

SECTION **EC**

ENGINE CONTROL SYSTEM

CONTENTS

SERVICE INFORMATION	9	Input/Output Signal Chart	27
INDEX FOR DTC	9	System Description	27
U1000 - U1010	9	AUTOMATIC SPEED CONTROL DEVICE	
P0011 - P0084	9	(ASCD)	28
P0101 - P0128	10	System Description	28
P0130 - P0159	10	Component Description	29
P0171 - P0228	11	CAN COMMUNICATION	30
P0300 - P0345	11	System Description	30
P0420 - P0448	12	EVAPORATIVE EMISSION SYSTEM	31
P0451 - P0463	12	Description	31
P0500 - P0643	12	Component Inspection	33
P0700 - P0745	13	Removal and Installation	35
P0850 - P1217	13	How to Detect Fuel Vapor Leakage	35
P1225 - P1574	14	ON BOARD REFUELING VAPOR RECOV-	
P1610 - P1615	14	ERY (ORVR)	37
P1715 - P1805	14	System Description	37
P2100 - P2A03	15	Diagnosis Procedure	37
PRECAUTIONS	16	Component Inspection	39
Precaution for Supplemental Restraint System		POSITIVE CRANKCASE VENTILATION	42
(SRS) "AIR BAG" and "SEAT BELT PRE-TEN-		Description	42
SIONER"	16	Component Inspection	42
Precaution for Battery Service	16	NVIS (NISSAN VEHICLE IMMOBILIZER SYS-	
Precaution for Procedure without Cowl Top Cover... 16		TEM-NATS)	44
On Board Diagnosis (OBD) System of Engine and		Description	44
A/T	16	ON BOARD DIAGNOSTIC (OBD) SYSTEM	45
Precaution	17	Introduction	45
PREPARATION	20	Two Trip Detection Logic	45
Special Service Tool	20	Emission-related Diagnostic Information	46
Commercial Service Tool	20	Malfunction Indicator Lamp (MIL)	62
ENGINE CONTROL SYSTEM	22	OBD System Operation Chart	65
Schematic	22	BASIC SERVICE PROCEDURE	71
Multiport Fuel Injection (MFI) System	23	Basic Inspection	71
Electronic Ignition (EI) System	25	Idle Speed and Ignition Timing Check	75
Fuel Cut Control (at No Load and High Engine		Procedure After Replacing ECM	75
Speed)	26		
AIR CONDITIONING CUT CONTROL	27		

VIN Registration	75	Removal and Installation	150
Exhaust Valve Timing Control Learning	76	DTC P0014 P0024 EVT CONTROL	151
Accelerator Pedal Released Position Learning	76	Description	151
Throttle Valve Closed Position Learning	76	CONSULT-III Reference Value in Data Monitor	
Idle Air Volume Learning	77	Mode	151
Fuel Pressure Check	78	On Board Diagnosis Logic	152
TROUBLE DIAGNOSIS	80	DTC Confirmation Procedure	152
Trouble Diagnosis Introduction	80	Diagnosis Procedure	153
DTC Inspection Priority Chart	84	Component Inspection	154
Fail-Safe Chart	85	Removal and Installation	155
Symptom Matrix Chart	87	DTC P0031, P0032, P0051, P0052 A/F SEN-	
Engine Control Component Parts Location	91	SOR 1 HEATER	156
Vacuum Hose Drawing	97	Description	156
Circuit Diagram	98	CONSULT-III Reference Value in Data Monitor	
ECM Harness Connector Terminal Layout	100	Mode	156
ECM Terminal and Reference Value	100	On Board Diagnosis Logic	156
CONSULT-III Function (ENGINE)	111	DTC Confirmation Procedure	156
Generic Scan Tool (GST) Function	120	Wiring Diagram	157
CONSULT-III Reference Value in Data Monitor	121	Diagnosis Procedure	160
TROUBLE DIAGNOSIS - SPECIFICATION		Component Inspection	162
VALUE	126	Removal and Installation	162
Description	126	DTC P0037, P0038, P0057, P0058 HO2S2	
Testing Condition	126	HEATER	163
Inspection Procedure	126	Description	163
Diagnosis Procedure	127	CONSULT-III Reference Value in Data Monitor	
TROUBLE DIAGNOSIS FOR INTERMITTENT		Mode	163
INCIDENT	134	On Board Diagnosis Logic	163
Description	134	DTC Confirmation Procedure	163
Diagnosis Procedure	134	Wiring Diagram	165
POWER SUPPLY AND GROUND CIRCUIT ..	135	Diagnosis Procedure	168
Wiring Diagram	135	Component Inspection	170
Diagnosis Procedure	138	Removal and Installation	171
Ground Inspection	142	DTC P0075, P0081 IVT CONTROL SOLE-	
DTC U1000, U1001 CAN COMMUNICATION		NOID VALVE	172
LINE	144	Component Description	172
Description	144	CONSULT-III Reference Value in Data Monitor	
On Board Diagnosis Logic	144	Mode	172
DTC Confirmation Procedure	144	On Board Diagnosis Logic	172
Wiring Diagram	145	DTC Confirmation Procedure	172
Diagnosis Procedure	145	Wiring Diagram	173
DTC U1010 CAN COMMUNICATION	146	Diagnosis Procedure	176
Description	146	Component Inspection	177
On Board Diagnosis Logic	146	Removal and Installation	178
DTC Confirmation Procedure	146	DTC P0078 P0084 EVT CONTROL MAGNET	
Diagnosis Procedure	146	RETARDER	179
DTC P0011, P0021 IVT CONTROL	147	Component Description	179
Description	147	CONSULT-III Reference Value in Data Monitor	
CONSULT-III Reference Value in Data Monitor		Mode	179
Mode	147	On Board Diagnosis Logic	179
On Board Diagnosis Logic	148	DTC Confirmation Procedure	179
DTC Confirmation Procedure	148	Wiring Diagram	180
Diagnosis Procedure	149	Diagnosis Procedure	183
Component Inspection	150	Component Inspection	184
		Removal and Installation	185

DTC P0101, P010B MAF SENSOR	186	Removal and Installation	230	
Component Description	186			A
CONSULT-III Reference Value in Data Monitor		DTC P0125 ECT SENSOR	231	
Mode	186	Component Description	231	
On Board Diagnosis Logic	187	On Board Diagnosis Logic	231	EC
DTC Confirmation Procedure	187	DTC Confirmation Procedure	231	
Overall Function Check	189	Diagnosis Procedure	232	
Wiring Diagram	191	Component Inspection	233	
Diagnosis Procedure	194	Removal and Installation	233	C
Component Inspection	196			
Removal and Installation	198	DTC P0127 IAT SENSOR	234	
DTC P0102, P0103, P010C, P010D MAF SEN-		Component Description	234	D
SOR	199	On Board Diagnosis Logic	234	
Component Description	199	DTC Confirmation Procedure	234	
CONSULT-III Reference Value in Data Monitor		Diagnosis Procedure	235	E
Mode	199	Component Inspection	236	
On Board Diagnosis Logic	199	Removal and Installation	236	
DTC Confirmation Procedure	200	DTC P0128 THERMOSTAT FUNCTION	237	F
Wiring Diagram	201	On Board Diagnosis Logic	237	
Diagnosis Procedure	204	DTC Confirmation Procedure	237	
Component Inspection	206	Diagnosis Procedure	237	G
Removal and Installation	207	Component Inspection	237	
DTC P0112, P0113 IAT SENSOR	208	Removal and Installation	238	
Component Description	208	DTC P0130, P0150 A/F SENSOR 1	239	H
On Board Diagnosis Logic	208	Component Description	239	
DTC Confirmation Procedure	208	CONSULT-III Reference Value in Data Monitor		
Wiring Diagram	209	Mode	239	I
Diagnosis Procedure	209	On Board Diagnosis Logic	239	
Component Inspection	211	DTC Confirmation Procedure	239	
Removal and Installation	212	Overall Function Check	240	J
DTC P0116 ECT SENSOR	213	Wiring Diagram	241	
Component Description	213	Diagnosis Procedure	244	
On Board Diagnosis Logic	213	Removal and Installation	246	K
DTC Confirmation Procedure	213	DTC P0131, P0151 A/F SENSOR 1	247	
Diagnosis Procedure	214	Component Description	247	L
Component Inspection	215	CONSULT-III Reference Value in Data Monitor		
Removal and Installation	215	Mode	247	
DTC P0117, P0118 ECT SENSOR	216	On Board Diagnosis Logic	247	
Component Description	216	DTC Confirmation Procedure	247	M
On Board Diagnosis Logic	216	Wiring Diagram	249	
DTC Confirmation Procedure	217	Diagnosis Procedure	252	
Wiring Diagram	218	Removal and Installation	254	
Diagnosis Procedure	218	DTC P0132, P0152 A/F SENSOR 1	255	N
Component Inspection	220	Component Description	255	
Removal and Installation	221	CONSULT-III Reference Value in Data Monitor		O
DTC P0122, P0123, P0227, P0228 TP SEN-		Mode	255	
SOR	222	On Board Diagnosis Logic	255	
Component Description	222	DTC Confirmation Procedure	255	
CONSULT-III Reference Value in Data Monitor		Wiring Diagram	257	P
Mode	222	Diagnosis Procedure	260	
On Board Diagnosis Logic	222	Removal and Installation	262	
DTC Confirmation Procedure	223	DTC P0133, P0153 A/F SENSOR 1	263	
Wiring Diagram	223	Component Description	263	
Diagnosis Procedure	227	CONSULT-III Reference Value in Data Monitor		
Component Inspection	229	Mode	263	

On Board Diagnosis Logic	263	Wiring Diagram	329
DTC Confirmation Procedure	263	Diagnosis Procedure	329
Wiring Diagram	265	Component Inspection	331
Diagnosis Procedure	268	Removal and Installation	331
Removal and Installation	272		
DTC P0137, P0157 HO2S2	273	DTC P0182, P0183 FTT SENSOR	332
Component Description	273	Component Description	332
CONSULT-III Reference Value in Data Monitor		On Board Diagnosis Logic	332
Mode	273	DTC Confirmation Procedure	332
On Board Diagnosis Logic	273	Wiring Diagram	333
DTC Confirmation Procedure	273	Diagnosis Procedure	333
Overall Function Check	274	Component Inspection	335
Wiring Diagram	275	Removal and Installation	335
Diagnosis Procedure	278		
Component Inspection	281	DTC P0196 EOT SENSOR	336
Removal and Installation	282	Component Description	336
		On Board Diagnosis Logic	336
DTC P0138, P0158 HO2S2	283	DTC Confirmation Procedure	336
Component Description	283	Diagnosis Procedure	337
CONSULT-III Reference Value in Data Monitor		Component Inspection	338
Mode	283	Removal and Installation	339
On Board Diagnosis Logic	283		
DTC Confirmation Procedure	284	DTC P0197, P0198 EOT SENSOR	340
Overall Function Check	285	Component Description	340
Wiring Diagram	286	On Board Diagnosis Logic	340
Diagnosis Procedure	289	DTC Confirmation Procedure	340
Component Inspection	294	Wiring Diagram	341
Removal and Installation	295	Diagnosis Procedure	341
		Component Inspection	343
DTC P0139, P0159 HO2S2	296	Removal and Installation	344
Component Description	296		
CONSULT-III Reference Value in Data Monitor		DTC P0222, P0223, P2132, P2133 TP SEN-	SOR
Mode	296	Component Description	345
On Board Diagnosis Logic	296	CONSULT-III Reference Value in Data Monitor	
DTC Confirmation Procedure	296	Mode	345
Overall Function Check	297	On Board Diagnosis Logic	345
Wiring Diagram	298	DTC Confirmation Procedure	346
Diagnosis Procedure	301	Wiring Diagram	346
Component Inspection	304	Diagnosis Procedure	350
Removal and Installation	305	Component Inspection	352
		Removal and Installation	353
DTC P0171, P0174 FUEL INJECTION SYS-		DTC P0300, P0301, P0302, P0303, P0304,	
TEM FUNCTION	306	P0305, P0306 MULTIPLE CYLINDER MIS-	
On Board Diagnosis Logic	306	FIRE, NO. 1 - 6 CYLINDER MISFIRE	354
DTC Confirmation Procedure	306	On Board Diagnosis Logic	354
Wiring Diagram	310	DTC Confirmation Procedure	354
Diagnosis Procedure	313	Diagnosis Procedure	355
DTC P0172, P0175 FUEL INJECTION SYS-		DTC P0327, P0328, P0332, P0333 KS	360
TEM FUNCTION	317	Component Description	360
On Board Diagnosis Logic	317	On Board Diagnosis Logic	360
DTC Confirmation Procedure	317	DTC Confirmation Procedure	360
Wiring Diagram	321	Wiring Diagram	360
Diagnosis Procedure	324	Diagnosis Procedure	364
		Component Inspection	366
DTC P0181 FTT SENSOR	328	Removal and Installation	366
Component Description	328		
On Board Diagnosis Logic	328	DTC P0335 CKP SENSOR (POS)	367
DTC Confirmation Procedure	328		

Component Description	367	Diagnosis Procedure	411	
CONSULT-III Reference Value in Data Monitor		Component Inspection	413	A
Mode	367	Removal and Installation	413	
On Board Diagnosis Logic	367			
DTC Confirmation Procedure	368	DTC P0447 EVAP CANISTER VENT CON-		EC
Wiring Diagram	369	TROL VALVE	414	
Diagnosis Procedure	370	Component Description	414	
Component Inspection	373	CONSULT-III Reference Value in Data Monitor		
Removal and Installation	374	Mode	414	C
		On Board Diagnosis Logic	414	
DTC P0340, P0345 CMP SENSOR (PHASE).. 375		DTC Confirmation Procedure	414	
Component Description	375	Wiring Diagram	415	D
CONSULT-III Reference Value in Data Monitor		Diagnosis Procedure	416	
Mode	375	Component Inspection	418	
On Board Diagnosis Logic	375			
DTC Confirmation Procedure	376	DTC P0448 EVAP CANISTER VENT CON-		E
Wiring Diagram	377	TROL VALVE	419	
Diagnosis Procedure	380	Component Description	419	
Component Inspection	383	CONSULT-III Reference Value in Data Monitor		F
Removal and Installation	384	Mode	419	
		On Board Diagnosis Logic	419	
DTC P0420, P0430 THREE WAY CATALYST		DTC Confirmation Procedure	419	G
FUNCTION	385	Wiring Diagram	421	
On Board Diagnosis Logic	385	Diagnosis Procedure	422	
DTC Confirmation Procedure	385	Component Inspection	423	H
Overall Function Check	386			
Diagnosis Procedure	386	DTC P0451 EVAP CONTROL SYSTEM		
		PRESSURE SENSOR	425	
DTC P0441 EVAP CONTROL SYSTEM	390	Component Description	425	I
System Description	390	CONSULT-III Reference Value in Data Monitor		
On Board Diagnosis Logic	390	Mode	425	
DTC Confirmation Procedure	390	On Board Diagnosis Logic	425	J
Overall Function Check	391	DTC Confirmation Procedure	426	
Diagnosis Procedure	391	Diagnosis Procedure	426	
		Component Inspection	428	K
DTC P0442 EVAP CONTROL SYSTEM	395			
On Board Diagnosis Logic	395	DTC P0452 EVAP CONTROL SYSTEM		
DTC Confirmation Procedure	395	PRESSURE SENSOR	430	
Diagnosis Procedure	396	Component Description	430	L
		CONSULT-III Reference Value in Data Monitor		
DTC P0443 EVAP CANISTER PURGE VOL-		Mode	430	
UME CONTROL SOLENOID VALVE	401	On Board Diagnosis Logic	430	M
Description	401	DTC Confirmation Procedure	431	
CONSULT-III Reference Value in Data Monitor		Wiring Diagram	432	
Mode	401	Diagnosis Procedure	433	N
On Board Diagnosis Logic	402	Component Inspection	436	
DTC Confirmation Procedure	402			
Wiring Diagram	403	DTC P0453 EVAP CONTROL SYSTEM		
Diagnosis Procedure	404	PRESSURE SENSOR	438	O
Component Inspection	407	Component Description	438	
Removal and Installation	407	CONSULT-III Reference Value in Data Monitor		
		Mode	438	
DTC P0444, P0445 EVAP CANISTER PURGE		On Board Diagnosis Logic	439	P
VOLUME CONTROL SOLENOID VALVE	408	DTC Confirmation Procedure	439	
Description	408	Wiring Diagram	440	
CONSULT-III Reference Value in Data Monitor		Diagnosis Procedure	441	
Mode	408	Component Inspection	445	
On Board Diagnosis Logic	409			
DTC Confirmation Procedure	409	DTC P0455 EVAP CONTROL SYSTEM	446	
Wiring Diagram	410	On Board Diagnosis Logic	446	

