup>2</sup> , 14 - 18 psi) (Limit)	<a href="#">CO-9, "Inspection"</a>
ON*2	5	• Coolant leaks	• Visual	No leaks	<a href="#">CO-9, "Inspection"</a>
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	<a href="#">CO-20</a>
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P1217 ( <a href="#">EC-469</a> ).
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	<a href="#">MA-12, "Changing Engine Coolant"</a>
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	<a href="#">MA-12, "Changing Engine Coolant"</a>
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	<a href="#">EM-69, "Inspection After Disassembly"</a>
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	<a href="#">EM-93, "Inspection After Disassembly"</a>

\*1: Turn the ignition switch ON.

\*2: Engine running at 3,000 rpm for 10 minutes.

\*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

\*4: After 60 minutes of cool down time.

For more information, refer to [CO-6](#).

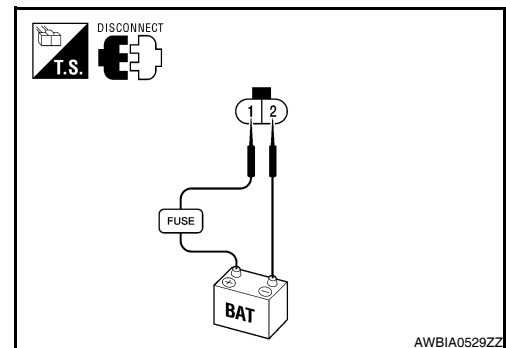
## Component Inspection

INFOID:000000003531996

### COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

**Cooling fan motor should operate.**  
If NG, replace cooling fan motor.



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# DTC P1225 TP SENSOR

< SERVICE INFORMATION >

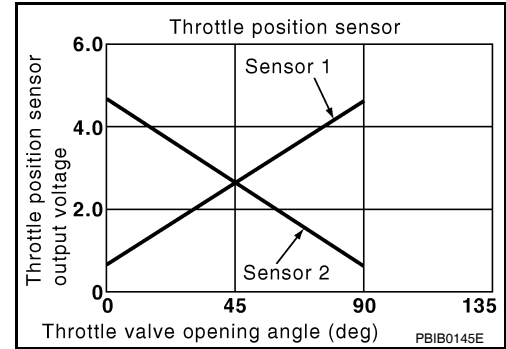
## DTC P1225 TP SENSOR

### Component Description

INFOID:000000003531997

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

The throttle position sensor has the 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.



### On Board Diagnosis Logic

INFOID:000000003531998

**The MIL will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	<ul style="list-style-type: none"> <li>Electric throttle control actuator (TP sensor 1 and 2)</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003531999

**NOTE:**

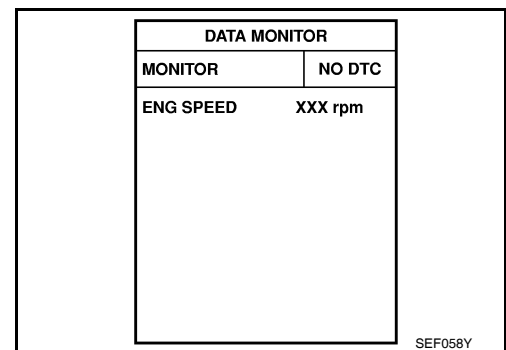
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

**WITH CONSULT-II**

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to [EC-477, "Diagnosis Procedure"](#).



**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003532000

#### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

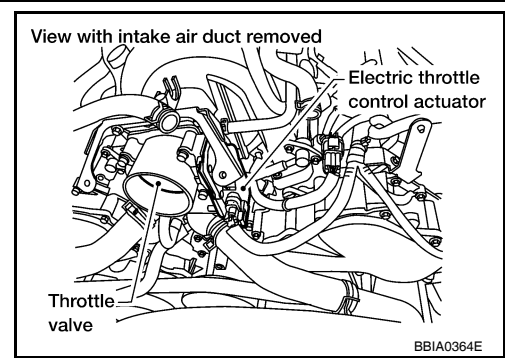
## DTC P1225 TP SENSOR

### < SERVICE INFORMATION >

3. Check if foreign matter is caught between the throttle valve and the housing.

#### OK or NG

- OK >> GO TO 2.
- NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



## 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78. "Idle Air Volume Learning"](#).

>> **INSPECTION END**

### Removal and Installation

INFOID:000000003532001

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#).

# DTC P1226 TP SENSOR

< SERVICE INFORMATION >

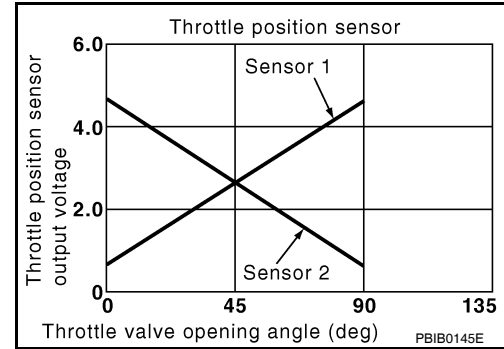
## DTC P1226 TP SENSOR

### Component Description

INFOID:000000003532002

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

The throttle position sensor has the 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.



### On Board Diagnosis Logic

INFOID:000000003532003

**The MIL will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	<ul style="list-style-type: none"> <li>Electric throttle control actuator (TP sensor 1 and 2)</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532004

**NOTE:**

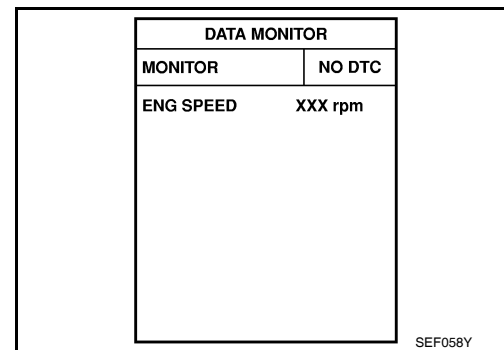
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

Ⓟ WITH CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Repeat steps 3 and 4 for 32 times.
- If 1st trip DTC is detected, go to [EC-479, "Diagnosis Procedure"](#).



Ⓟ WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003532005

#### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct.

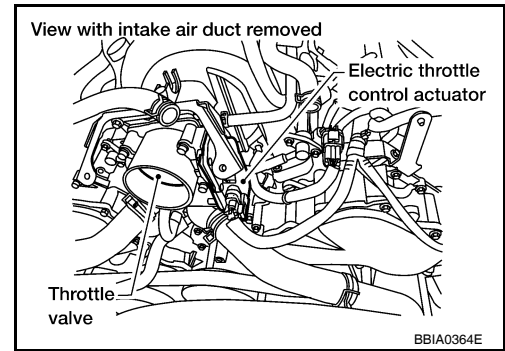
## DTC P1226 TP SENSOR

### < SERVICE INFORMATION >

3. Check if foreign matter is caught between the throttle valve and the housing.

#### OK or NG

- OK >> GO TO 2.
- NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



## 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78. "Idle Air Volume Learning"](#).

>> **INSPECTION END**

### Removal and Installation

INFOID:000000003532006

#### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#).



# DTC P1421 COLD START CONTROL

< SERVICE INFORMATION >

## DTC P1421 COLD START CONTROL

### Description

INFOID:000000003532007

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

### On Board Diagnosis Logic

INFOID:000000003532008

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421 1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	<ul style="list-style-type: none"><li>Lack of intake air volume</li><li>Fuel injection system</li><li>ECM</li></ul>

### DTC Confirmation Procedure

INFOID:000000003532009

#### NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

#### TESTING CONDITION:

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

#### Ⓟ WITH CONSULT-II

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.
- Check that the "COOLAN TEMP/S" indication is between 4°C (39°F) and 36°C (97°F).  
If "COOLAN TEMP/S" indication is within the specified value, go to the following step.  
If "COOLANT TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
- Start engine and let it idle for 5 minutes.
- If 1st trip DTC is detected, go to [EC-481, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

#### Ⓟ WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003532010

#### 1. PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-78, "Idle Air Volume Learning"](#).

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 2.

No >> Follow the instruction of Idle Air Volume Learning.

#### 2. CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part

## DTC P1421 COLD START CONTROL

< SERVICE INFORMATION >

---

### 3. CHECK FUEL INJECTION SYSTEM FUNCTION

---

Perform [EC-292, "DTC Confirmation Procedure"](#) in DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION.

OK or NG

OK >> GO TO 4.

NG >> Go to [EC-297, "Diagnosis Procedure"](#).

### 4. PERFORM DTC CONFIRMATION PROCEDURE

---

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**  
See [EC-481, "DTC Confirmation Procedure"](#).
5. Is the 1st trip DTC P1421 displayed again?

#### With GST

1. Turn ignition switch ON.
2. Select Service \$04 with GST.
3. **Perform DTC Confirmation Procedure.**  
See [EC-481, "DTC Confirmation Procedure"](#).
4. Is the 1st trip DTC P1421 displayed again?

Yes or No

Yes >> GO TO 5.

No >> **INSPECTION END**

### 5. REPLACE ECM

---

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs.  
Refer to [BL-117, "ECM Re-communicating Function"](#).
3. Perform [EC-77, "VIN Registration"](#).
4. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-78, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

# DTC P1550 BATTERY CURRENT SENSOR

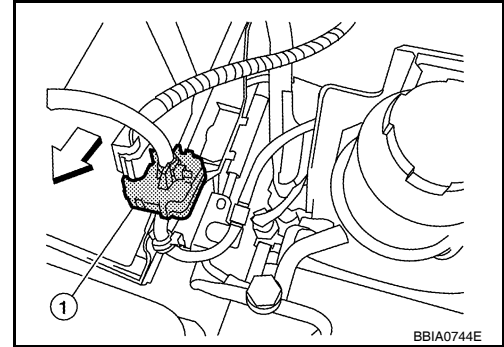
< SERVICE INFORMATION >

## DTC P1550 BATTERY CURRENT SENSOR

### Component Description

INFOID:000000003532011

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal of the battery. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



#### CAUTION:

**Do not 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.**

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532012

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Battery: Fully charged*</li> <li>• Selector lever: P or N</li> <li>• Air conditioner switch: OFF</li> <li>• No load</li> </ul>	Approx. 2,600 - 3,500mV

\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4, "How to Handle Battery"](#).

### On Board Diagnosis Logic

INFOID:000000003532013

**The MIL will not light up for this self-diagnosis.**

#### NOTE:

**If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550 1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Battery current sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532014

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 8V at idle.**

#### ⓐ WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P1550 BATTERY CURRENT SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait at least 10 seconds.
4. If 1st trip DTC is detected, go to [EC-486. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1550 BATTERY CURRENT SENSOR

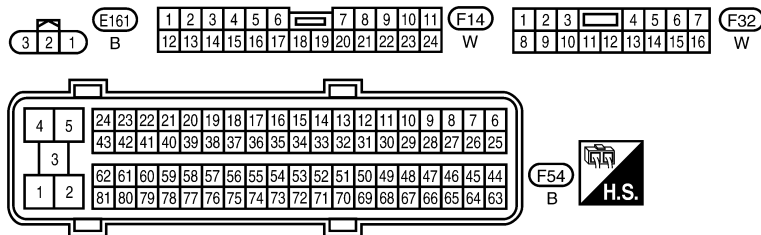
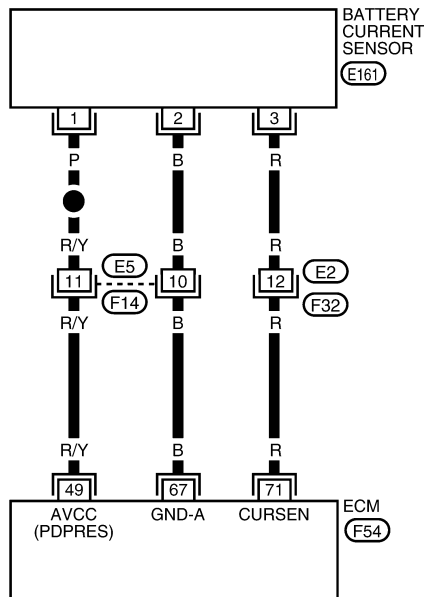
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532015

### EC-CUR/SE-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2767E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1550 BATTERY CURRENT SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Battery current sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground (Battery current sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
71	R	Battery current sensor	<b>[Engine is running]</b> • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5V

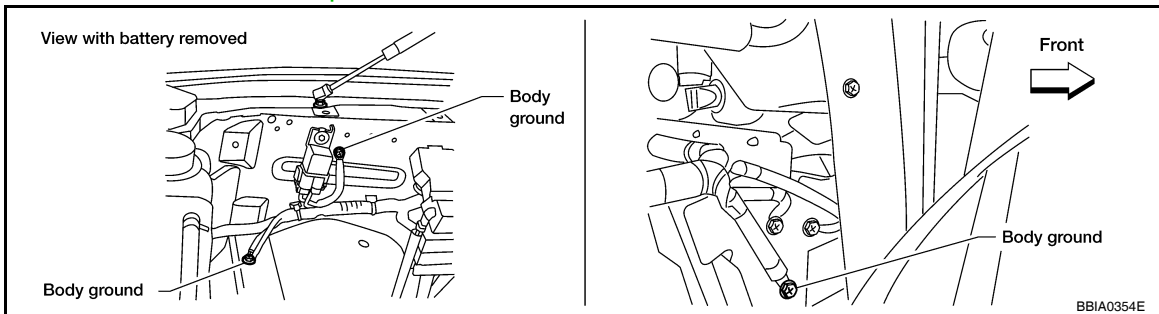
\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4. "How to Handle Battery"](#).

## Diagnosis Procedure

INFOID:000000003532016

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

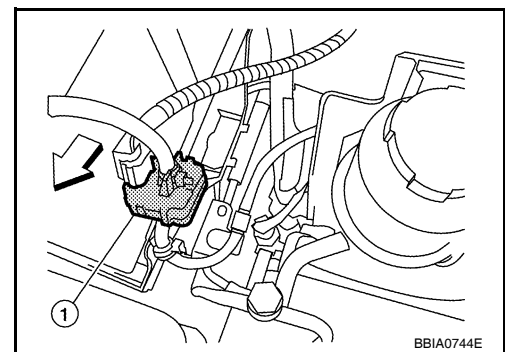


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor (1) harness connector.
2. Turn ignition switch ON.



## DTC P1550 BATTERY CURRENT SENSOR

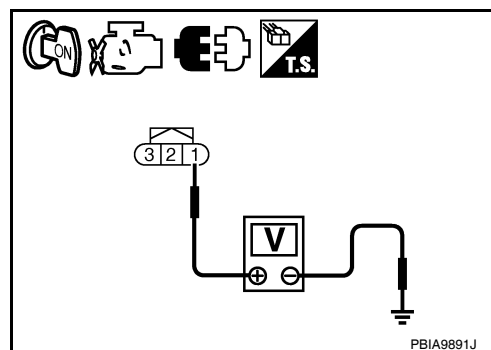
### < SERVICE INFORMATION >

3. Check voltage between battery current sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 7.

### 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between battery current sensor and ECM

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

### 8. CHECK BATTERY CURRENT SENSOR

Refer to [EC-488. "Component Inspection"](#).

# DTC P1550 BATTERY CURRENT SENSOR

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

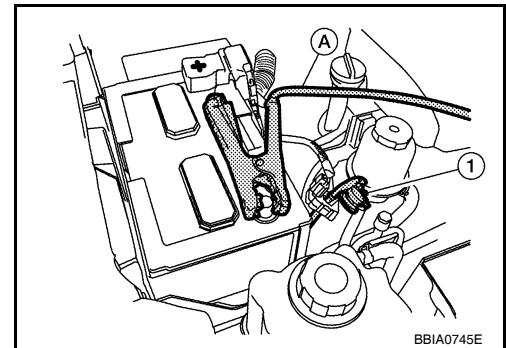
>> **INSPECTION END**

### Component Inspection

INFOID:000000003532017

#### BATTERY CURRENT SENSOR

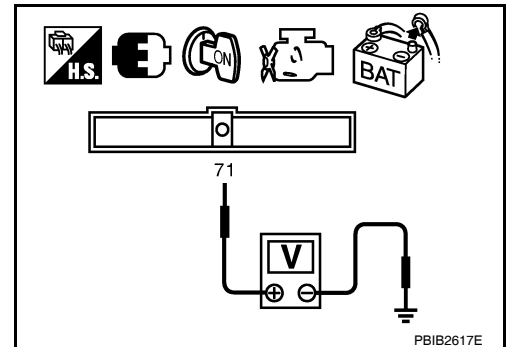
1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable (1).
  - ◀ : To body ground
3. Install jumper cable (A) between battery negative terminal and body ground.
4. Turn ignition switch ON.



5. Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

**Voltage: Approximately 2.5V**

6. If NG, replace battery negative cable assembly.





# DTC P1551, P1552 BATTERY CURRENT SENSOR

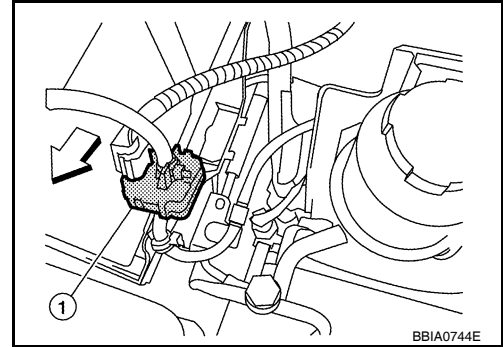
< SERVICE INFORMATION >

## DTC P1551, P1552 BATTERY CURRENT SENSOR

### Component Description

INFOID:000000003532018

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



#### CAUTION:

**Do not 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.**

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532019

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Battery: Fully charged*</li> <li>• Selector lever: P or N</li> <li>• Air conditioner switch: OFF</li> <li>• No load</li> </ul>	Approx. 2,600 - 3,500mV

\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4, "How to Handle Battery"](#).

### On Board Diagnosis Logic

INFOID:000000003532020

The MIL will not light up for these self-diagnoses.

#### NOTE:

**If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1551 1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Battery current sensor</li> </ul>
P1552 1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

### DTC Confirmation Procedure

INFOID:000000003532021

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 8V with ignition switch ON**

④ WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P1551, P1552 BATTERY CURRENT SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 10 seconds.
4. If 1st trip DTC is detected, go to [EC-492. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1551, P1552 BATTERY CURRENT SENSOR

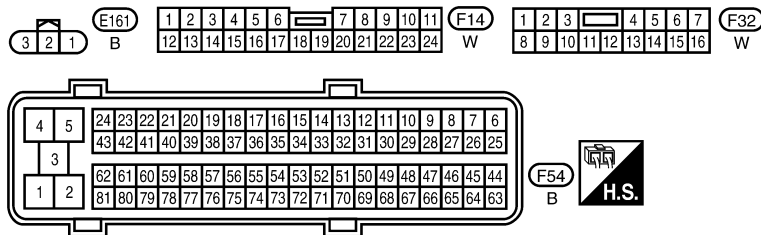
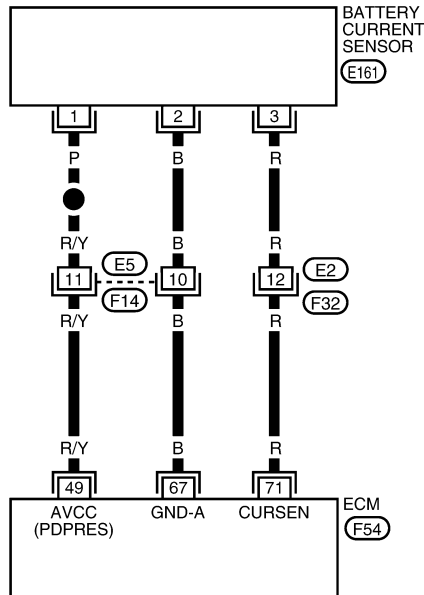
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532022

### EC-CUR/SE-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2767E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1551, P1552 BATTERY CURRENT SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Battery current sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground (Battery current sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
71	R	Battery current sensor	<b>[Engine is running]</b> • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5V

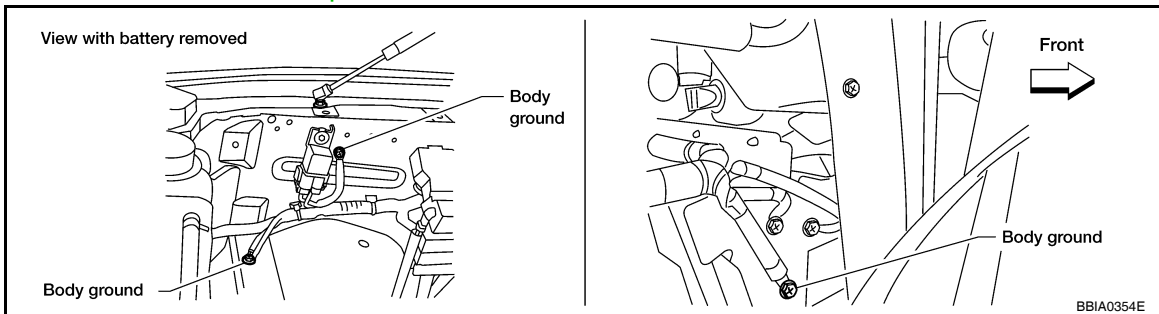
\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4. "How to Handle Battery"](#).

## Diagnosis Procedure

INFOID:000000003532023

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

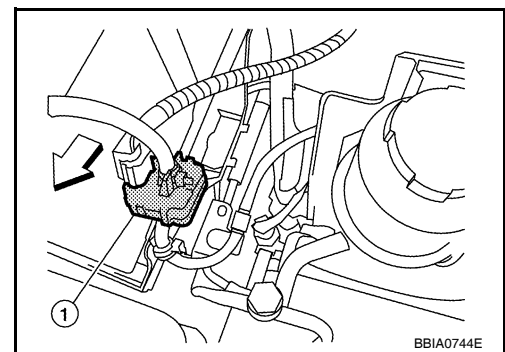


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor (1) harness connector.
2. Turn ignition switch ON.



# DTC P1551, P1552 BATTERY CURRENT SENSOR

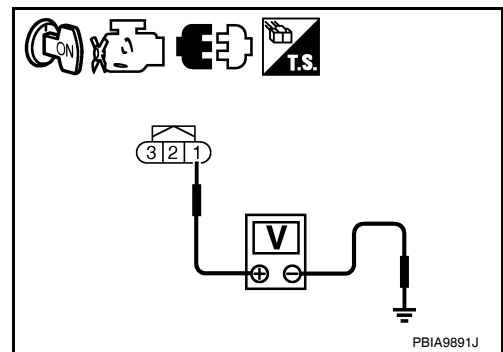
## < SERVICE INFORMATION >

3. Check voltage between battery current sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 4.
- NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

## 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

## 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between battery current sensor and ECM

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

## 8. CHECK BATTERY CURRENT SENSOR

Refer to [EC-494, "Component Inspection"](#).

# DTC P1551, P1552 BATTERY CURRENT SENSOR

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 9.
- NG >> Replace battery negative cable assembly.

## 9. CHECK INTERMITTENT INCIDENT


Refer to [EC-138](#).

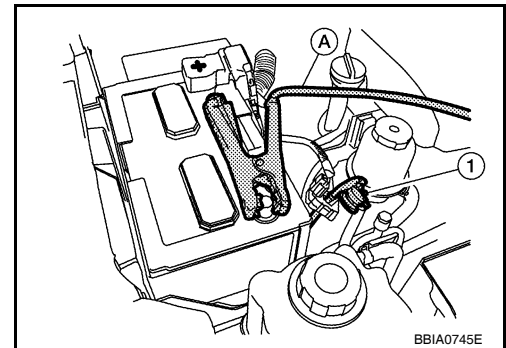
>> **INSPECTION END**

### Component Inspection

INFOID:000000003532024

#### BATTERY CURRENT SENSOR

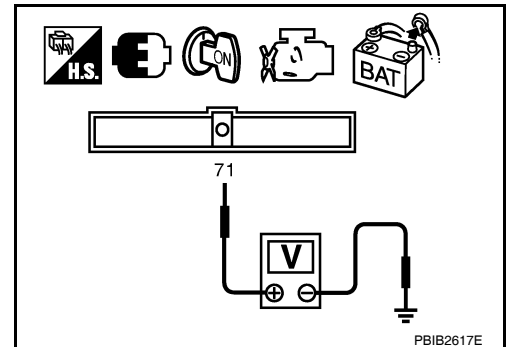
1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable (1).
  -  : To body ground
3. Install jumper cable (A) between battery negative terminal and body ground.
4. Turn ignition switch ON.



5. Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

**Voltage: Approximately 2.5V**

6. If NG, replace battery negative cable assembly.



# DTC P1553 BATTERY CURRENT SENSOR

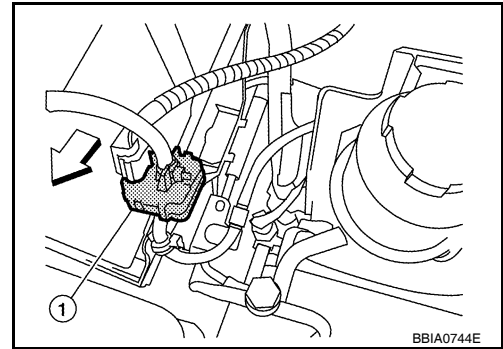
< SERVICE INFORMATION >

## DTC P1553 BATTERY CURRENT SENSOR

### Component Description

INFOID:000000003532025

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal of the battery. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



#### CAUTION:

**Do not 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.**

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532026

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Battery: Fully charged*</li> <li>• Selector lever: P or N</li> <li>• Air conditioner switch: OFF</li> <li>• No load</li> </ul>	Approx. 2,600 - 3,500mV

\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4, "How to Handle Battery"](#).

### On Board Diagnosis Logic

INFOID:000000003532027

**The MIL will not light up for this self-diagnosis.**

#### NOTE:

**If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553 1553	Battery current sensor performance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Battery current sensor</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532028

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 8V at idle.**

Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.

## DTC P1553 BATTERY CURRENT SENSOR

### < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and wait at least 10 seconds.
4. If 1st trip DTC is detected, go to [EC-498. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.



# DTC P1553 BATTERY CURRENT SENSOR

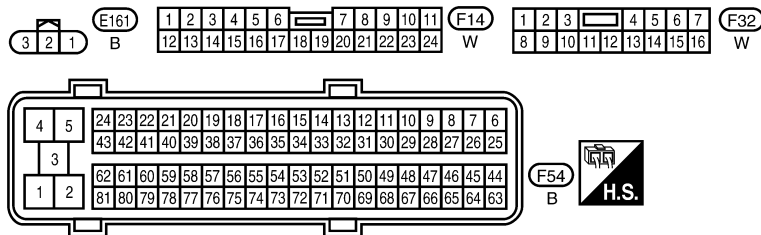
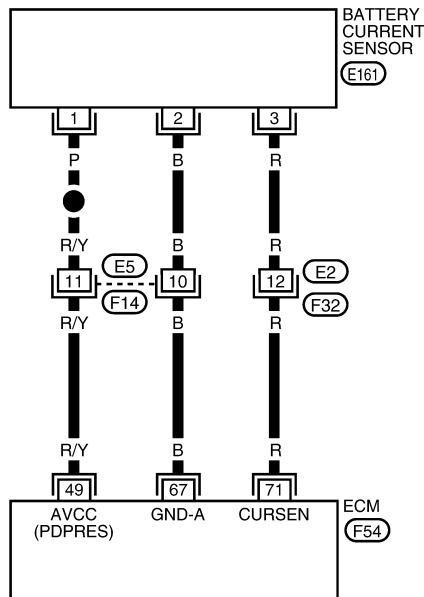
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532029

### EC-CUR/SE-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2767E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1553 BATTERY CURRENT SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Battery current sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground (Battery current sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
71	R	Battery current sensor	<b>[Engine is running]</b> • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5V

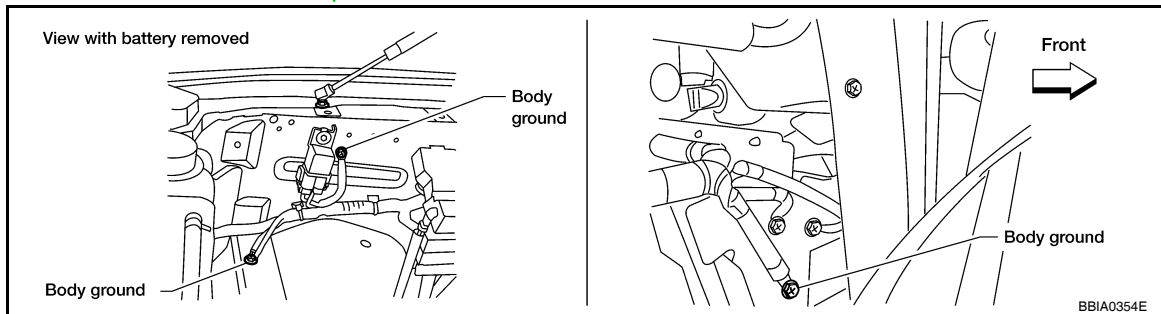
\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4. "How to Handle Battery"](#).

## Diagnosis Procedure

INFOID:000000003532030

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

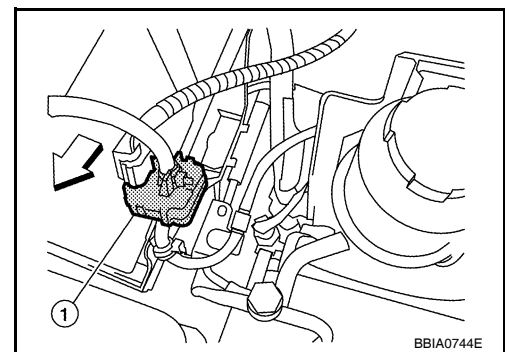


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor (1) harness connector.
2. Turn ignition switch ON.



## DTC P1553 BATTERY CURRENT SENSOR

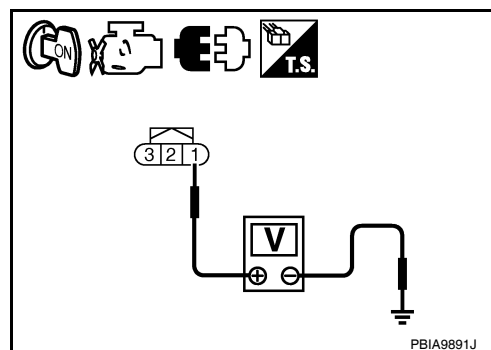
### < SERVICE INFORMATION >

3. Check voltage between battery current sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 7.

### 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between battery current sensor and ECM

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

### 8. CHECK BATTERY CURRENT SENSOR

Refer to [EC-500, "Component Inspection"](#).

# DTC P1553 BATTERY CURRENT SENSOR

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

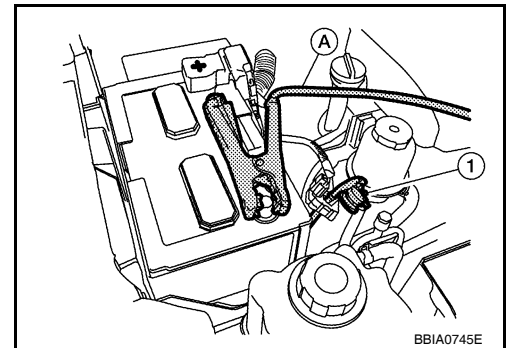
>> **INSPECTION END**

### Component Inspection

INFOID:000000003532031

#### BATTERY CURRENT SENSOR

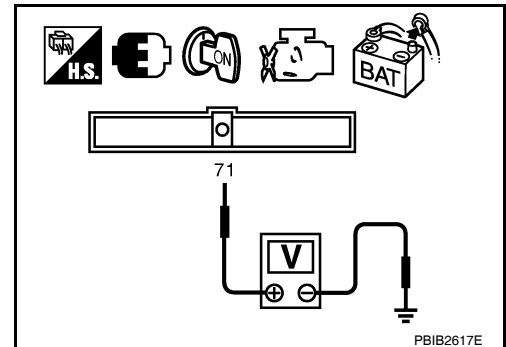
1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable (1).
  - ◀ : To body ground
3. Install jumper cable (A) between battery negative terminal and body ground.
4. Turn ignition switch ON.



5. Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

**Voltage: Approximately 2.5V**

6. If NG, replace battery negative cable assembly.



# DTC P1554 BATTERY CURRENT SENSOR

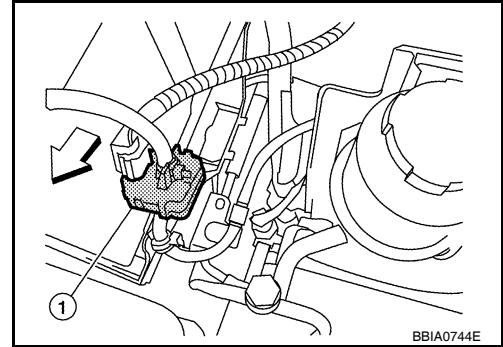
< SERVICE INFORMATION >

## DTC P1554 BATTERY CURRENT SENSOR

### Component Description

INFOID:000000003532032

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal of the battery. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



#### CAUTION:

**Do not 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.**

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532033

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul style="list-style-type: none"> <li>• Engine speed: Idle</li> <li>• Battery: Fully charged*</li> <li>• Selector lever: P or N</li> <li>• Air conditioner switch: OFF</li> <li>• No load</li> </ul>	Approx. 2,600 - 3,500mV

\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4, "How to Handle Battery"](#).

### On Board Diagnosis Logic

INFOID:000000003532034

The MIL will not light up for this self-diagnosis.

#### NOTE:

If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554 1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Battery current sensor</li> </ul>

### Overall Function Check

INFOID:000000003532035

Use this procedure to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

#### TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

#### ④ WITH CONSULT-II

1. Start engine and let it idle.

## DTC P1554 BATTERY CURRENT SENSOR

### < SERVICE INFORMATION >

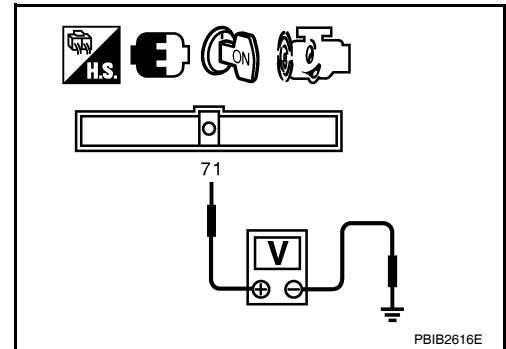
2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-II.
3. Check "BAT CUR SEN" indication for 10 seconds.  
**"BAT CUR SEN" should be above 2,300mV at least once.**
4. If NG, go to [EC-504, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
BAT CUR SEN	XXX mV

PBIB2615E

### WITH GST

1. Start engine and let it idle.
2. Check voltage between ECM terminal 71 (battery current sensor signal) and ground for 10 seconds.  
**The voltage should be above 2.3V at least once.**
3. If NG, go to [EC-504, "Diagnosis Procedure"](#).



# DTC P1554 BATTERY CURRENT SENSOR

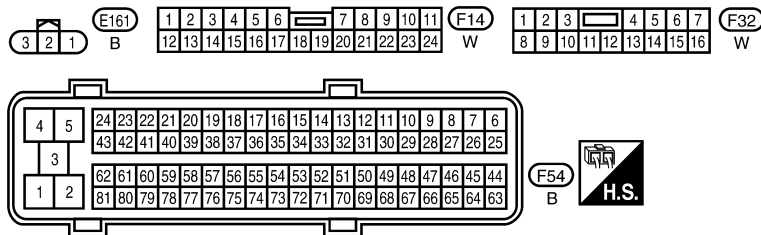
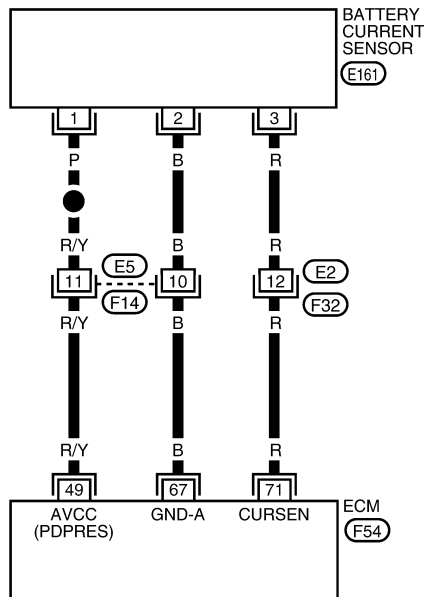
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532036

### EC-CUR/SE-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2767E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1554 BATTERY CURRENT SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Battery current sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground (Battery current sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
71	R	Battery current sensor	<b>[Engine is running]</b> • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5V

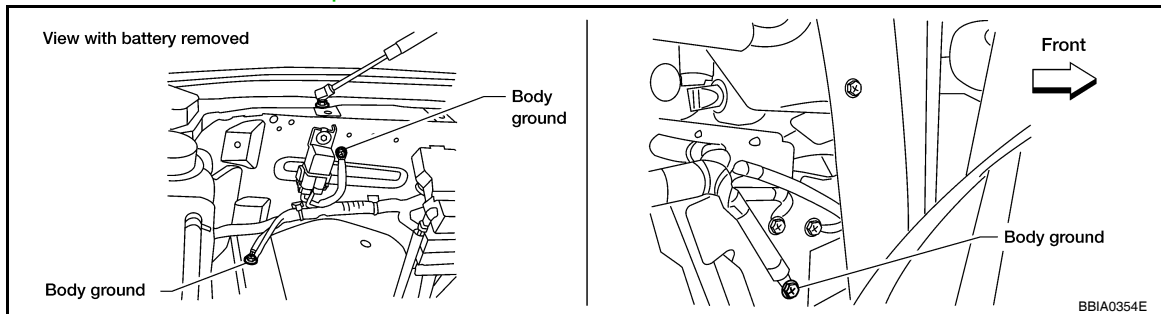
\*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to [SC-4. "How to Handle Battery"](#).

## Diagnosis Procedure

INFOID:000000003532037

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).