DTC Confirmation Procedure	446	Component Description	476
Diagnosis Procedure	447	On Board Diagnosis Logic	476
DTC P0456 EVAP CONTROL SYSTEM	452	DTC Confirmation Procedure	476
On Board Diagnosis Logic	452	Wiring Diagram	477
DTC Confirmation Procedure	453	Diagnosis Procedure	478
Overall Function Check	453	DTC P0605 ECM	480
Diagnosis Procedure	454	Component Description	480
DTC P0460 FUEL LEVEL SENSOR	459	On Board Diagnosis Logic	480
Component Description	459	DTC Confirmation Procedure	480
On Board Diagnosis Logic	459	Diagnosis Procedure	481
DTC Confirmation Procedure	459	DTC P0643 SENSOR POWER SUPPLY	482
Diagnosis Procedure	459	On Board Diagnosis Logic	482
Removal and Installation	460	DTC Confirmation Procedure	482
DTC P0461 FUEL LEVEL SENSOR	461	Wiring Diagram	483
Component Description	461	Diagnosis Procedure	484
On Board Diagnosis Logic	461	DTC P0850 PNP SWITCH	488
Overall Function Check	461	Component Description	488
Diagnosis Procedure	462	CONSULT-III Reference Value in Data Monitor	
Removal and Installation	462	Mode	488
DTC P0462, P0463 FUEL LEVEL SENSOR ..	463	On Board Diagnosis Logic	488
Component Description	463	DTC Confirmation Procedure	488
On Board Diagnosis Logic	463	Overall Function Check	489
DTC Confirmation Procedure	463	Wiring Diagram	490
Diagnosis Procedure	463	Diagnosis Procedure	493
Removal and Installation	464	DTC P1078 P1084 EVT CONTROL POSITION	
DTC P0500 VSS	465	SENSOR	496
Description	465	Component Description	496
On Board Diagnosis Logic	465	CONSULT-III Reference Value in Data Monitor	
DTC Confirmation Procedure	465	Mode	496
Overall Function Check	466	On Board Diagnosis Logic	496
Diagnosis Procedure	466	DTC Confirmation Procedure	497
DTC P0506 ISC SYSTEM	467	Wiring Diagram	498
Description	467	Diagnosis Procedure	501
On Board Diagnosis Logic	467	Component Inspection	505
DTC Confirmation Procedure	467	Removal and Installation	505
Diagnosis Procedure	467	DTC P1148, P1168 CLOSED LOOP CON-	
DTC P0507 ISC SYSTEM	469	TROL	506
Description	469	On Board Diagnosis Logic	506
On Board Diagnosis Logic	469	DTC P1211 TCS CONTROL UNIT	507
DTC Confirmation Procedure	469	Description	507
Diagnosis Procedure	469	On Board Diagnosis Logic	507
DTC P0550 PSP SENSOR	471	DTC Confirmation Procedure	507
Component Description	471	Diagnosis Procedure	507
CONSULT-III Reference Value in Data Monitor		DTC P1212 TCS COMMUNICATION LINE	508
Mode	471	Description	508
On Board Diagnosis Logic	471	On Board Diagnosis Logic	508
DTC Confirmation Procedure	471	DTC Confirmation Procedure	508
Wiring Diagram	472	Diagnosis Procedure	508
Diagnosis Procedure	473	DTC P1217 ENGINE OVER TEMPERATURE.	509
Component Inspection	475	Description	509
Removal and Installation	475	CONSULT-III Reference Value in Data Monitor	
DTC P0603 ECM POWER SUPPLY	476	Mode	510
		On Board Diagnosis Logic	510

Overall Function Check	510	Component Description	549	
Wiring Diagram	512	CONSULT-III Reference Value in Data Monitor		A
Diagnosis Procedure	513	Mode	549	
Main 12 Causes of Overheating	518	On Board Diagnosis Logic	549	
Component Inspection	518	DTC Confirmation Procedure	549	EC
		Wiring Diagram	550	
		Diagnosis Procedure	553	
DTC P1225, P1234 TP SENSOR	519	DTC P1421 COLD START CONTROL	556	C
Component Description	519	Description	556	
On Board Diagnosis Logic	519	On Board Diagnosis Logic	556	
DTC Confirmation Procedure	519	DTC Confirmation Procedure	556	D
Diagnosis Procedure	519	Diagnosis Procedure	556	
Removal and Installation	520			
DTC P1226, P1235 TP SENSOR	521	DTC P1564 ASCD STEERING SWITCH	558	E
Component Description	521	Component Description	558	
On Board Diagnosis Logic	521	CONSULT-III Reference Value in Data Monitor		
DTC Confirmation Procedure	521	Mode	558	F
Diagnosis Procedure	521	On Board Diagnosis Logic	558	
Removal and Installation	522	DTC Confirmation Procedure	558	
		Wiring Diagram	560	
DTC P1233, P2101 ELECTRIC THROTTLE		Diagnosis Procedure	561	G
CONTROL FUNCTION	523	Component Inspection	563	
Description	523			
On Board Diagnosis Logic	523	DTC P1572 ASCD BRAKE SWITCH	565	H
DTC Confirmation Procedure	523	Component Description	565	
Wiring Diagram	524	CONSULT-III Reference Value in Data Monitor		
Diagnosis Procedure	527	Mode	565	
Component Inspection	531	On Board Diagnosis Logic	565	I
Removal and Installation	531	DTC Confirmation Procedure	566	
		Wiring Diagram	567	
DTC P1236, P2118 THROTTLE CONTROL		Diagnosis Procedure	570	J
MOTOR	532	Component Inspection	577	
Component Description	532			
On Board Diagnosis Logic	532	DTC P1574 ASCD VEHICLE SPEED SEN-		
DTC Confirmation Procedure	532	SOR	579	K
Wiring Diagram	533	Component Description	579	
Diagnosis Procedure	536	On Board Diagnosis Logic	579	
Component Inspection	538	DTC Confirmation Procedure	579	L
Removal and Installation	538	Diagnosis Procedure	579	
DTC P1238, P2119 ELECTRIC THROTTLE		DTC P1715 INPUT SPEED SENSOR	581	M
CONTROL ACTUATOR	539	Description	581	
Component Description	539	CONSULT-III Reference Value in Data Monitor		
On Board Diagnosis Logic	539	Mode	581	
DTC Confirmation Procedure	539	On Board Diagnosis Logic	581	N
Diagnosis Procedure	540	Diagnosis Procedure	581	
DTC P1239, P2135 TP SENSOR	541	DTC P1805 BRAKE SWITCH	582	O
Component Description	541	Description	582	
CONSULT-III Reference Value in Data Monitor		CONSULT-III Reference Value in Data Monitor		
Mode	541	Mode	582	
On Board Diagnosis Logic	541	On Board Diagnosis Logic	582	P
DTC Confirmation Procedure	541	DTC Confirmation Procedure	582	
Wiring Diagram	542	Wiring Diagram	583	
Diagnosis Procedure	545	Diagnosis Procedure	584	
Component Inspection	547	Component Inspection	585	
Removal and Installation	548			
DTC P1290, P2100, P2103 THROTTLE CON-		DTC P2122, P2123 APP SENSOR	586	
TROL MOTOR RELAY	549	Component Description	586	

CONSULT-III Reference Value in Data Monitor		ELECTRICAL LOAD SIGNAL	632
Mode	586	Description	632
On Board Diagnosis Logic	586	CONSULT-III Reference Value in Data Monitor	
DTC Confirmation Procedure	587	Mode	632
Wiring Diagram	588	Diagnosis Procedure	632
Diagnosis Procedure	589		
Component Inspection	591	FUEL INJECTOR	634
Removal and Installation	592	Component Description	634
DTC P2127, P2128 APP SENSOR	593	CONSULT-III Reference Value in Data Monitor	
Component Description	593	Mode	634
CONSULT-III Reference Value in Data Monitor		Wiring Diagram	635
Mode	593	Diagnosis Procedure	636
On Board Diagnosis Logic	593	Component Inspection	638
DTC Confirmation Procedure	594	Removal and Installation	638
Wiring Diagram	595		
Diagnosis Procedure	596	FUEL PUMP	639
Component Inspection	600	Description	639
Removal and Installation	600	CONSULT-III Reference Value in Data Monitor	
DTC P2138 APP SENSOR	601	Mode	639
Component Description	601	Wiring Diagram	640
CONSULT-III Reference Value in Data Monitor		Diagnosis Procedure	641
Mode	601	Component Inspection	643
On Board Diagnosis Logic	601	Removal and Installation	644
DTC Confirmation Procedure	602		
Wiring Diagram	603	IGNITION SIGNAL	645
Diagnosis Procedure	604	Component Description	645
Component Inspection	608	Wiring Diagram	646
Removal and Installation	608	Diagnosis Procedure	651
		Component Inspection	654
DTC P2A00, P2A03 A/F SENSOR 1	609	Removal and Installation	656
Component Description	609		
CONSULT-III Reference Value in Data Monitor		REFRIGERANT PRESSURE SENSOR	657
Mode	609	Component Description	657
On Board Diagnosis Logic	609	Wiring Diagram	658
DTC Confirmation Procedure	609	Diagnosis Procedure	659
Wiring Diagram	611	Removal and Installation	661
Diagnosis Procedure	614		
Removal and Installation	619	MIL AND DATA LINK CONNECTOR	662
ASCD BRAKE SWITCH	620	Wiring Diagram	662
Component Description	620		
CONSULT-III Reference Value in Data Monitor		SERVICE DATA AND SPECIFICATIONS	
Mode	620	(SDS)	664
Wiring Diagram	621	Fuel Pressure	664
Diagnosis Procedure	624	Idle Speed and Ignition Timing	664
Component Inspection	628	Calculated Load Value	664
ASCD INDICATOR	629	Mass Air Flow Sensor	664
Component Description	629	Intake Air Temperature Sensor	664
CONSULT-III Reference Value in Data Monitor		Engine Coolant Temperature Sensor	664
Mode	629	Air Fuel Ratio (A/F) Sensor 1 Heater	664
Wiring Diagram	630	Heated Oxygen sensor 2 Heater	665
Diagnosis Procedure	630	Crankshaft Position Sensor (POS)	665
		Camshaft Position Sensor (PHASE)	665
		Throttle Control Motor	665
		Fuel Injector	665
		Fuel Pump	665

INDEX FOR DTC

< SERVICE INFORMATION >

SERVICE INFORMATION

INDEX FOR DTC

U1000 - U1010

INFOID:000000001645475

EC

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	EC-144
U1001	1001*4	CAN COMM CIRCUIT	EC-144
U1010	1010	CONTROL UNIT(CAN)	EC-146

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

*2: This number is prescribed by SAE J2012.

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

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

P0011 - P0084

INFOID:000000003218309

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0011	0011	INT/V TIM CONT-B1	EC-148
P0014	0014	EXH/V TIM CONT-B1	EC-152
P0021	0021	INT/V TIM CONT-B2	EC-148
P0024	0024	EXH/V TIM CONT-B2	EC-152
P0031	0031	A/F SEN1 HTR (B1)	EC-156
P0032	0032	A/F SEN1 HTR (B1)	EC-156
P0037	0037	HO2S2 HTR (B1)	EC-163
P0038	0038	HO2S2 HTR (B1)	EC-163
P0051	0051	A/F SEN1 HTR (B2)	EC-156
P0052	0052	A/F SEN1 HTR (B2)	EC-156
P0057	0057	HO2S2 HTR (B2)	EC-163
P0058	0058	HO2S2 HTR (B2)	EC-163
P0075	0075	INT/V TIM V/CIR-B1	EC-172
P0078	0078	EX V/T MGT/RTDR-B1	EC-179
P0081	0081	INT/V TIM V/CIR-B2	EC-172
P0084	0084	EX V/T MGT/RTDR-B2	EC-179

*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.

INDEX FOR DTC

< SERVICE INFORMATION >

P0101 - P0128

INFOID:000000003218311

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0101	0101	MAF SEN/CIRCUIT-B1	EC-187
P0102	0102	MAF SEN/CIRCUIT-B1	EC-199
P0103	0103	MAF SEN/CIRCUIT-B1	EC-199
P010B	010B	MAF SEN/CIRCUIT-B2	EC-187
P010C	010C	MAF SEN/CIRCUIT-B2	EC-199
P010D	010D	MAF SEN/CIRCUIT-B2	EC-199
P0112	0112	IAT SEN/CIRCUIT-B1	EC-208
P0113	0113	IAT SEN/CIRCUIT-B1	EC-208
P0116	0116	ECT SENSOR	EC-213
P0117	0117	ECT SEN/CIRC	EC-216
P0118	0118	ECT SEN/CIRC	EC-216
P0122	0122	TP SEN 2/CIRC-B1	EC-222
P0123	0123	TP SEN 2/CIRC-B1	EC-222
P0125	0125	ECT SENSOR	EC-231
P0127	0127	IAT SENSOR-B1	EC-234
P0128	0128	THERMSTAT FNCTN	EC-237

*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.

P0130 - P0159

INFOID:000000003218310

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0130	0130	A/F SENSOR1 (B1)	EC-239
P0131	0131	A/F SENSOR1 (B1)	EC-247
P0132	0132	A/F SENSOR1 (B1)	EC-255
P0133	0133	A/F SENSOR1 (B1)	EC-263
P0137	0137	HO2S2 (B1)	EC-273
P0138	0138	HO2S2 (B1)	EC-283
P0139	0139	HO2S2 (B1)	EC-283
P0150	0150	A/F SENSOR1 (B2)	EC-239
P0151	0151	A/F SENSOR1 (B2)	EC-247
P0152	0152	A/F SENSOR1 (B2)	EC-255
P0153	0153	A/F SENSOR1 (B2)	EC-263
P0157	0157	HO2S2 (B2)	EC-273
P0158	0158	HO2S2 (B2)	EC-283
P0159	0159	HO2S2 (B2)	EC-296

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

*2: This number is prescribed by SAE J2012.

INDEX FOR DTC

< SERVICE INFORMATION >

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

P0171 - P0228

INFOID:000000003218312

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0171	0171	FUEL SYS-LEAN-B1	EC-306
P0172	0172	FUEL SYS-RICH-B1	EC-317
P0174	0174	FUEL SYS-LEAN-B2	EC-306
P0175	0175	FUEL SYS-RICH-B2	EC-317
P0181	0181	FTT SENSOR	EC-328
P0182	0182	FTT SEN/CIRCUIT	EC-332
P0183	0183	FTT SEN/CIRCUIT	EC-332
P0196	0196	EOT SENSOR	EC-336
P0197	0197	EOT SEN/CIRC	EC-340
P0198	0198	EOT SEN/CIRC	EC-340
P0222	0222	TP SEN 1/CIRC-B1	EC-345
P0223	0223	TP SEN 1/CIRC-B1	EC-345
P0227	0227	TP SEN 2/CIRC-B2	EC-222
P0228	0228	TP SEN 2/CIRC-B2	EC-222

*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.

P0300 - P0345

INFOID:000000003218313

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0300	0300	MULTI CYL MISFIRE	EC-354
P0301	0301	CYL 1 MISFIRE	EC-354
P0302	0302	CYL 2 MISFIRE	EC-354
P0303	0303	CYL 3 MISFIRE	EC-354
P0304	0304	CYL 4 MISFIRE	EC-354
P0305	0305	CYL 5 MISFIRE	EC-354
P0306	0306	CYL 6 MISFIRE	EC-354
P0327	0327	KNOCK SEN/CIRC-B1	EC-360
P0328	0328	KNOCK SEN/CIRC-B1	EC-360
P0332	0332	KNOCK SEN/CIRC-B2	EC-360
P0333	0333	KNOCK SEN/CIRC-B2	EC-360
P0335	0335	CKP SEN/CIRCUIT	EC-367
P0340	0340	CMP SEN/CIRC-B1	EC-375
P0345	0345	CMP SEN/CIRC-B2	EC-375

*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.

INDEX FOR DTC

< SERVICE INFORMATION >

P0420 - P0448

INFOID:000000003218314

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0420	0420	TW CATALYST SYS-B1	EC-385
P0430	0430	TW CATALYST SYS-B2	EC-385
P0441	0441	EVAP PURG FLOW/MON	EC-390
P0442	0442	EVAP SMALL LEAK	EC-395
P0443	0443	PURG VOLUME CONT/V	EC-404
P0444	0444	PURG VOLUME CONT/V	EC-409
P0445	0445	PURG VOLUME CONT/V	EC-409
P0447	0447	VENT CONTROL VALVE	EC-414
P0448	0448	VENT CONTROL VALVE	EC-419

*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.

P0451 - P0463

INFOID:000000003218315

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0451	0451	EVAP SYS PRES SEN	EC-425
P0452	0452	EVAP SYS PRES SEN	EC-430
P0453	0453	EVAP SYS PRES SEN	EC-439
P0455	0455	EVAP GROSS LEAK	EC-446
P0456	0456	EVAP VERY SML LEAK	EC-452
P0460	0460	FUEL LEV SEN SLOSH	EC-459
P0461	0461	FUEL LEVEL SENSOR	EC-461
P0462	0462	FUEL LEVL SEN/CIRC	EC-463
P0463	0463	FUEL LEVL SEN/CIRC	EC-463

*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.

P0500 - P0643

INFOID:000000003218316

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0500	0500	VEH SPEED SEN/CIRC	EC-465
P0506	0506	ISC SYSTEM	EC-467
P0507	0507	ISC SYSTEM	EC-469
P0550	0550	PW ST P SEN/CIRC	EC-471
P0603	0603	ECM BACK UP/CIRCUIT	EC-476

INDEX FOR DTC

< SERVICE INFORMATION >

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0605	0605	ECM	EC-480
P0643	0643	SENSOR POWER/CIRC	EC-482

*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.

P0700 - P0745

INFOID:0000000003218317

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0700	0700	TRANSMISSION CONT	AT-97
P0705	0705	T/M RANGE SENSOR A	AT-98
P0710	0710	ATF TEMP SEN/CIRC	AT-128
P0717	0717	INPUT SPEED SENSOR A	AT-101
P0720	0720	OUTPUT SPEED SENSOR	AT-103
P0731	0731	1GR INCORRECT RATIO	AT-110
P0732	0732	2GR INCORRECT RATIO	AT-112
P0733	0733	3GR INCORRECT RATIO	AT-114
P0734	0734	4GR INCORRECT RATIO	AT-116
P0735	0735	5GR INCORRECT RATIO	AT-118
P0740	0740	TORQUE CONVERTER	AT-120
P0744	0744	TORQUE CONVERTER	AT-122
P0745	0745	PC SOLENOID A	AT-124

*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.

P0850 - P1217

INFOID:0000000003218318

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0850	0850	P-N POS SW/CIRCUIT	EC-488
P1078	1078	EXH TIM SEN/CIR-B1	EC-496
P1084	1084	EXH TIM SEN/CIR-B2	EC-496
P1148	1148	CLOSED LOOP-B1	EC-506
P1168	1168	CLOSED LOOP-B2	EC-506
P1211	1211	TCS C/U FUNCTN	EC-507
P1212	1212	TCS/CIRC	EC-508
P1217	1217	ENG OVER TEMP	EC-510

*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.

INDEX FOR DTC

< SERVICE INFORMATION >

P1225 - P1574

INFOID:000000003218319

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1225	1225	CTP LEARNING-B1	EC-519
P1226	1226	CTP LEARNING-B1	EC-521
P1233	1233	ETC FUNCTION/CIRC-B2	EC-523
P1234	1234	CTP LEARNING-B2	EC-519
P1235	1235	CTP LEARNING-B2	EC-521
P1236	1236	ETC MOT-B2	EC-532
P1238	1238	ETC ACTR-B2	EC-539
P1239	1239	TP SENSOR-B2	EC-541
P1290	1290	ETC MOT PWR-B2	EC-549
P1421	1421	COLD START CONTROL	EC-556
P1564	1564	ASCD SW	EC-558
P1572	1572	ASCD BRAKE SW	EC-565
P1574	1574	ASCD VHL SPD SEN	EC-579

*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.

P1610 - P1615

INFOID:000000003218320

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1610	1610	LOCK MODE	BL-137
P1611	1611	ID DISCORD,IMM-ECM	BL-137
P1612	1612	CHAIN OF ECM-IMMU	BL-137
P1614	1614	CHAIN OF IMMU-KEY	BL-137
P1615	1615	DIFFERENCE OF KEY	BL-137

*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.

P1715 - P1805

INFOID:000000003218321

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1715	1715	IN PULY SPEED	EC-581
P1730	1730	INTERLOCK	AT-135
P1752	1752	INPUT CLUTCH SOL	AT-139
P1757	1757	FR BRAKE SOLENOID	AT-141
P1762	1762	DRCT CLUTCH SOL	AT-143
P1767	1767	HLR CLUTCH SOLENOID	AT-145

INDEX FOR DTC

< SERVICE INFORMATION >

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1772	1772	L C BRAKE SOLENOID	AT-147
P1774	1774	L C BRAKE SOLENOID	AT-149
P1805	1805	BRAKE SW/CIRCUIT	EC-582

*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.

P2100 - P2A03

INFOID:000000003218322

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P2100	2100	ETC MOT PWR-B1	EC-549
P2101	2101	ETC FNCTN/CIRC-B1	EC-523
P2103	2103	ETC MOT PWR-B1	EC-549
P2118	2118	ETC MOT-B1	EC-532
P2119	2119	ETC ACTR-B1	EC-539
P2122	2122	APP SEN 1/CIRC	EC-586
P2123	2123	APP SEN 1/CIRC	EC-586
P2127	2127	APP SEN 2/CIRC	EC-593
P2128	2128	APP SEN 2/CIRC	EC-593
P2132	2132	TP SEN 1/CIRC-B2	EC-345
P2133	2133	TP SEN 1/CIRC-B2	EC-345
P2135	2135	TP SENSOR-B1	EC-541
P2138	2138	APP SENSOR	EC-601
P2A00	2A00	A/F SENSOR1 (B1)	EC-609
P2A03	2A03	A/F SENSOR1 (B2)	EC-609

*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.

PRECAUTIONS

< SERVICE INFORMATION >

PRECAUTIONS

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

INFOID:000000003230061

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

WARNING:

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

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

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Battery Service

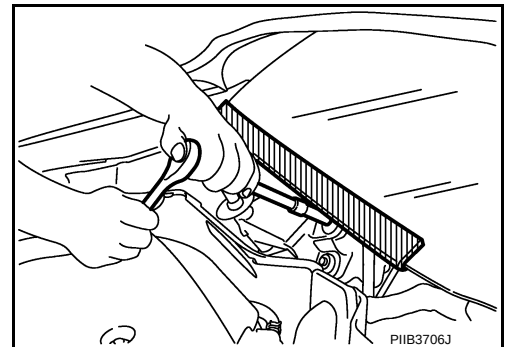
INFOID:000000003230072

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

Precaution for Procedure without Cowl Top Cover

INFOID:000000003230077

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



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

INFOID:000000001645480

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.

PRECAUTIONS

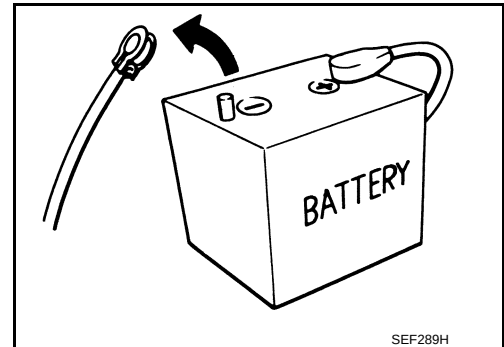
< SERVICE INFORMATION >

- 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-74](#).
- 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.

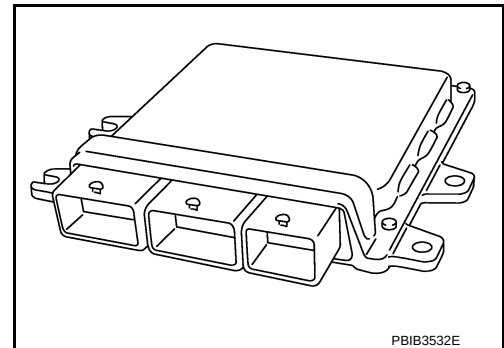
Precaution

INFOID:000000001645481

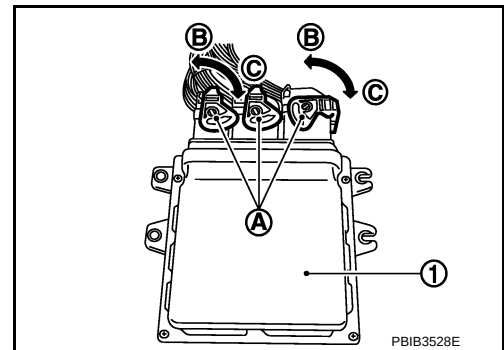
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage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



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission related diagnostic information will be lost within 24 hours.
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st freeze frame data
 - System readiness test (SRT) codes
 - Test values
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.



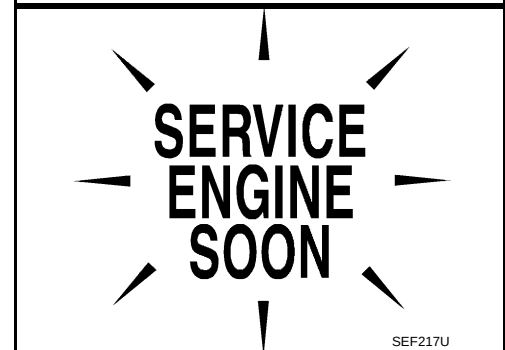
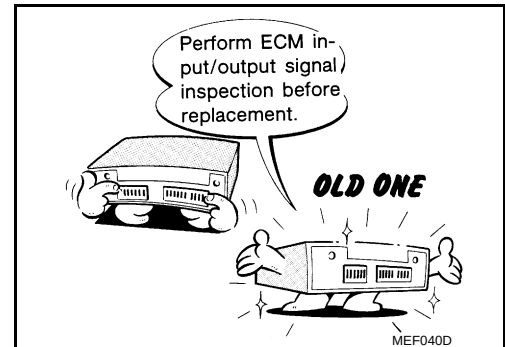
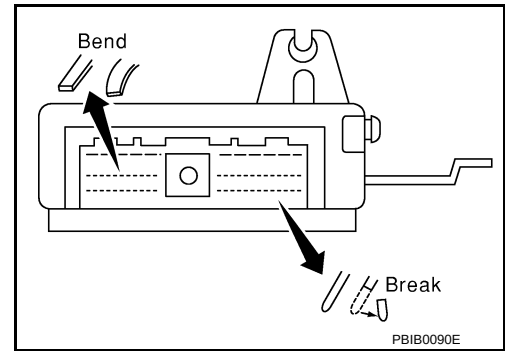
- 1 : ECM
C : Loosen



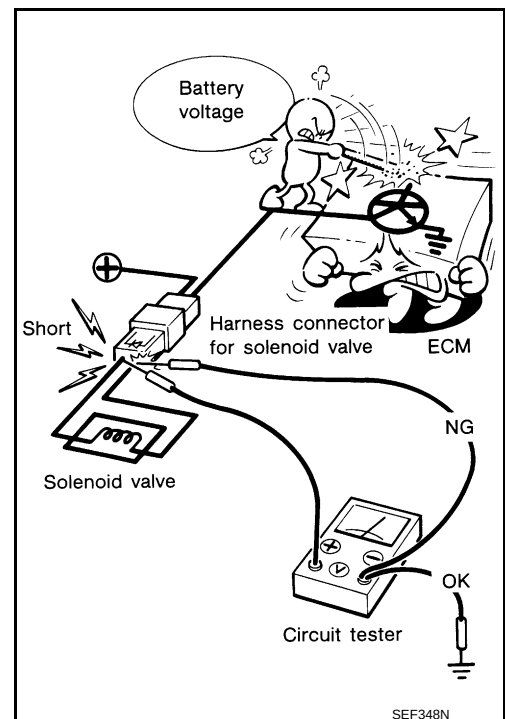
PRECAUTIONS

< SERVICE INFORMATION >

- 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-100, "ECM Terminal and Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or 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.



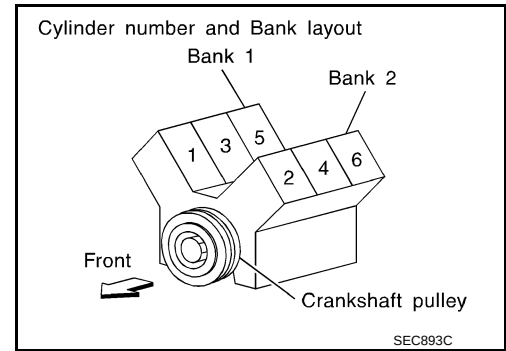
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



PRECAUTIONS

< SERVICE INFORMATION >

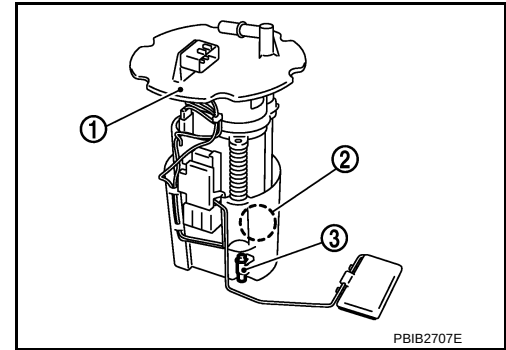
- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.



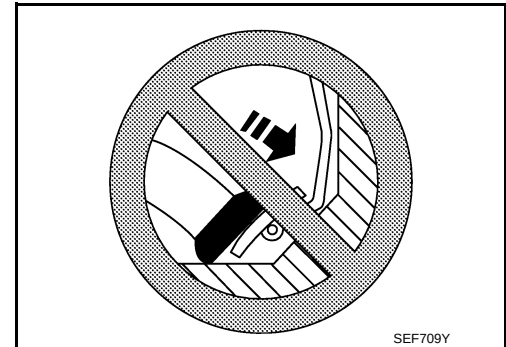
- Do not operate fuel pump when there is no fuel in lines.

- 1 : Fuel level sensor unit and fuel pump
- 2 : Fuel pressure regulator
- 3 : Fuel tank temperature sensor

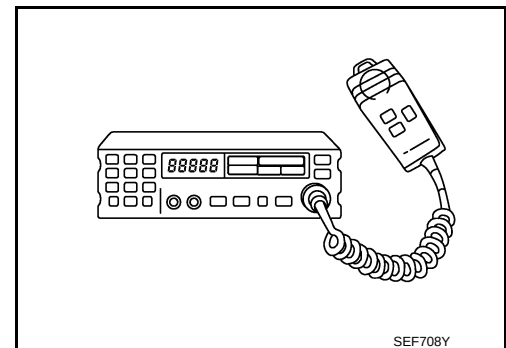
- Tighten fuel hose clamps to the specified torque.