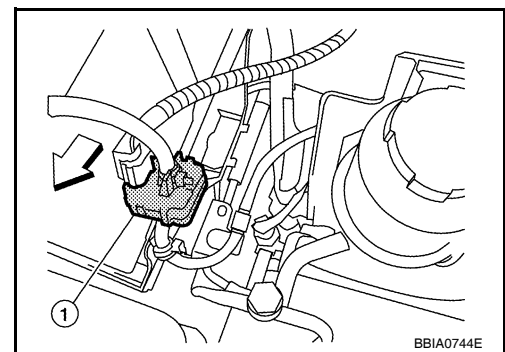


#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor (1) harness connector.
2. Turn ignition switch ON.





## DTC P1554 BATTERY CURRENT SENSOR

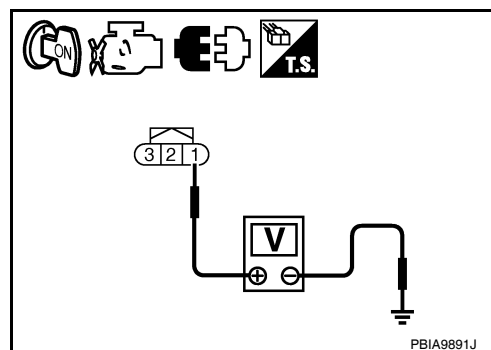
### < SERVICE INFORMATION >

3. Check voltage between battery current sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 6.  
NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between battery current sensor and ECM

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

### 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 7.

### 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between battery current sensor and ECM

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

### 8. CHECK BATTERY CURRENT SENSOR

Refer to [EC-506, "Component Inspection"](#).

# DTC P1554 BATTERY CURRENT SENSOR

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 9.
- NG >> Replace battery negative cable assembly.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

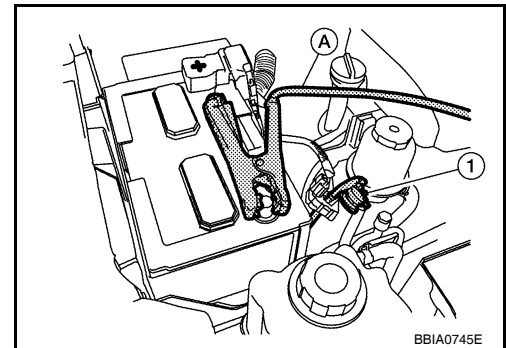
>> **INSPECTION END**

### Component Inspection

INFOID:000000003532038

#### BATTERY CURRENT SENSOR

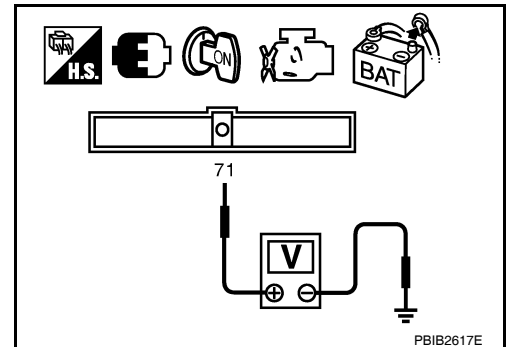
1. Reconnect harness connectors disconnected.
2. Disconnect battery negative cable (1).
  - : To body ground
3. Install jumper cable (A) between battery negative terminal and body ground.
4. Turn ignition switch ON.



5. Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

**Voltage: Approximately 2.5V**

6. If NG, replace battery negative cable assembly.



# DTC P1564 ICC STEERING SWITCH

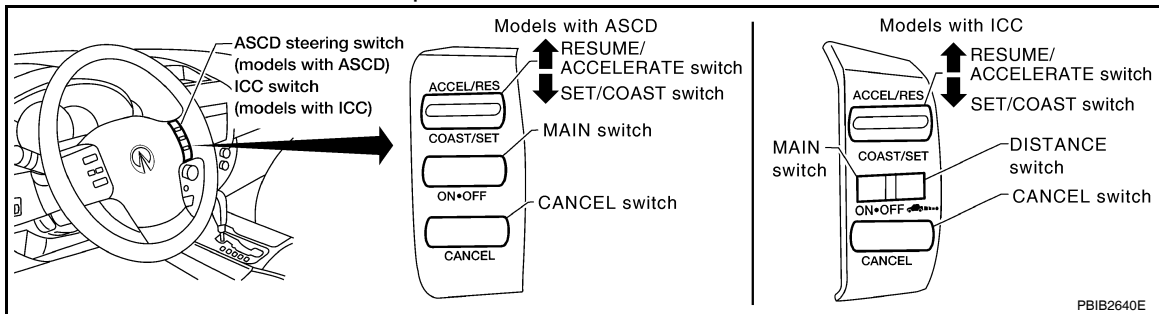
< SERVICE INFORMATION >

## DTC P1564 ICC STEERING SWITCH

### Component Description

INFOID:000000003532039

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



Refer to [EC-30, "System Description"](#) for the ICC function.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532040

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAIN SW	• Ignition switch: ON MAIN switch: Pressed	ON
	MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON CANCEL switch: Pressed	ON
	CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON RESUME/ACCELERATE switch: Pressed	ON
	RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON SET/COAST switch: Pressed	ON
	SET/COAST switch: Released	OFF
DIST SW	• Ignition switch: ON DISTANCE switch: Pressed	ON
	DISTANCE switch: Released	OFF

### On Board Diagnosis Logic

INFOID:000000003532041

**This self-diagnosis has the one trip detection logic.**

**The MIL will not light up for this self-diagnosis.**

**NOTE:**

**If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564 1564	ICC steering switch	<ul style="list-style-type: none"> <li>An excessively high voltage signal from the ICC steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ICC steering switch is out of the specified range.</li> <li>ECM detects that the ICC steering switch is stuck ON.</li> </ul>	<ul style="list-style-type: none"> <li>Harness or connectors (The switch circuit is open or shorted.)</li> <li>ICC steering switch</li> <li>Combination switch (spiral cable)</li> <li>ECM</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532042

**NOTE:**

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

## DTC P1564 ICC STEERING SWITCH

### < SERVICE INFORMATION >

---

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
9. If DTC is detected, go to [EC-510. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓟ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1564 ICC STEERING SWITCH

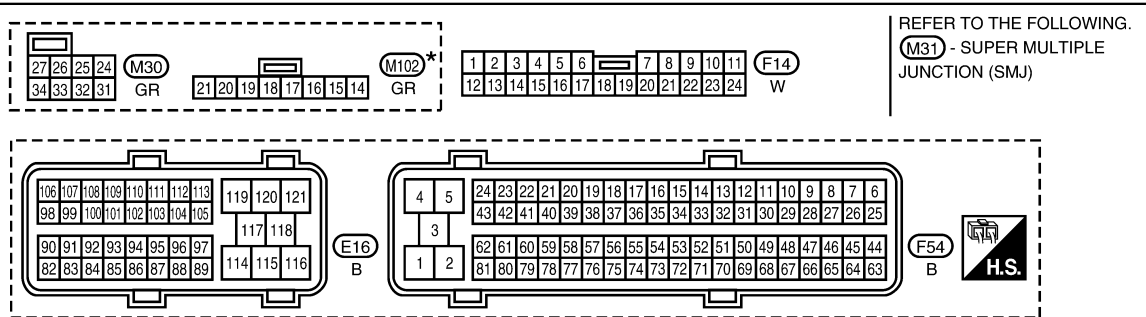
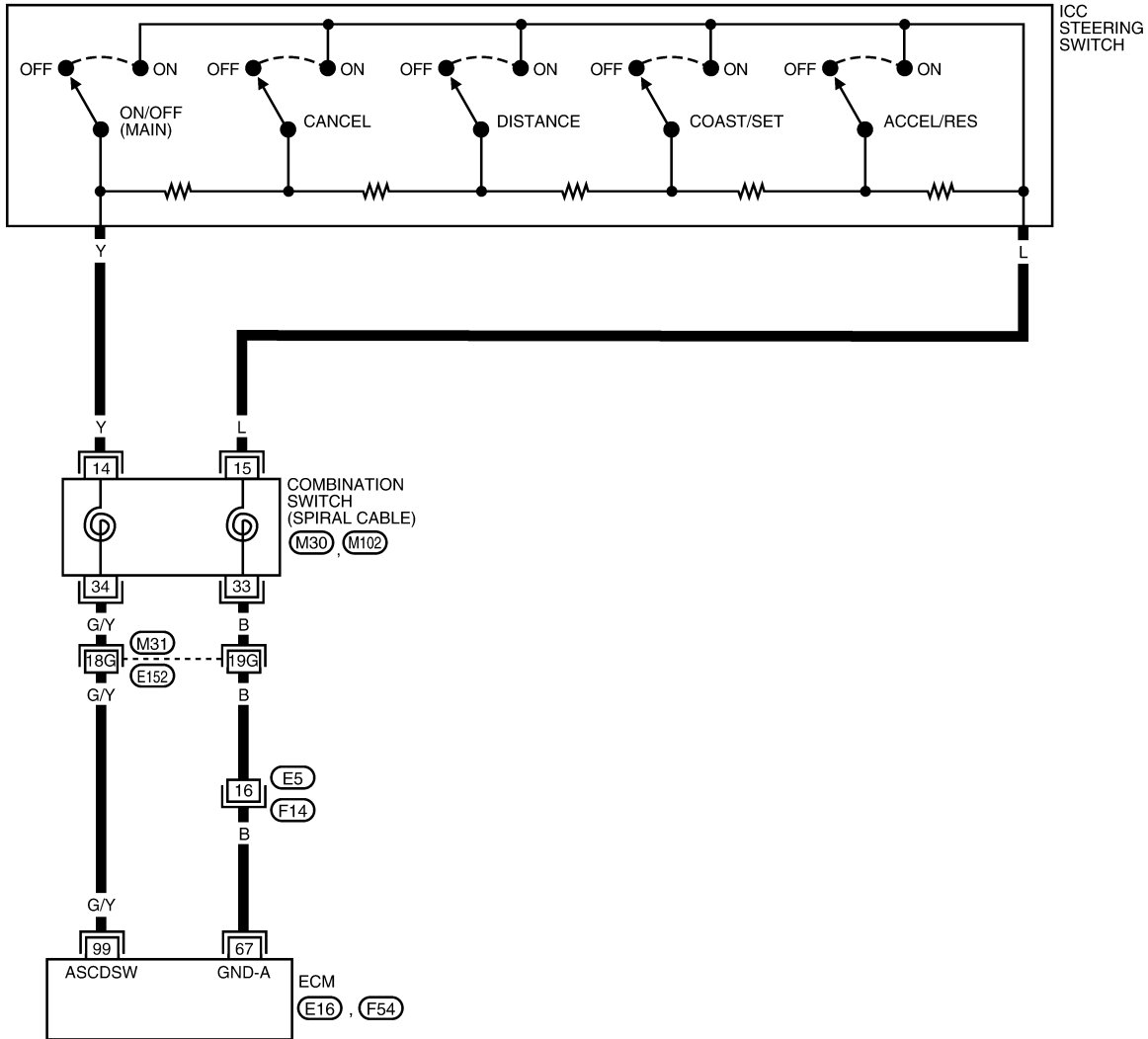
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532043

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC

EC-ICC/SW-01



\*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

BBWA2127E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1564 ICC STEERING SWITCH

## < SERVICE INFORMATION >

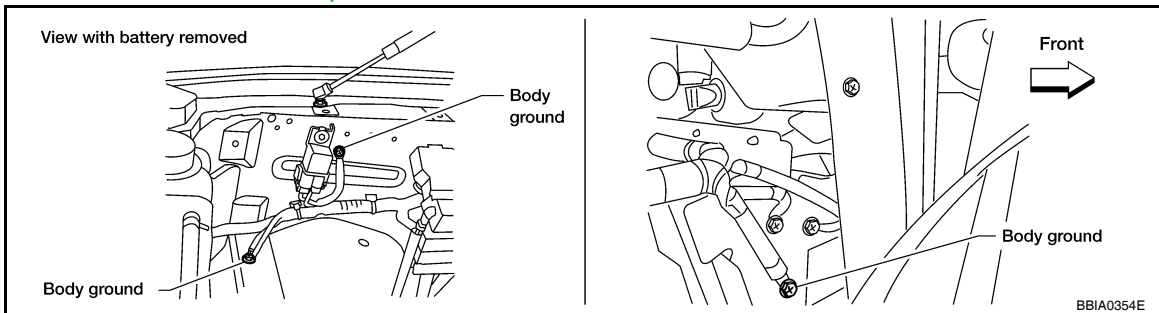
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B	Sensor ground	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
99	G/Y	ICC steering switch	<b>[Ignition switch: ON]</b> • ICC steering switch: OFF	Approximately 4.3V
			<b>[Ignition switch: ON]</b> • MAIN switch: Pressed	Approximately 0V
			<b>[Ignition switch: ON]</b> • CANCEL switch: Pressed	Approximately 1.3V
			<b>[Ignition switch: ON]</b> • RESUME/ACCELERATE switch: Pressed	Approximately 3.7V
			<b>[Ignition switch: ON]</b> • SET/COAST switch: Pressed	Approximately 3V
			<b>[Ignition switch: ON]</b> • DISTANCE switch: Pressed	Approximately 2.2V

## Diagnosis Procedure

INFOID:000000003532044

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK ICC STEERING SWITCH CIRCUIT

#### Ⓟ With CONSULT-II

1. Turn ignition switch ON.
2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW", "SET SW" and "DIST SW" in "DATA MONITOR" mode with CONSULT-II.
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF

DATA MONITOR	
MONITOR	NO DTC
MAIN SW	OFF
CANCEL SW	OFF
RESUME/ACC SW	OFF
SET SW	OFF
DIST SW	OFF

# DTC P1564 ICC STEERING SWITCH

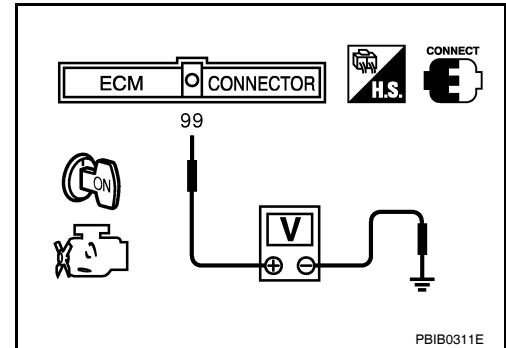
## < SERVICE INFORMATION >

Switch	Monitor item	Condition	Indication
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF
DISTANCE switch	DIST SW	Pressed	ON
		Released	OFF

### ⊗ Without CONSULT-II

- Turn ignition switch ON.
- Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.3
CANCEL switch	Pressed	Approx. 1.3
	Released	Approx. 4.3
RESUME/ACCELERATE switch	Pressed	Approx. 3.7
	Released	Approx. 4.3
SET/COAST switch	Pressed	Approx. 3.0
	Released	Approx. 4.3
DISTANCE switch	Pressed	Approx. 2.2
	Released	Approx. 4.3



### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 3.

## 3. CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Disconnect combination switch harness connector.
- Check harness continuity between combination switch terminal 15 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Harness connectors E5, F14
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

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

- Check harness continuity between ECM terminal 99 and combination switch terminal 14. Refer to Wiring Diagram.

**Continuity should exist.**

# DTC P1564 ICC STEERING SWITCH

## < SERVICE INFORMATION >

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

### OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

## 7. CHECK ICC STEERING SWITCH

Refer to [EC-512, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 8.
- NG >> Replace ICC steering switch.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

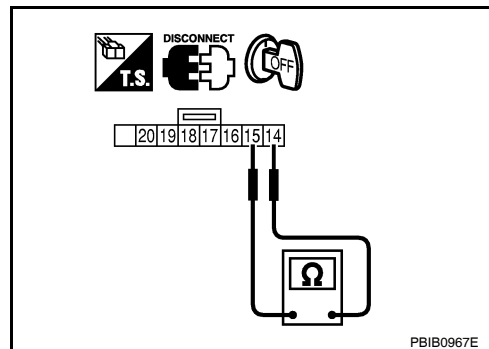
INFOID:000000003532045

### ICC STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M102.
2. Check continuity between combination switch terminals 1 and 2 with pushing each switch.

Switch	Condition	Resistance [ $\Omega$ ]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 5,500
CANCEL switch	Pressed	Approx. 310
	Released	Approx. 5,500
RESUME/ACCELERATE switch	Pressed	Approx. 2,600
	Released	Approx. 5,500
SET/COAST switch	Pressed	Approx. 1,400
	Released	Approx. 5,500
DISTANCE switch	Pressed	Approx. 740
	Released	Approx. 5,500

If NG, replace ICC steering switch.



PBIB0967E



# DTC P1564 ASCD STEERING SWITCH

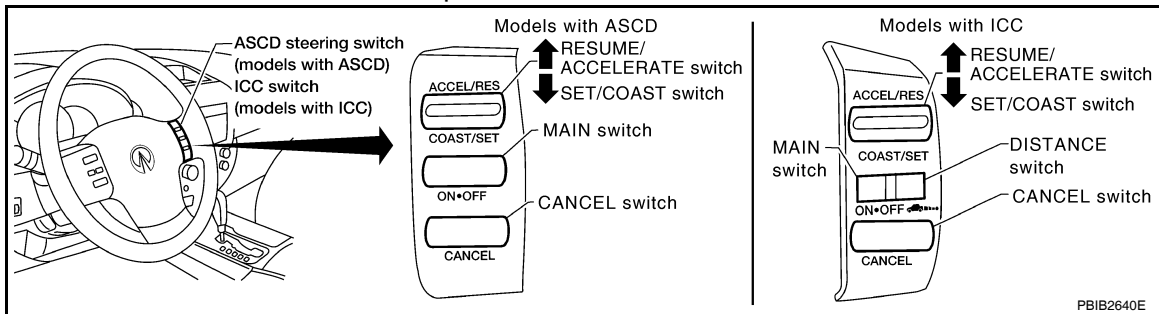
< SERVICE INFORMATION >

## DTC P1564 ASCD STEERING SWITCH

### Component Description

INFOID:000000003532046

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



Refer to [EC-30](#) for the ASCD function.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532047

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAIN SW	• Ignition switch: ON MAIN switch: Pressed	ON
	MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON CANCEL switch: Pressed	ON
	CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON RESUME/ACCELERATE switch: Pressed	ON
	RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON SET/COAST switch: Pressed	ON
	SET/COAST switch: Released	OFF

### On Board Diagnosis Logic

INFOID:000000003532048

- This self-diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

**NOTE:**

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	<ul style="list-style-type: none"> <li>• An excessively high voltage signal from the ASCD steering switch is sent to ECM.</li> <li>• ECM detects that input signal from the ASCD steering switch is out of the specified range.</li> <li>• ECM detects that the ASCD steering switch is stuck ON.</li> </ul>	<ul style="list-style-type: none"> <li>• Harness or connectors (The switch circuit is open or shorted.)</li> <li>• ASCD steering switch</li> <li>• Combination meter (spiral cable)</li> <li>• ECM</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532049

**NOTE:**

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Wait at least 10 seconds.

## DTC P1564 ASCD STEERING SWITCH

### < SERVICE INFORMATION >

---

4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to [EC-516, "Diagnosis Procedure"](#).

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1564 ASCD STEERING SWITCH

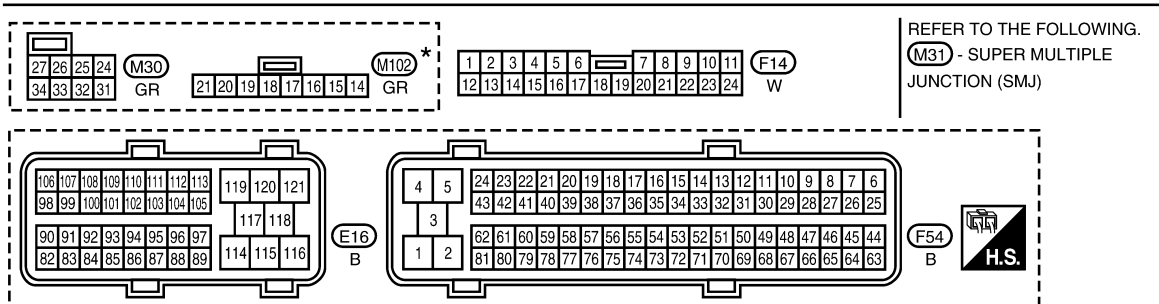
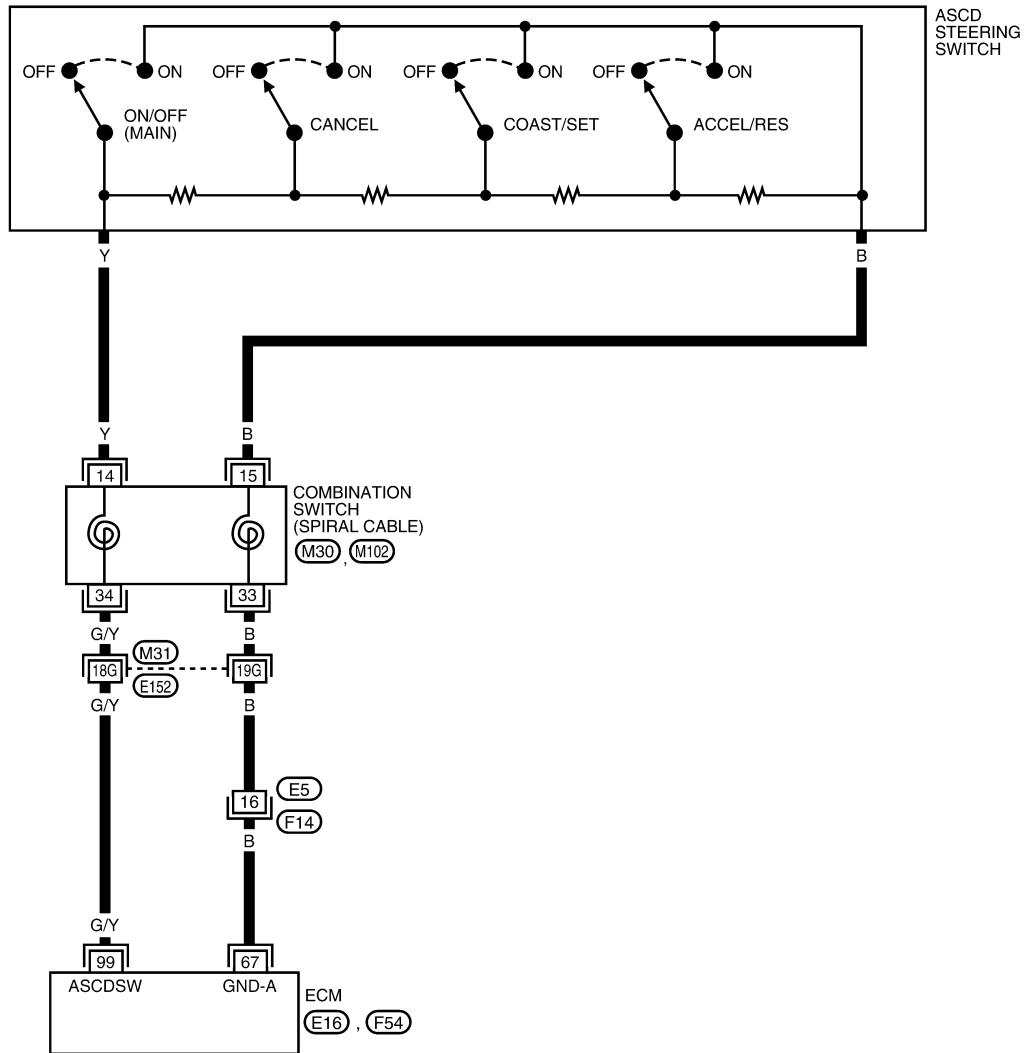
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532050

### EC-ASC/SW-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



\*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

BBWA2104E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1564 ASCD STEERING SWITCH

## < SERVICE INFORMATION >

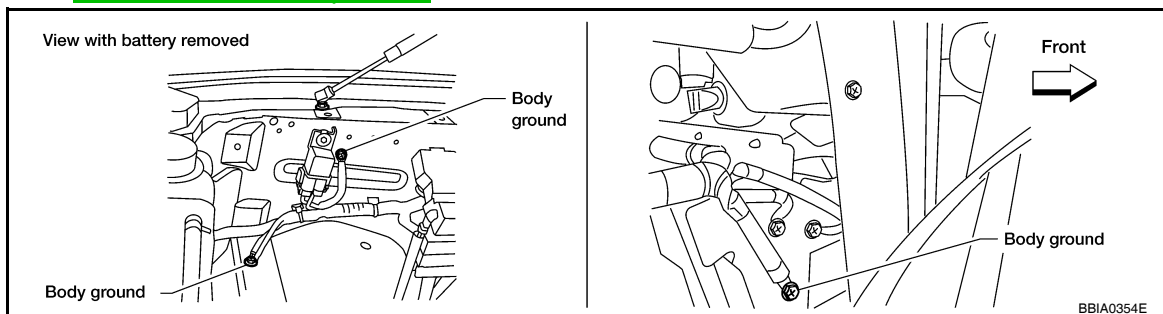
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B	Sensor ground	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
99	G/Y	ASCD steering switch	<b>[Ignition switch: ON]</b> • ASCD steering switch: OFF	Approximately 4V
			<b>[Ignition switch: ON]</b> • MAIN switch: ON	Approximately 0V
			<b>[Ignition switch: ON]</b> • CANCEL switch: ON	Approximately 1V
			<b>[Ignition switch: ON]</b> • RESUME/ACCELERATTE switch: ON	Approximately 3V
			<b>[Ignition switch: ON]</b> • SET/COAST switch: ON	Approximately 2V

## Diagnosis Procedure

INFOID:000000003532051

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK ASCD STEERING SWITCH CIRCUIT

#### With CONSULT-II

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-II.
- Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

DATA MONITOR	
MONITOR	NO DTC
MAIN SW	OFF
CANCEL SW	OFF
RESUME/ACC SW	OFF
SET SW	OFF

SEC006D

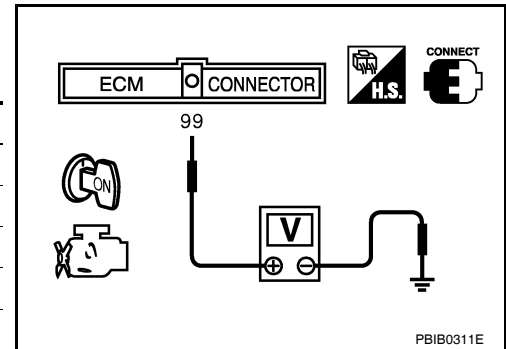
# DTC P1564 ASCD STEERING SWITCH

## < SERVICE INFORMATION >

### ⊗ Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



### OK or NG

- OK >> GO TO 8.  
 NG >> GO TO 3.

## 3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

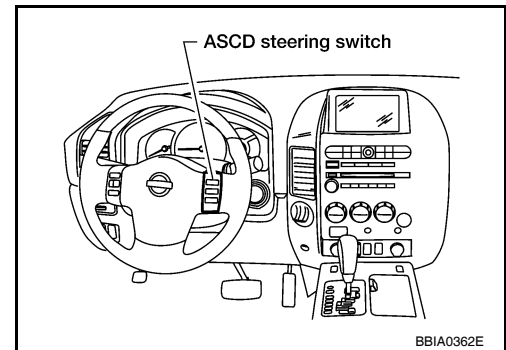
1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector M102.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 15 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 5.  
 NG >> GO TO 4.



## 4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Harness connectors E5, F14
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

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

1. Check harness continuity between ECM terminal 99 and combination switch terminal 14. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 7.  
 NG >> GO TO 6.

## 6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152

# DTC P1564 ASCD STEERING SWITCH

## < SERVICE INFORMATION >

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

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

## 7. CHECK ASCD STEERING SWITCH

Refer to [EC-518, "Component Inspection"](#).

### OK or NG

OK >> GO TO 8.

NG >> Replace ASCD steering switch. Refer to [PS-13, "Disassembly and Assembly"](#).

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

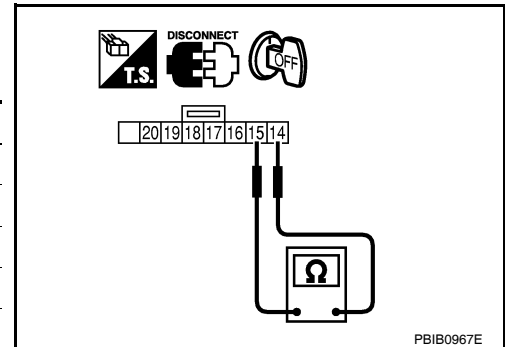
## Component Inspection

INFOID:000000003532052

### ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M102.
2. Check continuity between combination switch (spiral cable) terminals 14 and 15 with pushing each switch.

Switch	Condition	Resistance [ $\Omega$ ]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



# DTC P1568 ICC FUNCTION

< SERVICE INFORMATION >

## DTC P1568 ICC FUNCTION

### On Board Diagnosis Logic

INFOID:000000003532053

- This self-diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

#### NOTE:

- If DTC P1568 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P1568 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).
- If DTC P1568 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1568 1568	ICC function	ECM detects a difference between signals from ICC unit is out of specified range.	<ul style="list-style-type: none"><li>• Harness or connectors (The CAN communication line is open or shorted.)</li><li>• ICC unit</li><li>• ECM</li></ul>

### DTC Confirmation Procedure

INFOID:000000003532054

#### CAUTION:

Always drive vehicle at a safe speed.

#### NOTE:

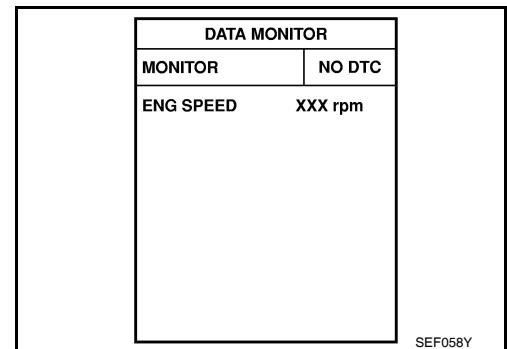
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Step 4 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-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Press MAIN switch on ICC steering switch.
4. Drive the vehicle at more than 40 km/h (25 MPH).
5. Press SET/COAST switch.
6. If DTC is detected, go to [EC-519, "Diagnosis Procedure"](#).



#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

### Diagnosis Procedure

INFOID:000000003532055

#### 1. REPLACE ICC UNIT

1. Replace ICC unit.
2. Perform [ACS-9](#).
3. Check DTC of ICC unit. Refer to [ACS-34](#).

>> INSPECTION END

# DTC P1572 ICC BRAKE SWITCH

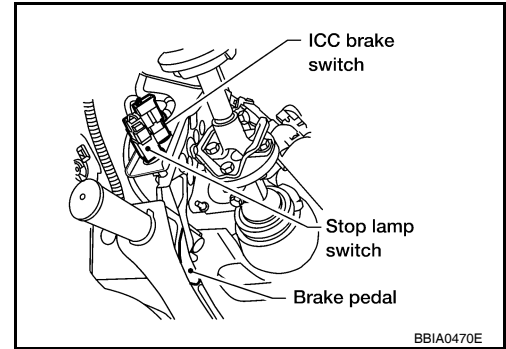
< SERVICE INFORMATION >

## DTC P1572 ICC BRAKE SWITCH

### Component Description

INFOID:000000003532056

When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [ACS-6](#) for the ICC function.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532057

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ICC brake switch)	• Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2 (stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

### On Board Diagnosis Logic

INFOID:000000003532058

- This diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

**NOTE:**

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572 1572	ICC brake switch	A)	When vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ICC brake switch are sent to ECM at the same time.	<ul style="list-style-type: none"> <li>• Harness or connectors (The stop lamp switch circuit is shorted.)</li> <li>• Harness or connectors (The ICC brake switch circuit is shorted.)</li> <li>• Stop lamp switch</li> <li>• ICC brake switch</li> <li>• ICC brake hold relay</li> <li>• Incorrect stop lamp switch installation</li> <li>• Incorrect ICC brake switch installation</li> <li>• ECM</li> </ul>
		B)	ICC brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

### DTC Confirmation Procedure

INFOID:000000003532059

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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



# DTC P1572 ICC BRAKE SWITCH

## < SERVICE INFORMATION >

- 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.

### TESTING CONDITION:

Steps 4 and 5 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-II

1. Start engine (VDC switch OFF).
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE lamp lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If 1st trip DTC is detected, go to [EC-523. "Diagnosis Procedure"](#).  
 If 1st trip DTC is not detected, go to the following step.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
CRUISE LAMP	ON
BRAKE SW 1	ON
BRAKE SW 2	OFF

PBIB2386E

5. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

6. If 1st trip DTC is detected, go to [EC-523. "Diagnosis Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

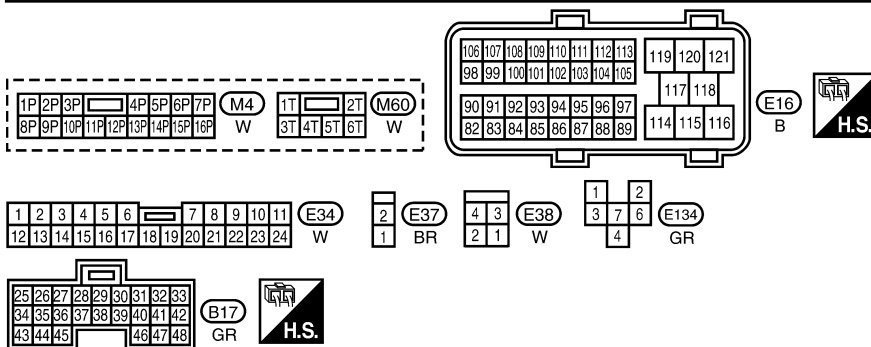
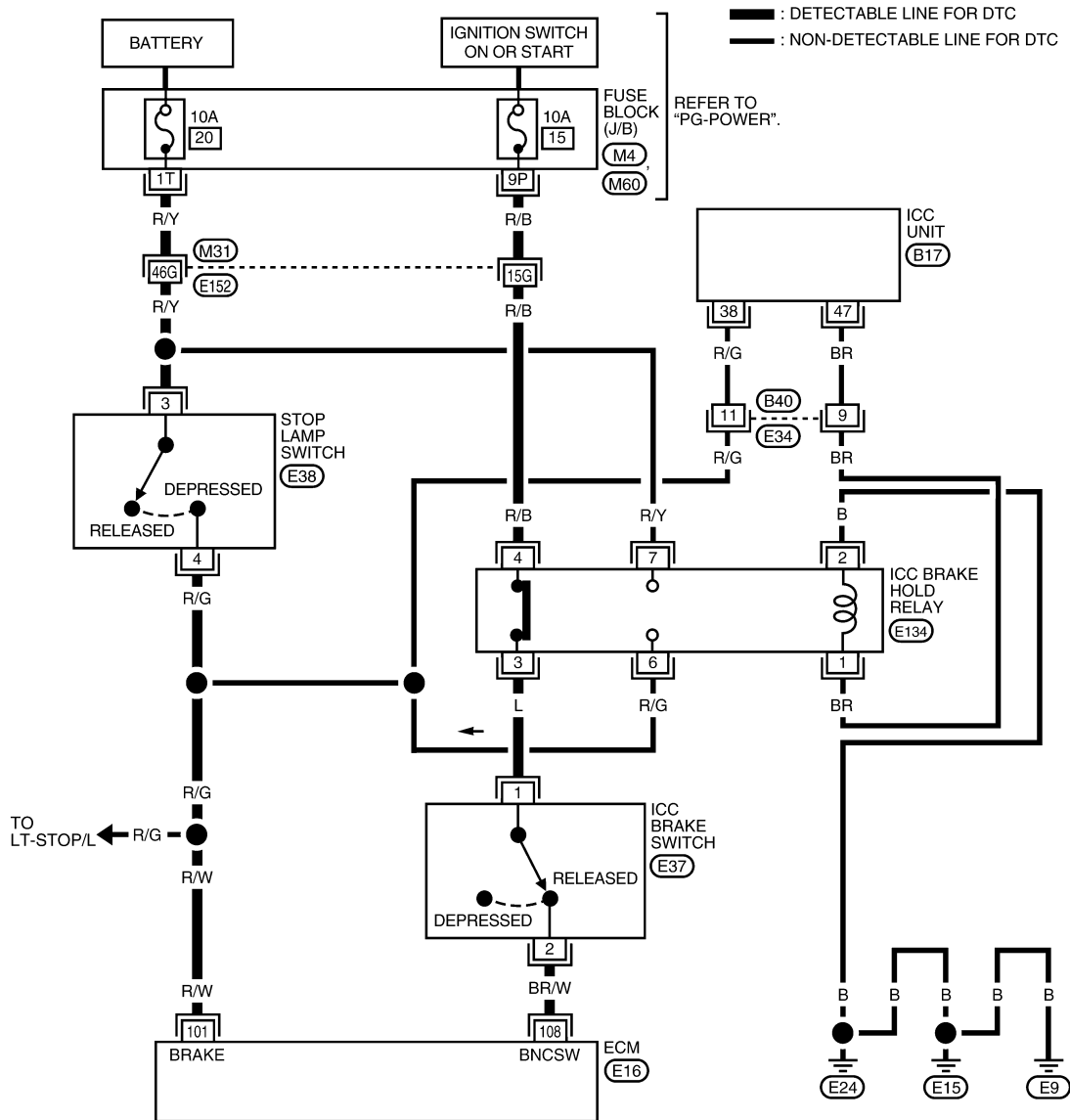
# DTC P1572 ICC BRAKE SWITCH

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532060

### EC-ICC/BS-01



REFER TO THE FOLLOWING.  
 (M31) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2129E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1572 ICC BRAKE SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/W	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	BR/W	ICC brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

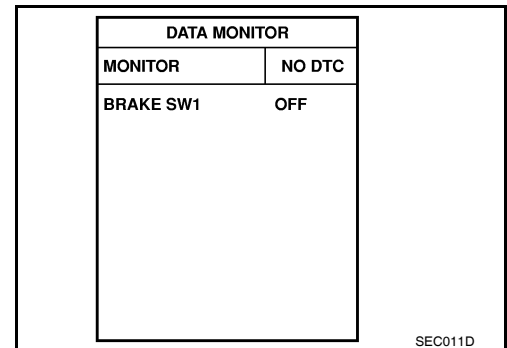
INFOID:000000003532061

### 1. CHECK OVERALL FUNCTION-I

#### ☑ With CONSULT-II

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
- Check "BRAKE SW1" indication under the following conditions.