- 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

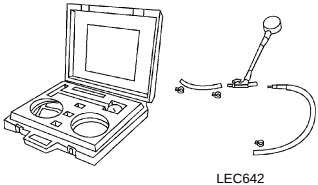
< SERVICE INFORMATION >

PREPARATION

Special Service Tool

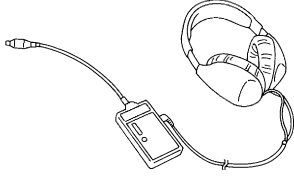
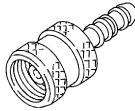
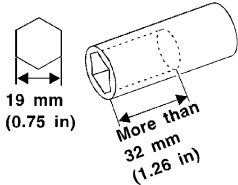
INFOID:000000001645482

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

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge kit	Checking fuel pressure
 LEC642	

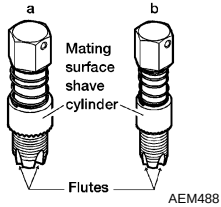
Commercial Service Tool

INFOID:000000001645483

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

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. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
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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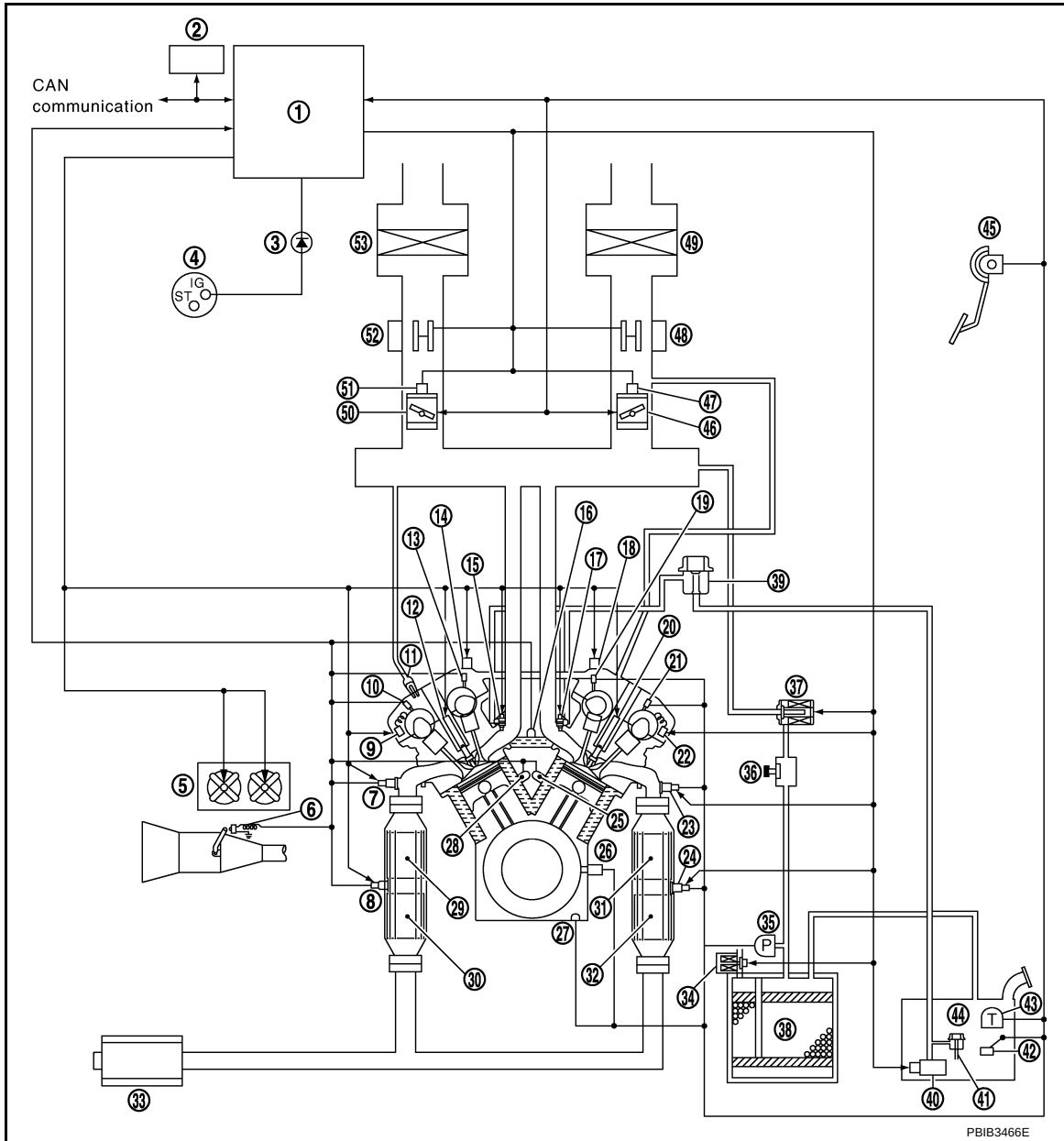
ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

ENGINE CONTROL SYSTEM

Schematic

INFOID:000000001645484



1. ECM	2. Data link connector	3. MIL
		Transmission range switch (A/T models)
4. Ignition switch	5. Cooling fan	6. Park/neutral position switch (M/T models)
7. A/F sensor 1	8. Heated oxygen sensor 2	9. Exhaust valve timing control magnet retarder
10. Exhaust valve timing control position sensor	11. PCV valve	12. Spark plug
13. Camshaft position sensor (PHASE)	14. Intake valve timing control solenoid valve	15. Fuel injector
16. Engine coolant temperature sensor	17. Fuel injector	18. Intake valve timing control solenoid valve
19. Camshaft position sensor (PHASE)	20. Spark plug	21. Exhaust valve timing control position sensor

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

22. Exhaust valve timing control magnet retarder	23. A/F sensor 1	24. Heated oxygen sensor 2
25. Knock sensor	26. Crankshaft position sensor (POS)	27. Engine oil temperature sensor
28. Knock sensor	29. Three way catalyst 1	30. Three way catalyst 2
31. Three way catalyst 1	32. Three way catalyst 2	33. Muffler
34. EVAP canister vent control valve	35. EVAP control system pressure sensor	36. EVAP service port
37. EVAP canister purge volume control solenoid valve	38. EVAP canister	39. Fuel camper
40. Fuel pump	41. Fuel pressure regulator	42. Fuel level sensor
43. Fuel tank temperature sensor	44. Fuel tank	45. Accelerator pedal position sensor
46. Electric throttle control actuator	47. Throttle position sensor	48. Mass air flow sensor (with intake air temperature sensor)
49. Air cleaner	50. Electric throttle control actuator	51. Throttle position sensor
52. Mass air flow sensor (with intake air temperature sensor)	53. Air cleaner	

Multiport Fuel Injection (MFI) System

INFOID:000000001645485

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ³	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Piston position		
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		
TCM(A/T models) Park/neutral position (PNP) switch(M/T models)	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		
Air conditioner switch	Air conditioner operation* ²		
Wheel sensor	Vehicle speed* ²		

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

*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

ENGINE CONTROL SYSTEM

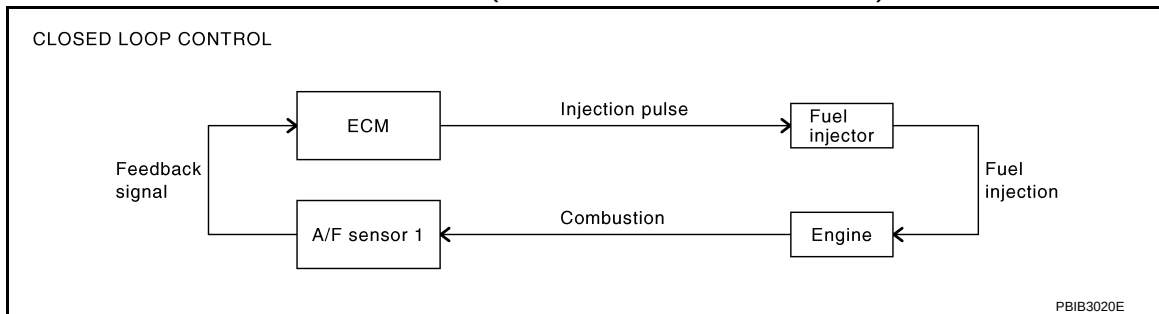
< SERVICE INFORMATION >

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst 1 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-247](#). 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 1. 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 air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

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

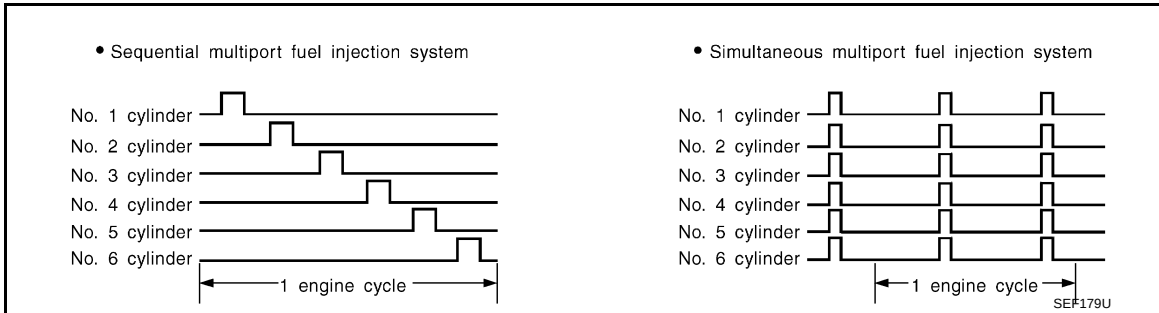
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume 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.

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

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 six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

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

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

INFOID:0000000001645486

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
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		
TCM (A/T models) Park/neutral position (PNP) switch (M/T models)	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: 1-2-3-4-5-6

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

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

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

- At starting
- During warm-up
- At idle

ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

- 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:000000001645487

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
TCM (A/T models) Park/neutral position (PNP) switch (M/T models)	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.

SYSTEM DESCRIPTION

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

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

NOTE:

This function is different from deceleration control listed under [EC-23, "Multiport Fuel Injection \(MFI\) System"](#).

AIR CONDITIONING CUT CONTROL

< SERVICE INFORMATION >

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:000000001645488

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle position		
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		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		
Battery	Battery voltage*2		

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

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

SYSTEM DESCRIPTION

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

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

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

System Description

INFOID:000000001645489

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:000000001645490

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 clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
TCM (A/T models) Park/neutral position (PNP) switch (M/T models)	Gear position		
Wheel sensor.	Vehicle speed*		
TCM (A/T models)	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
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- VDC/TCS system is operated

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

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

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

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

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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SERVICE INFORMATION >

COAST OPERATION

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

RESUME OPERATION

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

- Brake pedal is released
- Clutch pedal is released (M/T models)
- A/T selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

INFOID:000000001645491

ASCD STEERING SWITCH

Refer to [EC-558](#)

ASCD BRAKE SWITCH

Refer to [EC-565](#) and [EC-620](#).

ASCD CLUTCH SWITCH

Refer to [EC-565](#) and [EC-620](#).

STOP LAMP SWITCH

Refer to [EC-565](#), [EC-582](#) and [EC-620](#).

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EC-523](#), [EC-532](#), [EC-539](#) and [EC-549](#).

ASCD INDICATOR

Refer to [EC-629](#).

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CAN COMMUNICATION

< SERVICE INFORMATION >

CAN COMMUNICATION

System Description

INFOID:000000001645492

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-41, "CAN System Specification Chart"](#), about CAN communication for detail.

EVAPORATIVE EMISSION SYSTEM

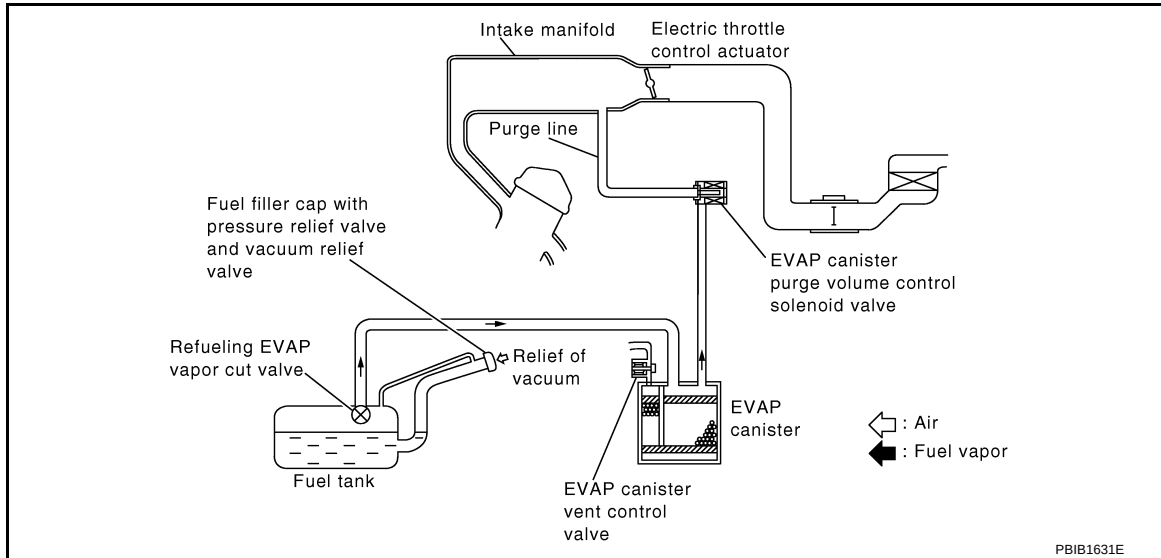
< SERVICE INFORMATION >

EVAPORATIVE EMISSION SYSTEM

Description

INFOID:000000001645493

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.

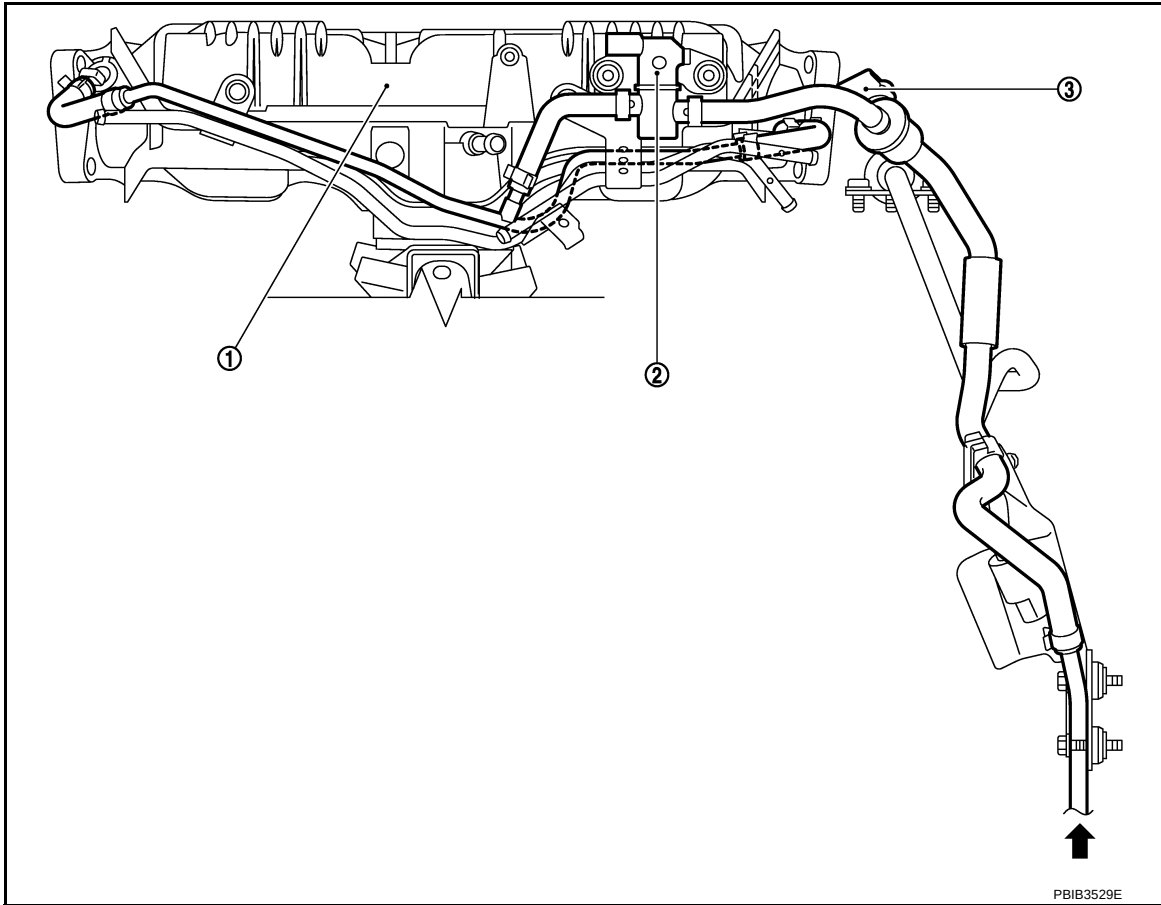
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