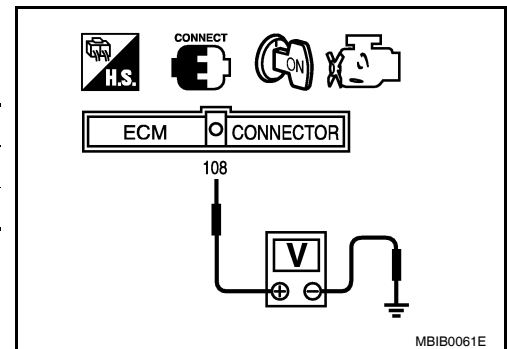
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



#### ☒ Without CONSULT-II

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



#### OK or NG

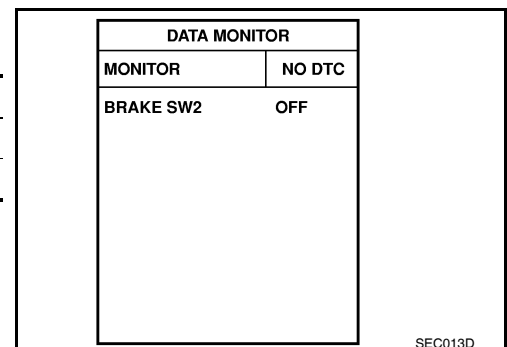
- OK >> GO TO 2.  
NG >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

#### ☑ With CONSULT-II

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



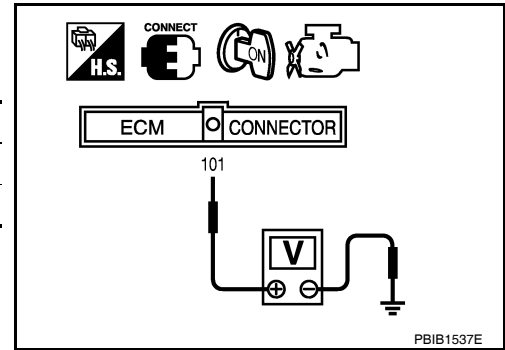
## DTC P1572 ICC BRAKE SWITCH

### < SERVICE INFORMATION >

**⊗ Without CONSULT-II**

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

- OK >> GO TO 14.
- NG >> GO TO 10.

### 3. CHECK DTC WITH ICC UNIT

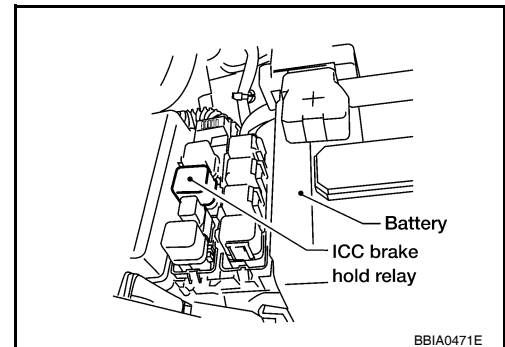
Refer to [ACS-34](#).

OK or NG

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

### 4. CHECK ICC BRAKE HOLD RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ICC brake hold relay.
3. Turn ignition switch ON.

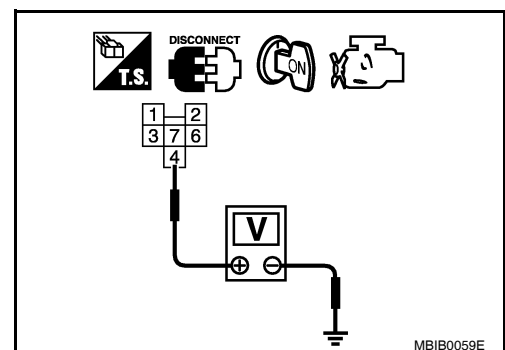


4. Check voltage between ICC brake hold relay terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.



### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ICC brake hold relay and fuse

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

## DTC P1572 ICC BRAKE SWITCH

< SERVICE INFORMATION >

### 6. CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ICC brake switch harness connector.
3. Check harness continuity between ICC brake hold relay terminal 3 and ICC brake switch terminal 1.  
Refer to Wiring Diagram.

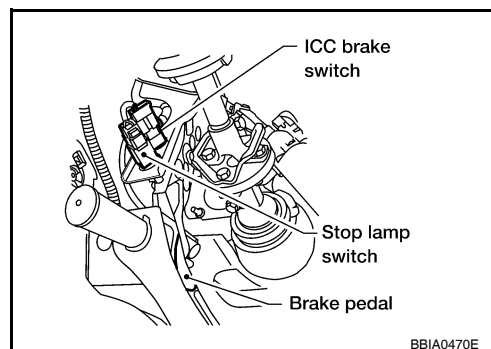
**Continuity should exist.**

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

OK or NG

OK >> GO TO 7.

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



### 7. CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ICC brake switch terminal 2 and ECM terminal 108.  
Refer Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

### 8. CHECK ICC BRAKE HOLD RELAY

Refer to [EC-526, "Component Inspection"](#).

OK >> GO TO 9.

NG >> Replace ICC brake hold relay.

### 9. CHECK ICC BRAKE SWITCH

Refer to [EC-526, "Component Inspection"](#).

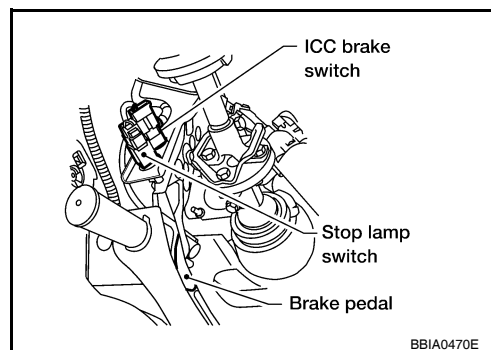
OK or NG

OK >> GO TO 14.

NG >> Replace ICC brake switch.

### 10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



## DTC P1572 ICC BRAKE SWITCH

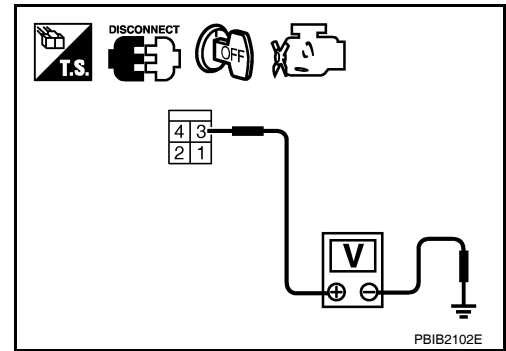
### < SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 12.  
NG >> GO TO 11.



## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) No. 1 connector M60
- 10A fuse
- Harness for open or short between stop lamp switch and battery

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

## 12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 13.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 13. CHECK STOP LAMP SWITCH

Refer to [EC-526. "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 14.  
NG >> Replace stop lamp switch.

## 14. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003532062

### ICC BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ICC brake switch harness connector.

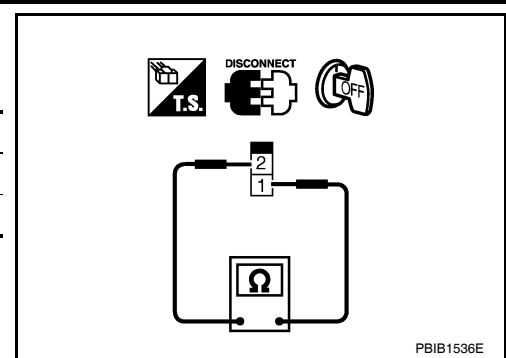
## DTC P1572 ICC BRAKE SWITCH

### < SERVICE INFORMATION >

- Check continuity between ICC brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ICC brake switch installation, refer to [BR-5](#), and perform step 3 again.

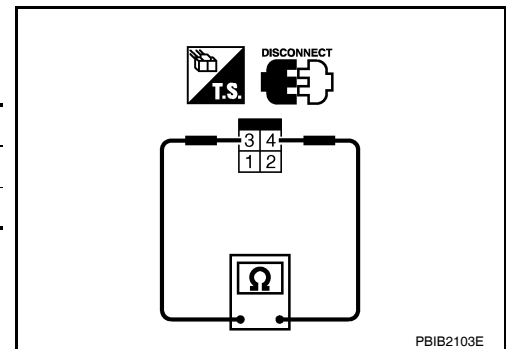


### STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 3 and 4 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.

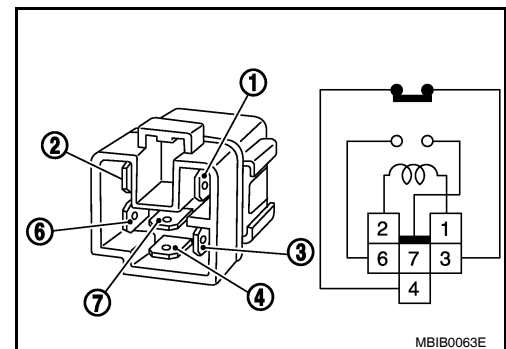


### ICC BRAKE HOLD RELAY

- Apply 12V direct current between ICC brake hold relay terminals 1 and 2.
- Check continuity between relay terminals 3 and 4, 6 and 7 under the following conditions.

Condition	Between terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	Should not exist
	6 and 7	Should exist
No current supply	3 and 4	Should exist
	6 and 7	Should not exist

- If NG, replace ICC brake hold relay.



# DTC P1572 ASCD BRAKE SWITCH

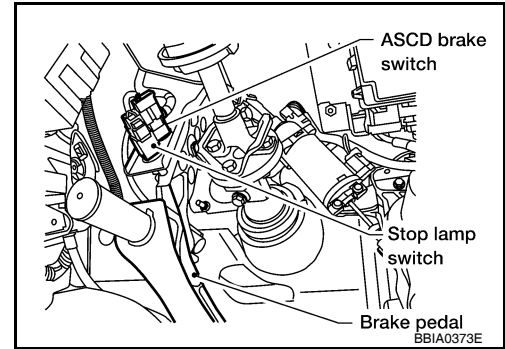
< SERVICE INFORMATION >

## DTC P1572 ASCD BRAKE SWITCH

### Component Description

INFOID:000000003532063

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-30](#) for the ASCD function.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532064

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

### On Board Diagnosis Logic

INFOID:000000003532065

- This self-diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

**NOTE:**

- If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	<ul style="list-style-type: none"> <li>• Harness or connectors (The stop lamp switch circuit is shorted.)</li> <li>• Harness or connectors (The ASCD brake switch circuit is shorted.)</li> <li>• Stop lamp switch</li> <li>• ASCD brake switch</li> <li>• Incorrect stop lamp switch installation</li> <li>• Incorrect ASCD brake switch installation</li> <li>• ECM</li> </ul>
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

### DTC Confirmation Procedure

INFOID:000000003532066

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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



# DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

## TESTING CONDITION:

Steps 4 and 5 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-II

1. Start engine (VDC switch OFF).
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If DTC is detected, go to [EC-531, "Diagnosis Procedure"](#).  
 If DTC is not detected, go to the following step.

5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

6. If DTC is detected, go to [EC-531, "Diagnosis Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
CRUISE LAMP	ON
BRAKE SW 1	ON
BRAKE SW 2	OFF

PBI82386E

A  
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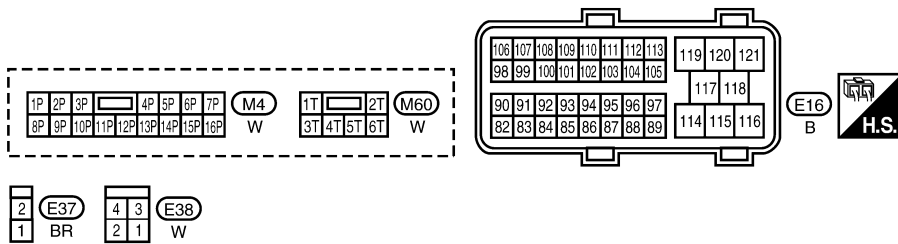
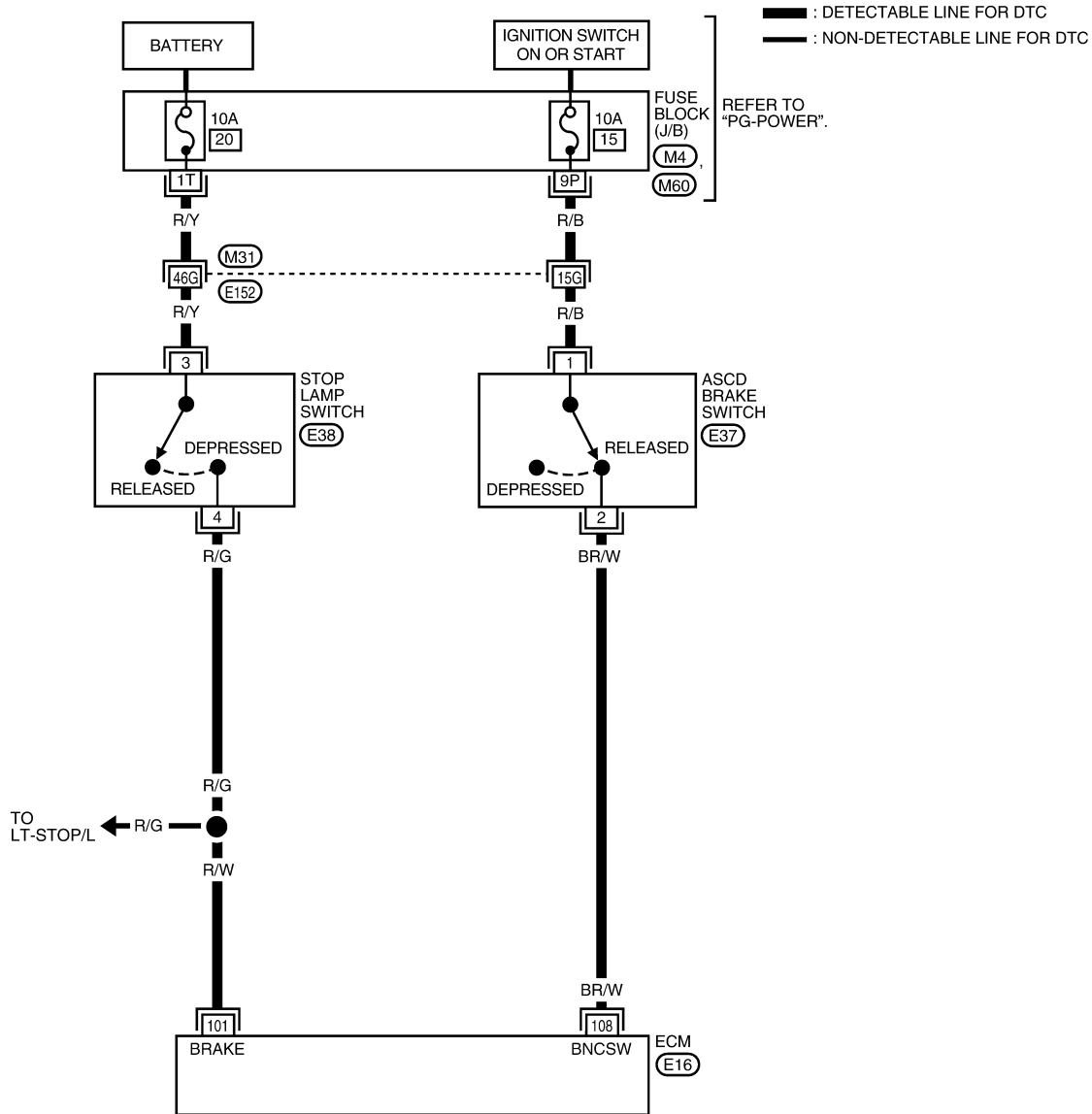
# DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532067

### EC-ASC/BS-01



REFER TO THE FOLLOWING.  
 (C1) - SUPER MULTIPLE JUNCTION (SMJ)

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1572 ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/W	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	BR/W	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0V

## Diagnosis Procedure

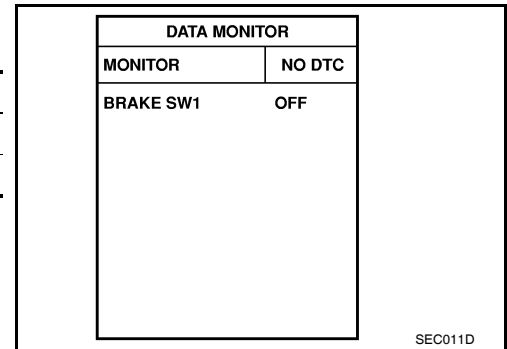
INFOID:000000003532068

### 1. CHECK OVERALL FUNCTION-I

#### ④ With CONSULT-II

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
- Check "BRAKE SW1" indication under the following conditions.

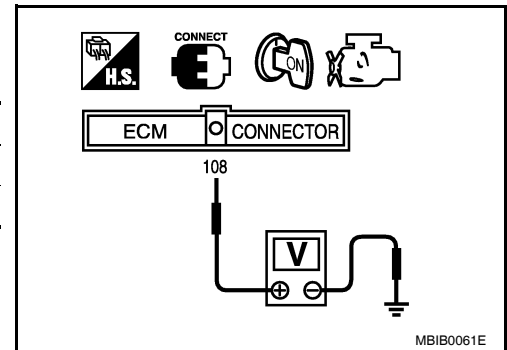
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



#### ⊗ Without CONSULT-II

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



### OK or NG

- OK >> GO TO 2.  
NG >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

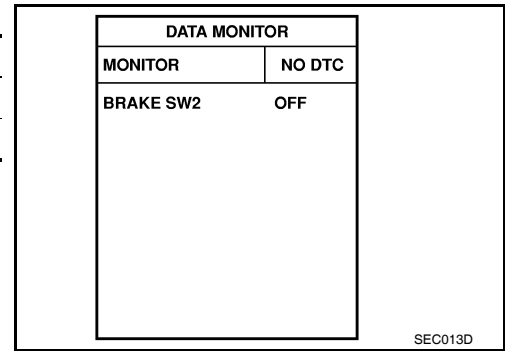
#### ④ With CONSULT-II

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

# DTC P1572 ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

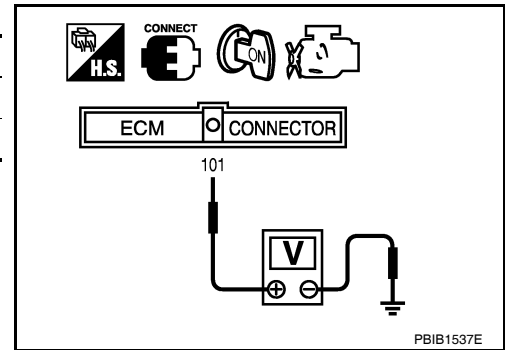
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



### ⊗ Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

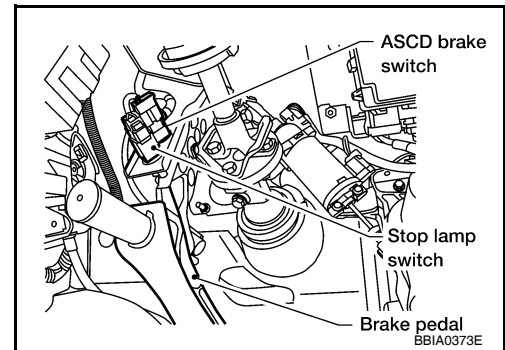


### OK or NG

- OK >> GO TO 11.
- NG >> GO TO 7.

## 3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

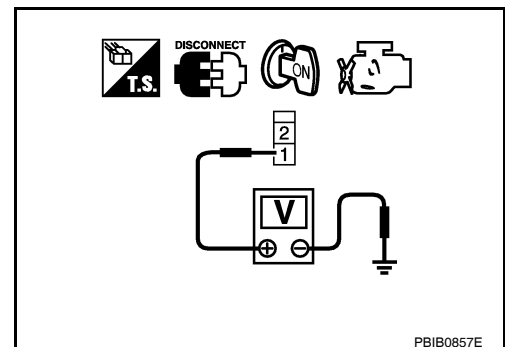


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

# DTC P1572 ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

- Harness connectors M31, E152
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

OK >> GO TO 6.

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

## 6. CHECK ASCD BRAKE SWITCH

Refer to [EC-534, "Component Inspection"](#).

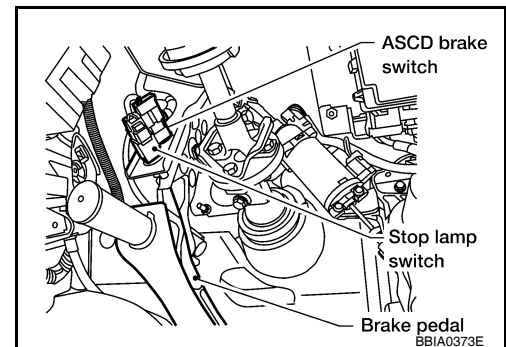
### OK or NG

OK >> GO TO 11.

NG >> Replace ASCD brake switch.

## 7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



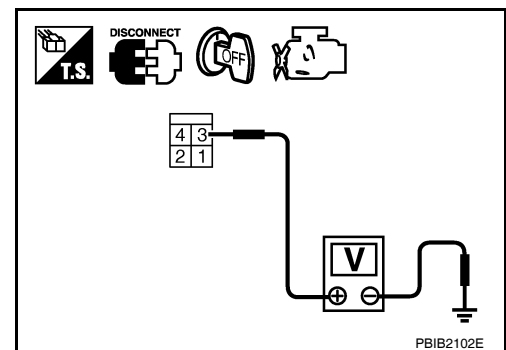
3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

OK >> GO TO 9.

NG >> GO TO 8.



## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) connector M60
- 10A fuse
- Harness for open or short between stop lamp switch and battery

# DTC P1572 ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

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

### 9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 4.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 10.

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

### 10. CHECK STOP LAMP SWITCH

Refer to [EC-534, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 11.

NG >> Replace stop lamp switch.

### 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

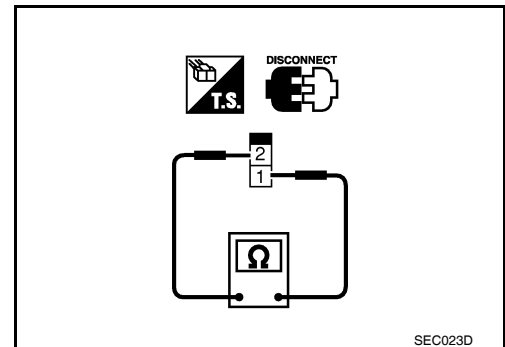
INFOID:000000003532069

### ASC D BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist.
Brake pedal: Slightly depressed	Should not exist.

If NG, adjust ASCD brake switch installation, refer to [BR-5](#), and perform step 3 again.



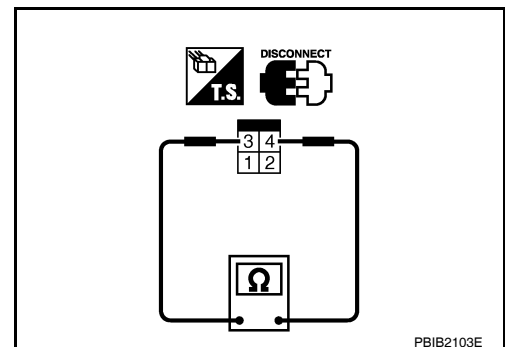
SEC023D

### STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.



PBIB2103E

# DTC P1574 ICC VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

## DTC P1574 ICC VEHICLE SPEED SENSOR

### Component Description

INFOID:000000003532070

The ECM receives two vehicle speed signals via CAN communication line. One is sent from “unified meter and A/C amp.”, and the other is from TCM (Transmission control module). The ECM uses these signals for ICC control. Refer to [ACS-6](#) for ICC functions.

### On Board Diagnosis Logic

INFOID:000000003532071

- This self-diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

#### NOTE:

- If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-429](#).
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ICC vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul style="list-style-type: none"> <li>• Harness or connectors (The CAN communication line is open or shorted.)</li> <li>• Combination meter</li> <li>• ABS actuator and electric unit (control unit)</li> <li>• Wheel sensor</li> <li>• TCM</li> <li>• ECM</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532072

#### CAUTION:

Always drive vehicle at a safe speed.

#### NOTE:

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:

Step 3 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-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25MPH).
4. If DTC is detected, go to [EC-536. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### WITH GST

Follow the procedure “WITH CONSULT-II” above.

# DTC P1574 ICC VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

---

## Diagnosis Procedure

INFOID:000000003532073

### 1. CHECK DTC WITH TCM

---

Check DTC with TCM. Refer to [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).

#### OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

### 2. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

---

Refer to [BRC-11](#).

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

### 3. CHECK COMBINATION METER FUNCTION

---

Refer to [DI-5](#).

>> **INSPECTION END**



# DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

## DTC P1574 ASCD VEHICLE SPEED SENSOR

### Component Description

INFOID:000000003532074

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to [EC-30](#) for ASCD functions.

### On Board Diagnosis Logic

INFOID:000000003532075

- This self-diagnosis has the one trip detection logic.
- The MIL will not light up for this self-diagnosis.

#### NOTE:

- If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#).
- If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-147](#).
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-429](#).
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-444](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul style="list-style-type: none"> <li>• Harness or connectors (The CAN communication line is open or shorted.)</li> <li>• Combination meter</li> <li>• ABS actuator and electric unit (control unit)</li> <li>• Wheel sensor</li> <li>• TCM</li> <li>• ECM</li> </ul>

### DTC Confirmation Procedure

INFOID:000000003532076

#### CAUTION:

Always drive vehicle at a safe speed.

#### NOTE:

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:

Step 3 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-II

1. Start engine (VDC switch OFF).
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. If DTC is detected, go to [EC-538, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓢ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

---

## Diagnosis Procedure

INFOID:000000003532077

### 1. CHECK DTC WITH TCM

---

Check DTC with TCM. Refer to [AT-39, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).

#### OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

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

---

Refer to [BRC-11](#).

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

### 3. CHECK COMBINATION METER FUNCTION

---

Check combination meter function.

Refer to [DI-5](#).

>> **INSPECTION END**

# DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

## DTC P1805 BRAKE SWITCH

### Description

INFOID:000000003532078

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532079

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

### On Board Diagnosis Logic

INFOID:000000003532080

**The MIL will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	<ul style="list-style-type: none"><li>• Harness or connectors (Stop lamp switch circuit is open or shorted.)</li><li>• Stop lamp switch</li></ul>

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating 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

### DTC Confirmation Procedure

INFOID:000000003532081

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. If 1st trip DTC is detected, go to [EC-541. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### Ⓟ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P1805 BRAKE SWITCH

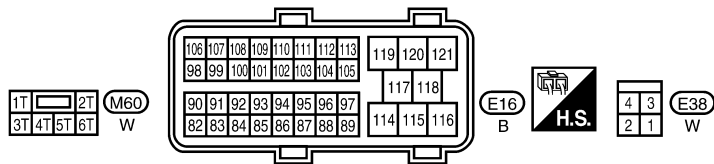
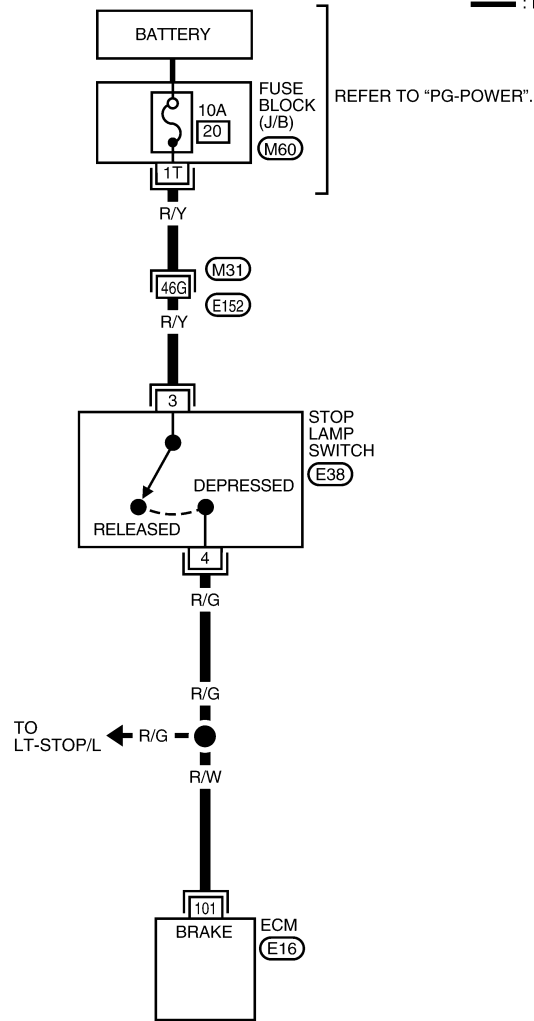
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532082

### EC-BRK/SW-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(M31) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1705E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P1805 BRAKE SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/W	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

INFOID:000000003532083

### 1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

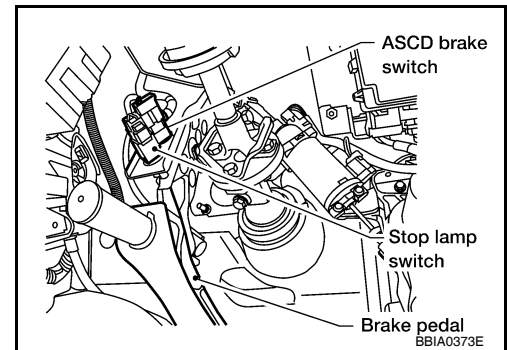
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 2.

### 2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.

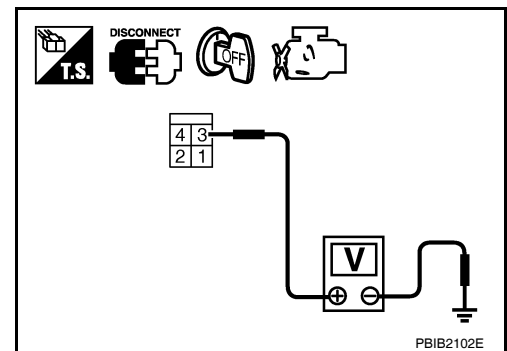


2. Check voltage between stop lamp switch terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) connector M60
- 10A fuse
- Harness for open and short between stop lamp switch and battery

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

# DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

## 4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 4.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 5.

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

## 5. CHECK STOP LAMP SWITCH

Refer to [EC-542, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace stop lamp switch.

## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

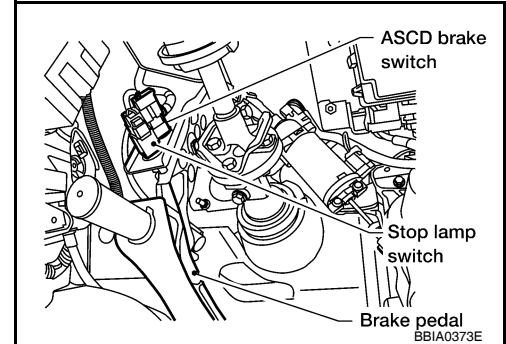
>> **INSPECTION END**

## Component Inspection

INFOID:000000003532084

### STOP LAMP SWITCH

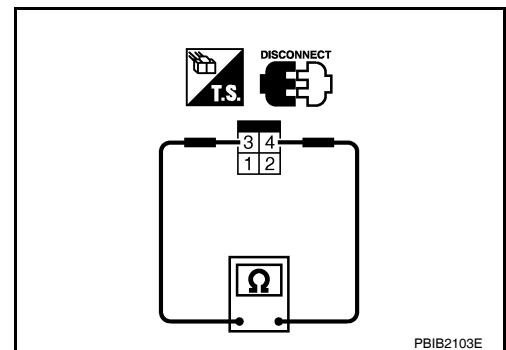
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 3 and 4 under the following conditions.

Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

3. If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 2 again.



# DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

## DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

### Component Description

INFOID:000000003532085

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.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532086

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

### On Board Diagnosis Logic

INFOID:000000003532087

**These self-diagnoses have the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100 2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor relay circuit is open)</li><li>• Throttle control motor relay</li></ul>
P2103 2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor relay circuit is shorted)</li><li>• Throttle control motor relay</li></ul>

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### DTC Confirmation Procedure

INFOID:000000003532088

#### NOTE:

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

#### PROCEDURE FOR DTC P2100

④ With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-546, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

# DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

## < SERVICE INFORMATION >

---

 With GST

Follow the procedure "With CONSULT-II" above.

### PROCEDURE FOR DTC P2103

#### TESTING CONDITION:

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

 With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. If DTC is detected, go to [EC-546, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With GST

Follow the procedure "With CONSULT-II" above.



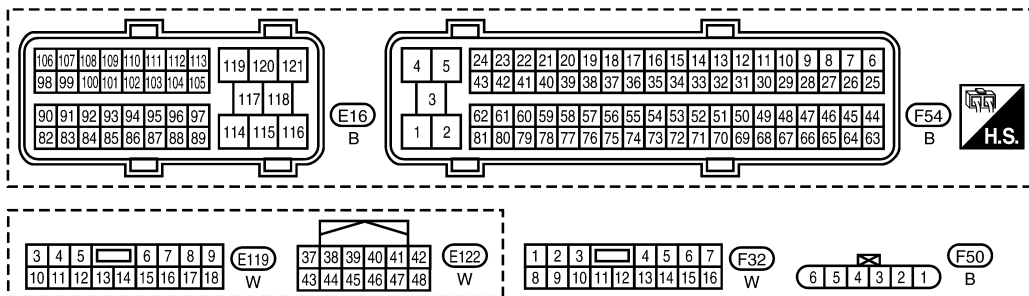
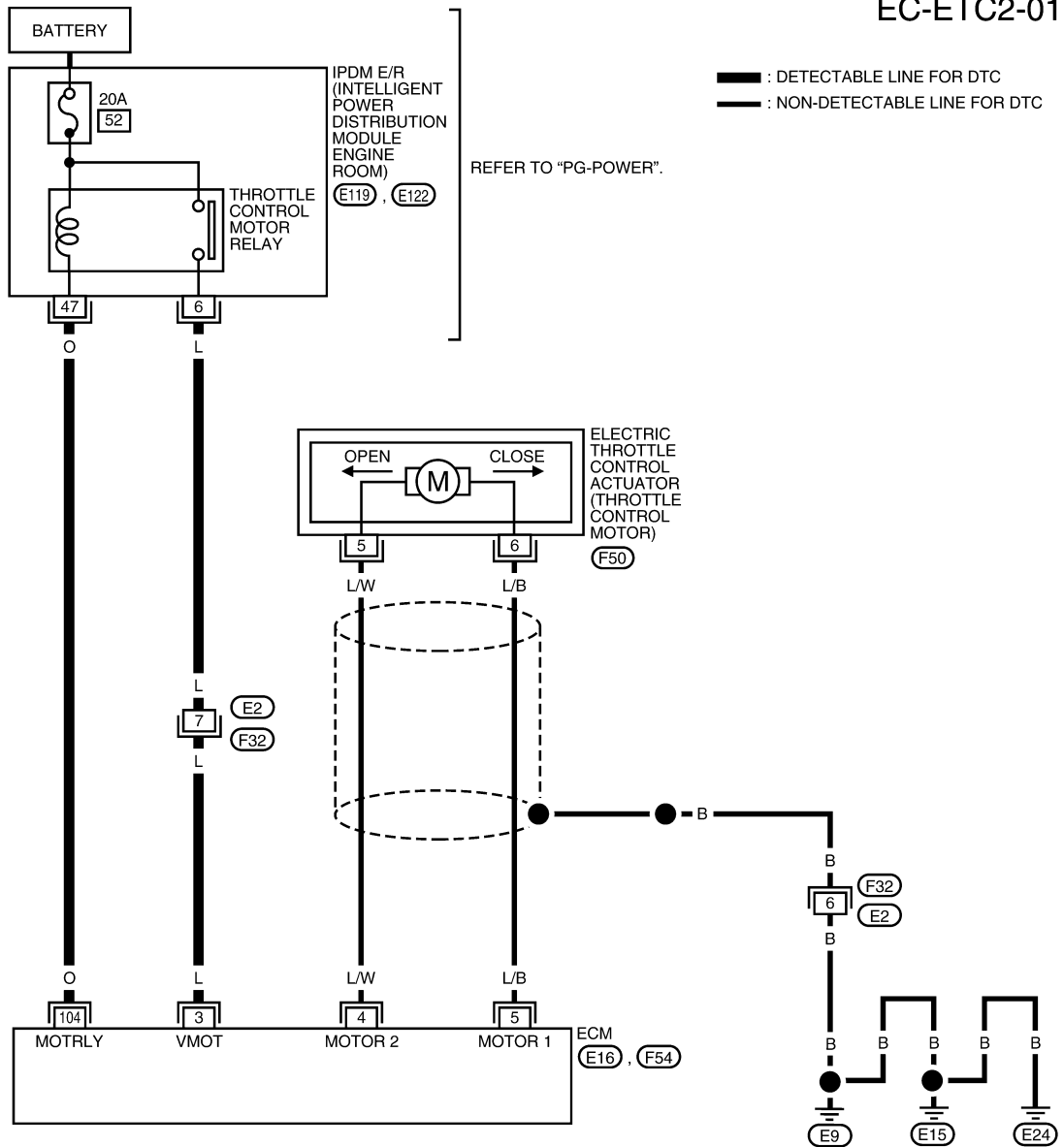
# DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532089

EC-ETC2-01



BBWA2100E

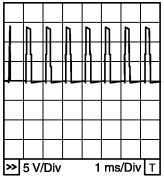
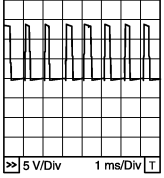
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L	Throttle control motor relay power supply	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	<b>[Ignition switch: OFF]</b>	BATTERY VOLTAGE (11 - 14V)
			<b>[Ignition switch: ON]</b>	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532090

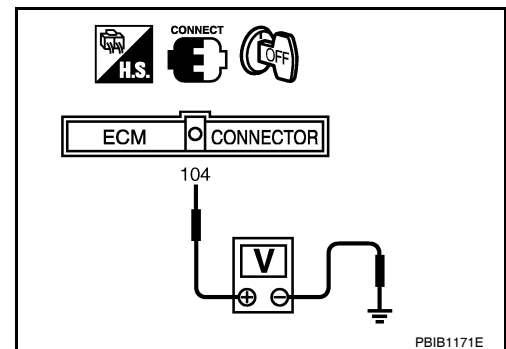
### 1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 4.  
NG >> GO TO 2.