EVAPORATIVE EMISSION SYSTEM

< SERVICE INFORMATION >



1. Intake manifold collector

2. EVAP canister purge volume control

3. EVAP service port solenoid valve

← From next page

PBIB3529E

EVAPORATIVE EMISSION SYSTEM

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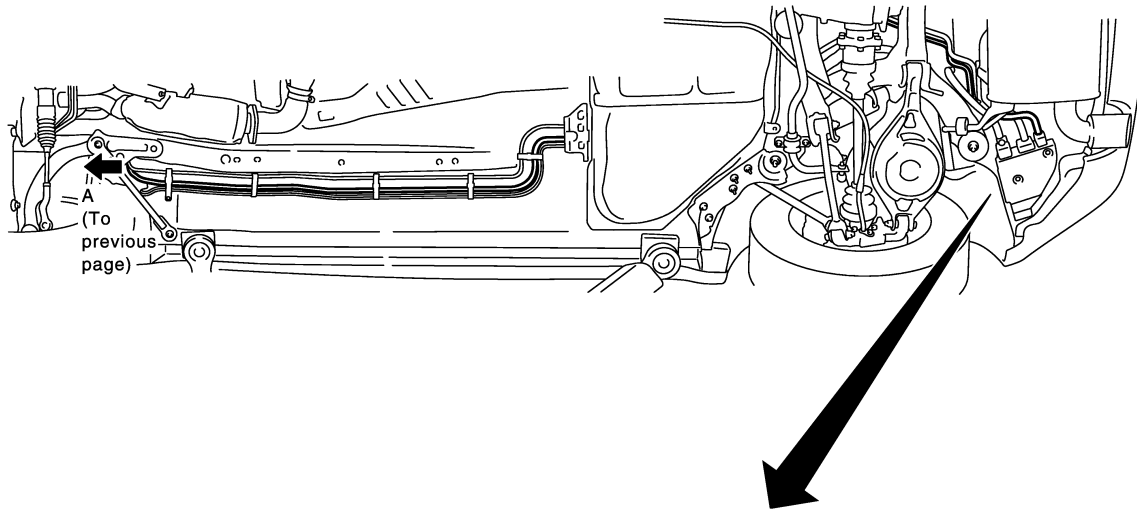
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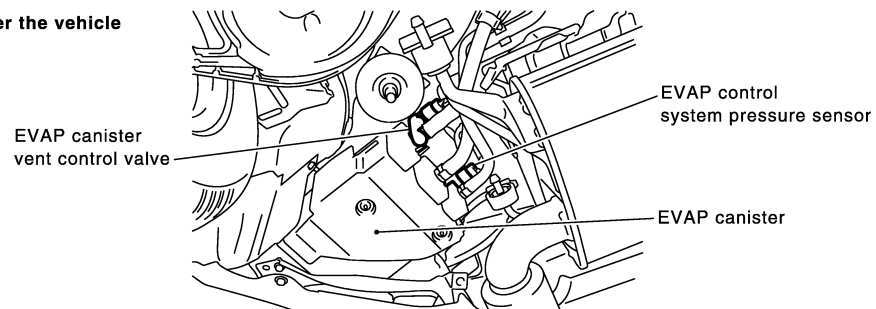
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View from under the vehicle



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Component Inspection

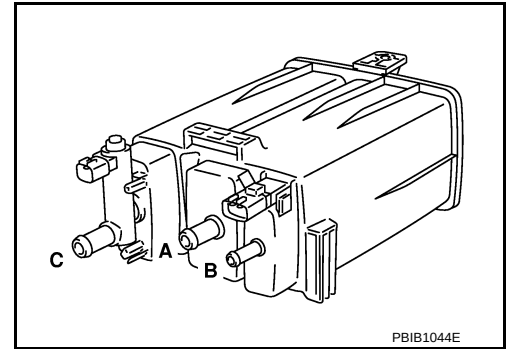
EVAP CANISTER

EVAPORATIVE EMISSION SYSTEM

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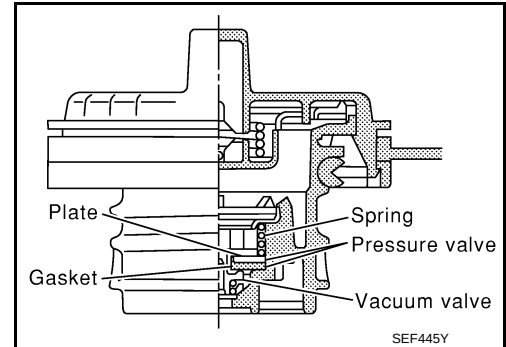
Check EVAP canister as follows:

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.

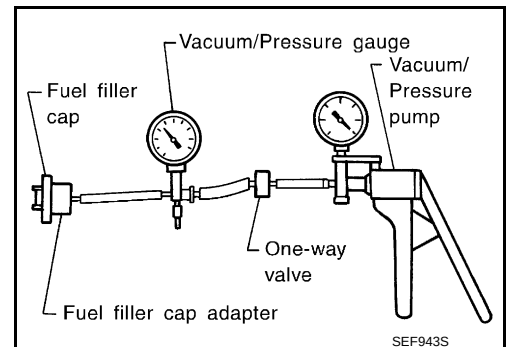
Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

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-413](#).

FUEL TANK TEMPERATURE SENSOR

Refer to [EC-331](#).

EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-418](#).

EVAP CONTROL SYSTEM PRESSURE SENSOR

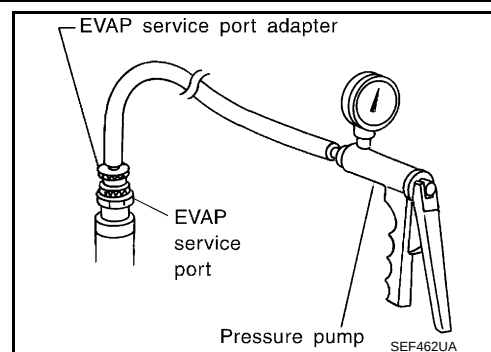
Refer to [EC-428](#).

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.

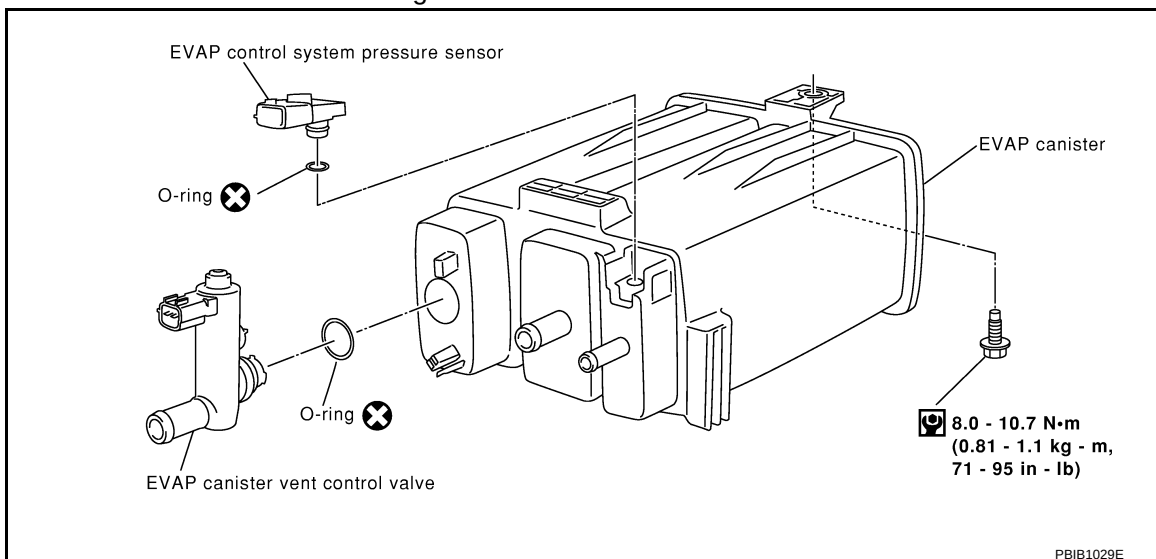


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Removal and Installation

EVAP CANISTER

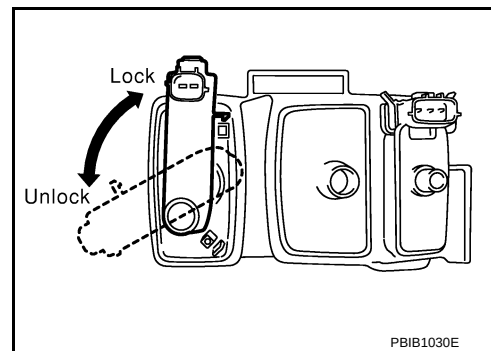
Tighten EVAP canister as shown in the figure.



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.



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How to Detect Fuel Vapor Leakage

CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

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

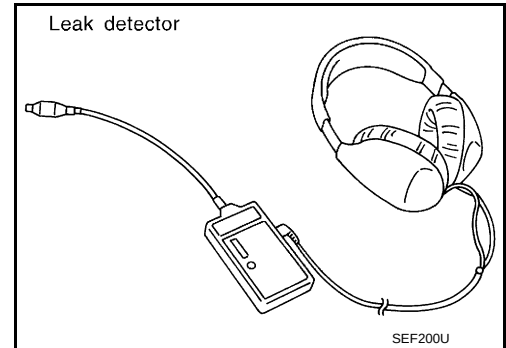
WITH CONSULT-III

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.

EVAPORATIVE EMISSION SYSTEM

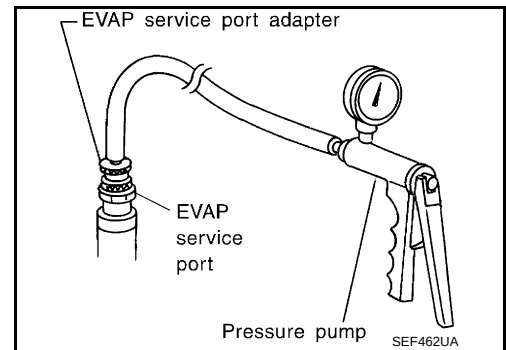
< SERVICE INFORMATION >

3. Turn ignition switch ON.
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-III.
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-31, "Description"](#).

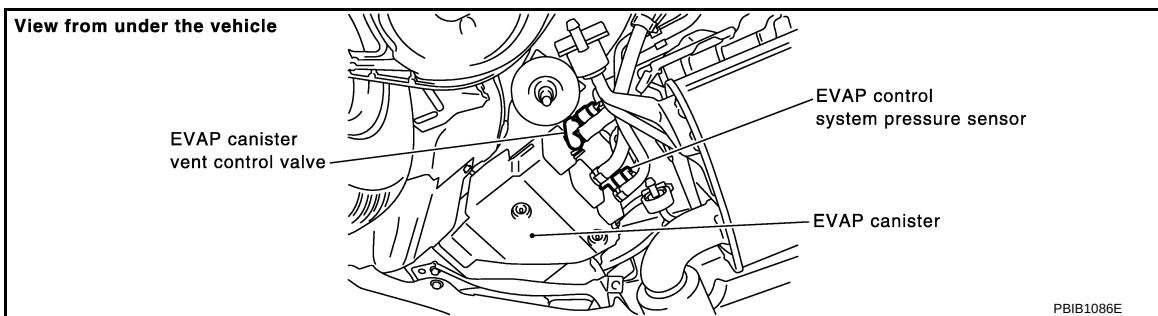


⊗ WITHOUT CONSULT-III

1. Attach the EVAP service port adapter securely to the EVAP service port.
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/cm², 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-31, "Description"](#).

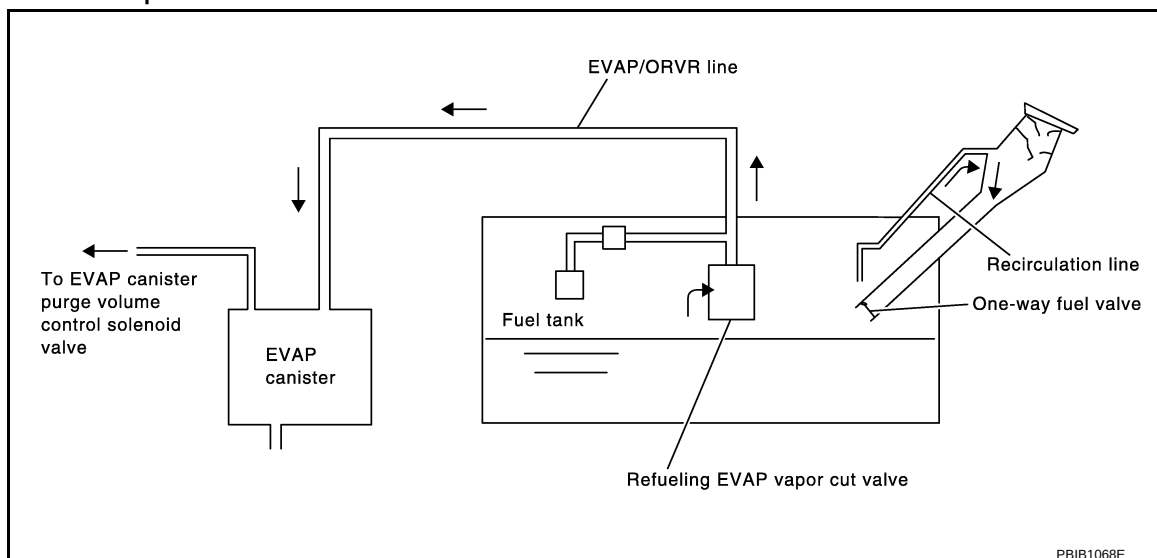
ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

System Description

INFOID:000000001645497



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

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

WARNING:

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

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

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - Put drained fuel in an explosion-proof container and put lid on securely.
 - Release fuel pressure from fuel line. Refer to [EC-78, "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:000000001645498

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 2.2 kg (4.9 lb).

OK or NG

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

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

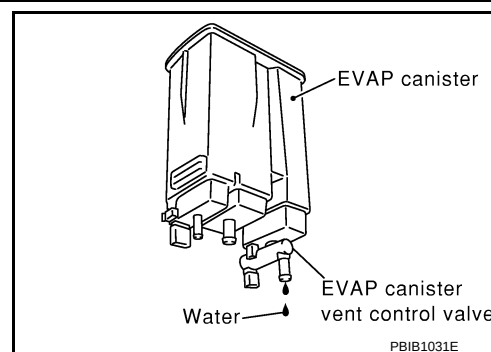
ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< 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-39, "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 2.2 kg (4.9 lb).

OK or NG

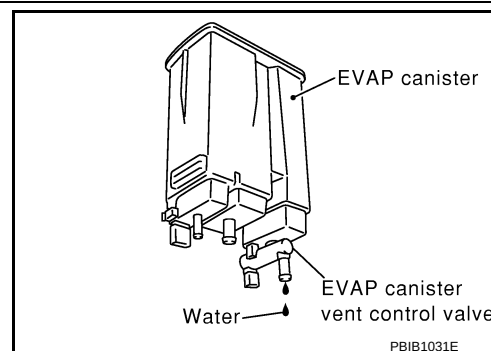
- OK >> GO TO 2.
NG >> GO TO 3.

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.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

>> 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 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-39. "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

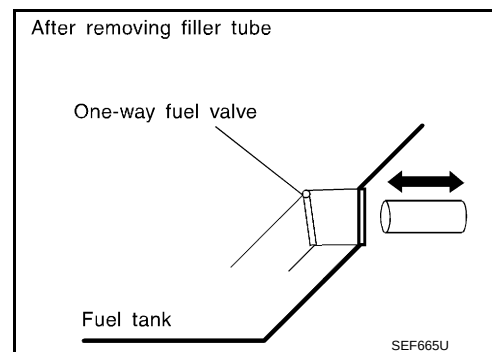
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
When a stick is inserted, the valve should open, when removing stick it should close.

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.



INFOID:000000001645499

Component Inspection

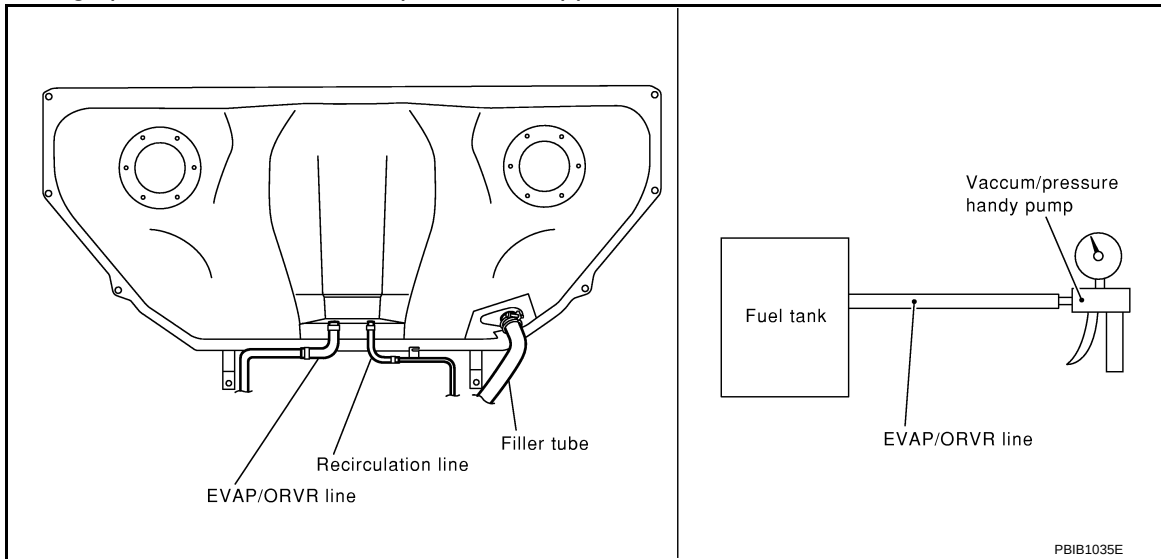
REFUELING EVAP VAPOR CUT VALVE

Ⓟ With CONSULT-III

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< SERVICE INFORMATION >

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



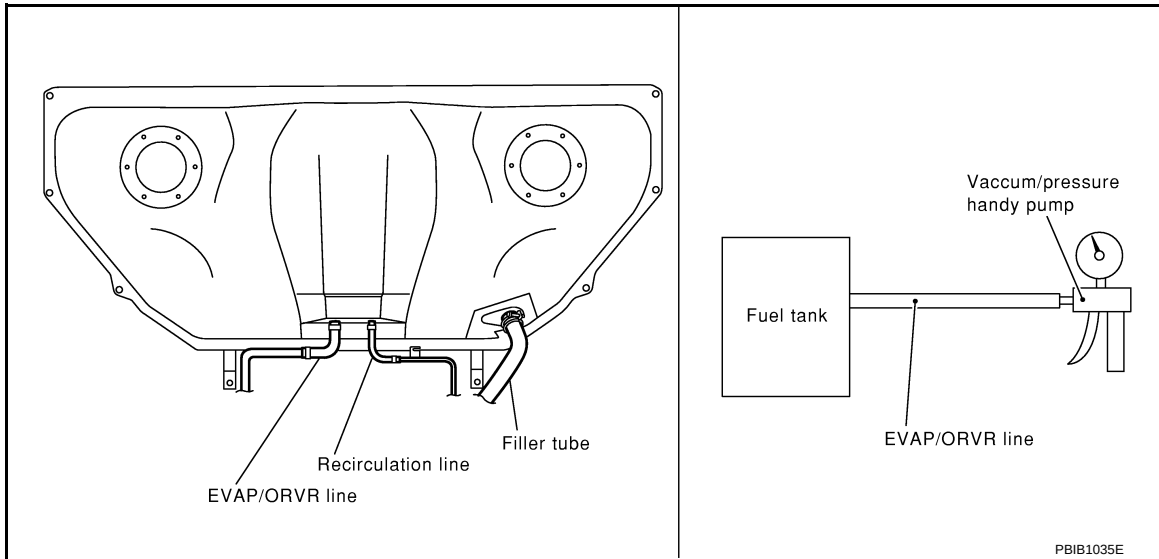
⊗ Without CONSULT-III

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.



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POSITIVE CRANKCASE VENTILATION

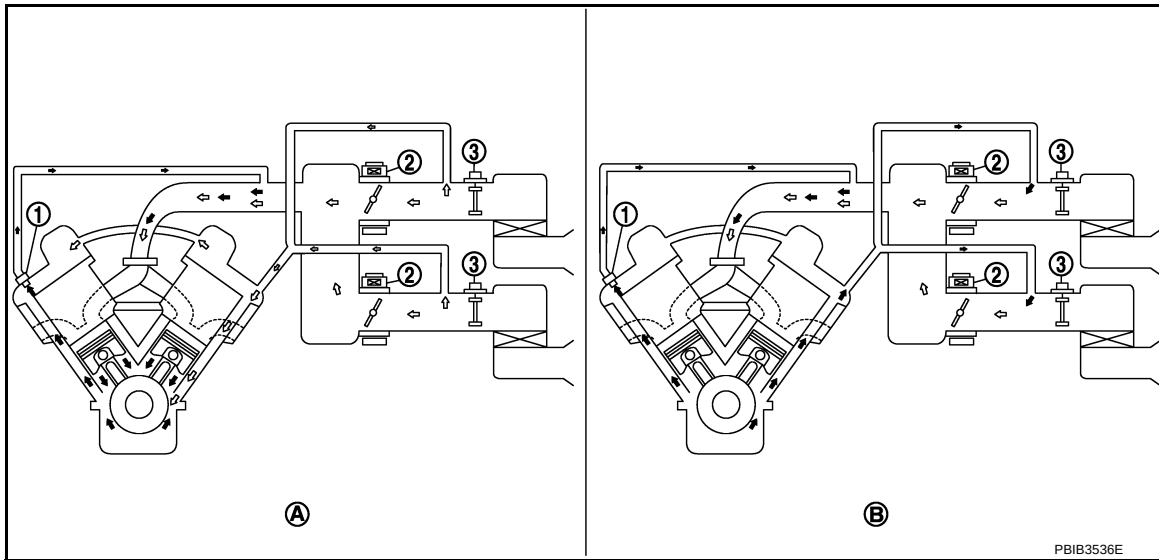
< SERVICE INFORMATION >

POSITIVE CRANKCASE VENTILATION

Description

INFOID:000000001645500

SYSTEM DESCRIPTION



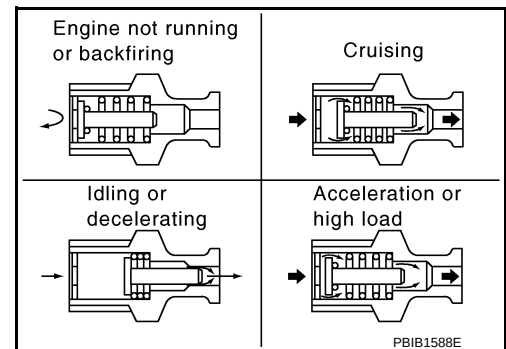
1. PCV valve
A. Normal condition
2. Electric throttle control actuator
B. Hi-load condition
3. Mass air flow sensor

◀: Fresh air
▶: Blow-by air

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

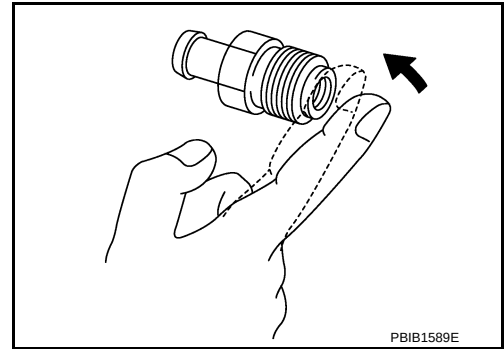
INFOID:000000001645501

PCV (POSITIVE CRANKCASE VENTILATION) VALVE

POSITIVE CRANKCASE VENTILATION

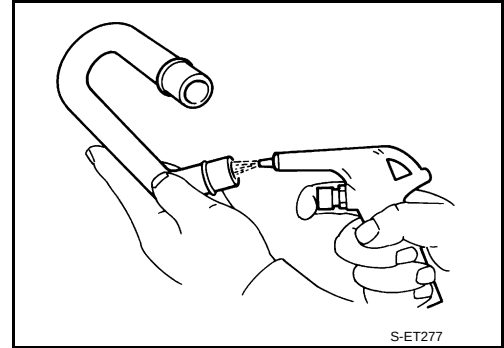
< SERVICE INFORMATION >

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

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.



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NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

< SERVICE INFORMATION >

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

Description

INFOID:000000001645502

- 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-III using NATS program card. Refer to [BL-134](#).
- Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-III.
- When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs must be carried out with CONSULT-III using NATS program card.
Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NVIS (NATS) initialization and all NVIS (NATS) ignition key ID registration, refer to CONSULT-III Operation Manual, IVIS/NVIS.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:000000001645503

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 status	SRT code	Test value
CONSULT-III	×	×	×	×	×	×	—
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	×	—	—

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode.

(Refer to [EC-85, "Fail-Safe Chart"](#).)

Two Trip Detection Logic

INFOID:000000001645504

When a malfunction is detected for the 1st 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 - P0306 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-46, "Emission-related Diagnostic Information" .)	—	×	—	—	×	—	—	—
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:000000001645505

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*5	—	1	×	EC-144
CAN COMM CIRCUIT	U1001	1001*5	—	2	—	EC-144
CONTROL UNIT(CAN)	U1010	1010	—	1 (A/T)	×	EC-146
				2 (M/T)	— (M/T)	
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0000	—	—	Flashing*7	EC-62
INT/V TIM CONT-B1	P0011	0011	—	2	×	EC-147
EXH/V TIM CONT-B1	P0014	0014	—	2	×	EC-151
INT/V TIM CONT-B2	P0021	0021	—	2	×	EC-147
EXH/V TIM CONT-B2	P0024	0024	—	2	×	EC-151
A/F SEN1 HTR (B1)	P0031	0031	—	2	×	EC-156
A/F SEN1 HTR (B1)	P0032	0032	—	2	×	EC-156
HO2S2 HTR (B1)	P0037	0037	—	2	×	EC-163
HO2S2 HTR (B1)	P0038	0038	—	2	×	EC-163
A/F SEN1 HTR (B2)	P0051	0051	—	2	×	EC-156
A/F SEN1 HTR (B2)	P0052	0052	—	2	×	EC-156
HO2S2 HTR (B2)	P0057	0057	—	2	×	EC-163
HO2S2 HTR (B2)	P0058	0058	—	2	×	EC-163
INT/V TIM V/CIR-B1	P0075	0075	—	2	×	EC-172
EX V/T MGT/RTDR-B1	P0078	0078	—	2	×	EC-179
INT/V TIM V/CIR-B2	P0081	0081	—	2	×	EC-172
EX V/T MGT/RTDR-B2	P0084	0084	—	2	×	EC-179
MAF SEN/CIRCUIT-B1	P0101	0101	—	2	×	EC-186
MAF SEN/CIRCUIT-B1	P0102	0102	—	1	×	EC-199
MAF SEN/CIRCUIT-B1	P0103	0103	—	1	×	EC-199
MAF SEN/CIRCUIT-B2	P010B	010B	—	2	×	EC-186
MAF SEN/CIRCUIT-B2	P010C	010C	—	1	×	EC-199
MAF SEN/CIRCUIT-B2	P010D	010D	—	1	×	EC-199
IAT SEN/CIRCUIT-B1	P0112	0112	—	2	×	EC-208
IAT SEN/CIRCUIT-B1	P0113	0113	—	2	×	EC-208
ECT SEN/CIRC	P0117	0117	—	1	×	EC-216
ECT SEN/CIRC	P0118	0118	—	1	×	EC-216
TP SEN 2/CIRC-B1	P0122	0122	—	1	×	EC-222

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
TP SEN 2/CIRC-B1	P0123	0123	—	1	×	EC-222
ECT SENSOR	P0125	0125	—	2	×	EC-231
IAT SENSOR-B1	P0127	0127	—	2	×	EC-234
THERMSTAT FNCTN	P0128	0128	—	2	×	EC-237
A/F SENSOR1 (B1)	P0130	0130	—	2	×	EC-239
A/F SENSOR1 (B1)	P0131	0131	—	2	×	EC-247
A/F SENSOR1 (B1)	P0132	0132	—	2	×	EC-255
A/F SENSOR1 (B1)	P0133	0133	×	2	×	EC-263
HO2S2 (B1)	P0137	0137	×	2	×	EC-273
HO2S2 (B1)	P0138	0138	×	2	×	EC-283
HO2S2 (B1)	P0139	0139	×	2	×	EC-296
A/F SENSOR1 (B2)	P0150	0150	—	2	×	EC-239
A/F SENSOR1 (B2)	P0151	0151	—	2	×	EC-247
A/F SENSOR1 (B2)	P0152	0152	—	2	×	EC-255
A/F SENSOR1 (B2)	P0153	0153	×	2	×	EC-263
HO2S2 (B2)	P0157	0157	×	2	×	EC-273
HO2S2 (B2)	P0158	0158	×	2	×	EC-283
HO2S2 (B2)	P0159	0159	×	2	×	EC-296
FUEL SYS-LEAN-B1	P0171	0171	—	2	×	EC-306
FUEL SYS-RICH-B1	P0172	0172	—	2	×	EC-317
FUEL SYS-LEAN-B2	P0174	0174	—	2	×	EC-306
FUEL SYS-RICH-B2	P0175	0175	—	2	×	EC-317
FTT SENSOR	P0181	0181	—	2	×	EC-328
FTT SEN/CIRCUIT	P0182	0182	—	2	×	EC-332
FTT SEN/CIRCUIT	P0183	0183	—	2	×	EC-332
EOT SENSOR	P0196	0196	—	2	×	EC-336
EOT SEN/CIRCUIT	P0197	0197	—	2	×	EC-231
EOT SEN/CIRCUIT	P0198	0198	—	2	×	EC-231
TP SEN 1/CIRC-B1	P0222	0222	—	1	×	EC-345
TP SEN 1/CIRC-B1	P0223	0223	—	1	×	EC-345
TP SEN 2/CIRC-B2	P0227	0227	—	1	×	EC-222
TP SEN 2/CIRC-B2	P0228	0228	—	1	×	EC-222
MULTI CYL MISFIRE	P0300	0300	—	2	×	EC-354
CYL 1 MISFIRE	P0301	0301	—	2	×	EC-354
CYL 2 MISFIRE	P0302	0302	—	2	×	EC-354
CYL 3 MISFIRE	P0303	0303	—	2	×	EC-354
CYL 4 MISFIRE	P0304	0304	—	2	×	EC-354
CYL 5 MISFIRE	P0305	0305	—	2	×	EC-354
CYL 6 MISFIRE	P0306	0306	—	2	×	EC-354
KNOCK SEN/CIRC-B1	P0327	0327	—	2	—	EC-360
KNOCK SEN/CIRC-B1	P0328	0328	—	2	—	EC-360
KNOCK SEN/CIRC-B2	P0332	0332	—	2	—	EC-360

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
KNOCK SEN/CIRC-B2	P0333	0333	—	2	—	EC-360
CKP SEN/CIRCUIT	P0335	0335	—	2	×	EC-367
CMP SEN/CIRC-B1	P0340	0340	—	2	×	EC-375
CMP SEN/CIRC-B2	P0345	0345	—	2	×	EC-375
TW CATALYST SYS-B1	P0420	0420	×	2	×	EC-385
TW CATALYST SYS-B2	P0430	0430	×	2	×	EC-385
EVAP PURG FLOW/MON	P0441	0441	×	2	×	EC-390
EVAP SMALL LEAK	P0442	0442	×	2	×	EC-395
PURG VOLUME CONT/V	P0443	0443	—	2	×	EC-401
PURG VOLUME CONT/V	P0444	0444	—	2	×	EC-408
PURG VOLUME CONT/V	P0445	0445	—	2	×	EC-408
VENT CONTROL VALVE	P0447	0447	—	2	×	EC-414
VENT CONTROL VALVE	P0448	0448	—	2	×	EC-419
EVAP SYS PRES SEN	P0451	0451	—	2	×	EC-425
EVAP SYS PRES SEN	P0452	0452	—	2	×	EC-430
EVAP SYS PRES SEN	P0453	0453	—	2	×	EC-438
EVAP GROSS LEAK	P0455	0455	—	2	×	EC-446
EVAP VERY SML LEAK	P0456	0456	×*4	2	×	EC-452
FUEL LEV SEN SLOSH	P0460	0460	—	2	×	EC-459
FUEL LEVEL SENSOR	P0461	0461	—	2	×	EC-461
FUEL LEVL SEN/CIRC	P0462	0462	—	2	×	EC-463
FUEL LEVL SEN/CIRC	P0463	0463	—	2	×	EC-463
VEH SPEED SEN/CIRC*6	P0500	0500	—	2	×	EC-465
ISC SYSTEM	P0506	0506	—	2	×	EC-467
ISC SYSTEM	P0507	0507	—	2	×	EC-469
PW ST P SEN/CIRC	P0550	0550	—	2	—	EC-471
ECM BACK UP/CIRCUIT	P0603	0603	—	2	×	EC-476
ECM	P0605	0605	—	1 or 2	× or —	EC-480
SENSOR POWER/CIRC	P0643	0643	—	1	×	EC-482
TRANSMISSION CONT	P0700	0700	—	1	×	AT-97
T/M RANGE SENSOR A	P0705	0705	—	2	×	AT-98
ATF TEMP SEN/CIRC	P0710	0710	—	2	×	AT-128
INPUT SPEED SENSOR A	P0717	0717	—	2	×	AT-108
OUTPUT SPEED SENSOR*6	P0720	0720	—	2	×	AT-103
1GR INCORRECT RATIO	P0731	0731	—	2	×	AT-110
2GR INCORRECT RATIO	P0732	0732	—	2	×	AT-112
3GR INCORRECT RATIO	P0733	0733	—	2	×	AT-114
4GR INCORRECT RATIO	P0734	0734	—	2	×	AT-116
5GR INCORRECT RATIO	P0735	0735	—	2	×	AT-118
TORQUE CONVERTER	P0740	0740	—	2	×	AT-120
TORQUE CONVERTER	P0744	0744	—	2	×	AT-122
PC SOLENOID A	P0745	0745	—	2	×	AT-124