### 2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E122.
- Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 3.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

## < SERVICE INFORMATION >

### 3. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

#### OK or NG

- OK >> GO TO 7.  
NG >> Replace 20A fuse.

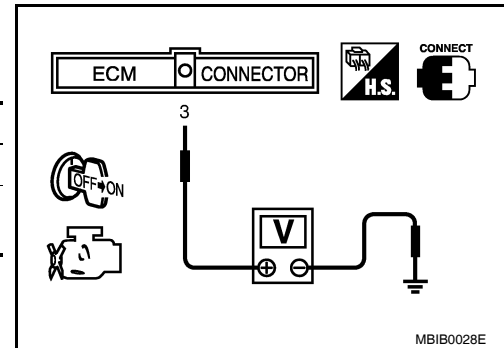
### 4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

#### OK or NG

- OK >> GO TO 7.  
NG >> GO TO 5.



### 5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E119.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 7.  
NG >> GO TO 6.

### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between ECM and IPDM E/R

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

### 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

#### OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28. "Removal and Installation of IPDM E/R"](#).  
NG >> Repair or replace harness or connectors.

# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

## DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

### Description

INFOID:000000003532091

#### NOTE:

If DTC P2101 is displayed with DTC P2100 or 2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to [EC-543](#) or [EC-559](#).

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

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

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

### On Board Diagnosis Logic

INFOID:000000003532092

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Electric throttle control performance	Electric throttle control function does not operate properly.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor circuit is open or shorted)</li><li>• Electric throttle control actuator</li></ul>

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### DTC Confirmation Procedure

INFOID:000000003532093

#### NOTE:

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 11V when engine is running.**

#### ④ WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-550, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.

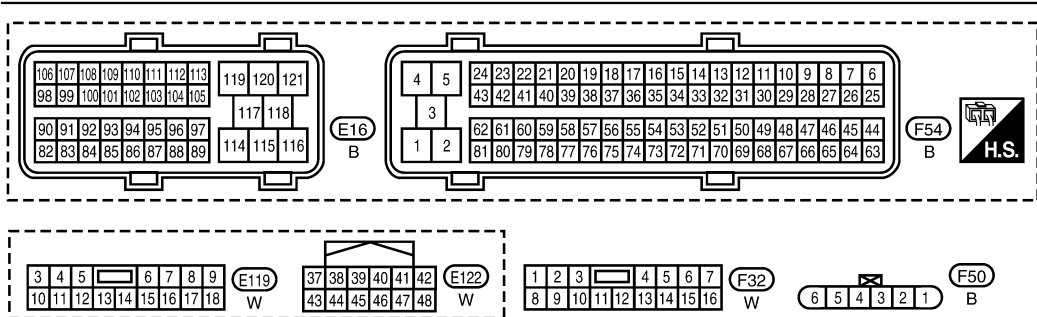
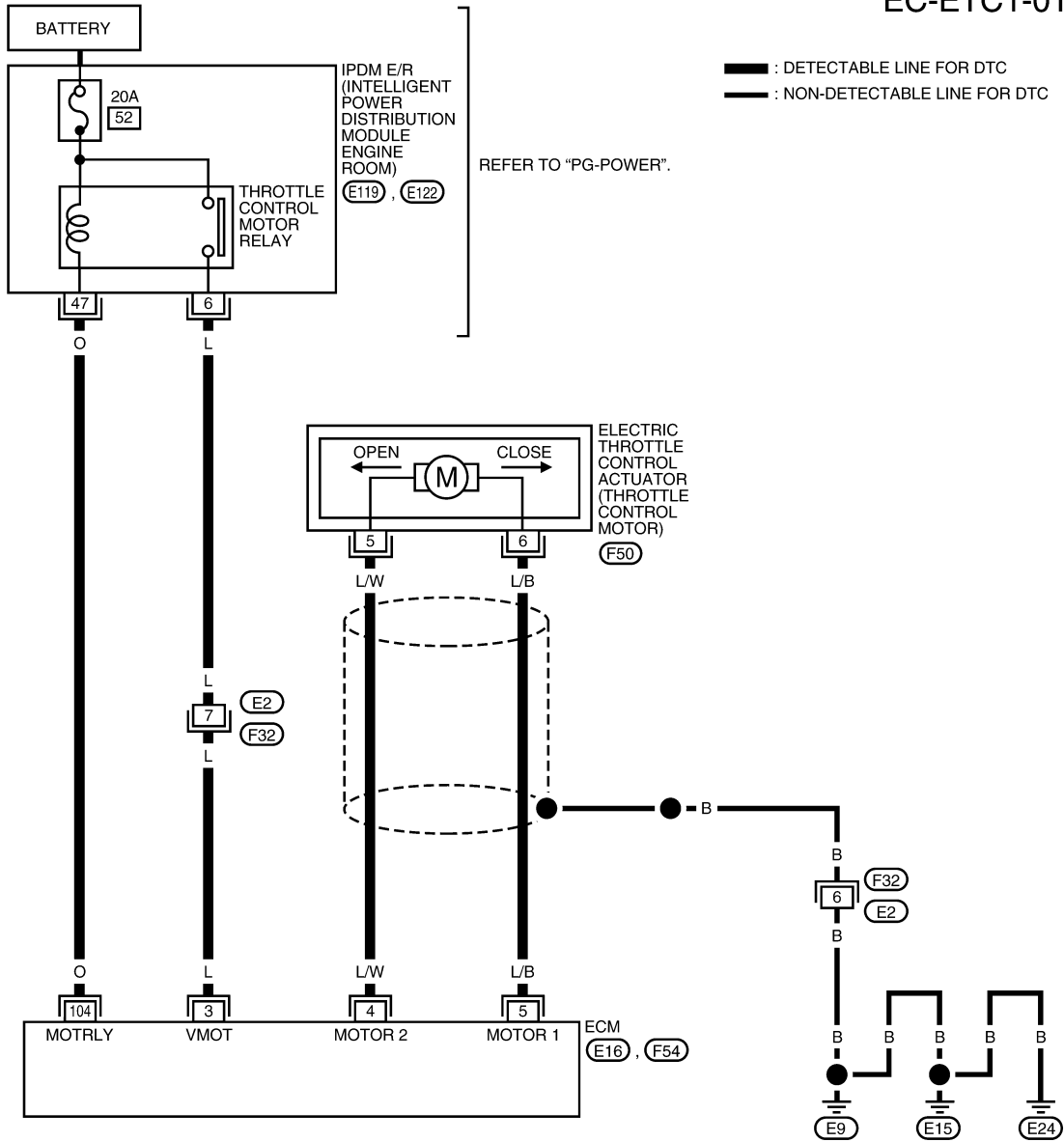
# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532094

EC-ETC1-01



BBWA2099E

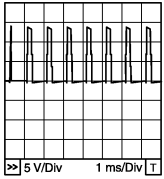
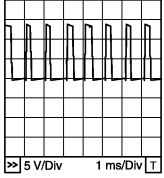
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L	Throttle control motor relay power supply	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	<b>[Ignition switch: OFF]</b>	BATTERY VOLTAGE (11 - 14V)
			<b>[Ignition switch: ON]</b>	0 - 1.0V

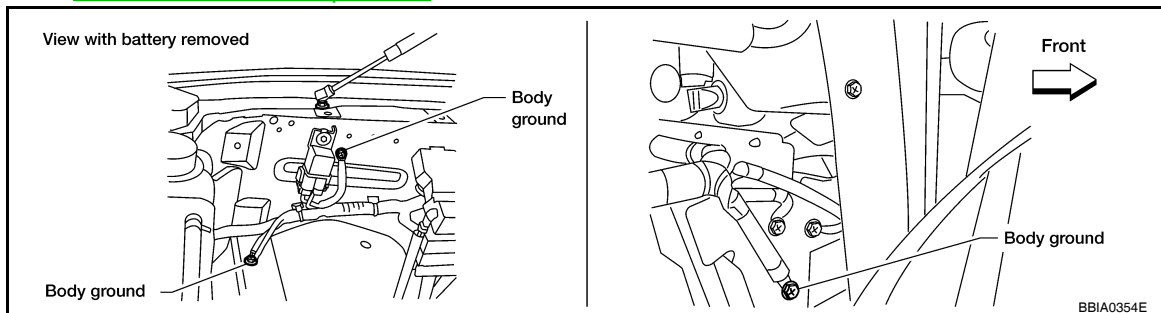
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532095

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

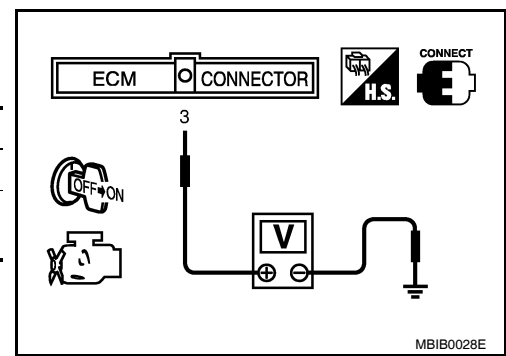
## < SERVICE INFORMATION >

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

### OK or NG

- OK >> GO TO 9.  
NG >> GO TO 3.



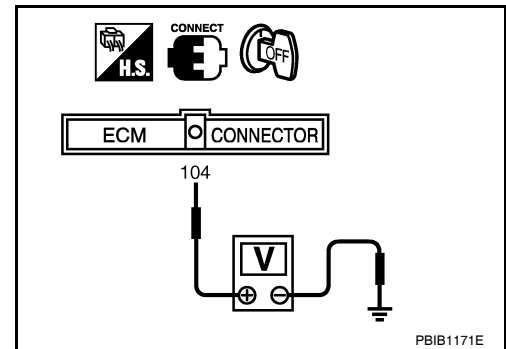
## 3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 6.  
NG >> GO TO 4.



## 4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E122.
3. Check harness continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 5.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5.CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

### OK or NG

- OK >> GO TO 8.  
NG >> Replace 20A fuse.

## 6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E119.
3. Check harness continuity between ECM terminal 3 and IPDM E/R terminal 6. Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 7.

# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between ECM and IPDM E/R

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

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

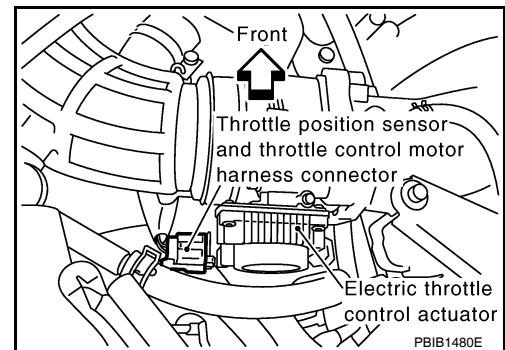
OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).
- NG >> Repair or replace harness or connectors.

## 9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.  
Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist



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

OK or NG

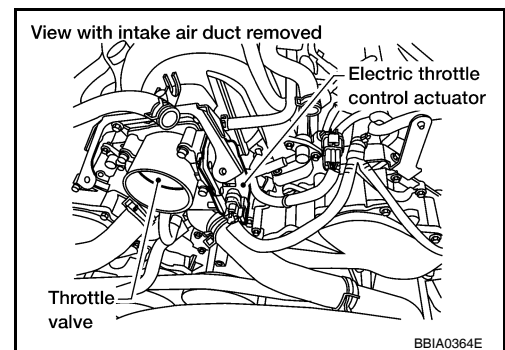
- OK >> GO TO 10.
- NG >> Repair or replace.

## 10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

- OK >> GO TO 11.
- NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



## 11. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-553, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
- NG >> GO TO 13.

## 12. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

OK or NG

- OK >> GO TO 13.



# DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

## < SERVICE INFORMATION >

NG >> Repair or replace harness or connectors.

### 13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> INSPECTION END

## Component Inspection

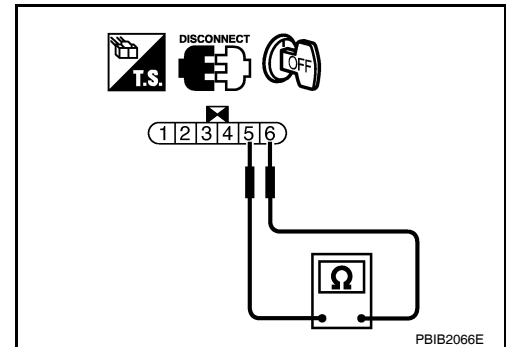
INFOID:000000003532096

### THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

**Resistance: Approximately 1 - 15  $\Omega$  [at 25 °C (77°F)]**

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-78, "Idle Air Volume Learning"](#) .



INFOID:000000003532097

## Removal and Installation

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#).

# DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

## DTC P2118 THROTTLE CONTROL MOTOR

### Component Description

INFOID:000000003532098

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.

### On Board Diagnosis Logic

INFOID:000000003532099

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118 2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	<ul style="list-style-type: none"><li>• Harness or connectors (Throttle control motor circuit is shorted.)</li><li>• Electric throttle control actuator (Throttle control motor)</li></ul>

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### DTC Confirmation Procedure

INFOID:000000003532100

#### NOTE:

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

#### ④ WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to [EC-556, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.

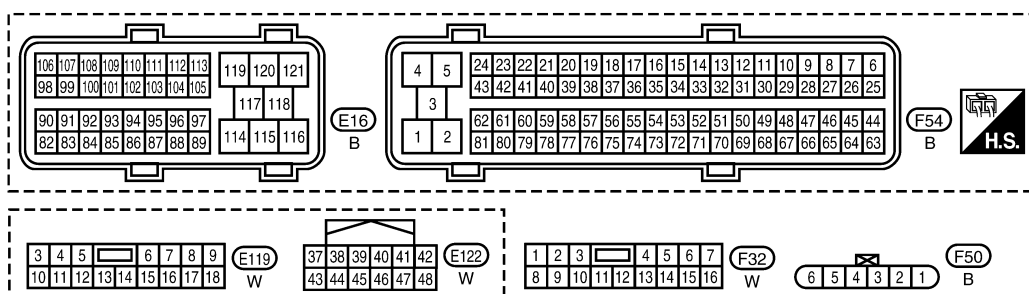
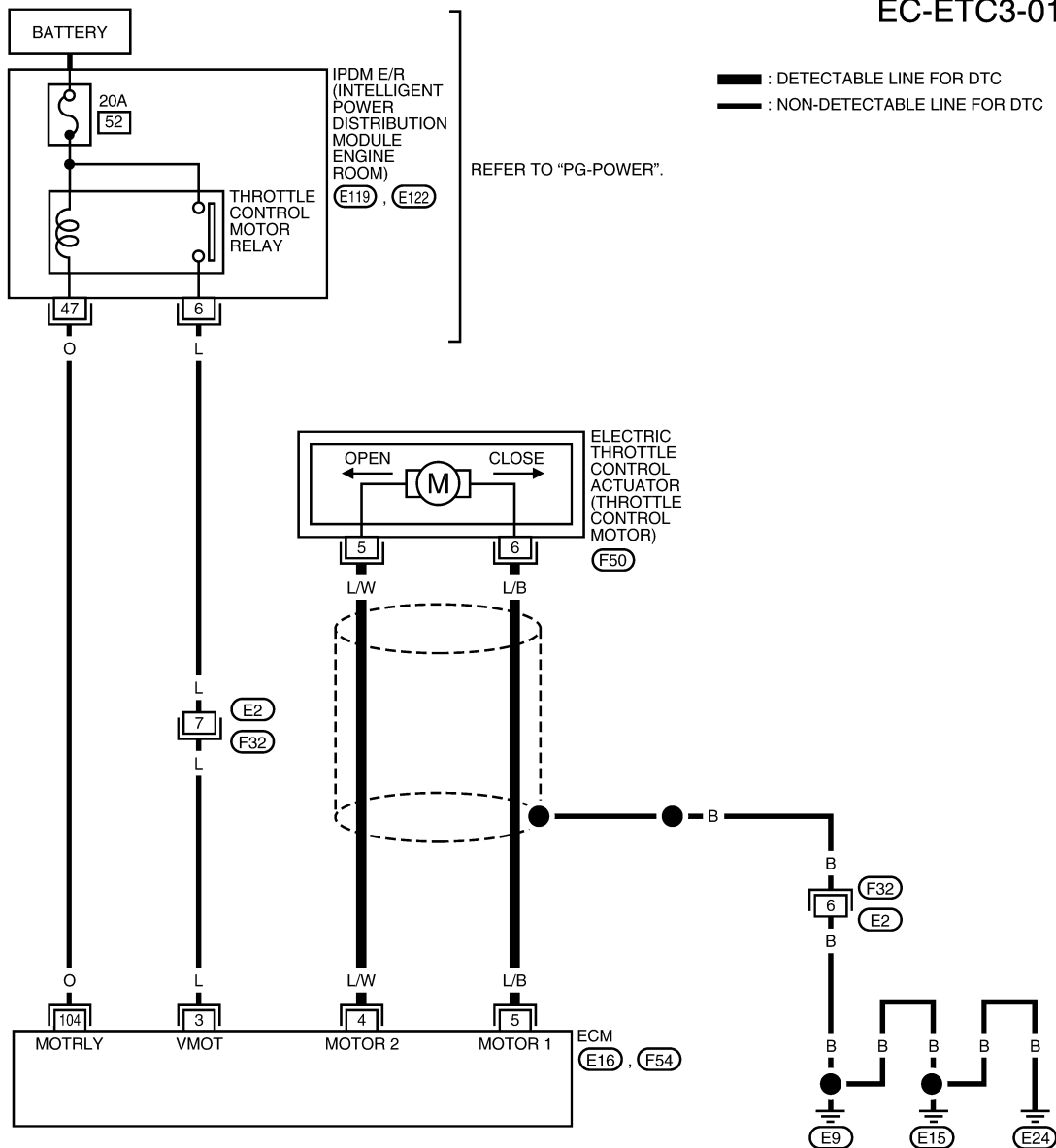
# DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532101

EC-ETC3-01



BBWA2101E

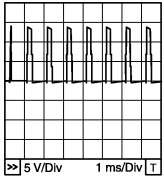
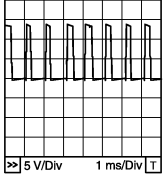
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P2118 THROTTLE CONTROL MOTOR

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L	Throttle control motor relay power supply	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14V★ 
5	L/B	Throttle control motor (Open)	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14V★ 
104	O	Throttle control motor relay	<b>[Ignition switch: OFF]</b>	BATTERY VOLTAGE (11 - 14V)
			<b>[Ignition switch: ON]</b>	0 - 1.0V

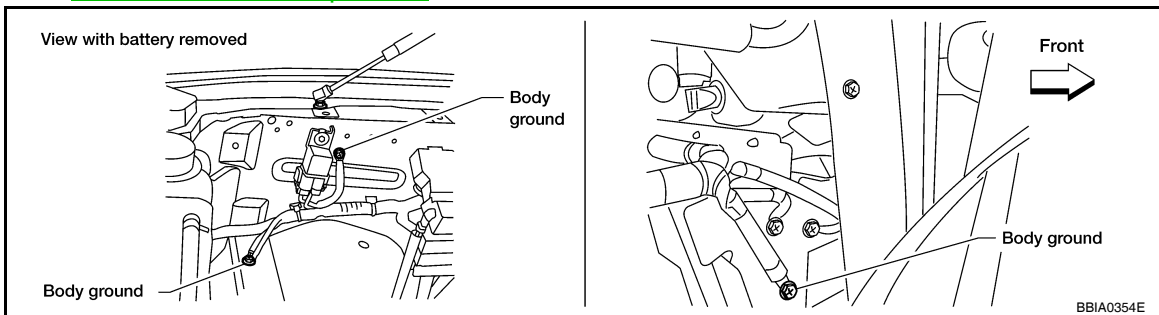
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532102

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

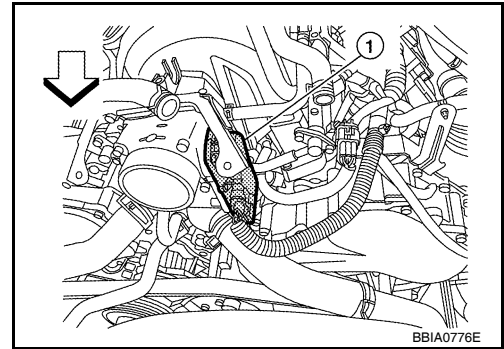
- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

# DTC P2118 THROTTLE CONTROL MOTOR

## < SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
  - Illustration shows the view with intake air duct removed.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

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

### OK or NG

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

## 3. CHECK THROTTLE CONTROL MOTOR

Refer to [EC-557, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 4.
- NG >> GO TO 5.

## 4. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

### OK or NG

- OK >> GO TO 5.
- NG >> Repair or replace harness or connectors.

## 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

## Component Inspection

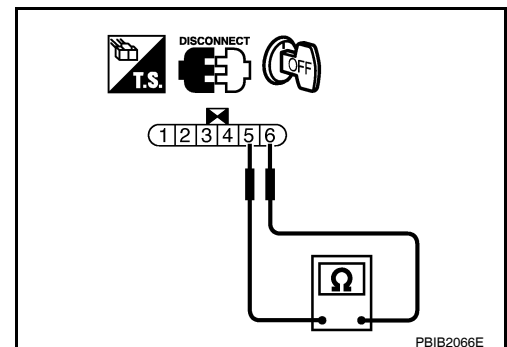
INFOID:000000003532103

### THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

**Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]**

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-78, "Idle Air Volume Learning"](#).



PBIB2066E

## Removal and Installation

INFOID:000000003532104

### ELECTRIC THROTTLE CONTROL ACTUATOR

## DTC P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

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Refer to [EM-17](#).

# DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

## DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

### Component Description

INFOID:000000003532105

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

### On Board Diagnosis Logic

INFOID:000000003532106

**This self-diagnosis has one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119 2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

### DTC Confirmation Procedure

INFOID:000000003532107

#### NOTE:

- Perform **PROCEDURE FOR MALFUNCTION A AND B** first. If the DTC cannot be confirmed, perform **PROCEDURE FOR MALFUNCTION C**.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### PROCEDURE FOR MALFUNCTION A AND B

① With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to D position and wait at least 3 seconds.
4. Shift selector lever to P or N position.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position and wait at least 3 seconds.
8. Shift selector lever to P or N position.
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. If DTC is detected, go to [EC-560, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

② With GST

# DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

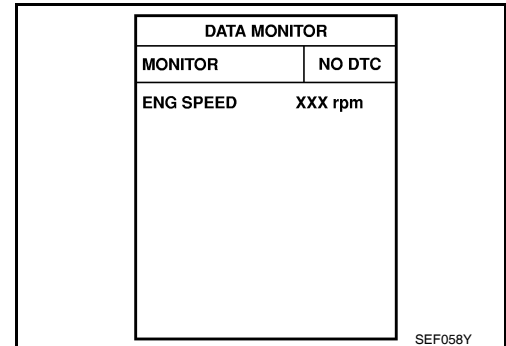
## < SERVICE INFORMATION >

Follow the procedure "With CONSULT-II" above.

### PROCEDURE FOR MALFUNCTION C

#### Ⓟ With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to D position and wait at least 3 seconds.
4. Shift selector lever to P position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to [EC-560. "Diagnosis Procedure"](#).



#### Ⓢ With GST

Follow the procedure "With CONSULT-II" above.

### Diagnosis Procedure

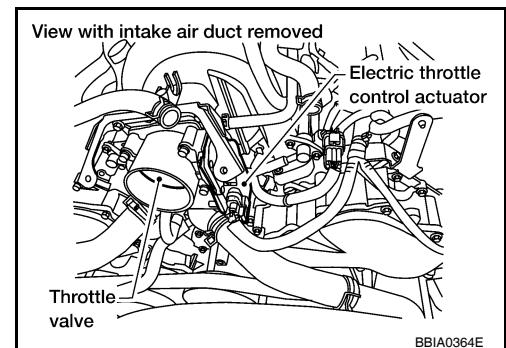
INFOID:000000003532108

## 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

#### OK or NG

- OK >> GO TO 2.  
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



## 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78. "Idle Air Volume Learning"](#).

>> INSPECTION END



# DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

## DTC P2122, P2123 APP SENSOR

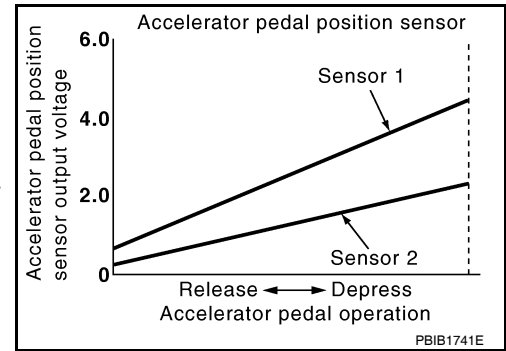
### Component Description

INFOID:000000003532109

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532110

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

\*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminal voltage.

### On Board Diagnosis Logic

INFOID:000000003532111

These self-diagnoses have the one trip detection logic.

#### NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (The APP sensor 1 circuit is open or shorted.)</li> <li>• Accelerator pedal position sensor (Accelerator pedal position sensor 1)</li> </ul>
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

#### Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:000000003532112

#### NOTE:

## DTC P2122, P2123 APP SENSOR

### < SERVICE INFORMATION >

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 8V at idle.

#### ④ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-564. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P2122, P2123 APP SENSOR

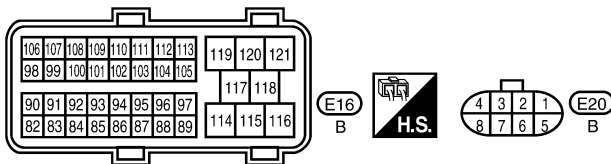
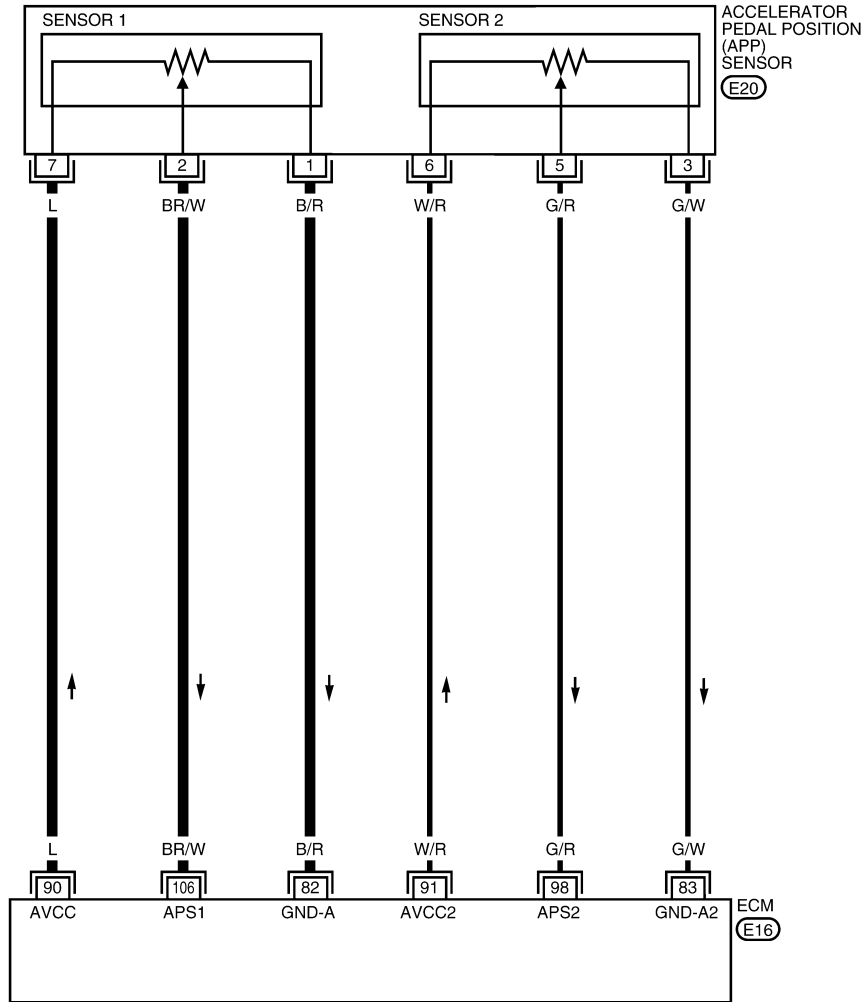
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532113

EC-APPS1-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA1706E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P2122, P2123 APP SENSOR

## < SERVICE INFORMATION >

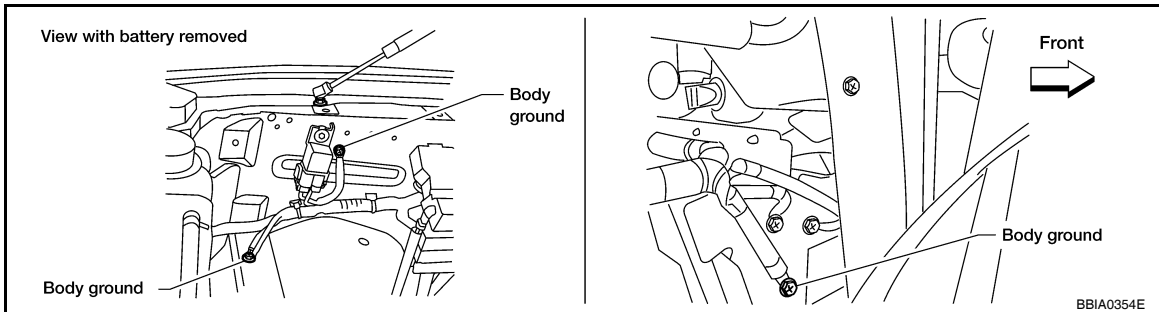
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B/R	Sensor ground (APP sensor 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
83	G/W	Sensor ground (APP sensor 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	<b>[Ignition switch: ON]</b>	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V
98	G/R	Accelerator pedal position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.25 - 0.50V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V
106	BR/W	Accelerator pedal position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.5 - 1.0V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V

## Diagnosis Procedure

INFOID:000000003532114

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

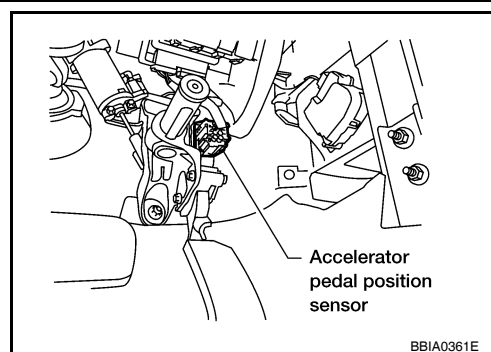
- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

### 2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

## DTC P2122, P2123 APP SENSOR

### < SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

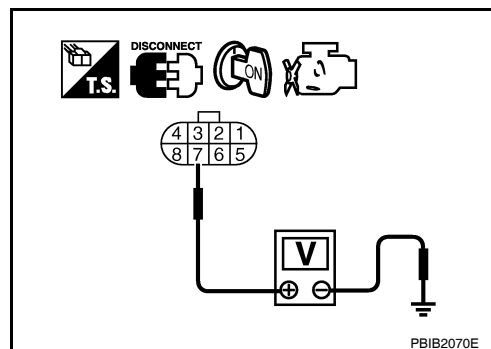


3. Check voltage between APP sensor terminal 7 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

#### OK or NG

- OK >> GO TO 3.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



### 3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 4.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 5.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5.CHECK APP SENSOR

Refer to [EC-566. "Component Inspection"](#) .

#### OK or NG

- OK >> GO TO 7.  
NG >> GO TO 6.

### 6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform [EC-77. "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-77. "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-78. "Idle Air Volume Learning"](#) .

# DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

>> INSPECTION END

## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> INSPECTION END

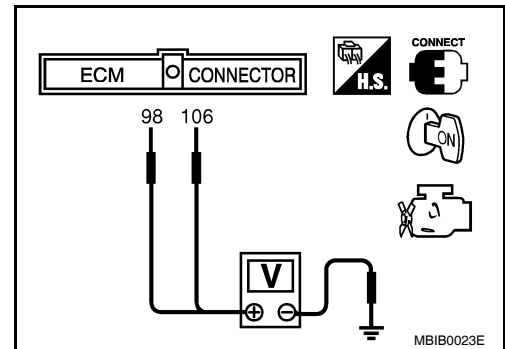
## Component Inspection

INFOID:000000003532115

### ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 4.8V
98 (Accelerator pedal position sensor 2)	Fully released	0.25 - 0.5V
	Fully depressed	2.0 - 2.5V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-78, "Idle Air Volume Learning"](#).

## Removal and Installation

INFOID:000000003532116

### ACCELERATOR PEDAL

Refer to [ACC-3](#).

# DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

## DTC P2127, P2128 APP SENSOR

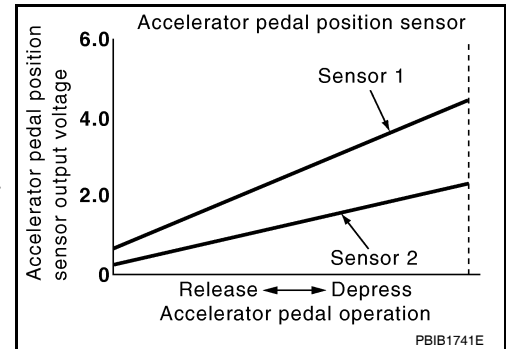
### Component Description

INFOID:000000003532117

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532118

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.5 - 1.0V
	Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	0.5 - 1.0V
	Accelerator pedal: Fully depressed	4.2 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped) Accelerator pedal: Fully released	ON
	Accelerator pedal: Slightly depressed	OFF

\*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminal voltage.

### On Board Diagnosis Logic

INFOID:000000003532119

**These self-diagnoses have the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	<ul style="list-style-type: none"> <li>• Harness or connectors (APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted.)</li> <li>• Accelerator pedal position sensor (Accelerator pedal position sensor 2)</li> <li>• Electric throttle control actuator (TP sensor)</li> </ul>
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

#### Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:000000003532120

#### NOTE:

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

## DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

---

### TESTING CONDITION:

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

#### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-570, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.



# DTC P2127, P2128 APP SENSOR

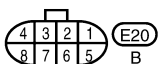
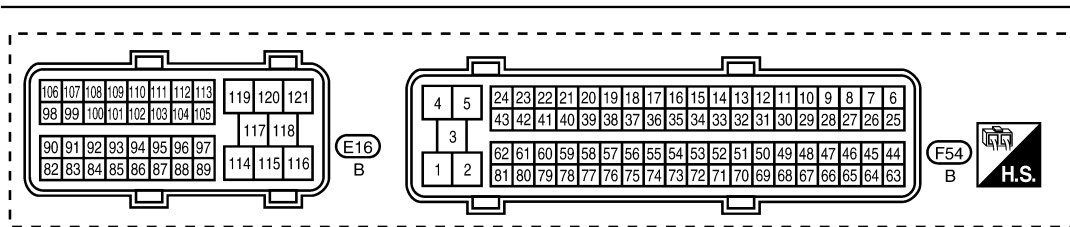
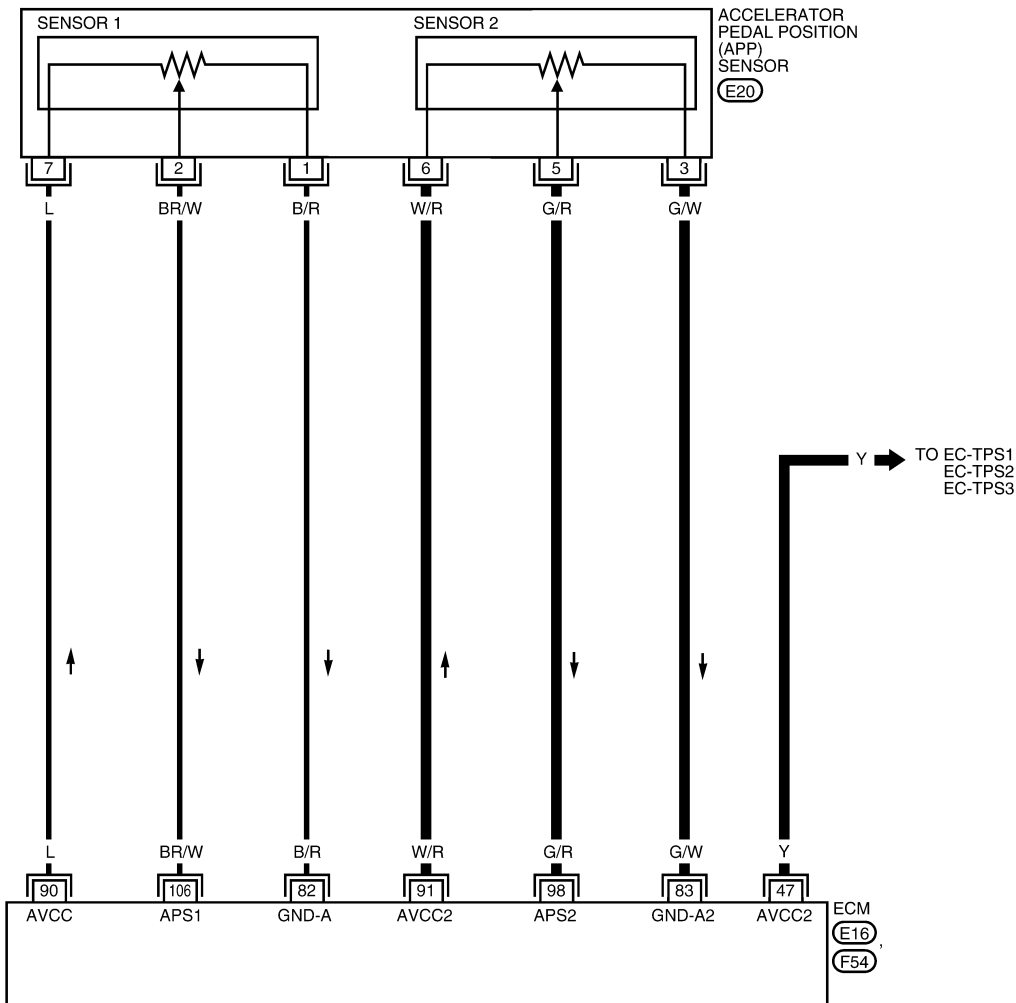
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532121

### EC-APPS2-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA1707E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P2127, P2128 APP SENSOR

## < SERVICE INFORMATION >

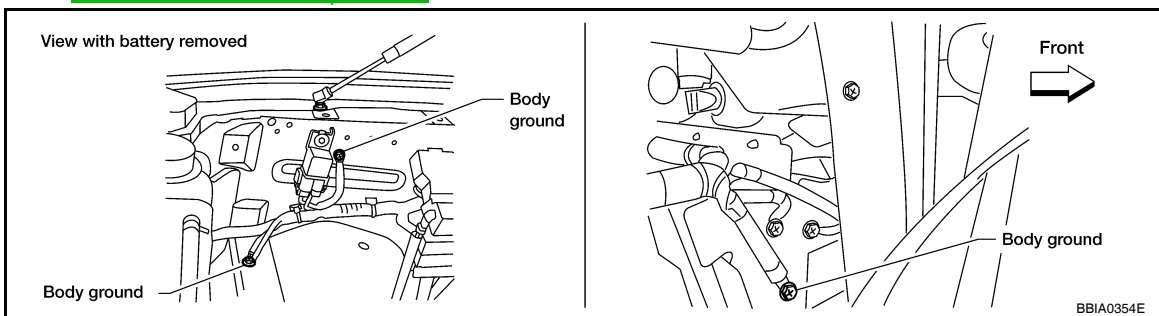
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	Y	Sensor power supply (TP sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
82	B/R	Sensor ground (APP sensor 1)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
83	G/W	Sensor ground (APP sensor 2)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	<b>[Ignition switch: ON]</b>	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V
98	G/R	Accelerator pedal position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.25 - 0.50V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V
106	BR/W	Accelerator pedal position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully released	0.5 - 1.0V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V

## Diagnosis Procedure

INFOID:000000003532122

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

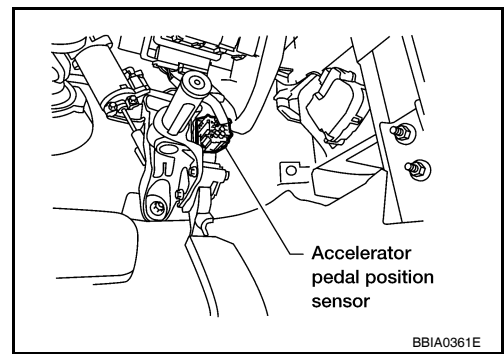
- OK >> GO TO 2.  
 NG >> Repair or replace ground connections.

### 2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

## DTC P2127, P2128 APP SENSOR

### < SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

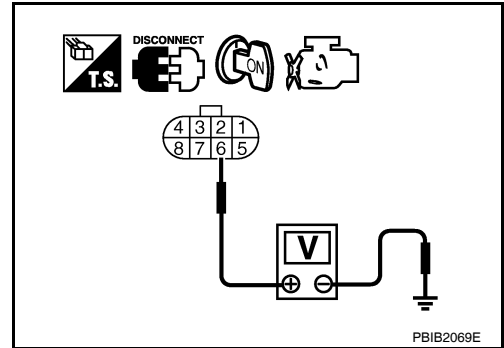


3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

- OK    >> GO TO 7.  
 NG    >> GO TO 3.



### 3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 6 and ECM terminal 91. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

- OK    >> GO TO 4.  
 NG    >> Repair open circuit.

### 4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	<a href="#">EC-576</a>
91	APP sensor terminal 6	<a href="#">EC-569</a>

OK or NG

- OK    >> GO TO 5.  
 NG    >> Repair short to ground or short to power in harness or connectors.

### 5. CHECK THROTTLE POSITION SENSOR

Refer to [EC-579. "Component Inspection"](#) .

OK or NG

- OK    >> GO TO 11.  
 NG    >> GO TO 6.

### 6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-77. "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-78. "Idle Air Volume Learning"](#) .

## DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

---

>> **INSPECTION END**

### 7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

---

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 83 and APP sensor terminal 3.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

### 8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 5.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 9.

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

### 9. CHECK APP SENSOR

---

Refer to [EC-572, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

### 10. REPLACE ACCELERATOR PEDAL ASSEMBLY

---

1. Replace the accelerator pedal assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

### 11. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

>> **INSPECTION END**

## Component Inspection

INFOID:000000003532123

### ACCELERATOR PEDAL POSITION SENSOR

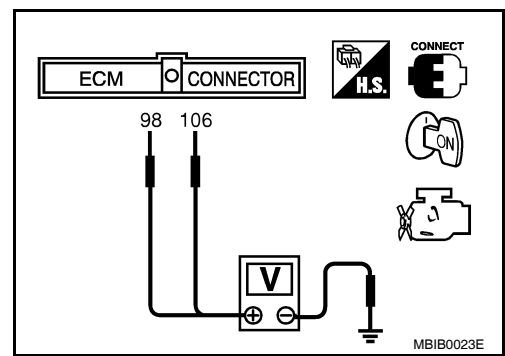
1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

## DTC P2127, P2128 APP SENSOR

### < SERVICE INFORMATION >

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 4.8V
98 (Accelerator pedal position sensor 2)	Fully released	0.25 - 0.5V
	Fully depressed	2.0 - 2.5V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-78, "Idle Air Volume Learning"](#).

### Removal and Installation

INFOID:000000003532124

### ACCELERATOR PEDAL

Refer to [ACC-3](#).

# DTC P2135 TP SENSOR

< SERVICE INFORMATION >

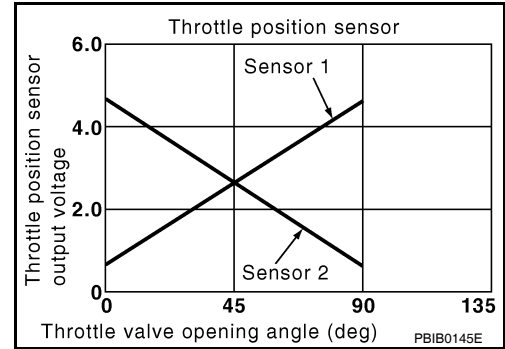
## DTC P2135 TP SENSOR

### Component Description

INFOID:000000003532125

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

The throttle position sensor has the 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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532126

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Selector lever: D Accelerator pedal: Fully released	More than 0.36V
	Accelerator pedal: Fully depressed	Less than 4.75V

\*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

### On Board Diagnosis Logic

INFOID:000000003532127

**This self-diagnosis has the one trip detection logic.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	<ul style="list-style-type: none"> <li>• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.)</li> <li>• Electric throttle control actuator (TP sensor 1 and 2)</li> <li>• Accelerator pedal position sensor (APP sensor 2)</li> </ul>

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:000000003532128

#### NOTE:

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 8V at idle.**

#### Ⓟ WITH CONSULT-II

1. Turn ignition switch ON.

# DTC P2135 TP SENSOR

## < SERVICE INFORMATION >

2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-577. "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

A

EC

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P

# DTC P2135 TP SENSOR

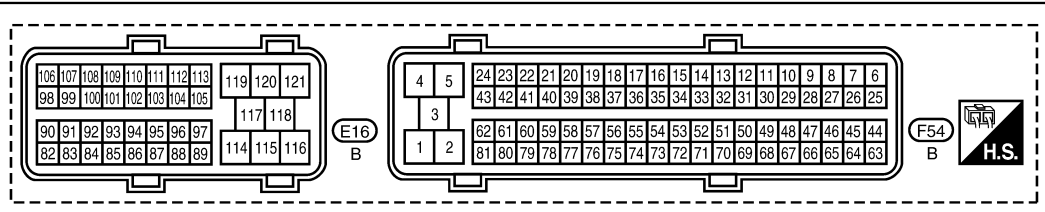
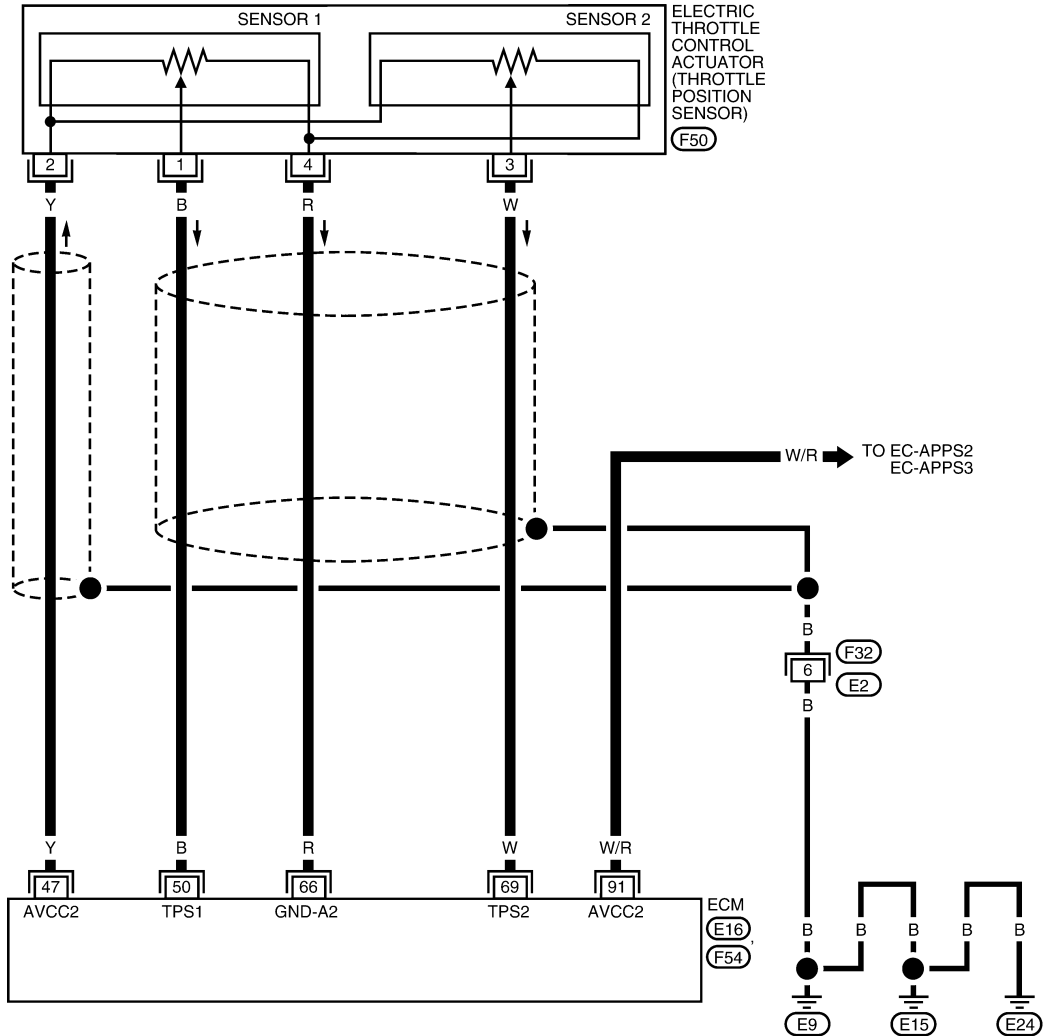
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532129

### EC-TPS3-01

: DETECTABLE LINE FOR DTC  
 : NON-DETECTABLE LINE FOR DTC



BBWA2093E

Specification data are reference values and are measured between each terminal and ground.  
**CAUTION:**  
 Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P2135 TP SENSOR

## < SERVICE INFORMATION >

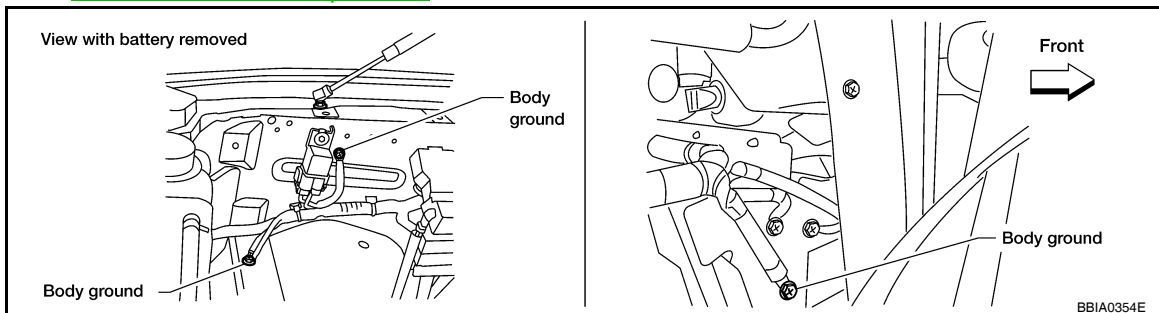
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	Y	Sensor power supply (Throttle position sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
50	B	Throttle position sensor 1	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	More than 0.36V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
69	W	Throttle position sensor 2	<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75V
			<b>[Ignition switch: ON]</b> • Engine: Stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	<b>[Ignition switch: ON]</b>	Approximately 5V

## Diagnosis Procedure

INFOID:000000003532130

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.  
Refer to [EC-143. "Ground Inspection"](#).



#### OK or NG

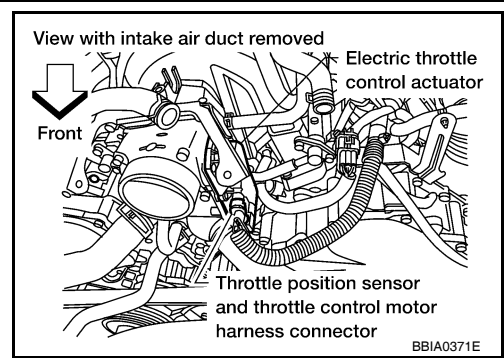
- OK >> GO TO 2.  
 NG >> Repair or replace ground connections.

### 2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

## DTC P2135 TP SENSOR

### < SERVICE INFORMATION >

1. Disconnect electric throttle control actuator (1) harness connector.
  - Illustration shows the view with intake air duct removed.
2. Turn ignition switch ON.

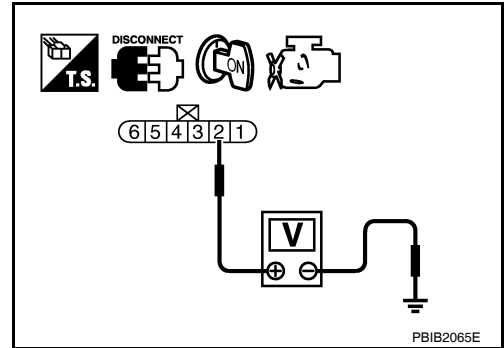


3. Check voltage between electric throttle control actuator (1) terminal 2 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 3.



### 3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

- OK >> GO TO 4.
- NG >> Repair open circuit.

### 4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	<a href="#">EC-576</a>
91	APP sensor terminal 6	<a href="#">EC-583</a>

OK or NG

- OK >> GO TO 5.
- NG >> Repair short to ground or short to power in harness or connectors.

### 5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to [EC-587, "Component Inspection"](#).

OK or NG

- OK >> GO TO 11.
- NG >> GO TO 6.

### 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-78, "Idle Air Volume Learning"](#).

# DTC P2135 TP SENSOR

< SERVICE INFORMATION >

---

>> **INSPECTION END**

## 7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

---

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 8.

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

## 8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 9.

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

## 9. CHECK THROTTLE POSITION SENSOR

---

Refer to [EC-579, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

---

1. Replace the electric throttle control actuator.
2. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-78, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

## 11. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003532131

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set selector lever to D position.

# DTC P2135 TP SENSOR

## < SERVICE INFORMATION >

5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.

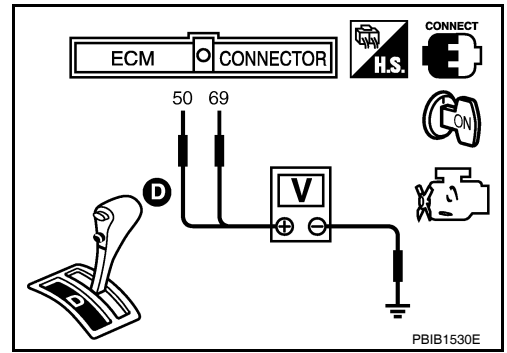
7. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).

8. Perform [EC-78, "Idle Air Volume Learning"](#).

## Removal and Installation

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-17](#).



INFOID:000000003532132

# DTC P2138 APP SENSOR

< SERVICE INFORMATION >

## DTC P2138 APP SENSOR

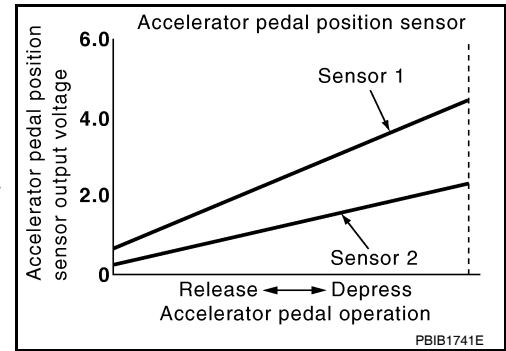
### Component Description

INFOID:000000003532133

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532134

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

\*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminal voltage.

### On Board Diagnosis Logic

INFOID:000000003532135

This self-diagnosis has the one trip detection logic.

#### NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-447](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul style="list-style-type: none"> <li>• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) (TP sensor circuit is shorted.)</li> <li>• Accelerator pedal position sensor 1 and 2</li> <li>• Electric throttle control actuator (TP sensor)</li> </ul>

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

# DTC P2138 APP SENSOR

< SERVICE INFORMATION >

## DTC Confirmation Procedure

INFOID:000000003532136

### NOTE:

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 8V at idle.

#### ④ WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to [EC-584, "Diagnosis Procedure"](#).

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

#### ④ WITH GST

Follow the procedure "WITH CONSULT-II" above.

# DTC P2138 APP SENSOR

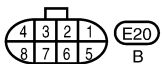
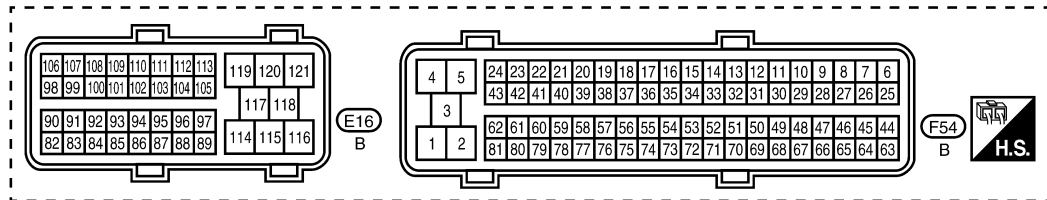
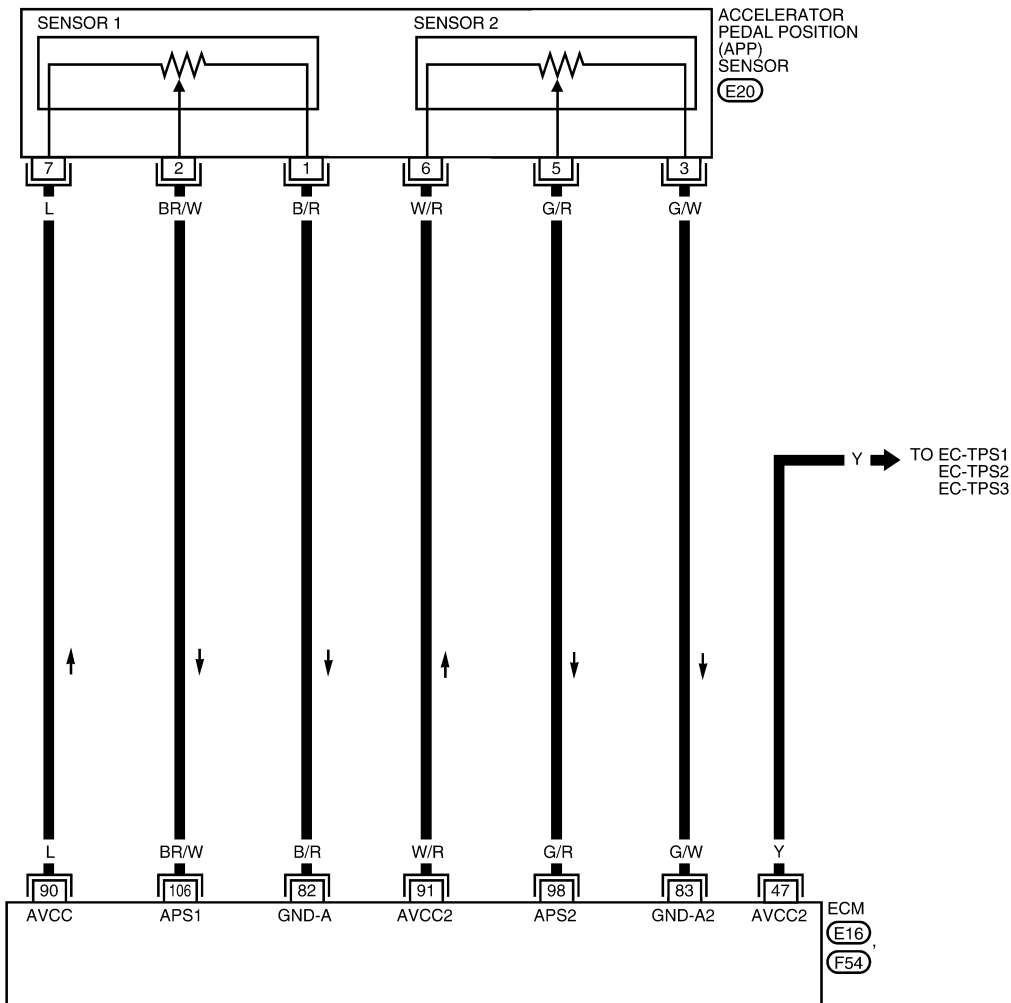
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532137

### EC-APPS3-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA1709E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# DTC P2138 APP SENSOR

## < SERVICE INFORMATION >

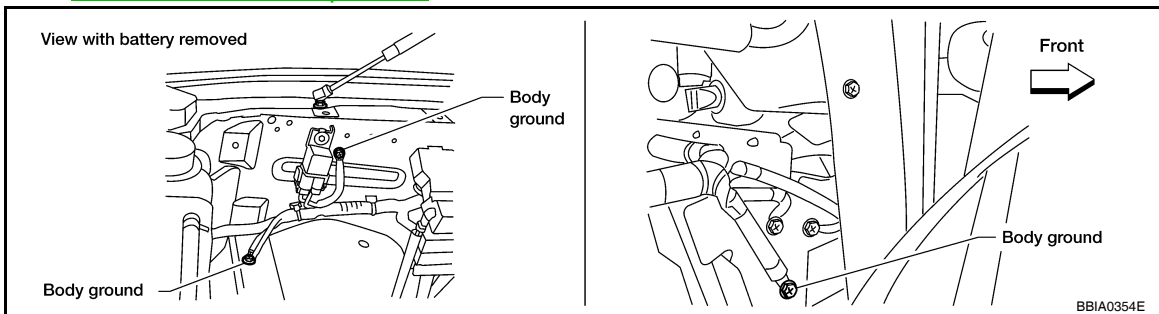
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	Y	Sensor power supply (TP sensor)	[Ignition switch: ON]	Approximately 5V
82	B/R	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
83	G/W	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5V
98	G/R	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.25 - 0.50V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V
106	BR/W	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V

## Diagnosis Procedure

INFOID:000000003532138

### 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten three ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).



#### OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

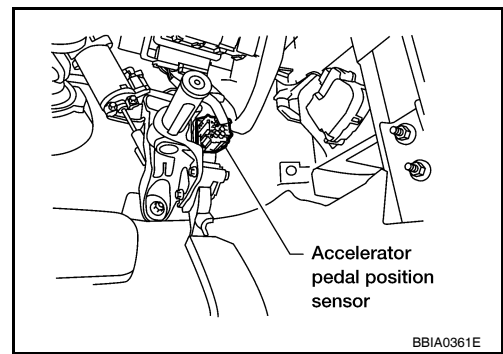
### 2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT



# DTC P2138 APP SENSOR

## < SERVICE INFORMATION >

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

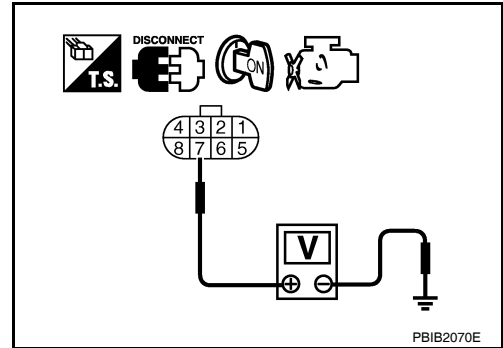


3. Check voltage between APP sensor terminal 7 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 3.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.



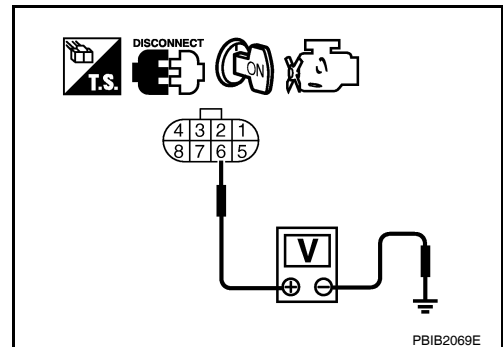
## 3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

### OK or NG

- OK >> GO TO 8.  
 NG >> GO TO 4.



## 4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 6 and ECM terminal 91. Refer to Wiring Diagram.

**Continuity should exist.**

### OK or NG

- OK >> GO TO 5.  
 NG >> Repair open circuit in harness or connectors.

## 5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	<a href="#">EC-576</a>
91	APP sensor terminal 6	<a href="#">EC-583</a>

### OK or NG

- OK >> GO TO 6.

## DTC P2138 APP SENSOR

### < SERVICE INFORMATION >

---

NG >> Repair short to ground or short to power in harness connectors.

### 6. CHECK THROTTLE POSITION SENSOR

---

Refer to [EC-579, "Component Inspection"](#) .

#### OK or NG

OK >> GO TO 12.

NG >> GO TO 7.

### 7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

---

1. Replace the electric throttle control actuator.
2. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
3. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

### 8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

---

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 1, ECM terminal 83 and APP sensor terminal 3.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 9.

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

### 9. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 2, ECM terminal 98 and APP sensor terminal 5.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 10.

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

### 10. CHECK ACCELERATOR PEDAL POSITION SENSOR

---

Refer to [EC-587, "Component Inspection"](#) .

#### OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

### 11. REPLACE ACCELERATOR PEDAL ASSEMBLY

---

1. Replace the accelerator pedal assembly.
2. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-77, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-78, "Idle Air Volume Learning"](#) .

>> **INSPECTION END**

### 12. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#) .

# DTC P2138 APP SENSOR

< SERVICE INFORMATION >

>> INSPECTION END

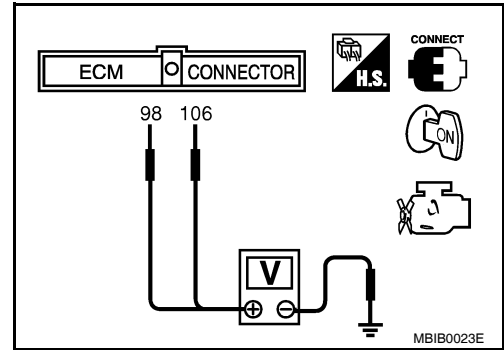
## Component Inspection

INFOID:000000003532139

### ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 4.8V
98 (Accelerator pedal position sensor 2)	Fully released	0.25 - 0.5V
	Fully depressed	2.0 - 2.5V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-77, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-77, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-78, "Idle Air Volume Learning"](#).

## Removal and Installation

INFOID:000000003532140

### ACCELERATOR PEDAL

Refer to [ACC-3](#).

# DTC P2A00, P2A03 A/F SENSOR 1

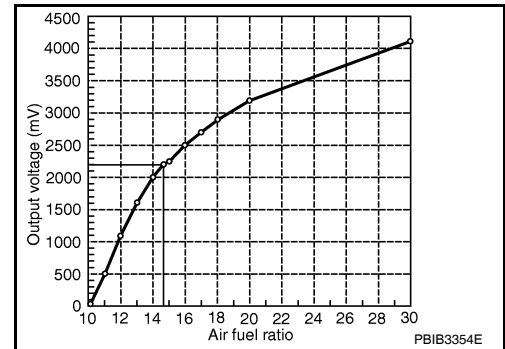
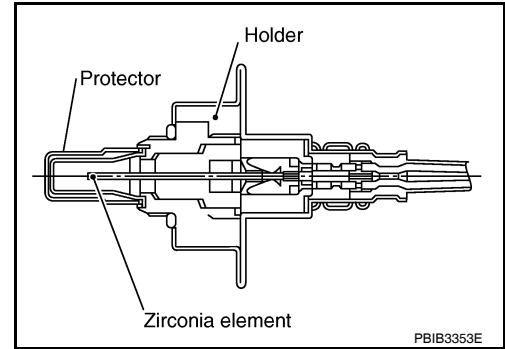
< SERVICE INFORMATION >

## DTC P2A00, P2A03 A/F SENSOR 1

### Component Description

INFOID:000000003532141

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532142

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	<ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Maintaining engine speed at 2,000 rpm</li> </ul>	Fluctuates around 2.2V

### On Board Diagnosis Logic

INFOID:000000003532143

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00 2A00 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit range/performance	<ul style="list-style-type: none"> <li>The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.</li> <li>The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.</li> </ul>	<ul style="list-style-type: none"> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>
P2A03 2A03 (Bank 2)			

### DTC Confirmation Procedure

INFOID:000000003532144

#### NOTE:

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 11V at idle.

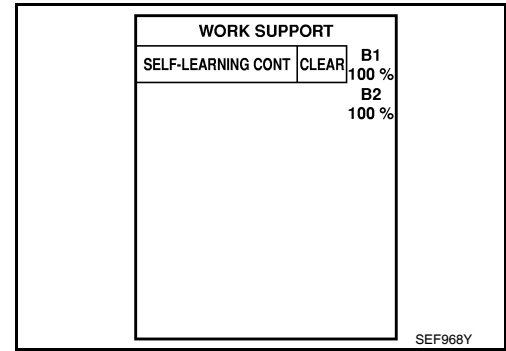
#### Ⓟ WITH CONSULT-II

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

# DTC P2A00, P2A03 A/F SENSOR 1

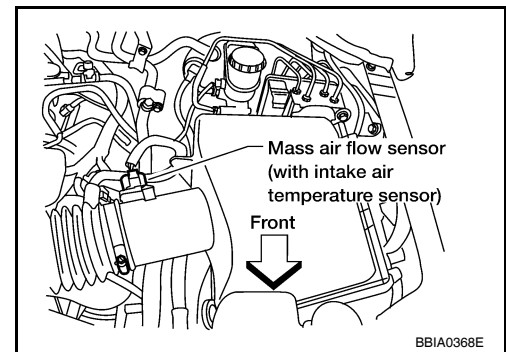
## < SERVICE INFORMATION >

- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning coefficient by touching "CLEAR".
- 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 1 minute under no load.
- Let engine idle for 1 minute.
- Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- If 1st trip DTC is detected, go to [EC-593. "Diagnosis Procedure"](#).



## WITH GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Disconnect mass air flow sensor harness connector.
- Start engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select Service \$03 with GST and make sure that DTC P0102 is detected.
- Select Service \$04 with GST and erase the DTC P0102.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
- Let engine idle for 1 minute.
- Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- Select Service \$07 with GST.  
If 1st trip DTC is detected, go to [EC-593. "Diagnosis Procedure"](#).



# DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

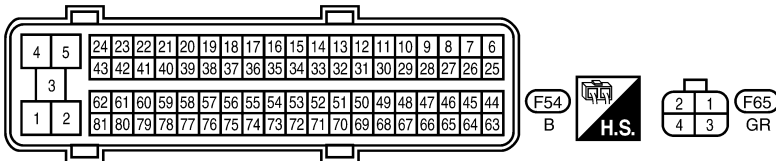
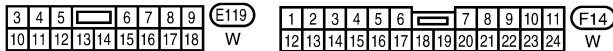
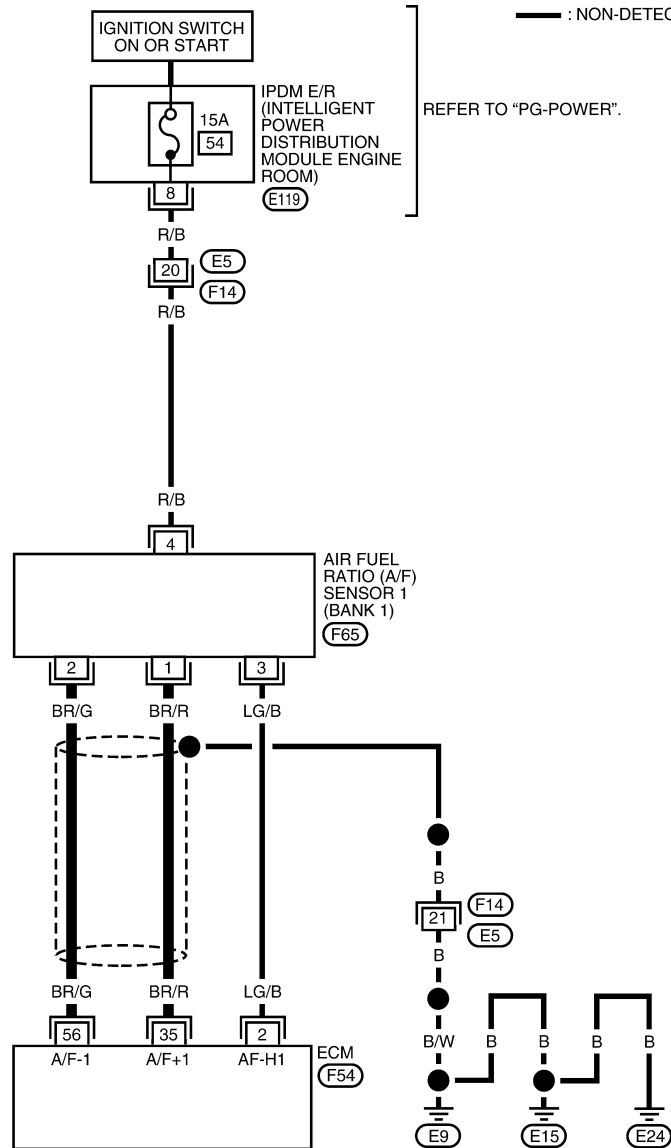
## Wiring Diagram

INFOID:000000003532145

BANK 1

EC-AF1B1-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA2790E

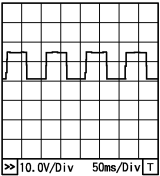
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# DTC P2A00, P2A03 A/F SENSOR 1

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	LG/B	A/F sensor 1 heater (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed (More than 140 seconds after starting engine)</li> </ul>	Approximately 2.9 - 8.8V★  <small>PBIA8148J</small>
35	BR/R	A/F sensor 1 (bank 1)	<b>[Engine is running]</b> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm</li> </ul>	Approximately 1.8V Output voltage varies with air fuel ratio.
56	BR/G	A/F sensor 1 (bank 1)	<b>[Ignition switch: ON]</b>	Approximately 2.2V

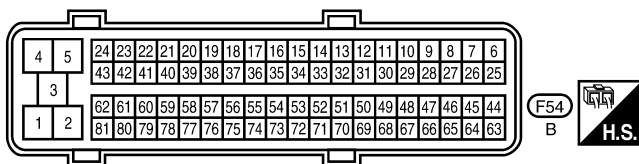
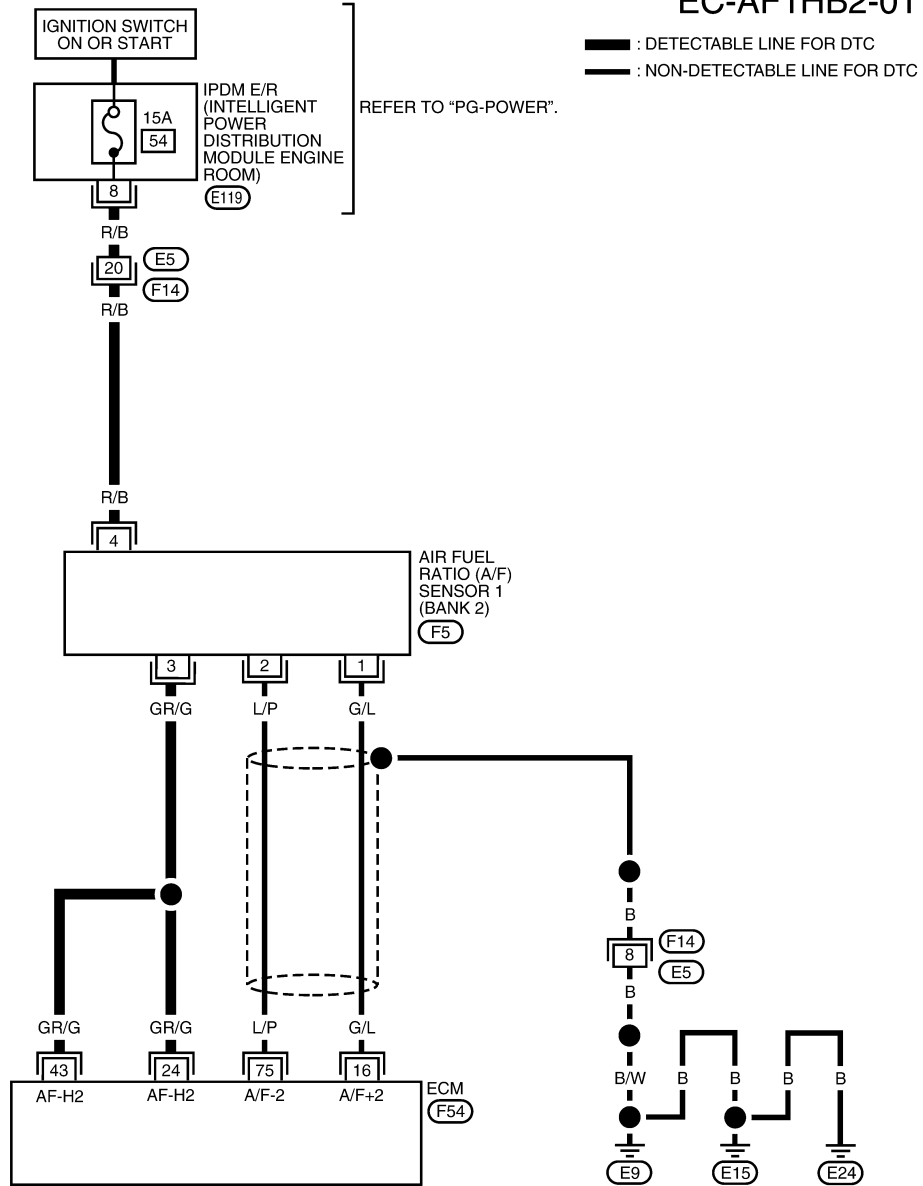
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1HB2-01



BBWA2789E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

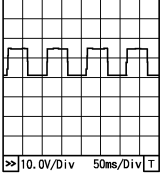
**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



# DTC P2A00, P2A03 A/F SENSOR 1

## < SERVICE INFORMATION >

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/L	A/F sensor 1 (bank 2)	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	GR/G GR/G	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  P81A8148J
75	L/P	A/F sensor 1 (bank 2)	[Ignition switch: ON]	Approximately 2.2V

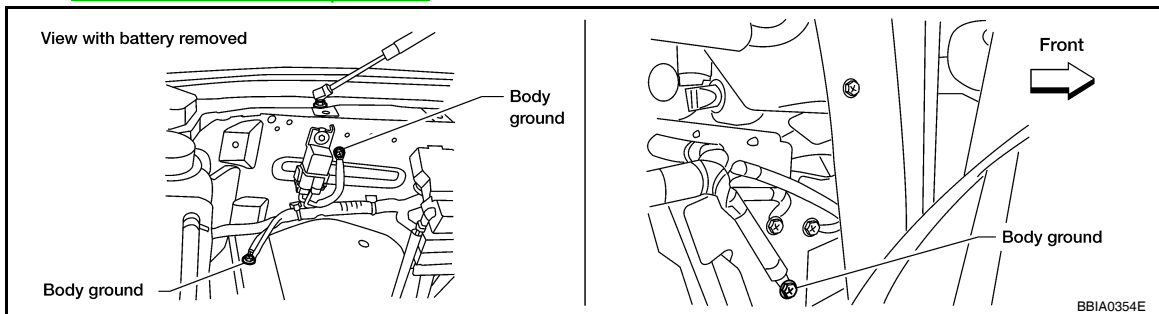
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532146

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.  
Refer to [EC-143, "Ground Inspection"](#).