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
P-N POS SW/CIRCUIT	P0850	0850	—	2	×	EC-488
EXH TIM SEN/CIR-B1	P1078	1078	—	2	×	EC-496
EXH TIM SEN/CIR-B2	P1084	1084	—	2	×	EC-496
CLOSED LOOP-B1	P1148	1148	—	1	×	EC-506
CLOSED LOOP-B2	P1168	1168	—	1	×	EC-506
TCS C/U FUNCTN	P1211	1211	—	2	—	EC-507
TCS/CIRC	P1212	1212	—	2	—	EC-508
ENG OVER TEMP	P1217	1217	—	1	×	EC-509
CTP LEARNING-B1	P1225	1225	—	2	—	EC-519
CTP LEARNING-B1	P1226	1226	—	2	—	EC-521
ETC FUNCTION/CIRC-B2	P1233	1233	—	1	×	EC-523
CTP LEARNING-B2	P1234	1234	—	2	—	EC-519
CTP LEARNING-B2	P1235	1235	—	2	—	EC-521
ETC MOT-B2	P1236	1236	—	1	×	EC-532
ETC ACTR-B2	P1238	1238	—	1	×	EC-539
TP SENSOR-B2	P1239	1239	—	1	×	EC-541
ETC MOT PWR-B2	P1290	1290	—	1	×	EC-549
COLD START CONTROL	P1421	1421	—	2	×	EC-556
ASCD SW	P1564	1564	—	1	—	EC-558
ASCD BRAKE SW	P1572	1572	—	1	—	EC-565
ASCD VHL SPD SEN	P1574	1574	—	1	—	EC-579
LOCK MODE	P1610	1610	—	2	—	BL-137
ID DISCORD,IMM-ECM	P1611	1611	—	2	—	BL-137
CHAIN OF ECM-IMMU	P1612	1612	—	2	—	BL-137
CHAIN OF IMMU-KEY	P1614	1614	—	2	—	BL-137
DIFFERENCE OF KEY	P1615	1615	—	2	—	BL-137
IN PULY SPEED	P1715	1715	—	2	—	EC-581
INTERLOCK	P1730	1730	—	1	×	AT-135
INPUT CLUTCH SOL	P1752	1752	—	1	×	AT-139
FR BRAKE SOLENOID	P1757	1757	—	1	×	AT-141
DRCT CLUTCH SOL	P1762	1762	—	1	×	AT-143
HLR CLUTCH SOLENOID	P1767	1767	—	1	×	AT-145
L C BRAKE SOLENOID	P1772	1772	—	1	×	AT-147
L C BRAKE SOLENOID	P1774	1774	—	1	×	AT-149
BRAKE SW/CIRCUIT	P1805	1805	—	2	—	EC-582
ETC MOT PWR-B1	P2100	2100	—	1	×	EC-549
ETC FNCTN/CIRC-B1	P2101	2101	—	1	×	EC-523
ETC MOT PWR-B1	P2103	2103	—	1	×	EC-549
ETC MOT-B1	P2118	2118	—	1	×	EC-532
ETC ACTR-B1	P2119	2119	—	1	×	EC-539
APP SEN 1/CIRC	P2122	2122	—	1	×	EC-586
APP SEN 1/CIRC	P2123	2123	—	1	×	EC-586

A

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
APP SEN 2/CIRC	P2127	2127	—	1	×	EC-593
APP SEN 2/CIRC	P2128	2128	—	1	×	EC-593
TP SENSOR2/CIRC-B2	P2132	2132	—	1	×	EC-345
TP SENSOR2/CIRC-B2	P2133	2133	—	1	×	EC-345
TP SENSOR-B1	P2135	2135	—	1	×	EC-541
APP SENSOR	P2138	2138	—	1	×	EC-601
A/F SENSOR1 (B1)	P2A00	2A00	—	2	×	EC-609
A/F SENSOR1 (B2)	P2A03	2A03	—	2	×	EC-609

*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-III.

*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".

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 results 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-III.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to [EC-80, "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-III

With GST

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

These DTCs are prescribed by SAE J2012.

(CONSULT-III 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.**

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

A sample of CONSULT-III 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-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

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

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

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. For details, see [EC-111, "CONSULT-III 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 - P0306 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.

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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

NOTE:

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

SRT Item

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

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

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

SRT Set Timing

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

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

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

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

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:

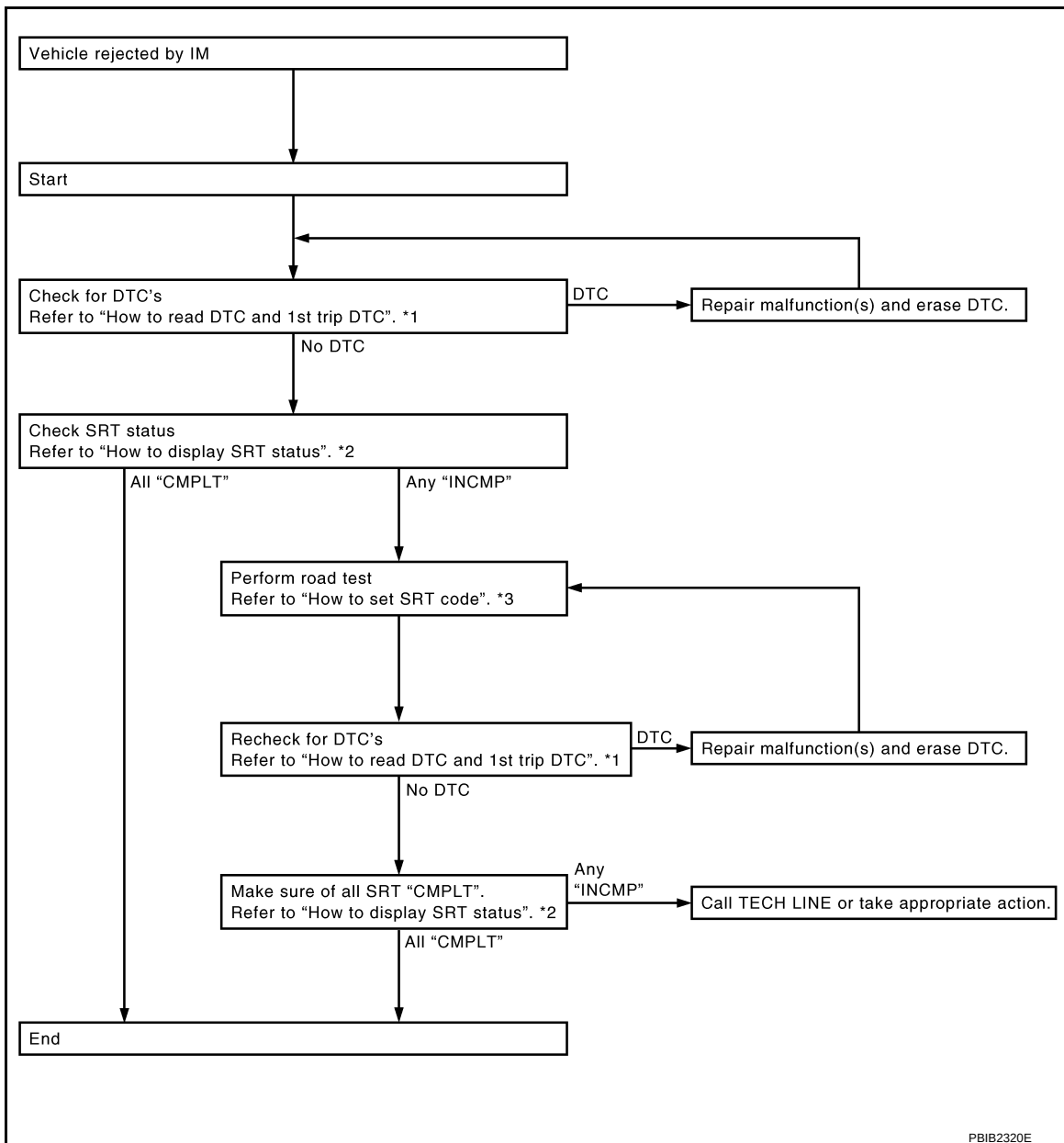
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory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



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

*3 "How to Set SRT Code"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

How to Display SRT Status

WITH CONSULT-III

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

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

A sample of CONSULT-III 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-III screen, "HO2S HTR" is not SRT item.

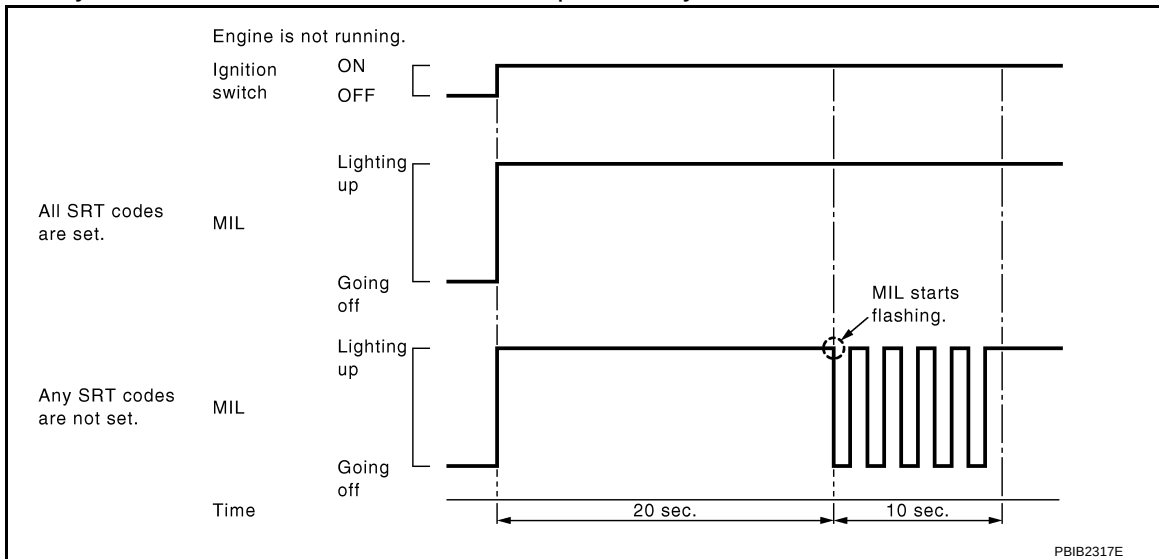
WITH GST

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

NO TOOLS

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

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



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-III

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

WITHOUT CONSULT-III

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

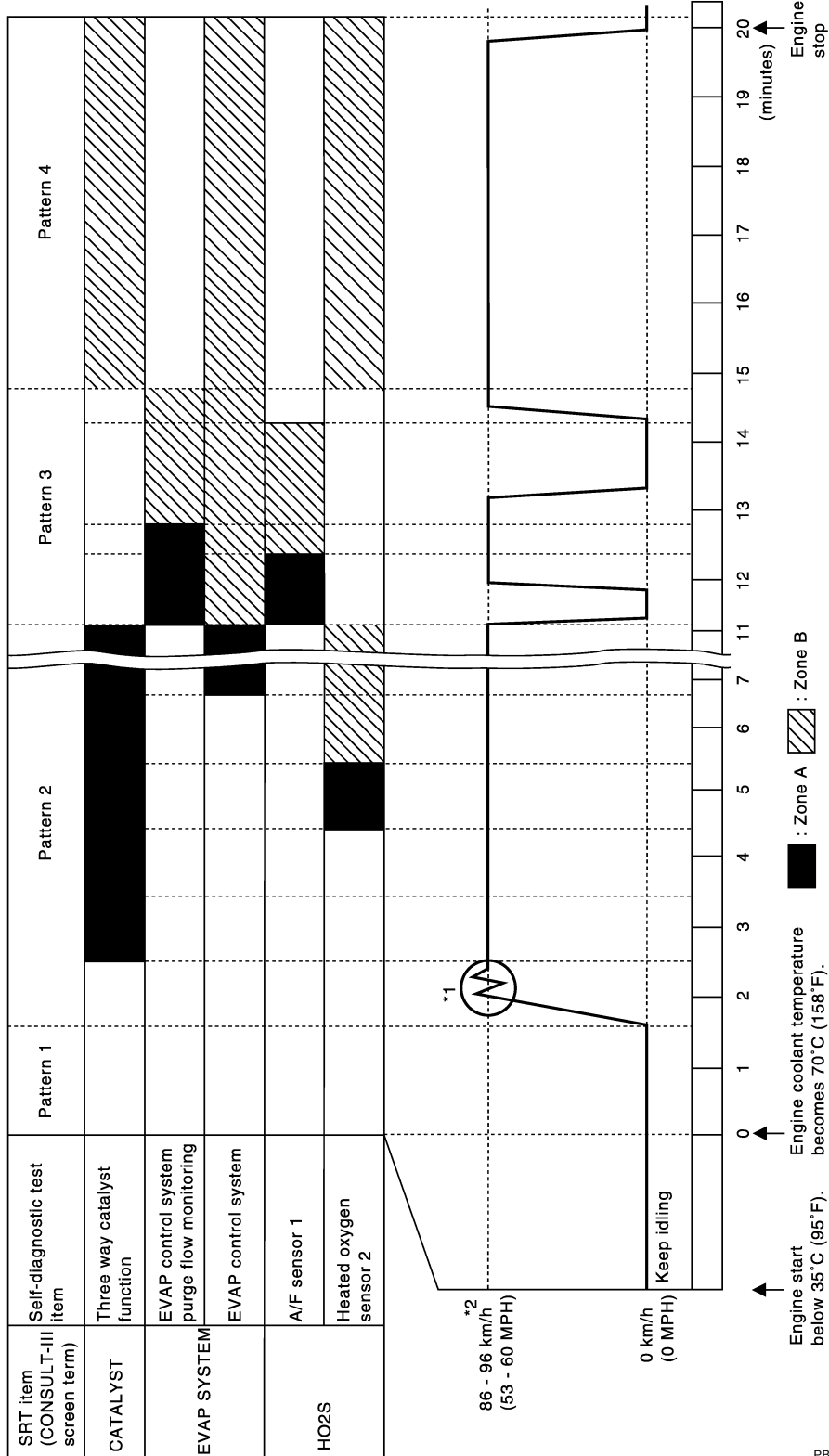
ON BOARD DIAGNOSTIC (OBD) SYSTEM

< 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.**

Driving pattern



PBIB3622E

- 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:

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 71 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 71 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 106 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:

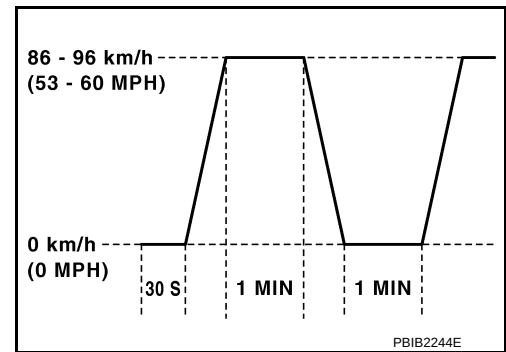
- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

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 for A/T Models

Set the selector lever in the D position.

Suggested Upshift Speeds for M/T Models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	21 (13)	13 (8)	24 (15)
2nd to 3rd	37 (23)	26 (16)	40 (25)
3rd to 4th	48 (30)	40 (25)	64 (40)
4th to 5th	60 (37)	45 (28)	72 (45)
6th	68 (42)	53 (33)	80 (50)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	65 (40)
2nd	106 (66)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Gear	km/h (MPH)
3rd	152 (95)
4th	—
5th	—
6th	—

TEST VALUE AND TEST LIMIT (GST ONLY - NOT APPLICABLE TO CONSULT-III)

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

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

These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if the bank 2 is not applied on this vehicle, only the items of the bank 1 is displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATA- LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04inch)
	3CH	EVAP control system (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
SECONDARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On

A

EC

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
MISFIRE	A1H	Multiple Cylinder Misfire	P0301	80H	24H	Misfiring counter at 1000rev of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000rev of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000rev of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000rev of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000rev of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000rev of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000rev of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000rev of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000rev of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200rev of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200rev of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200rev of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200rev of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0307	8FH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0308	90H	24H	Misfiring counter at 200rev of the fifth cylinder
			P0300	91H	24H	Misfiring counter at 1000rev of the single cylinder
			P0300	92H	24H	Misfiring counter at 200rev of the single cylinder
			P0300	93H	24H	Misfiring counter at 200rev of the multiple cylinders

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No.1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No.2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No.3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No.4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No.5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No.6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No.7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No.8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC and 1st Trip DTC

 **With CONSULT-III**

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
Wait at least 10 seconds and then turn it ON (engine stopped) again.
 - If the DTC is not for A/T related items (see [EC-13](#), [EC-14](#)), skip step 1.
1. Erase DTC in TCM. [AT-37, "OBD-II Diagnostic Trouble Code \(DTC\)".](#)
 2. Select "ENGINE" with CONSULT-III.
 3. Select "SELF-DIAG RESULTS".