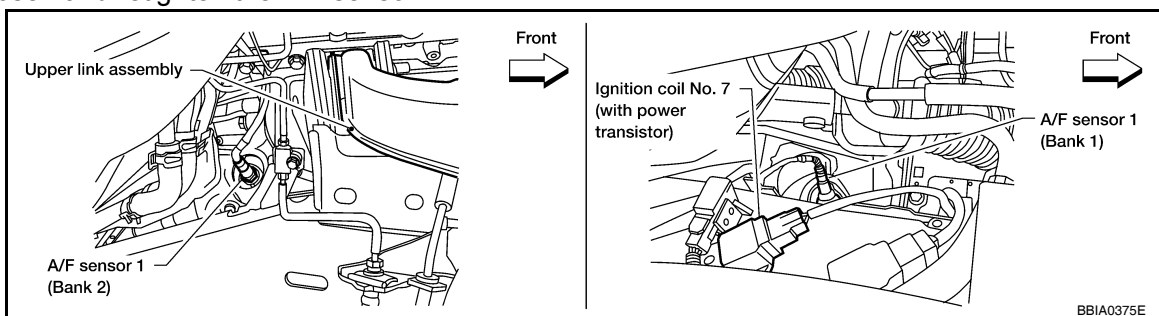


OK or NG

- OK >> GO TO 2.  
NG >> Repair or replace ground connections.

### 2. RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1.



**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

### 3. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.

# DTC P2A00, P2A03 A/F SENSOR 1

## < SERVICE INFORMATION >

- Listen for an intake air leak after the mass air flow sensor.

### OK or NG

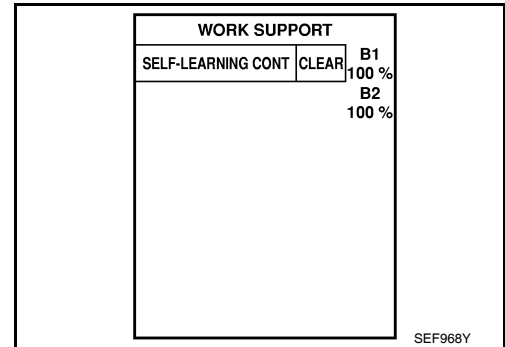
- OK >> GO TO 4.
- NG >> Repair or replace.

## 4. CLEAR THE SELF-LEARNING DATA

### With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

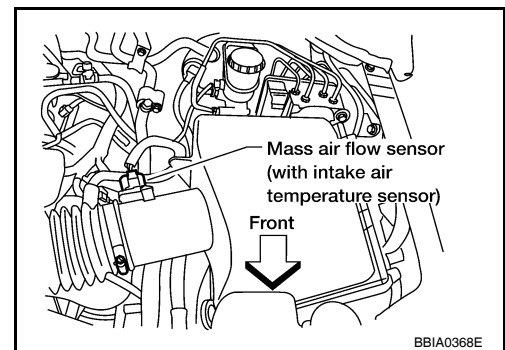
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



### Without CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- Make sure DTC P0102 is displayed.
- Erase the DTC memory. Refer to [EC-49, "Emission-related Diagnostic Information"](#).
- Make sure DTC P0000 is displayed.
- Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**

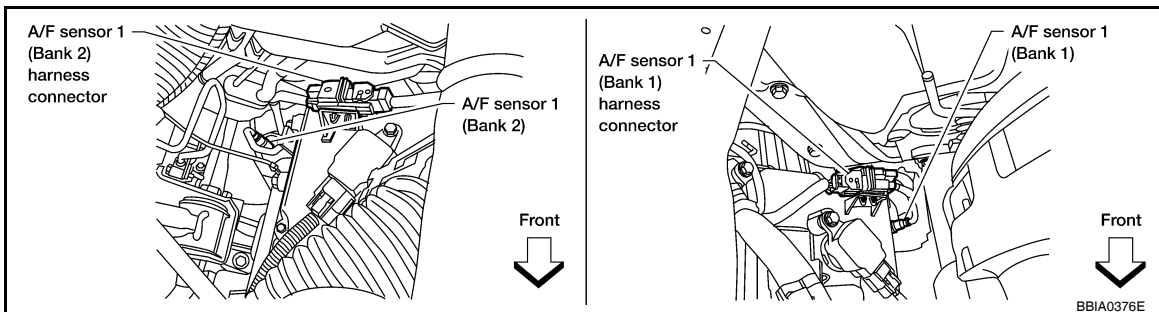


### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-292](#) or [EC-301](#).
- No >> GO TO 5.

## 5. CHECK HARNESS CONNECTOR

- Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.



- Check harness connector for water.

**Water should not exit.**

### OK or NG

- OK >> GO TO 6.
- NG >> Repair or replace harness connector.

# DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

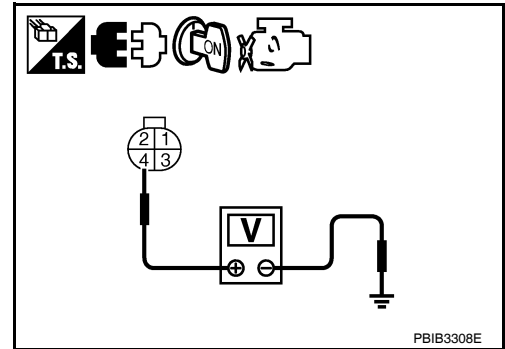
## 6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 8.  
 NG >> GO TO 7.



## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	35
	2	56
Bank 2	1	16
	2	75

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	35	1	16
2	56	2	75

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

- OK >> GO TO 9.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK A/F SENSOR 1 HEATER

Refer to [EC-168, "Component Inspection"](#).

OK or NG

# DTC P2A00, P2A03 A/F SENSOR 1

## < SERVICE INFORMATION >

- OK >> GO TO 10.
- NG >> GO TO 11.

### 10. CHECK INTERMITTENT INCIDENT

Perform [EC-138](#).

#### OK or NG

- OK >> GO TO 11.
- NG >> Repair or replace.

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

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

#### CAUTION:

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

>> GO TO 12.

### 12. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch OFF and then ON.
2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-II.
3. Make sure that "0.000" is displayed on CONSULT-II screen.

>> **INSPECTION END**

DATA MONITOR	
MONITORING	NO DTC
A/F ADJ-B1	0.000
A/F ADJ-B2	0.000

PBIB3202E

## Removal and Installation

INFOID:000000003532147

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-21](#).

# ASCD BRAKE SWITCH

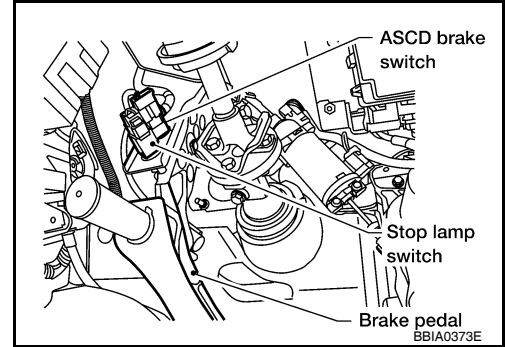
< SERVICE INFORMATION >

## ASCD BRAKE SWITCH

### Component Description

INFOID:000000003532148

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to [EC-30](#) for the ASCD function.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532149

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released	ON
		• Brake pedal: Slightly depressed	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	• Brake pedal: Fully released	OFF
		• Brake pedal: Slightly depressed	ON

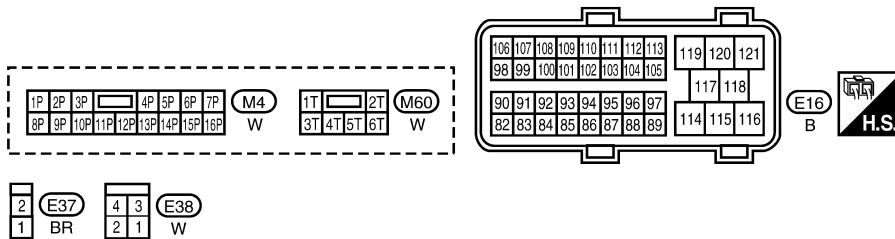
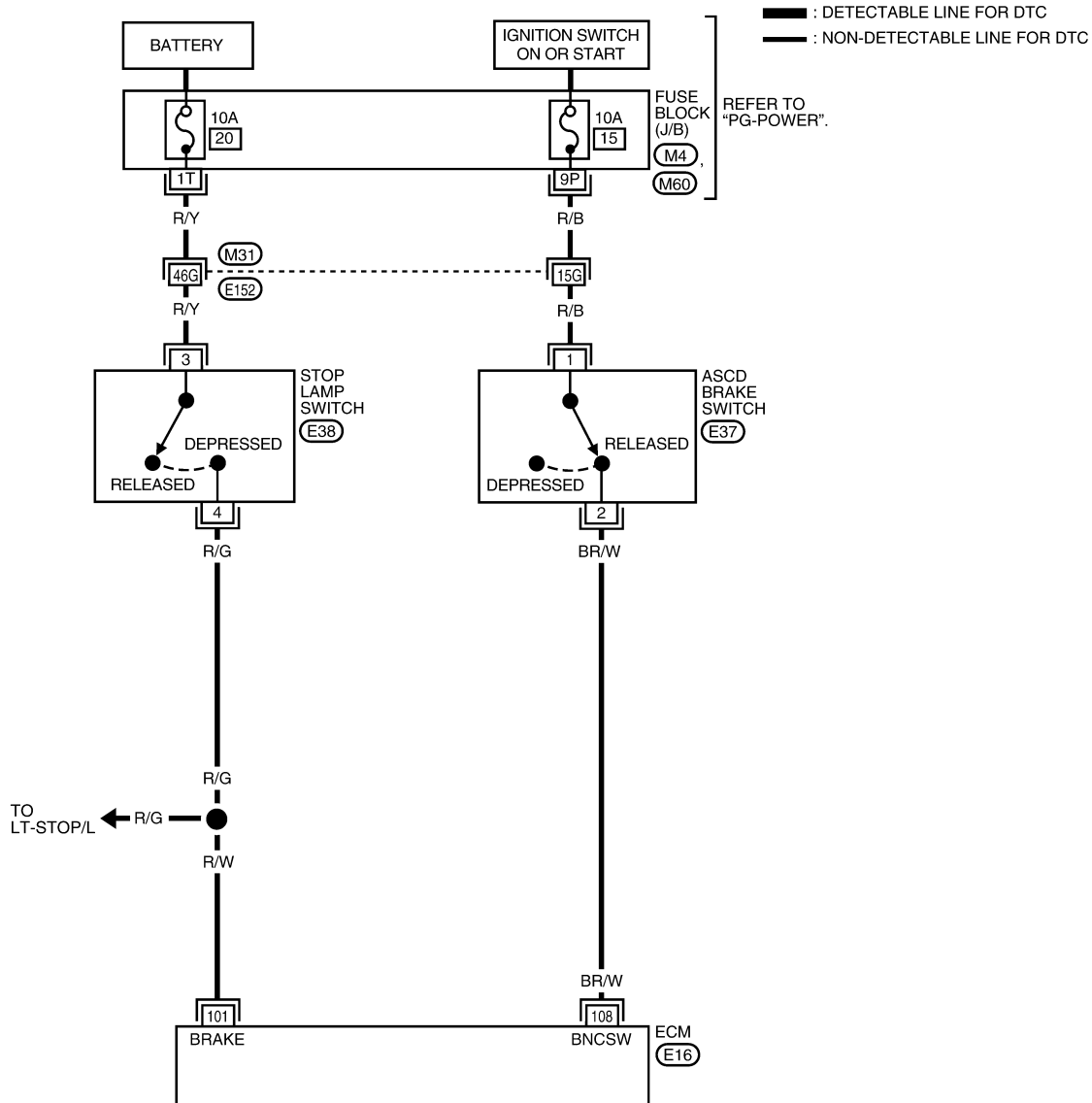
# ASC D BRAKE SWITCH

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532150

### EC-ASCBOF-01



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1716E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/W	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	BR/W	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

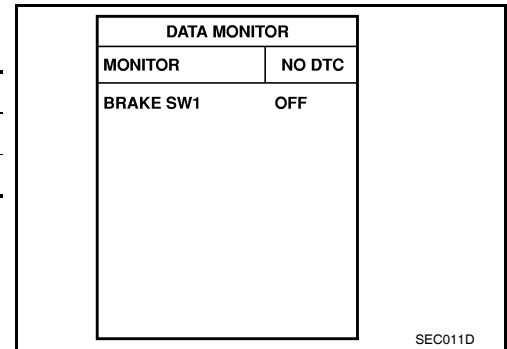
INFOID:000000003532151

### 1. CHECK OVERALL FUNCTION-I

#### ④ With CONSULT-II

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
- Check "BRAKE SW1" indication under the following conditions.

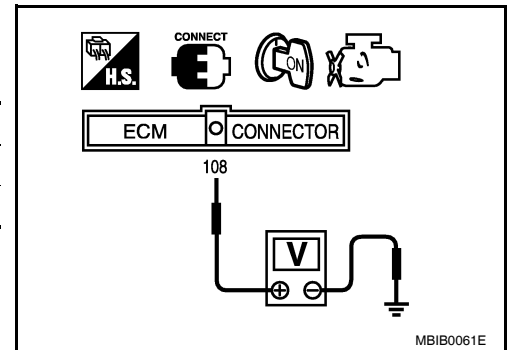
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



#### ⊗ Without CONSULT-II

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



### OK or NG

- OK >> GO TO 2.  
NG >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

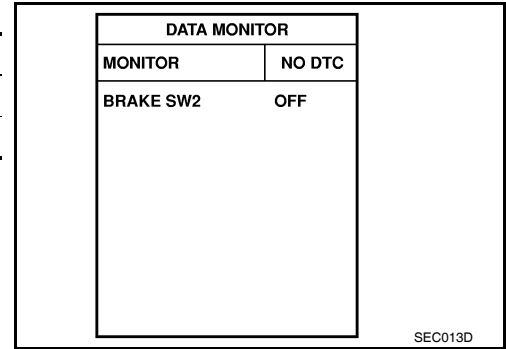
#### ④ With CONSULT-II

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

# ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

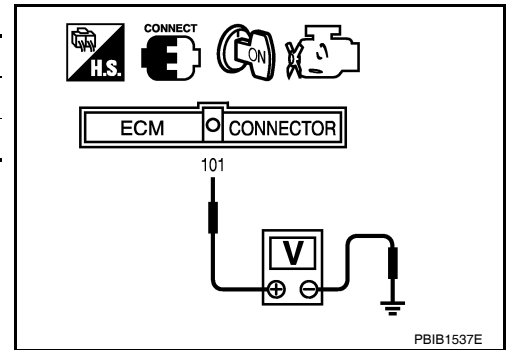
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



### ⊗ Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

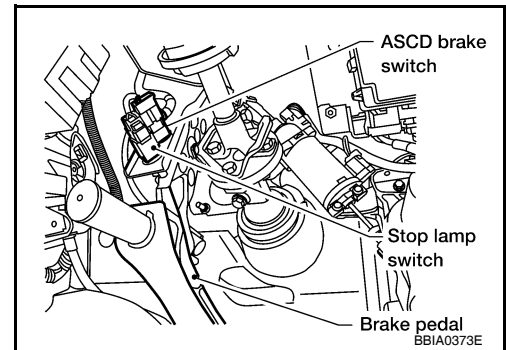


### OK or NG

- OK >> **INSPECTION END**
- NG >> GO TO 7.

## 3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

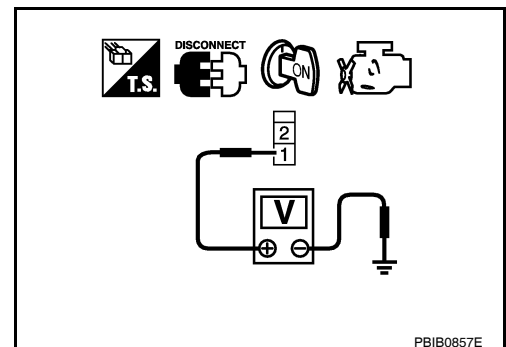


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.



# ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

- Harness connectors M31, E152
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 6.

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

## 6. CHECK ASCD BRAKE SWITCH

Refer to [EC-602. "Component Inspection"](#).

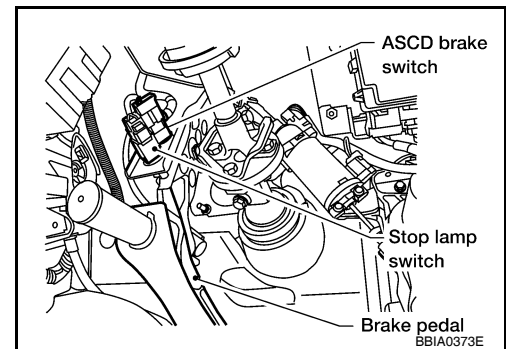
OK or NG

OK >> GO TO 11.

NG >> Replace ASCD brake switch.

## 7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



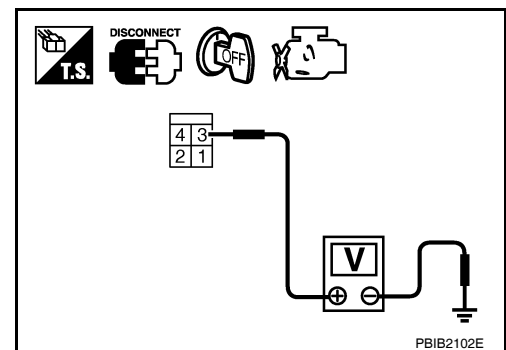
3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 9.

NG >> GO TO 8.



## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) connector M60
- 10A fuse
- Harness for open or short between stop lamp switch and battery

# ASCD BRAKE SWITCH

## < SERVICE INFORMATION >

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

### 9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 4.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

OK >> GO TO 10.

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

### 10. CHECK STOP LAMP SWITCH

Refer to [EC-602, "Component Inspection"](#).

#### OK or NG

OK >> GO TO 11.

NG >> Replace stop lamp switch.

### 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

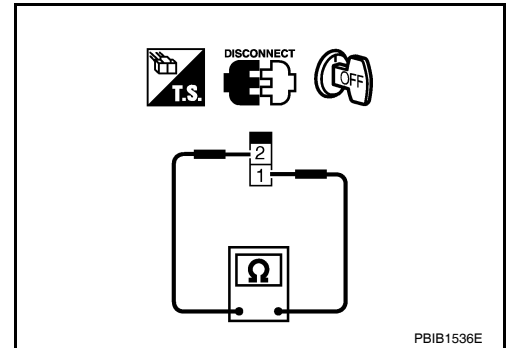
INFOID:000000003532152

### ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist.
Brake pedal: Slightly depressed	Should not exist.

If NG, adjust ASCD brake switch installation, refer to [BR-5](#), and perform step 3 again.

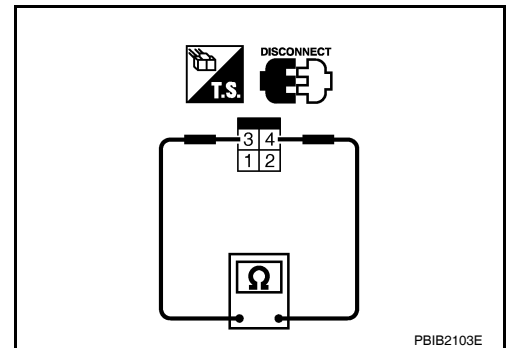


### STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 3 and 4 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.



# ASC D INDICATOR

< SERVICE INFORMATION >

## ASC D INDICATOR

### Component Description

INFOID:000000003532153

ASC D indicator lamp illuminates to indicate ASC D operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on ASC D steering switch is turned ON to indicate that ASC D system is ready for operation.

SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASC D steering switch is turned ON while vehicle speed is within the range of ASC D setting.

SET indicator remains lit during ASC D control.

Refer to [EC-30](#) for the ASC D function.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532154

Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	<ul style="list-style-type: none"><li>• Ignition switch: ON</li></ul>	<ul style="list-style-type: none"><li>• MAIN switch: Pressed at the 1st time → at the 2nd time</li></ul>	ON → OFF
SET LAMP	<ul style="list-style-type: none"><li>• MAIN switch: ON</li><li>• When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)</li></ul>	<ul style="list-style-type: none"><li>• ASC D: Operating</li></ul>	ON
		<ul style="list-style-type: none"><li>• ASC D: Not operating</li></ul>	OFF

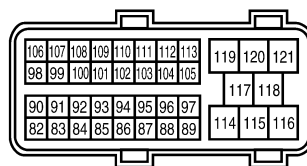
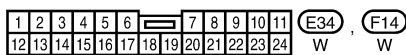
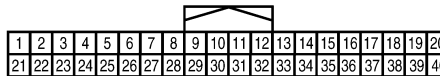
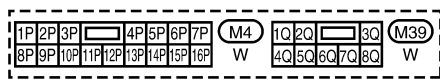
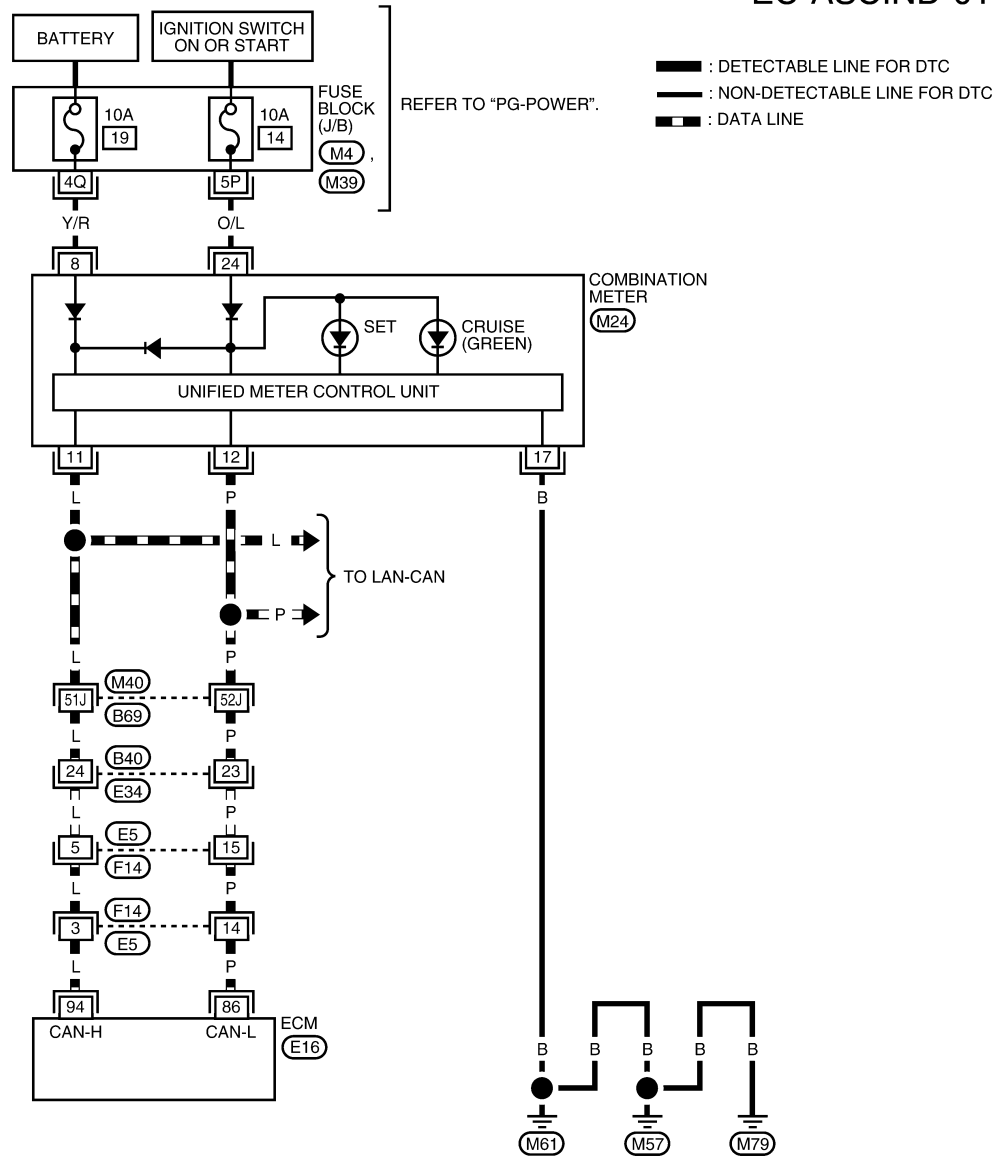
# ASC D INDICATOR

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532155

### EC-ASCIND-01



REFER TO THE FOLLOWING.

M40 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2109E

## Diagnosis Procedure

### 1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

INFOID:000000003532156

# ASCD INDICATOR

## < SERVICE INFORMATION >

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

### OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

## 2.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

### OK or NG

OK >> GO TO 3.

NG >> Perform trouble diagnosis for DTC U1000, U1001. Refer to [EC-145](#) .

## 3.CHECK COMBINATION METER FUNCTION

Refer to [DI-5](#).

### OK or NG

OK >> GO TO 4.

NG >> Go to [DI-5](#).

## 4.CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#) .

>> **INSPECTION END**

# ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

## ELECTRICAL LOAD SIGNAL

### Description

INFOID:000000003532157

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532158

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan control switch: ON	ON
		Heater fan control switch: OFF	OFF

### Diagnosis Procedure

INFOID:000000003532159

#### 1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Connect CONSULT-II and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

#### OK or NG

- OK >> GO TO 2.  
NG >> GO TO 4.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

#### 2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

#### OK or NG

- OK >> GO TO 3.  
NG >> GO TO 5.

DATA MONITOR	
MONITORING	NO DTC
LOAD SIGNAL	ON

PBIB0103E

#### 3. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

# ELECTRICAL LOAD SIGNAL

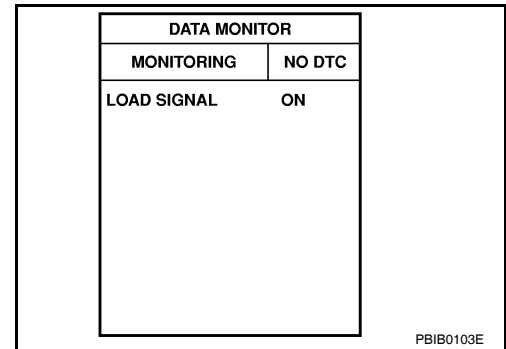
## < SERVICE INFORMATION >

Select "HEATER FAN SW" and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

### OK or NG

OK >> **INSPECTION END**  
NG >> GO TO 6.



## 4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-68](#).

>> **INSPECTION END**

## 5. CHECK HEADLAMP SYSTEM

Refer to [LT-5](#), or [LT-24](#).

>> **INSPECTION END**

## 6. CHECK HEATER FAN CONTROL SYSTEM

Refer to [ATC-30](#).

>> **INSPECTION END**

A  
EC  
C  
D  
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# FUEL INJECTOR

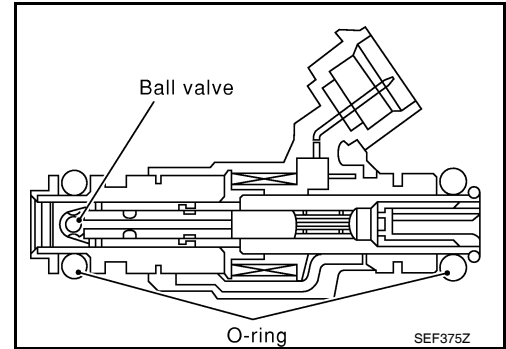
< SERVICE INFORMATION >

## FUEL INJECTOR

### Component Description

INFOID:000000003532160

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.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532161

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See <a href="#">EC-129</a> .		
INJ PULSE-B1 INJ PULSE-B2	<ul style="list-style-type: none"> <li>• Engine: After warming up</li> <li>• Air conditioner switch: OFF</li> <li>• Selector lever: P or N</li> <li>• No load</li> </ul>	Idle	2.0 - 2.8 msec
		2,000 rpm	1.9 - 2.9 msec



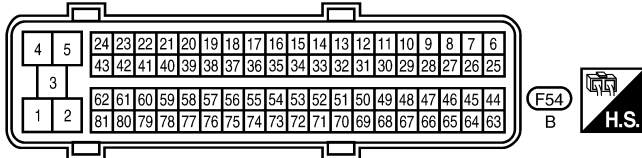
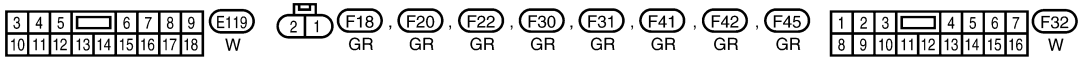
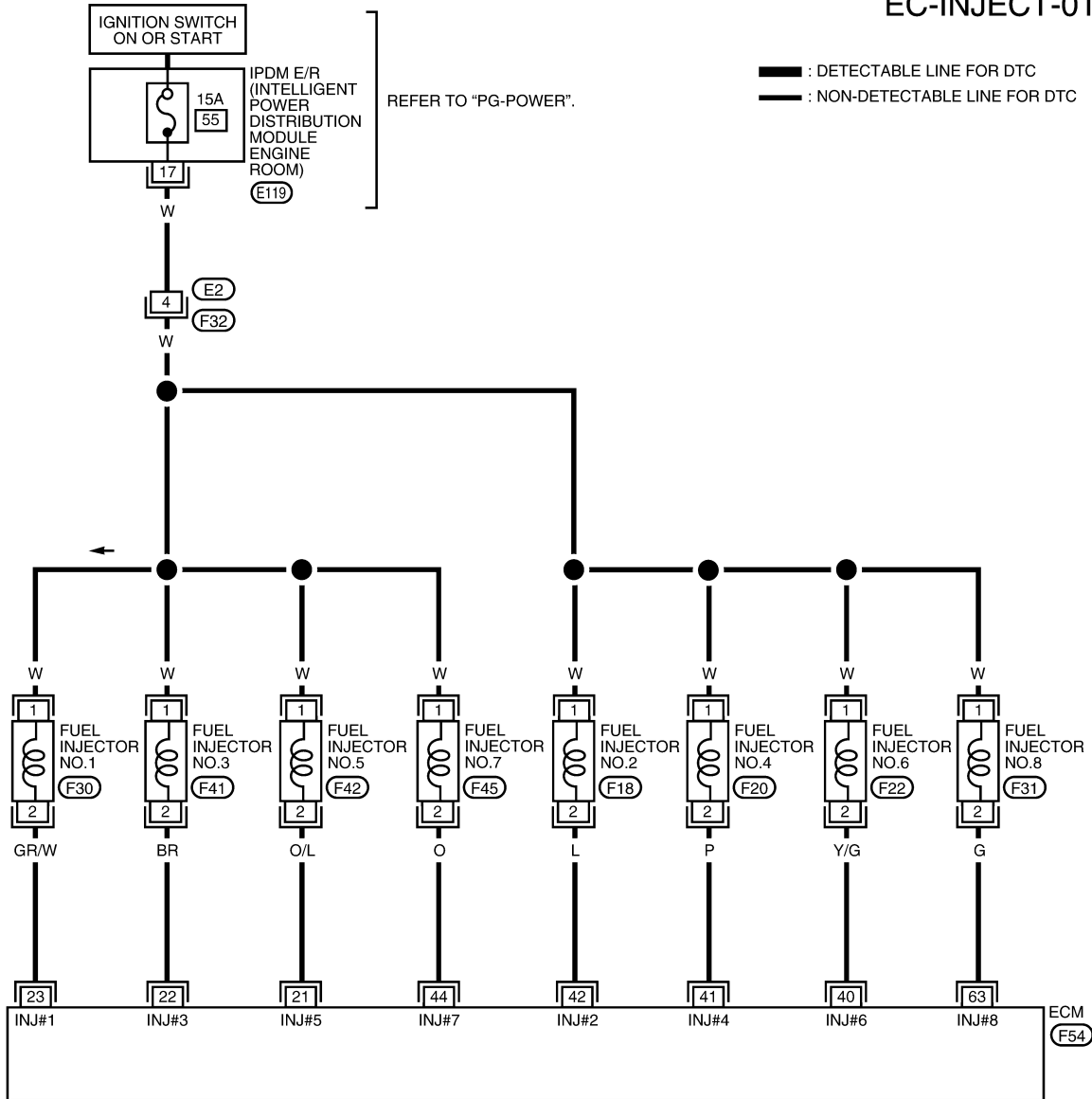
# FUEL INJECTOR

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532162

### EC-INJECT-01



BBWA2124E

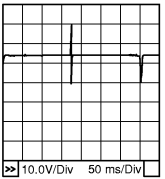
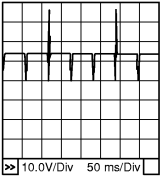
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

# FUEL INJECTOR

## < SERVICE INFORMATION >

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	O/L	Fuel injector No. 5	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
22	BR	Fuel injector No. 3		BATTERY VOLTAGE (11 - 14V)★ 
23	GR/W	Fuel injector No. 1		
40	Y/G	Fuel injector No. 6		
41	P	Fuel injector No. 4		
42	L	Fuel injector No. 2		
44	O	Fuel injector No. 7		
63	G	Fuel injector No. 8		

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532163

### 1. INSPECTION START

Turn ignition switch to START.

**Is any cylinder ignited?**

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

### 2. CHECK OVERALL FUNCTION

#### ⓐ With CONSULT-II

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

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

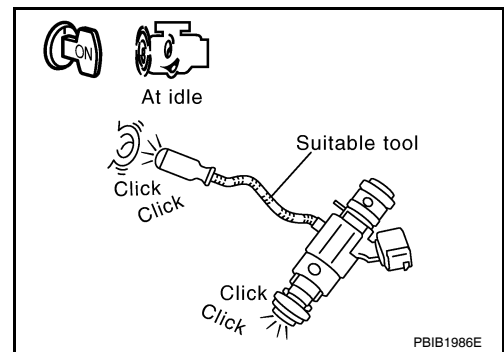
#### ⓑ Without CONSULT-II

- Start engine.

# FUEL INJECTOR

## < SERVICE INFORMATION >

- Listen to each fuel injector operating sound.  
**Clicking noise should be heard.**

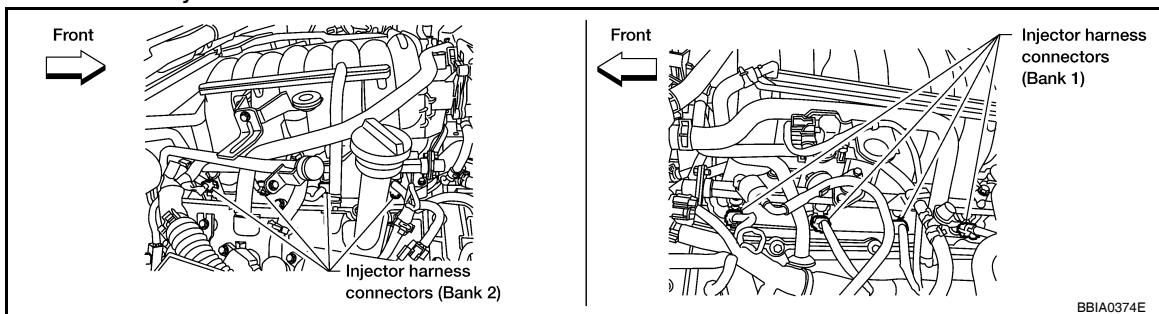


### OK or NG

- OK >> **INSPECTION END**
- NG >> GO TO 3.

## 3. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector.

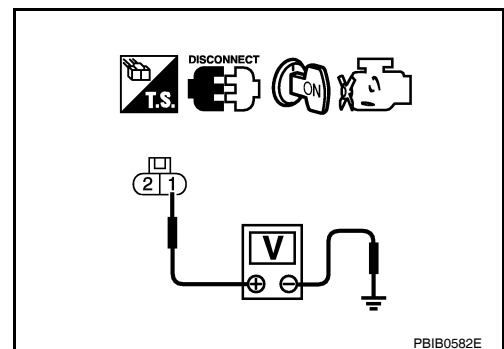


- Turn ignition switch ON.
- Check voltage between fuel injector terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- IPDM E/R connector E119
- 15A fuse
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

## 5. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between fuel injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42, 44, 63.  
Refer to Wiring Diagram.

**Continuity should exist.**

# FUEL INJECTOR

## < SERVICE INFORMATION >

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

### OK or NG

OK >> GO TO 6.

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

## 6. CHECK FUEL INJECTOR

Refer to [EC-612, "Component Inspection"](#).

### OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning fuel injector.

## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

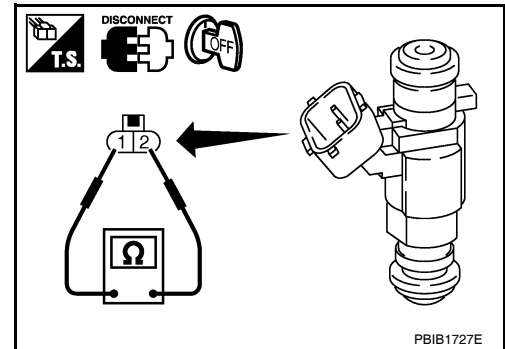
## Component Inspection

INFOID:000000003532164

### FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

**Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]**



INFOID:000000003532165

## Removal and Installation

### FUEL INJECTOR

Refer to [EM-31](#).

# FUEL PUMP

< SERVICE INFORMATION >

## FUEL PUMP

### Description

INFOID:000000003532166

### SYSTEM DESCRIPTION

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*		

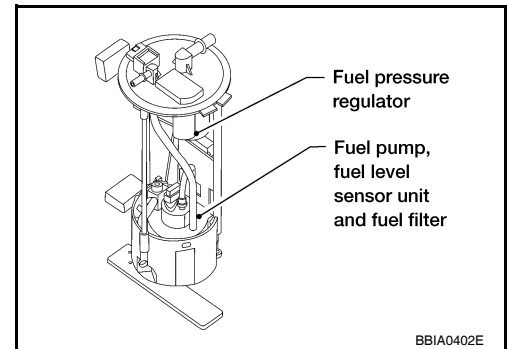
\*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

### COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532167

Specification data are reference values.

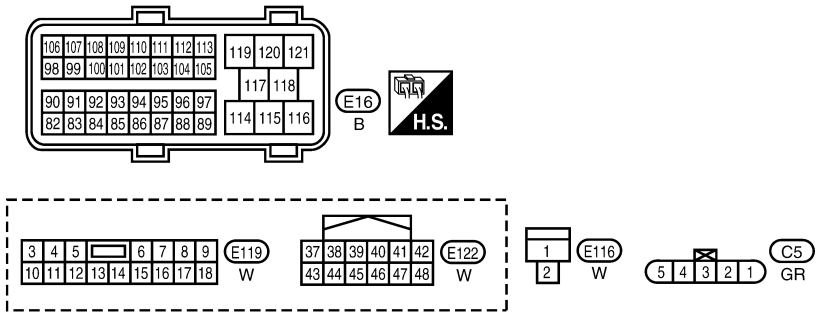
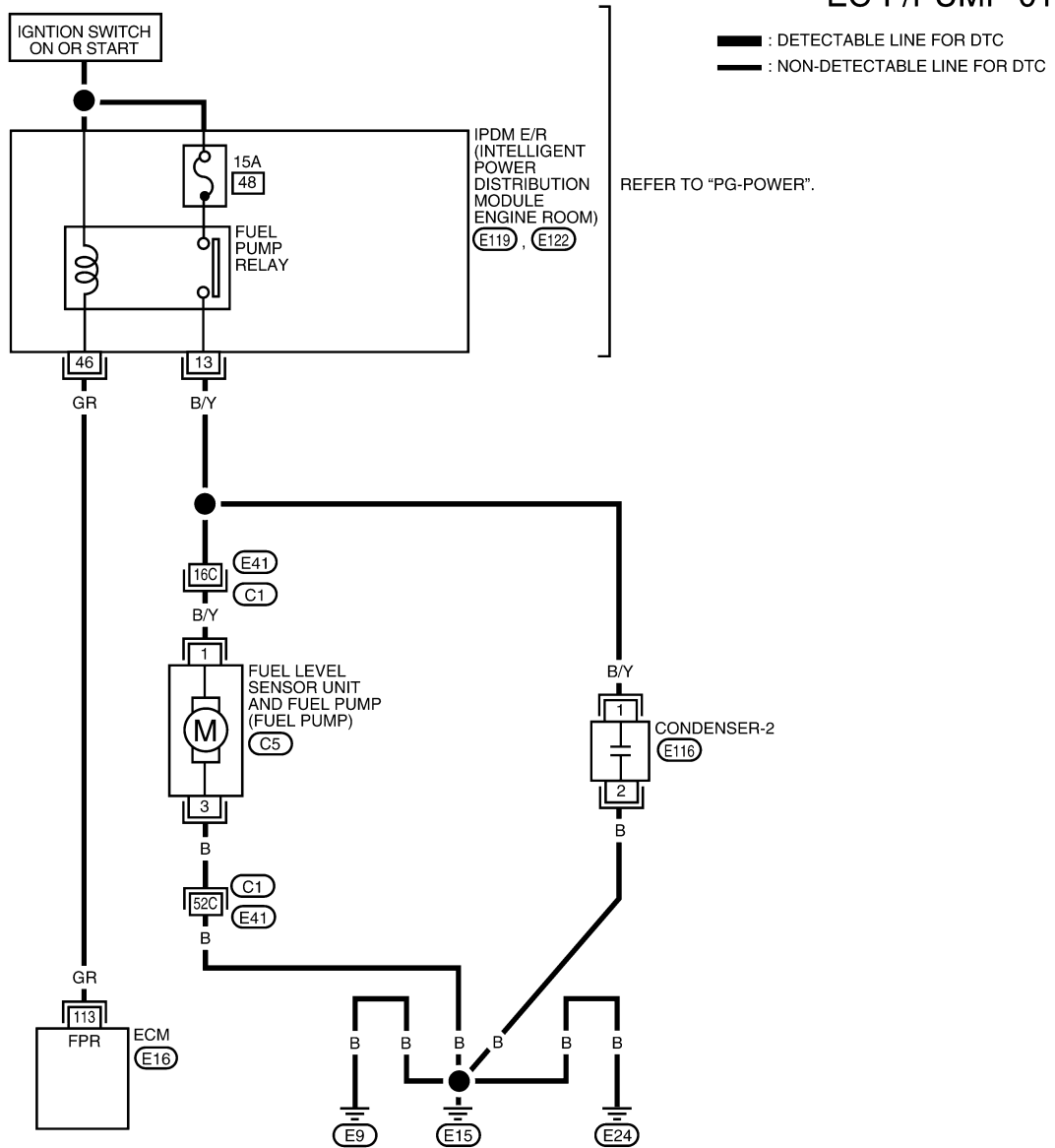
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> <li>For 1 second after turning ignition switch ON</li> <li>Engine running or cranking</li> </ul>	ON
	<ul style="list-style-type: none"> <li>Except above conditions</li> </ul>	OFF

# FUEL PUMP

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532168



REFER TO THE FOLLOWING.

(C1) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1714E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# FUEL PUMP

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	GR	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON	0 - 1.5V
			[Engine is running] [Ignition switch: ON] • More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)

### Diagnosis Procedure

INFOID:000000003532169

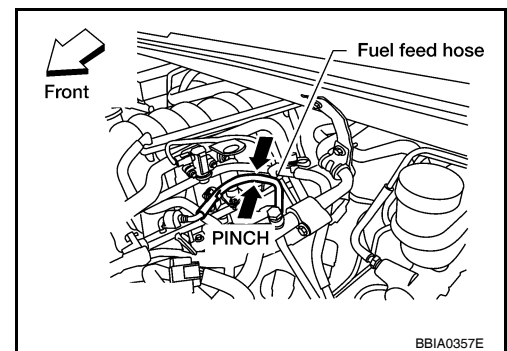
#### 1. CHECK OVERALL FUNCTION

- Turn ignition switch ON.
- Pinch fuel feed hose with two fingers.

**Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.**

OK or NG

- OK >> **INSPECTION END**  
 NG >> GO TO 2.



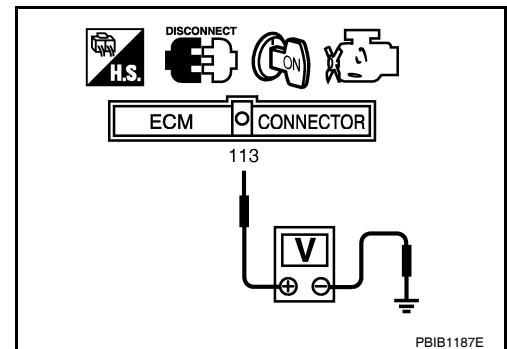
#### 2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Turn ignition switch ON.
- Check voltage between ECM terminal 113 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 5.  
 NG >> GO TO 3.



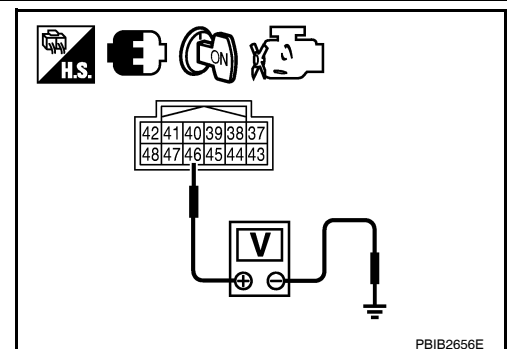
#### 3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

- OK >> GO TO 4.  
 NG >> GO TO 13.



#### 4. DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM.

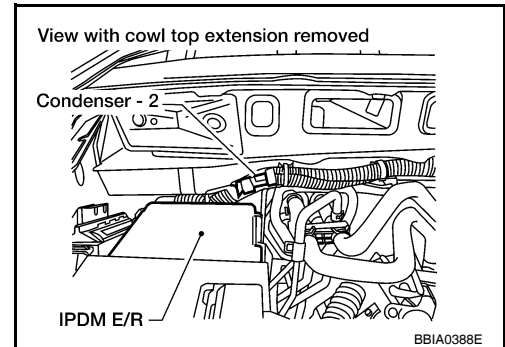
# FUEL PUMP

## < SERVICE INFORMATION >

>> Repair harness or connectors.

### 5. CHECK CONDENSER-2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect condenser-2 harness connector.
4. Turn ignition switch ON.



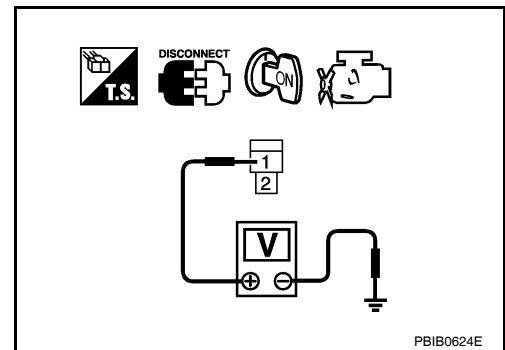
5. Check voltage between condenser-2 terminal 1 and ground with CONSULT-II or tester.

**Voltage:** Battery voltage should exist for 1 second after ignition switch is turned ON.

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

#### OK or NG

- OK >> GO TO 8.  
NG >> GO TO 6.



### 6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

#### OK or NG

- OK >> GO TO 7.  
NG >> Replace fuse.

### 7. CHECK CONDENSER-2 POWER SUPPLY CIRCUIT-II FOR OPEN AND SHORT

1. Disconnect IPDM E/R harness connector E119.
2. Check harness continuity between IPDM E/R terminal 13 and condenser-2 terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 13.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 8. CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between condenser-2

+ terminal 2 and ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.



# FUEL PUMP

## < SERVICE INFORMATION >

### OK or NG

- OK >> GO TO 9.
- NG >> Repair open circuit or short to power in harness or connectors.

## 9. CHECK CONDENSER-2

Refer to [EC-617, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 10.
- NG >> Replace condenser-2.

## 10. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
3. Disconnect IPDM E/R harness connector E119.
4. Check harness continuity between IPDM E/R terminal 13 and "fuel level sensor unit and fuel pump" terminal 1, "fuel level sensor unit and fuel pump" terminal 3 and ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 12.
- NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E41, C1
- Harness for open or short between fuel pump and IPDM E/R
- Harness for open or short between fuel pump and ground

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

## 12. CHECK FUEL PUMP

Refer to [EC-617, "Component Inspection"](#).

### OK or NG

- OK >> GO TO 13.
- NG >> Replace "fuel level sensor unit and fuel pump".

## 13. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

### OK or NG

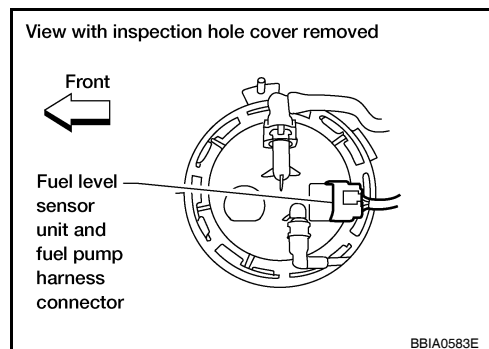
- OK >> Replace IPDM E/R.
- NG >> Repair or replace harness or connectors.

## Component Inspection

INFOID:000000003532170

### FUEL PUMP

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.

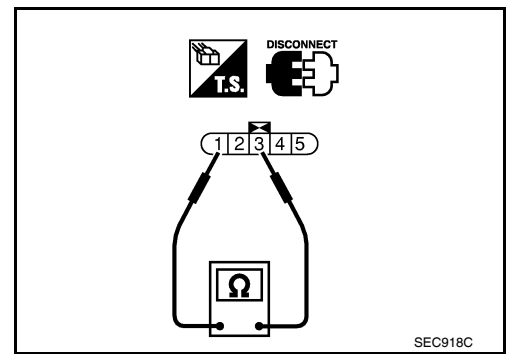


# FUEL PUMP

## < SERVICE INFORMATION >

2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 3.

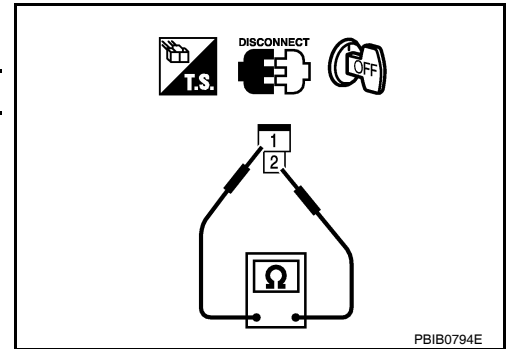
**Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]**



## CONDENSER-2

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals as 1 and 2.

Resistance	Above 1 MΩ at 25°C (77°F)
------------	---------------------------



INFOID:000000003532171

## Removal and Installation

### FUEL PUMP

Refer to [FL-5](#).

# ICC BRAKE SWITCH

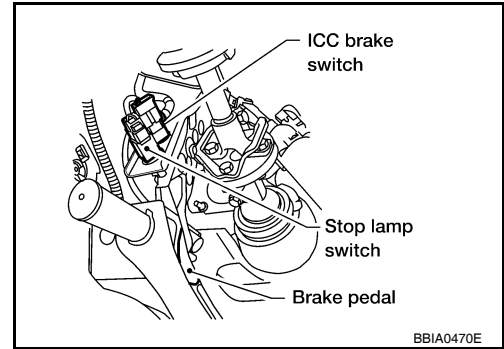
< SERVICE INFORMATION >

## ICC BRAKE SWITCH

### Component Description

INFOID:000000003532172

When depress on the brake pedal, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)  
Refer to [ACS-6](#) for the ICC function.



### CONSULT-II Reference Value in Data Monitor Mode

INFOID:000000003532173

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ICC brake switch)	• Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

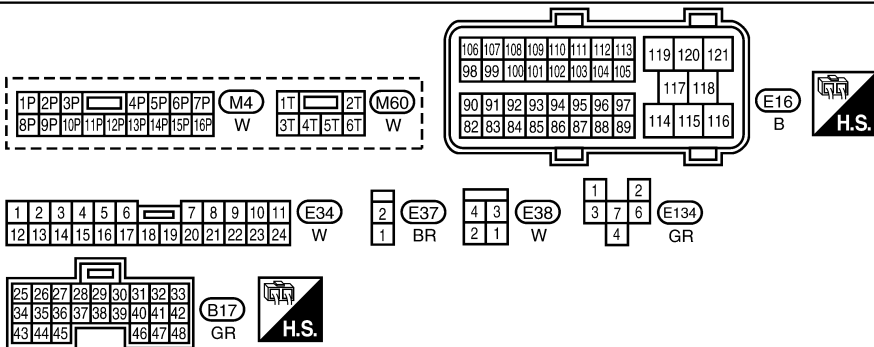
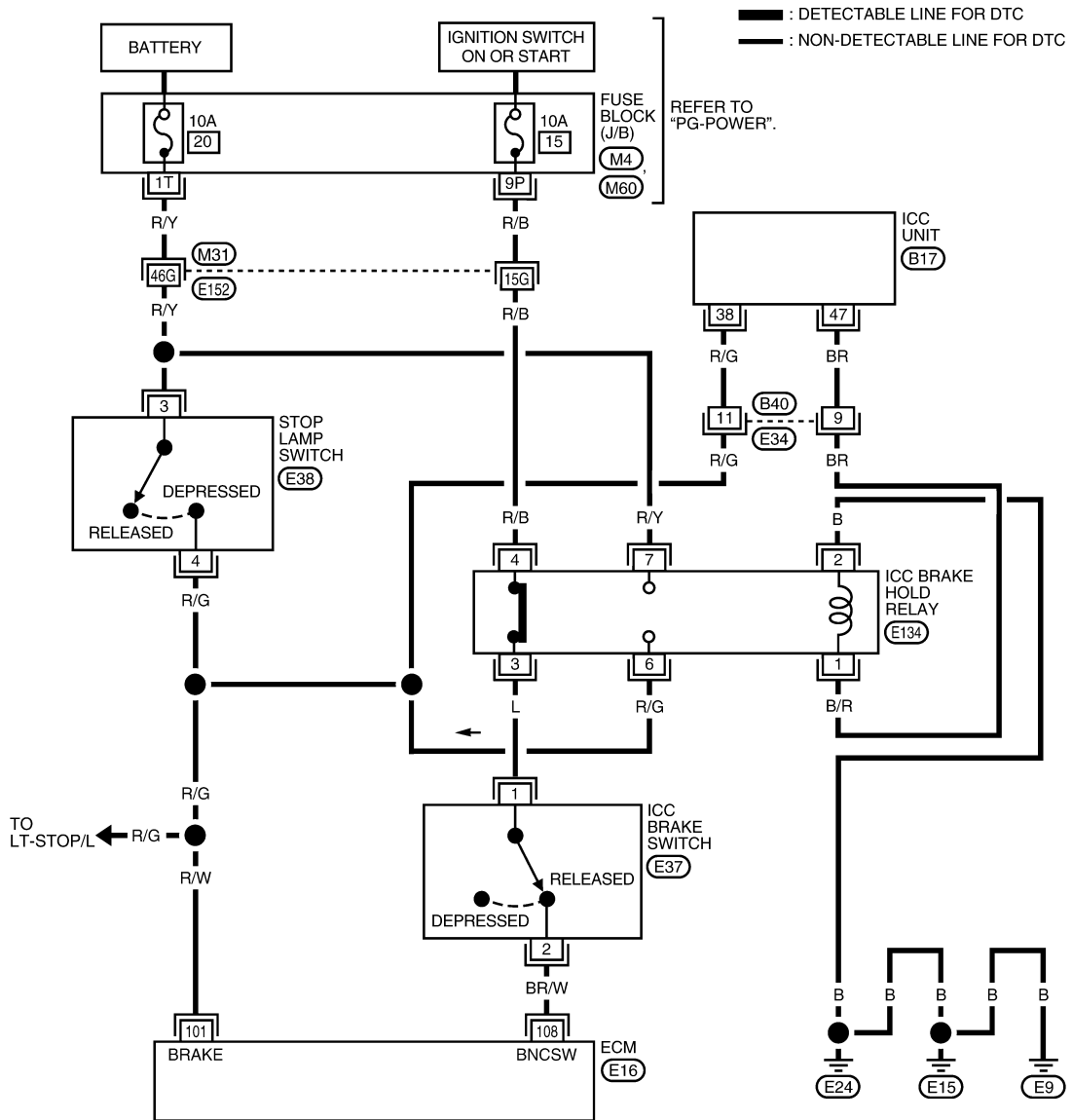
# ICC BRAKE SWITCH

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532174

### EC-ICCB0F-01



REFER TO THE FOLLOWING.

(M31) - SUPER MULTIPLE JUNCTION (SMJ)



BBWA2128E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# ICC BRAKE SWITCH

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/W	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	BR/W	ICC brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

## Diagnosis Procedure

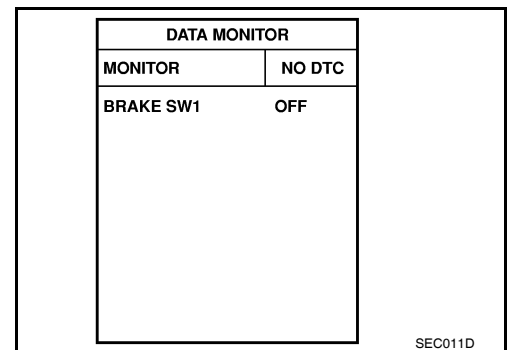
INFOID:000000003532175

### 1. CHECK OVERALL FUNCTION-I

#### ☑ With CONSULT-II

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-II.
- Check "BRAKE SW1" indication under the following conditions.

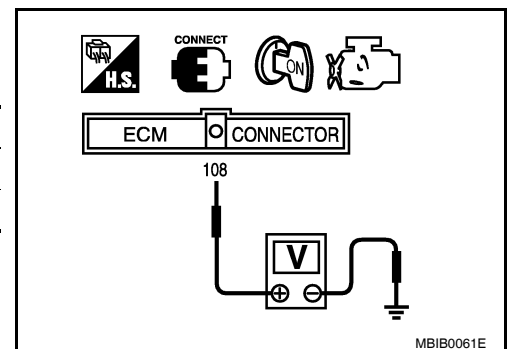
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



#### ☒ Without CONSULT-II

- Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



#### OK or NG

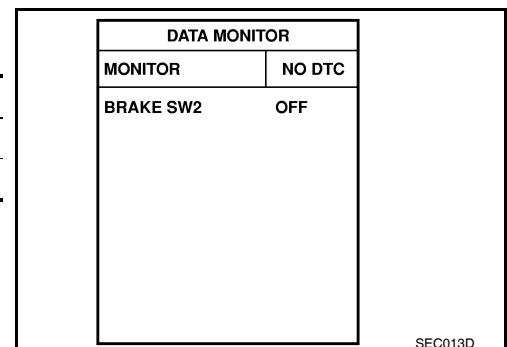
- OK >> GO TO 2.  
NG >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

#### ☑ With CONSULT-II

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



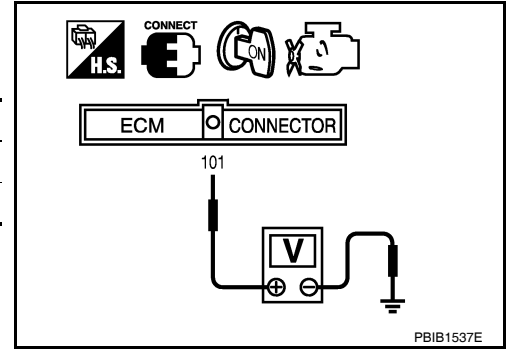
# ICC BRAKE SWITCH

## < SERVICE INFORMATION >

### ⊗ Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



### OK or NG

- OK >> **INSPECTION END**
- NG >> GO TO 10.

## 3. CHECK DTC WITH ICC UNIT

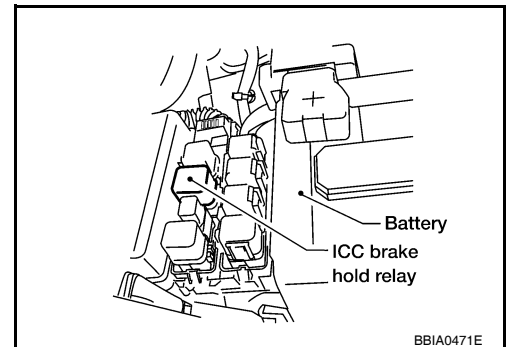
Refer to [ACS-34](#).

### OK or NG

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

## 4. CHECK ICC BRAKE HOLD RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ICC brake hold relay.
3. Turn ignition switch ON.

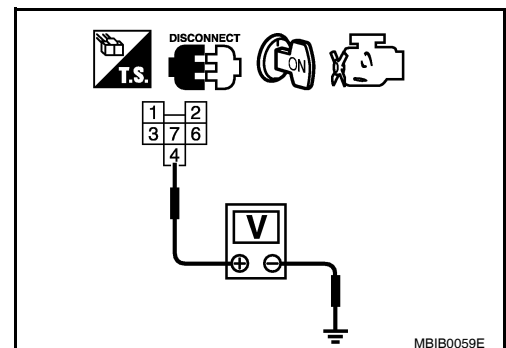


4. Check voltage between ICC brake hold relay terminal 4 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.



## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ICC brake hold relay and fuse

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

# ICC BRAKE SWITCH

< SERVICE INFORMATION >

## 6. CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

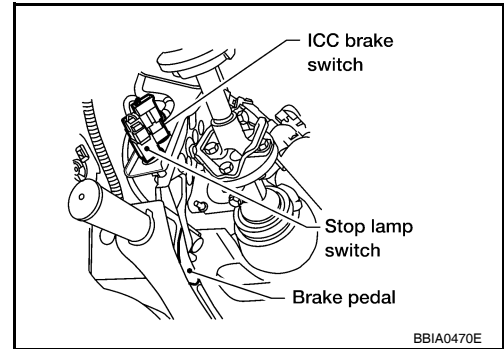
1. Turn ignition switch OFF.
2. Disconnect ICC brake switch harness connector.
3. Check harness continuity between ICC brake hold relay terminal 3 and ICC brake switch terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 7.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



## 7. CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ICC brake switch terminal 2 and ECM terminal 108.  
Refer Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 8.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK ICC BRAKE HOLD RELAY

Refer to [EC-624, "Component Inspection"](#) .

- OK >> GO TO 9.  
NG >> Replace ICC brake hold relay.

## 9. CHECK ICC BRAKE SWITCH

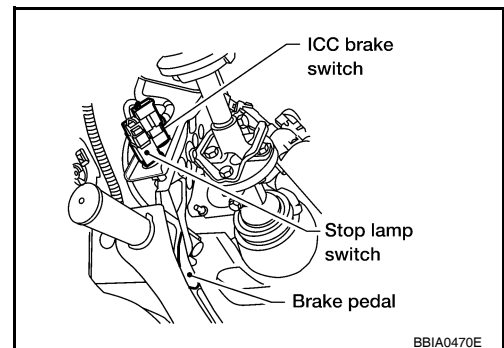
Refer to [EC-624, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 14.  
NG >> Replace ICC brake switch.

## 10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



## ICC BRAKE SWITCH

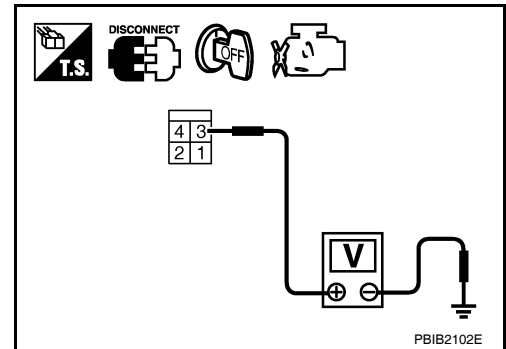
### < SERVICE INFORMATION >

3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

#### OK or NG

- OK >> GO TO 12.  
NG >> GO TO 11.



## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M31, E152
- Fuse block (J/B) No. 1 connector M60
- 10A fuse
- Harness for open or short between stop lamp switch and battery

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

## 12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

#### OK or NG

- OK >> GO TO 13.  
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 13. CHECK STOP LAMP SWITCH

Refer to [EC-624, "Component Inspection"](#).

#### OK or NG

- OK >> GO TO 14.  
NG >> Replace stop lamp switch.

## 14. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003532176

### ICC BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ICC brake switch harness connector.



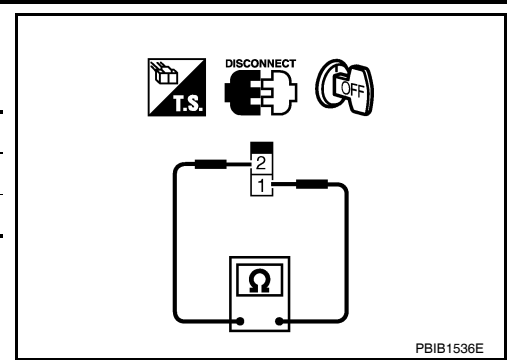
# ICC BRAKE SWITCH

## < SERVICE INFORMATION >

- Check continuity between ICC brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ICC brake switch installation, refer to [BR-5](#), and perform step 3 again.

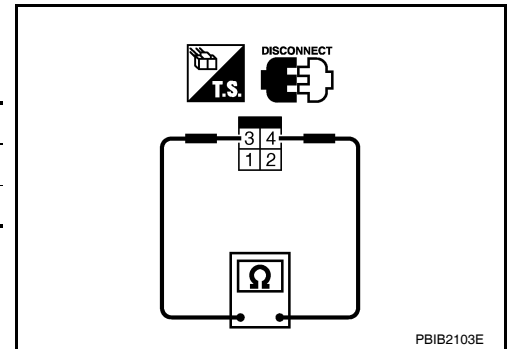


## STOP LAMP SWITCH

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- Check continuity between stop lamp switch terminals 3 and 4 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to [BR-5](#), and perform step 3 again.

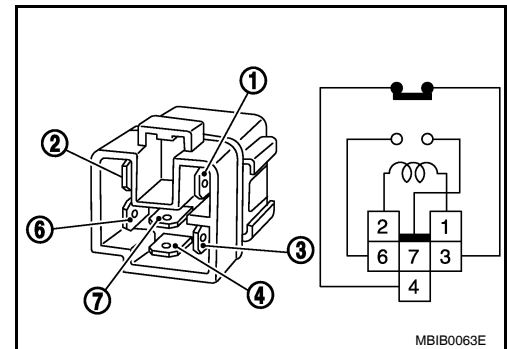


## ICC BRAKE HOLD RELAY

- Apply 12V direct current between ICC brake hold relay terminals 1 and 2.
- Check continuity between relay terminals 3 and 4, 6 and 7 under the following conditions.

Condition	Between terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	Should not exist
	6 and 7	Should exist
No current supply	3 and 4	Should exist
	6 and 7	Should not exist

- If NG, replace ICC brake hold relay.



# IGNITION SIGNAL

< SERVICE INFORMATION >

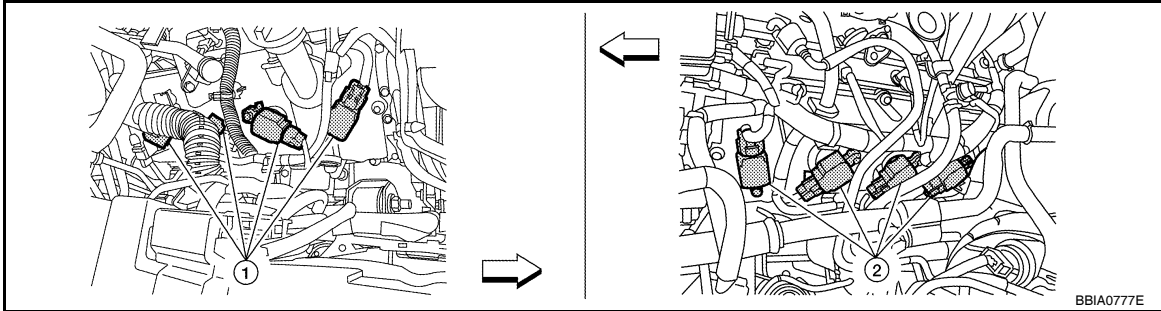
## IGNITION SIGNAL

### Component Description

INFOID:000000003532177

#### IGNITION COIL & POWER TRANSISTOR

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.



1. Ignition coils (with power transistor)  
(bank 2)
2. Ignition coils (with power transistor)  
(bank 1)

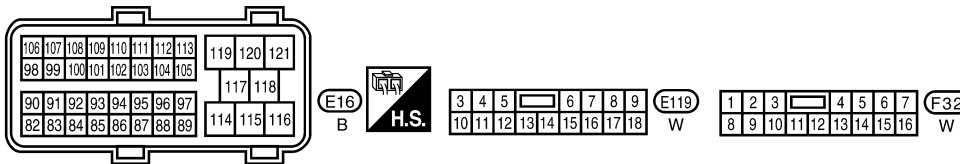
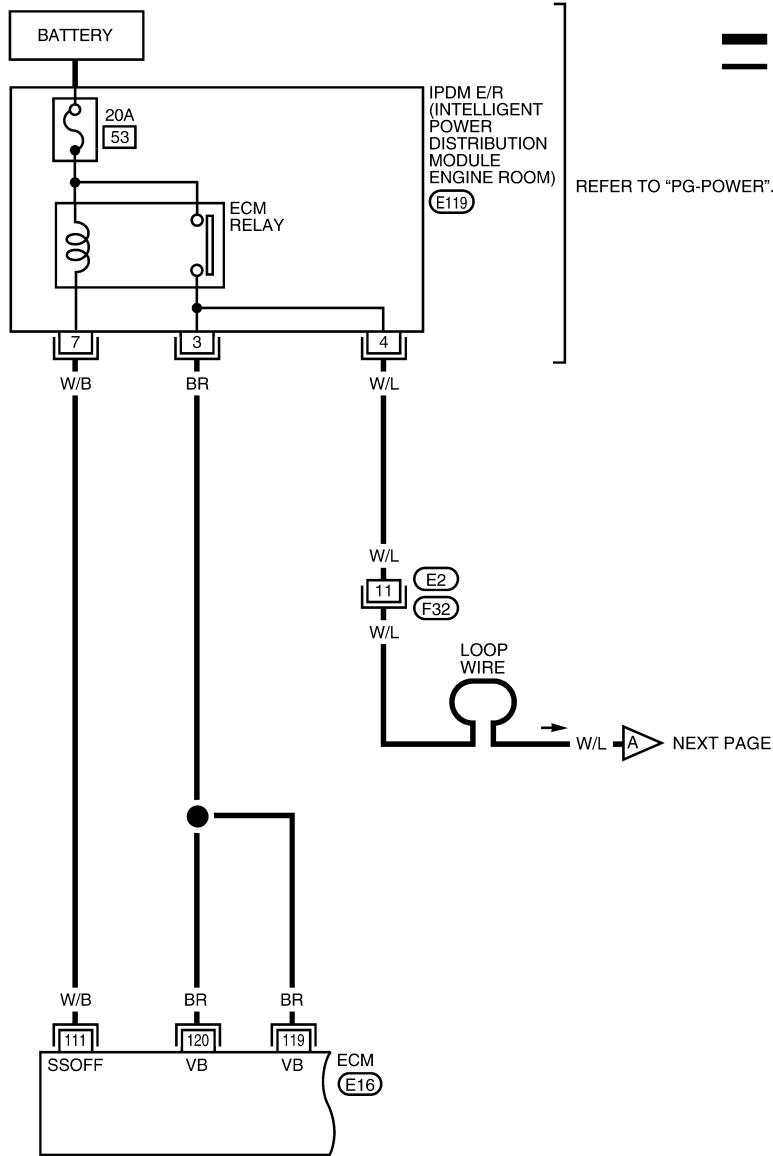
# IGNITION SIGNAL

< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532178

### EC-IGNSYS-01



BBWA2107E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# IGNITION SIGNAL

## < SERVICE INFORMATION >

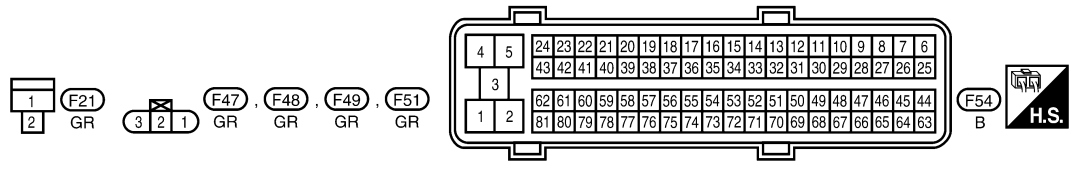
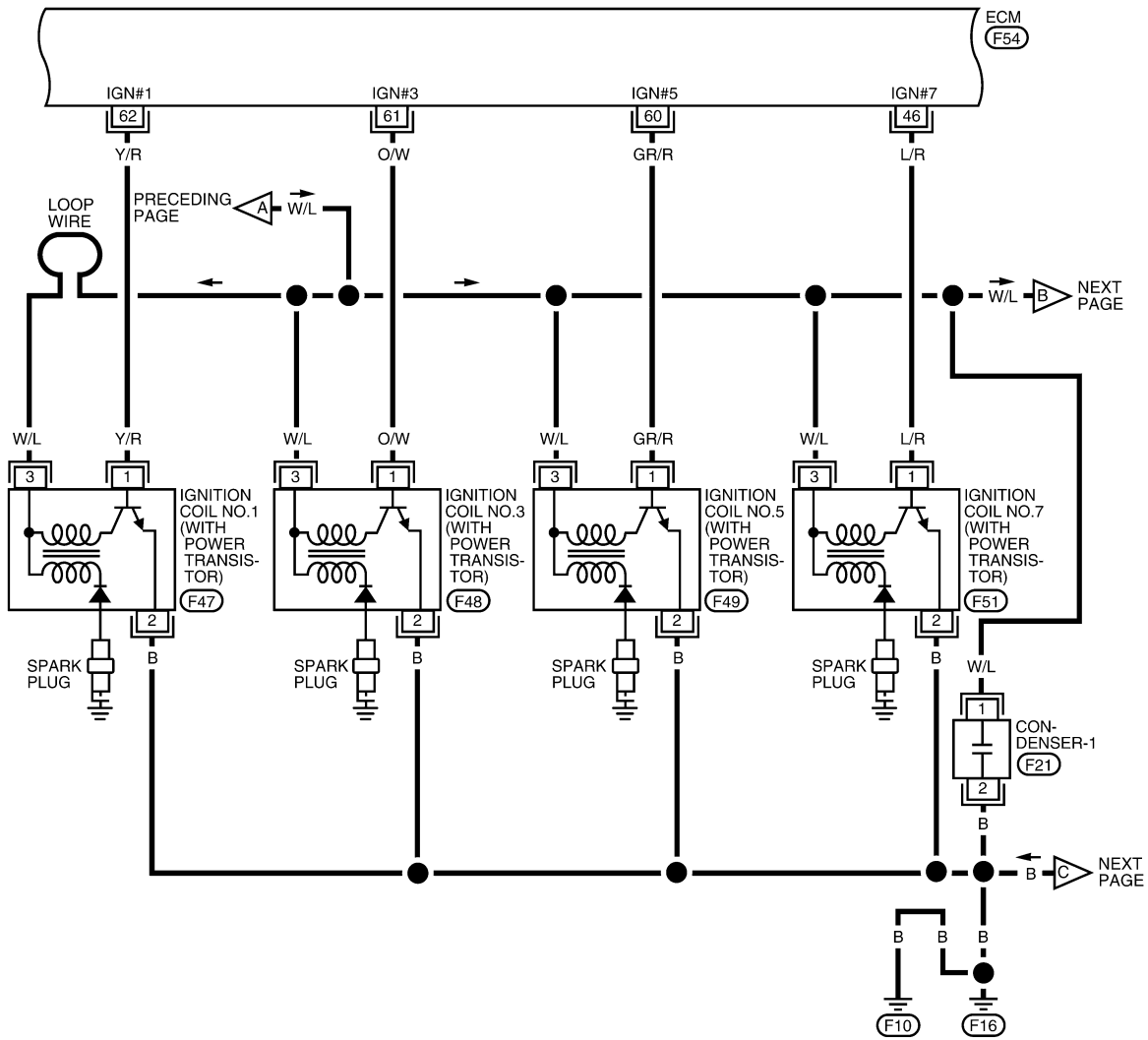
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/B	ECM relay (Self shut-off)	<b>[Engine is running]</b> <b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>• For a few seconds after turning ignition switch OFF</li> </ul>	0 - 1.5V
			<b>[Ignition switch: OFF]</b> <ul style="list-style-type: none"> <li>• More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 - 14V)
119 120	BR BR	Power supply for ECM	<b>[Ignition switch: ON]</b>	BATTERY VOLTAGE (11 - 14V)

# IGNITION SIGNAL

< SERVICE INFORMATION >

EC-IGNSYS-02

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA1871E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

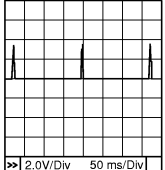
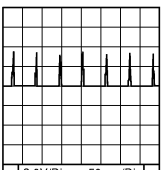
**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

A  
 EC  
 C  
 D  
 E  
 F  
 G  
 H  
 I  
 J  
 K  
 L  
 M  
 N  
 O  
 P

# IGNITION SIGNAL

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46 60 61 62	L/R GR/R O/W Y/R	Ignition signal No. 7 Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Idle speed</li> </ul> <p><b>NOTE:</b> The pulse cycle changes depending on rpm at idle.</p>	<p>0 - 0.2V★</p>  <p style="text-align: right; font-size: small;">PBIB0044E</p>
			<p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>• Warm-up condition</li> <li>• Engine speed: 2,000 rpm.</li> </ul>	<p>0.1 - 0.4V★</p>  <p style="text-align: right; font-size: small;">PBIB0045E</p>

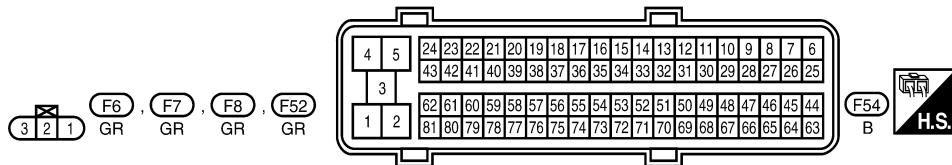
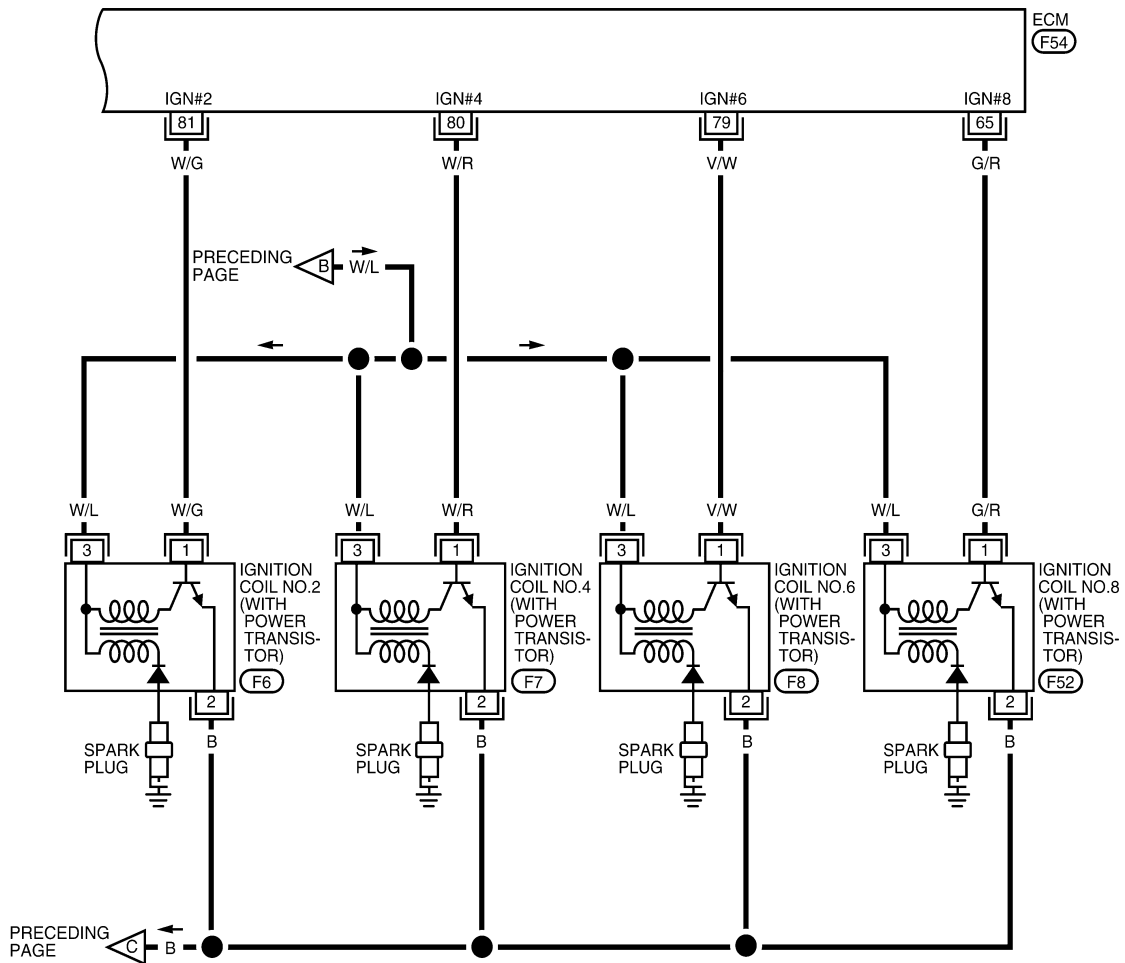
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# IGNITION SIGNAL

< SERVICE INFORMATION >

EC-IGNSYS-03

— : DETECTABLE LINE FOR DTC  
 — : NON-DETECTABLE LINE FOR DTC



BBWA1712E

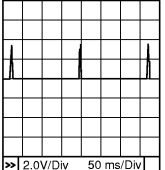
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# IGNITION SIGNAL

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65	G/R	Ignition signal No. 8 Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	<b>[Engine is running]</b> • Warm-up condition • Idle speed <b>NOTE:</b> The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  <small>2.0V/Div 50 ms/Div</small> PBIB0044E
79	V/W			<b>[Engine is running]</b> • Warm-up condition • Engine speed: 2,000 rpm.
80	W/R			
81	W/G			

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:000000003532179

### 1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.

**Is engine running?**

Yes or No

- Yes (With CONSULT-II) >> GO TO 2.
- Yes (Without CONSULT-II) >> GO TO 3.
- No >> GO TO 4.

### 2. CHECK OVERALL FUNCTION

**With CONSULT-II**

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

OK or NG

- OK >> **INSPECTION END**
- NG >> GO TO 10.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

### 3. CHECK OVERALL FUNCTION

**Without CONSULT-II**

1. Let engine idle.



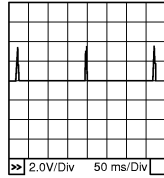
# IGNITION SIGNAL

## < SERVICE INFORMATION >

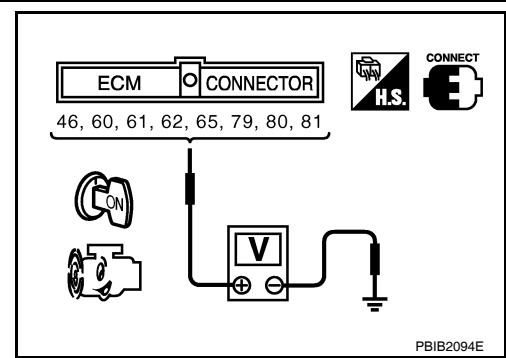
- Read the voltage signal between ECM terminals 46, 60, 61, 62, 65, 79, 80, 81 and ground with an oscilloscope.
- Verify that the oscilloscope screen shows the signal wave as shown below.

**NOTE:**

The pulse cycle changes depending on rpm at idle.



PBIB0044E



PBIB2094E

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

### 4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

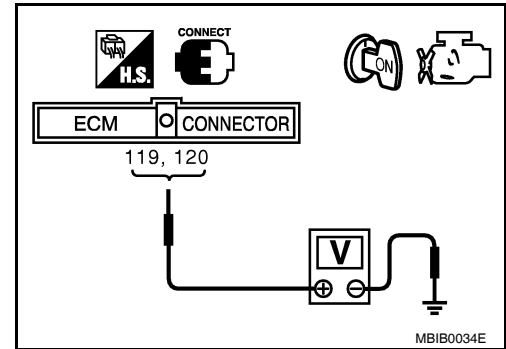
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 5.

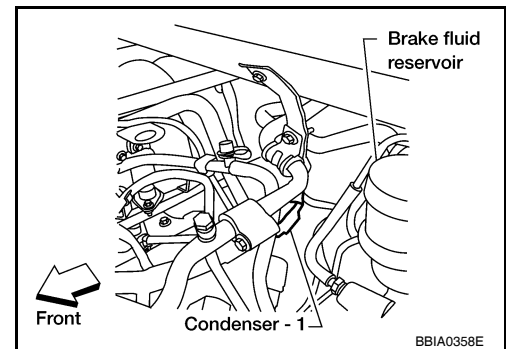
NG >> Go to [EC-139](#).



MBIB0034E

### 5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect condenser-1 harness connector.
- Turn ignition switch ON.



BBA0358E

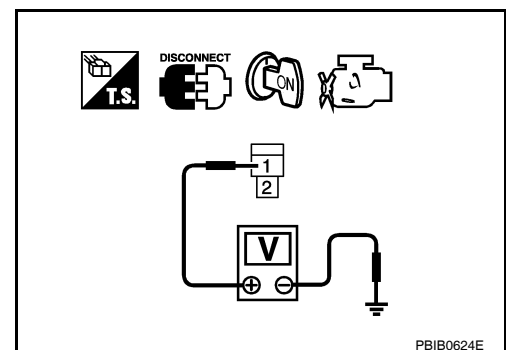
- Check voltage between condenser-1 terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 8.

NG >> GO TO 6.



PBIB0624E

### 6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.

# IGNITION SIGNAL

## < SERVICE INFORMATION >

2. Disconnect IPDM E/R connector E119.
3. Check harness continuity between IPDM E/R terminal 4 and condenser-1 terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> Go to [EC-139](#).  
NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between condenser-1 and IPDM E/R

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

## 8. CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 terminal 2 and ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

### OK or NG

- OK >> GO TO 9.  
NG >> Repair open circuit or short to power in harness or connectors.

## 9. CHECK CONDENSER-1

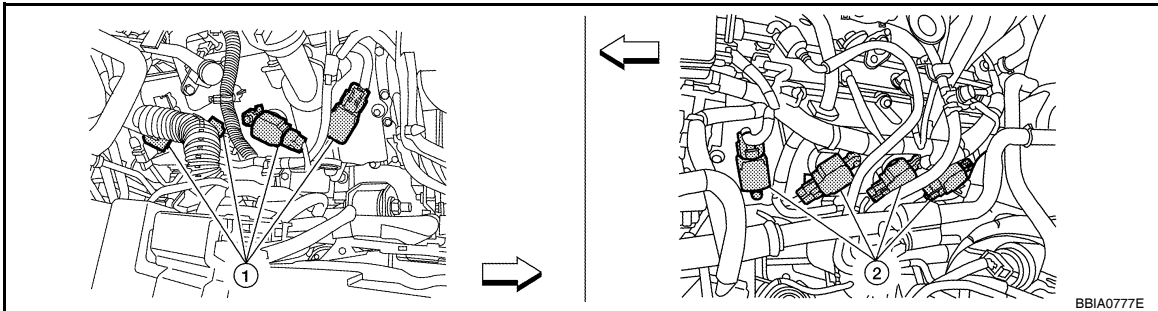
Refer to [EC-635. "Component Inspection"](#).

### OK or NG

- OK >> GO TO 10.  
NG >> Replace condenser-1.

## 10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.



1. Ignition coils (with power transistor) (bank 2)
2. Ignition coils (with power transistor) (bank 1)

4. Turn ignition switch ON.

# IGNITION SIGNAL

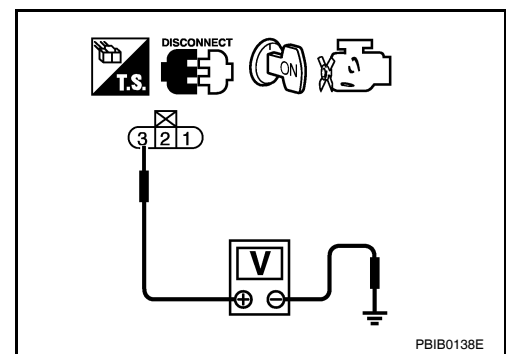
## < SERVICE INFORMATION >

5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

### OK or NG

- OK >> GO TO 12.
- NG >> GO TO 11.



## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- Harness for open or short between ignition coil and harness connector F32

>> Repair or replace harness or connectors.

## 12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

### OK or NG

- OK >> GO TO 13.
- NG >> Repair open circuit or short to power in harness or connectors.

## 13. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 46, 60, 61, 62, 65, 79, 80, 81 and ignition coil terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

### OK or NG

- OK >> GO TO 14.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 14. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-635. "Component Inspection"](#).

### OK or NG

- OK >> GO TO 15.
- NG >> Replace ignition coil with power transistor.

## 15. CHECK INTERMITTENT INCIDENT

Refer to [EC-138](#).

>> **INSPECTION END**

## Component Inspection

INFOID:000000003532180

## IGNITION COIL WITH POWER TRANSISTOR

**CAUTION:**

# IGNITION SIGNAL

## < SERVICE INFORMATION >

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

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

Terminal No. (Polarity)	Resistance $\Omega$ [at 25°C (77°F)]
1 and 2	Except 0 or $\infty$
1 and 3	Except 0
2 and 3	

4. If NG, replace ignition coil with power transistor.  
If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in fuse block No. 1 to release fuel pressure.

### NOTE:

Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.

8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. 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 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm is taken.

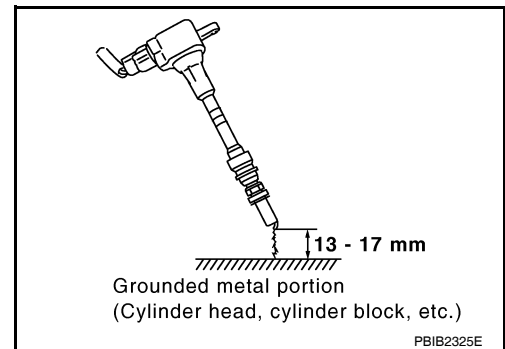
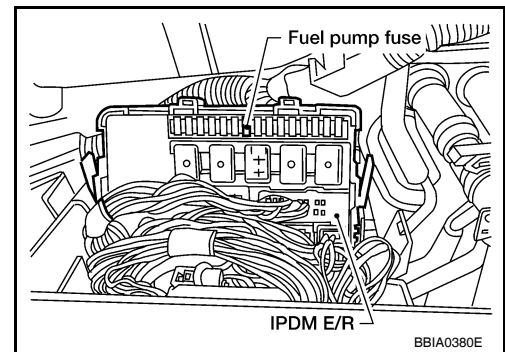
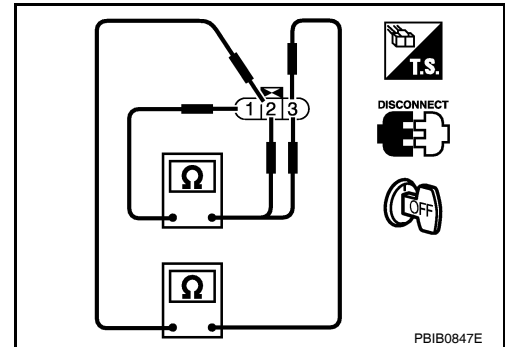
### NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

17. If NG, replace ignition coil with power transistor.

## CONDENSER-1

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

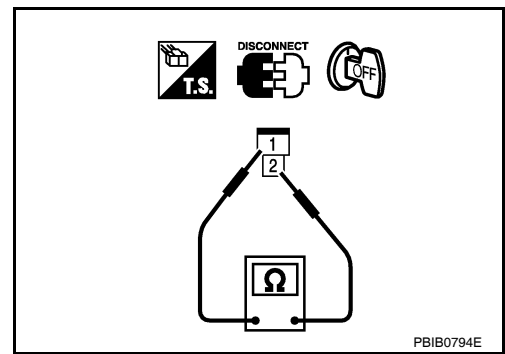


# IGNITION SIGNAL

## < SERVICE INFORMATION >

3. Check resistance between condenser-1 terminals 1 and 2.

Resistance	Above 1 M $\Omega$ at 25°C (77°F)
------------	-----------------------------------



## Removal and Installation

### IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-28](#).

A

EC

C

D

INFOID:000000003532181

E

F

G

H

I

J

K

L

M

N

O

P

# REFRIGERANT PRESSURE SENSOR

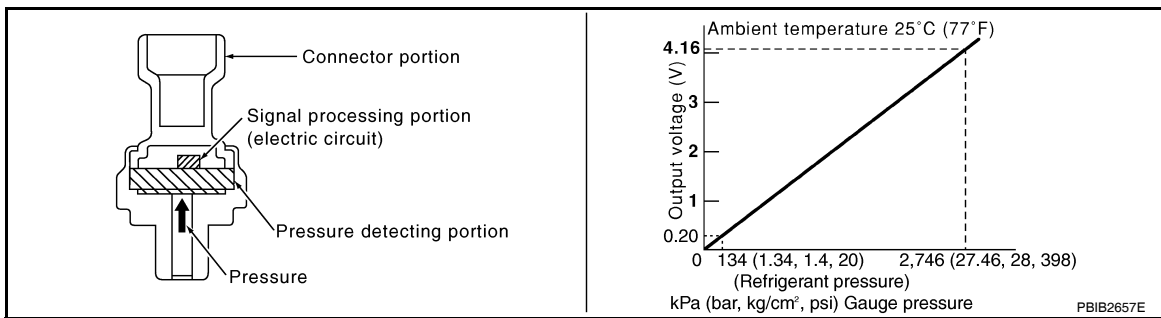
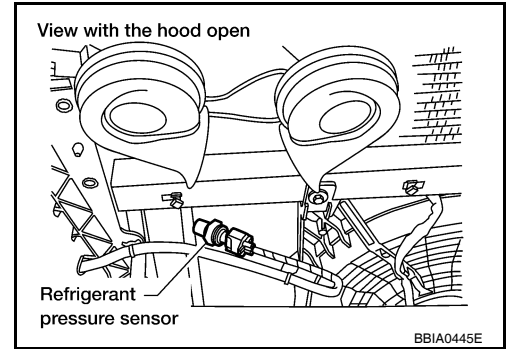
< SERVICE INFORMATION >

## REFRIGERANT PRESSURE SENSOR

### Component Description

INFOID:000000003532182

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.



# REFRIGERANT PRESSURE SENSOR

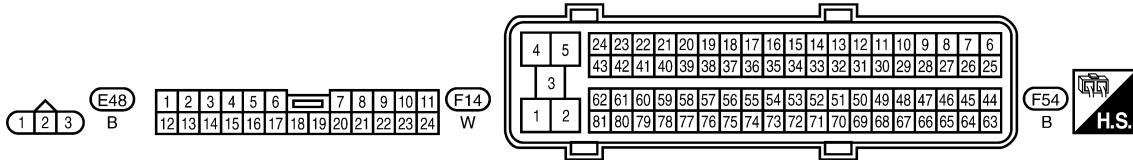
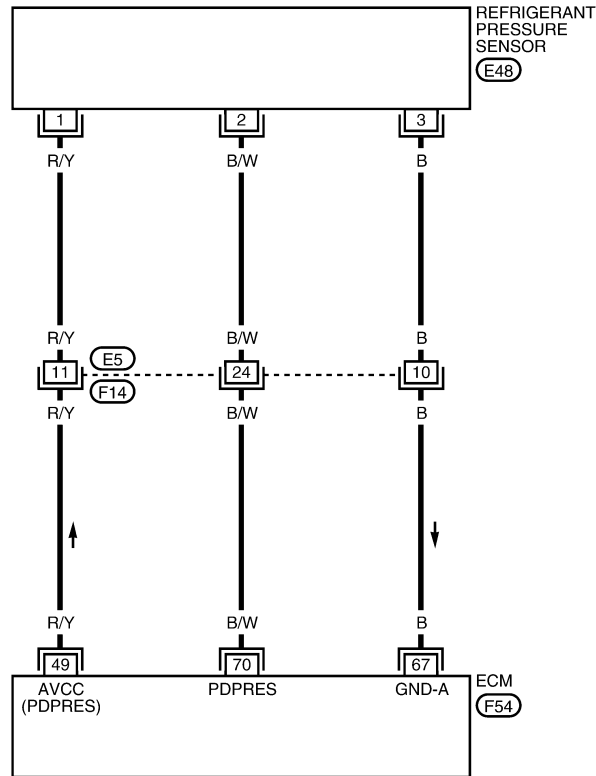
< SERVICE INFORMATION >

## Wiring Diagram

INFOID:000000003532183

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC  
 - - - : NON-DETECTABLE LINE FOR DTC



BBWA1715E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# REFRIGERANT PRESSURE SENSOR

## < SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	<b>[Ignition switch: ON]</b>	Approximately 5V
67	B	Sensor ground	<b>[Engine is running]</b> • Warm-up condition • Idle speed	Approximately 0V
70	B/W	Refrigerant pressure sensor	<b>[Engine is running]</b> • Warm-up condition • Both A/C switch and blower switch: ON (Compressor: Operates)	1.0 - 4.0V

## Diagnosis Procedure

INFOID:000000003532184

### 1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

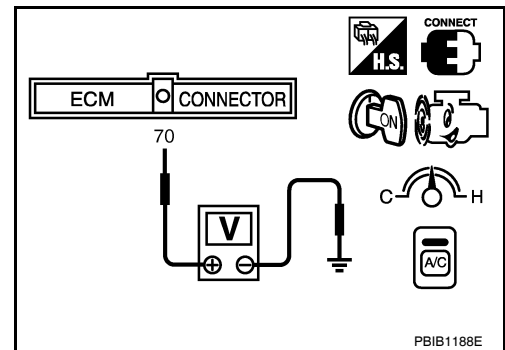
1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

**Voltage: 1.0 - 4.0V**

#### OK or NG

OK >> **INSPECTION END**

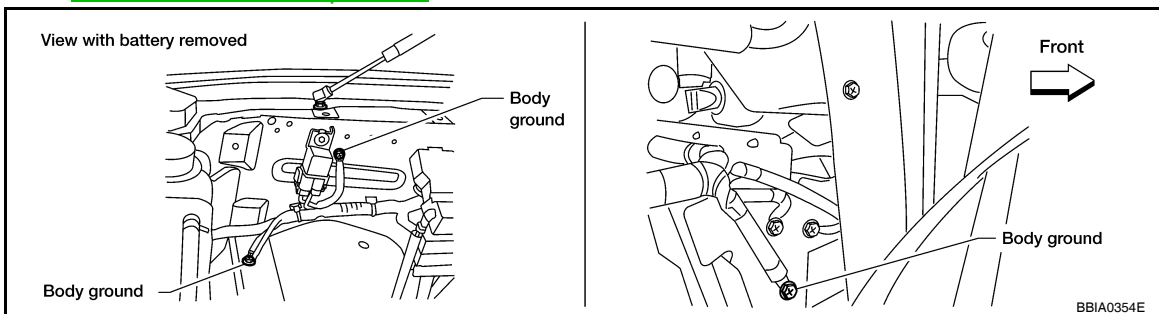
NG >> GO TO 2.



PBIB1188E

### 2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to [EC-143, "Ground Inspection"](#).



BBA0354E

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

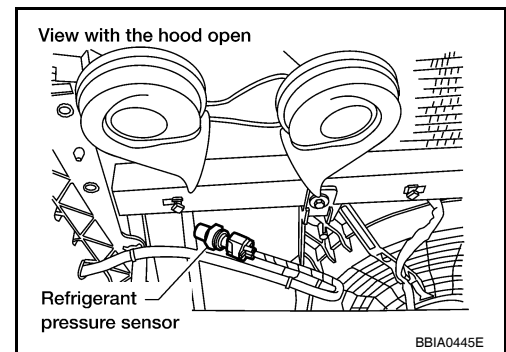
### 3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT



# REFRIGERANT PRESSURE SENSOR

## < SERVICE INFORMATION >

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.

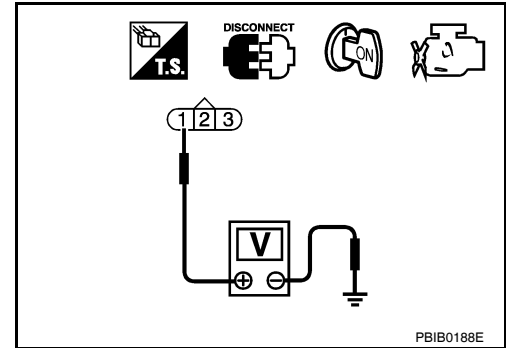


3. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

## 5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E5, F14
- Harness for open or short between ECM and refrigerant pressure sensor

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

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

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

A  
EC  
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I  
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L  
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P

# REFRIGERANT PRESSURE SENSOR

## < SERVICE INFORMATION >

---

- OK >> GO TO 9.
- NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors E5, F14
- Harness for open or short between ECM and refrigerant pressure sensor

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

## 9. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-138](#).

### OK or NG

- OK >> Replace refrigerant pressure sensor.
- NG >> Repair or replace.

## Removal and Installation

INFOID:000000003532185

## REFRIGERANT PRESSURE SENSOR

Refer to [ATC-161, "Removal and Installation for Refrigerant Pressure Sensor"](#).

# MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

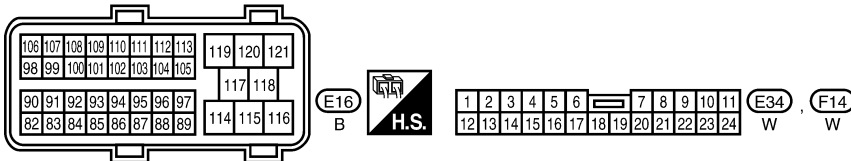
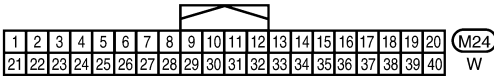
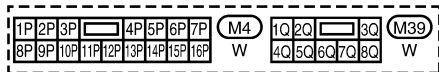
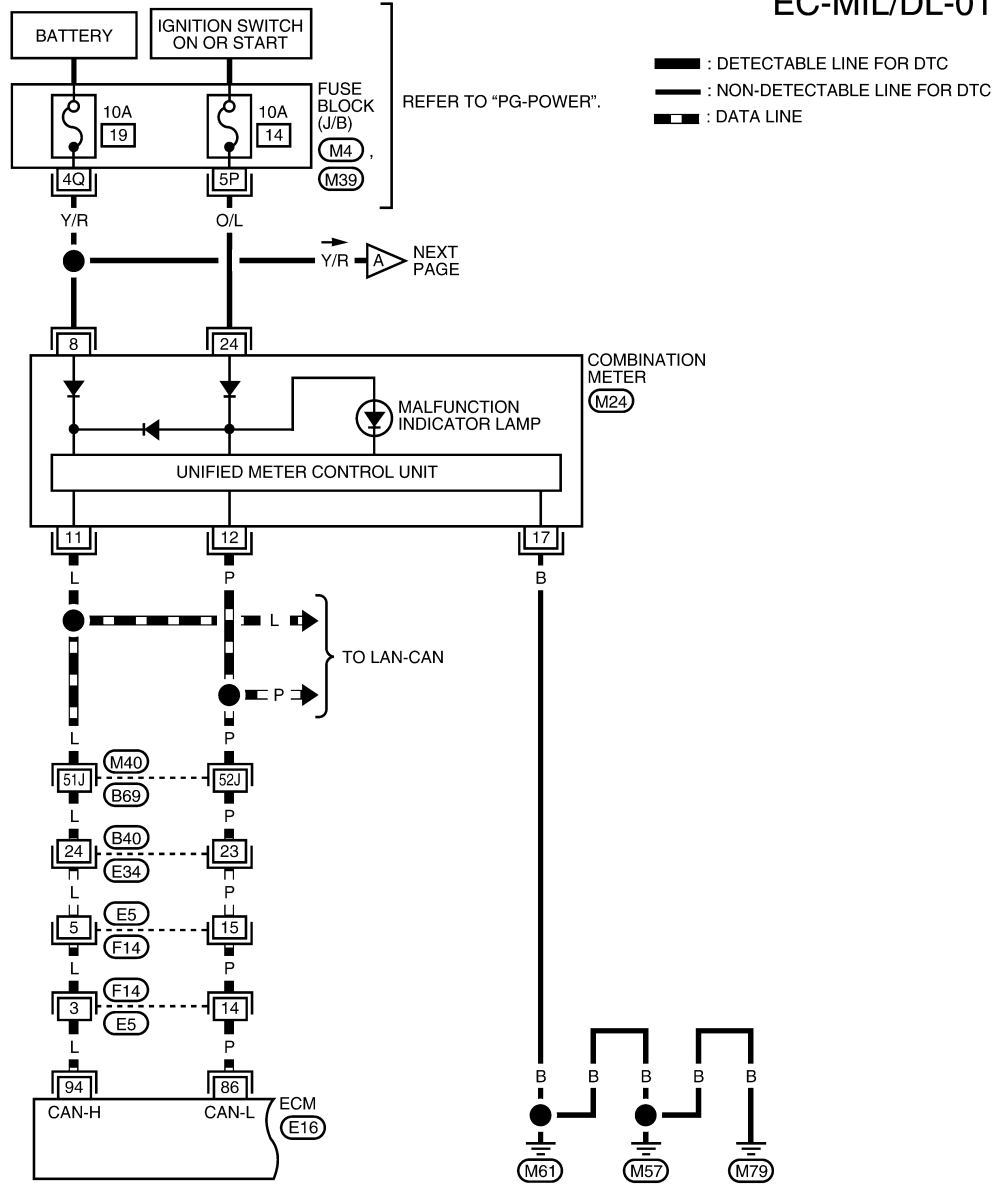
## MIL AND DATA LINK CONNECTOR

### Wiring Diagram

INFOID:000000003532186

### EC-MIL/DL-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P



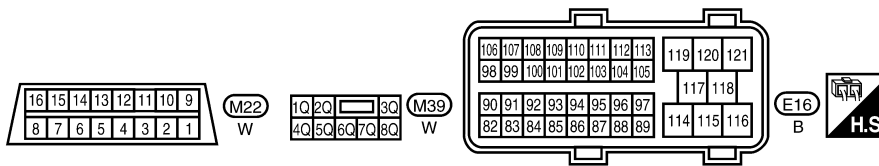
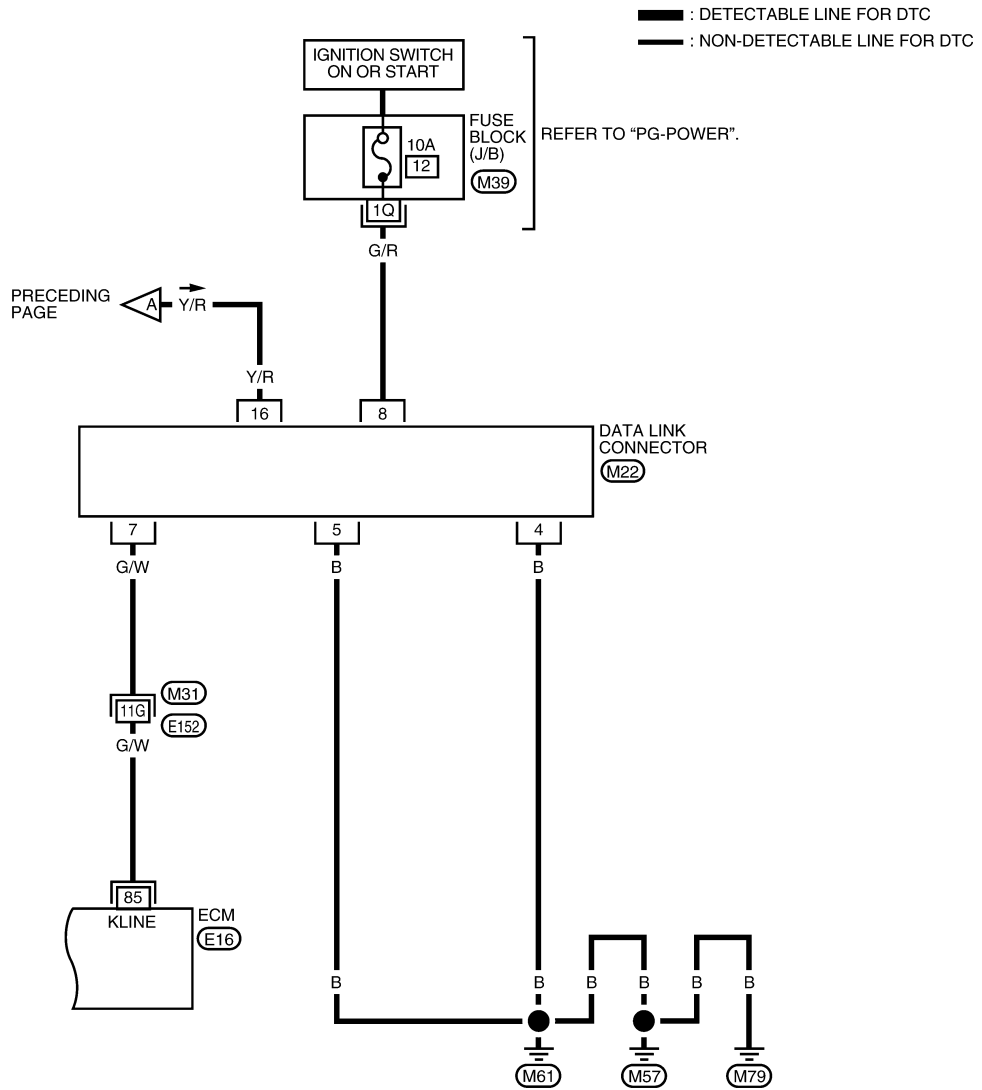
REFER TO THE FOLLOWING.  
 (M40) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2110E

# MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

EC-MIL/DL-02



REFER TO THE FOLLOWING.

(M31) - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1719E

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Fuel Pressure

INFOID:000000003532187

Fuel pressure at idling kPa (kg/cm <sup>2</sup> , psi)	Approximately 350 (3.57, 51)
--	------------------------------

### Idle Speed and Ignition Timing

INFOID:000000003532188

Target idle speed	No-load* (in P or N position)	650±50 rpm
Air conditioner: ON	In P or N position	700 rpm or more
Ignition timing	In P or N position	15° ± 5° BTDC

\*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights and heater fan)
- Steering wheel: Kept in straight-ahead position

### Calculated Load Value

INFOID:000000003532189

Condition	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

### Mass Air Flow Sensor

INFOID:000000003532190

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.3V*
Mass air flow (Using CONSULT-II or GST)	3.0 - 9.0 g·m/sec at idle* 9.0 - 28.0 g·m/sec at 2,500 rpm*

\*: Engine is warmed up to normal operating temperature and running under no load.

### Intake Air Temperature Sensor

INFOID:000000003532191

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

### Engine Coolant Temperature Sensor

INFOID:000000003532192

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

### A/F Sensor 1 Heater

INFOID:000000003532193

Resistance [at 25°C (77°F)]	1.8 - 2.44Ω
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### Heated Oxygen sensor 2 Heater

INFOID:000000003532194

Resistance [at 25°C (77°F)]	8 - 10Ω
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## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

Crankshaft Position Sensor (POS)

INFOID:000000003532195

Refer to [EC-341. "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

INFOID:000000003532196

Refer to [EC-347. "Component Inspection"](#).

Throttle Control Motor

INFOID:000000003532197

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω
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Fuel Injector

INFOID:000000003532198

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω
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Fuel Pump

INFOID:000000003532199

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω
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