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

4. Touch "ERACE". (DTC in ECM will be erased.)

With GST

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see [EC-13](#), [EC-14](#)), skip step 1.
- 1. Erase DTC in TCM. [AT-37, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).
- 2. Select Service \$04 with GST (Generic Scan Tool).

No Tools

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see [EC-13](#), [EC-14](#)), skip step 1.
- 1. Erase DTC in TCM. [AT-37, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).
- 2. Erase DTC in ECM. Refer to How to Erase Diagnostic Test Mode II (Self-diagnostic Results).
- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
 - Diagnostic trouble codes
 - 1st trip diagnostic trouble codes
 - Freeze frame data
 - 1st trip freeze frame data
 - System readiness test (SRT) codes
 - Test values

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

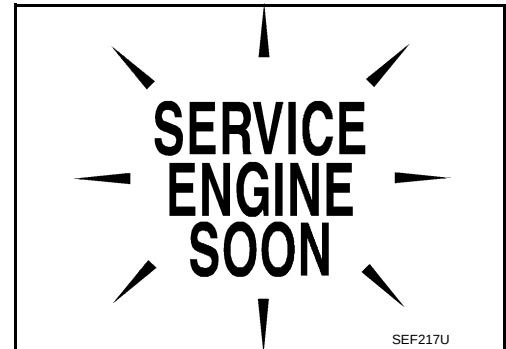
Malfunction Indicator Lamp (MIL)

INFOID:0000000001645506

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-53](#), or see [EC-662](#).
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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

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. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
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

When any SRT codes are not set, MIL may flash without DTC. For the details, refer to [EC-46, "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 5 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:

ON BOARD DIAGNOSTIC (OBD) SYSTEM

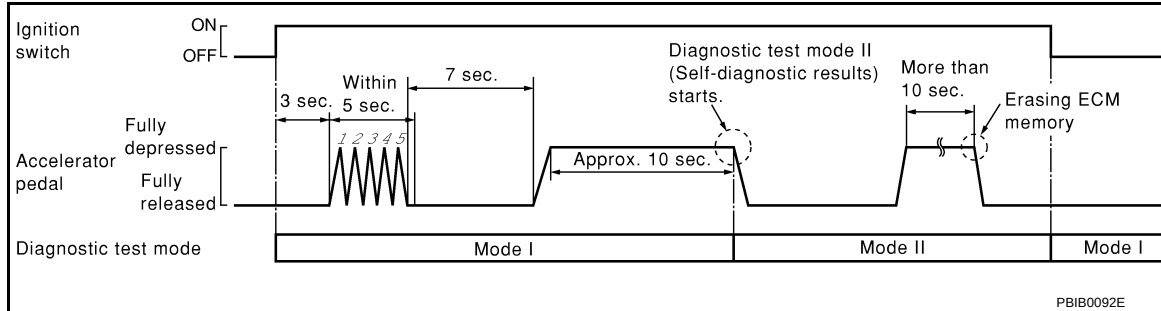
< SERVICE INFORMATION >

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-46, "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-53](#) or see [EC-662](#).

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

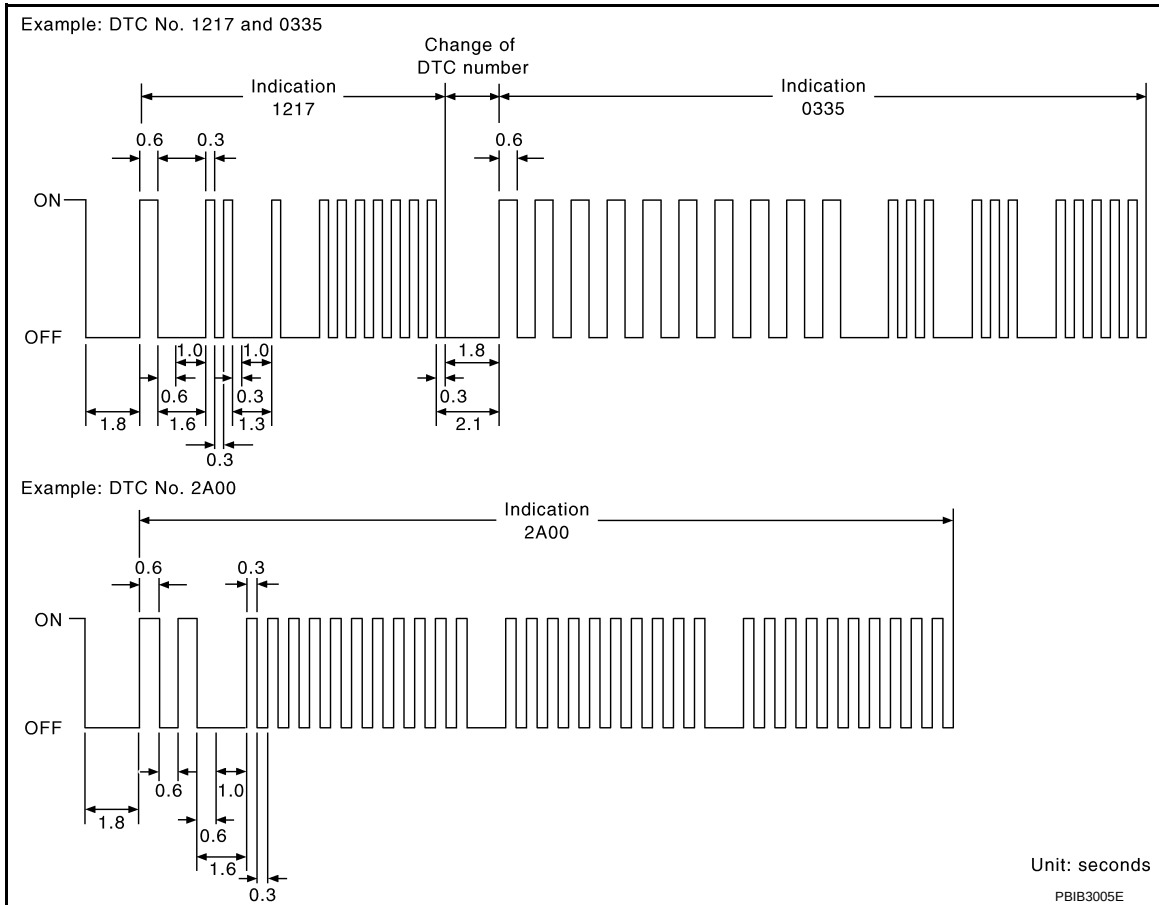
DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

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

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

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



A particular trouble code can be identified by the number of four-digit numeral flashes as follows. 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.

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

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:000000001645507

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the 1st 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-45, "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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

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

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

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

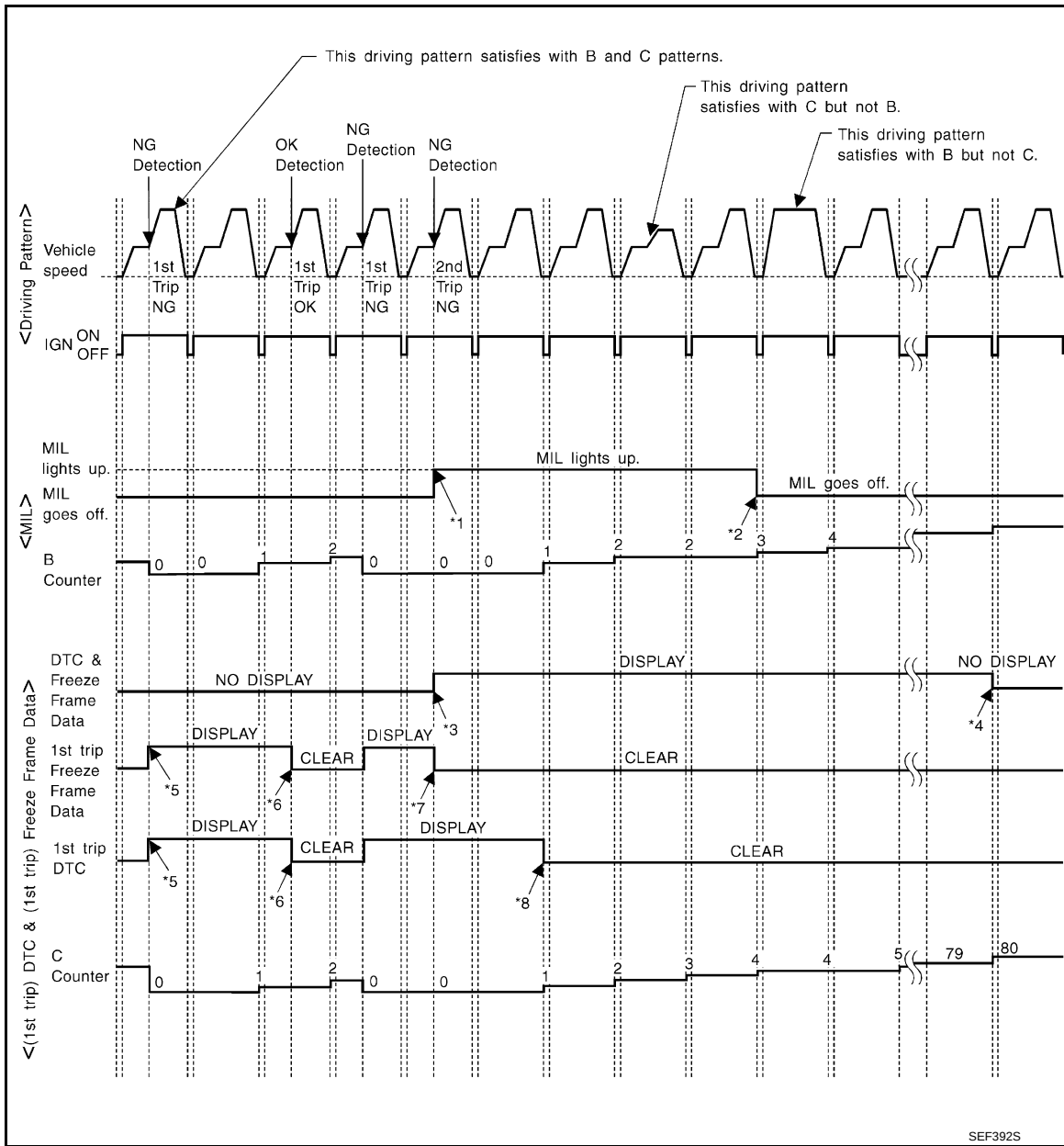
*1: Clear timing is at the moment OK is detected.

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

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

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 1st 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:

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SERVICE INFORMATION >

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) ± 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:

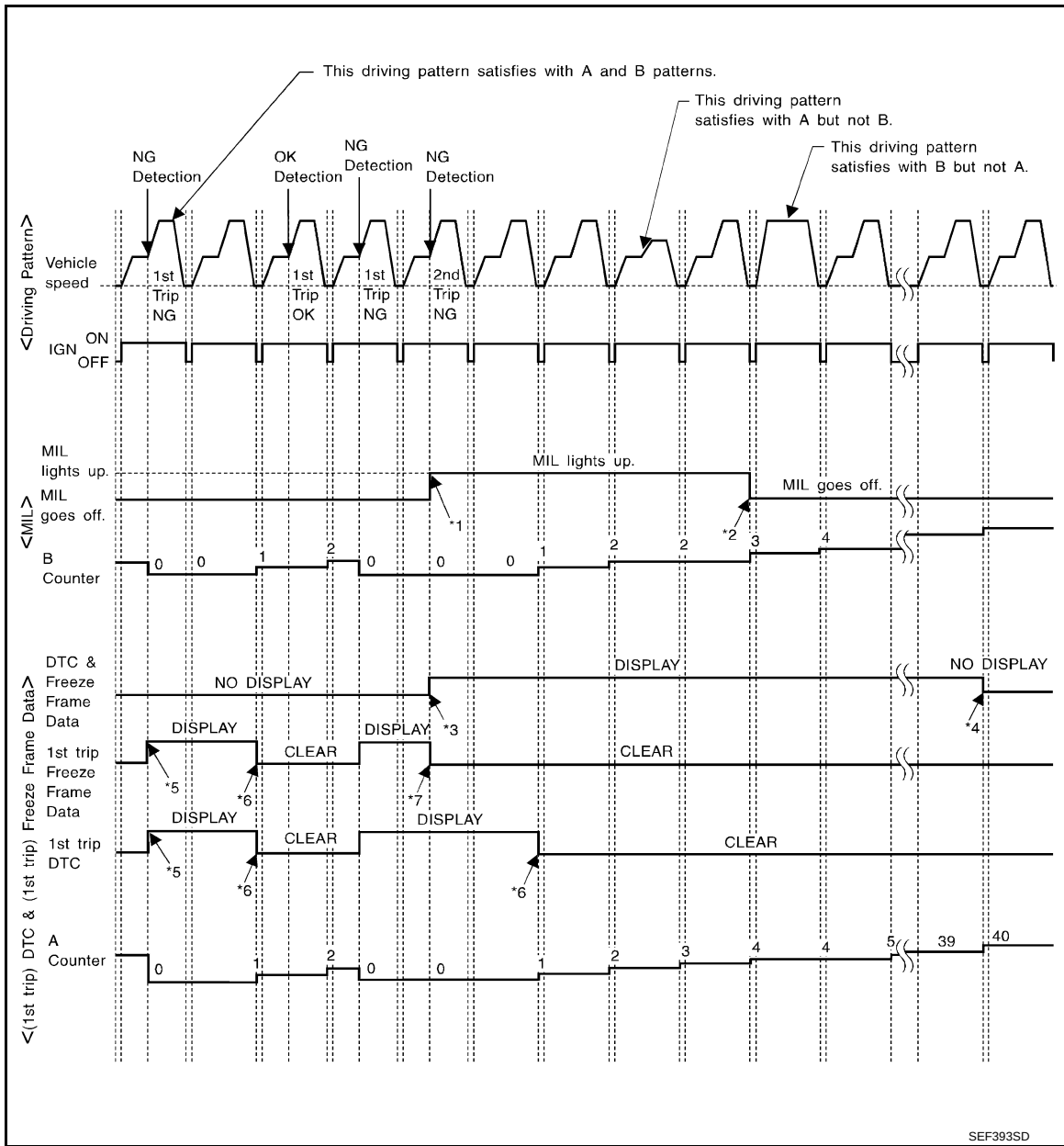
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- 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. (*2 in OBD SYSTEM OPERATION CHART)
- 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 1st 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.

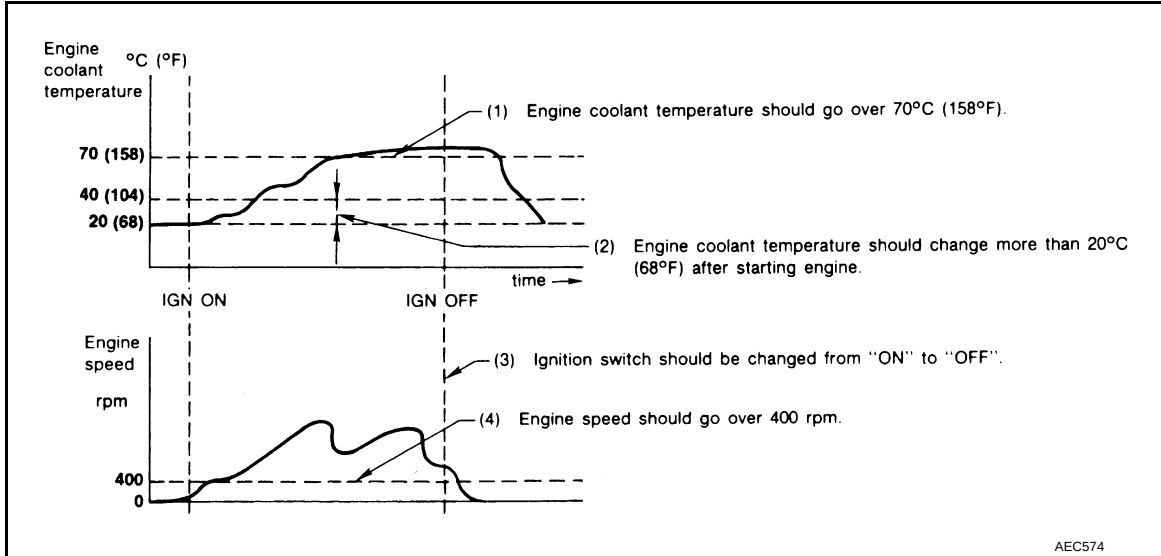
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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. (*2 in OBD SYSTEM OPERATION CHART)

<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 >

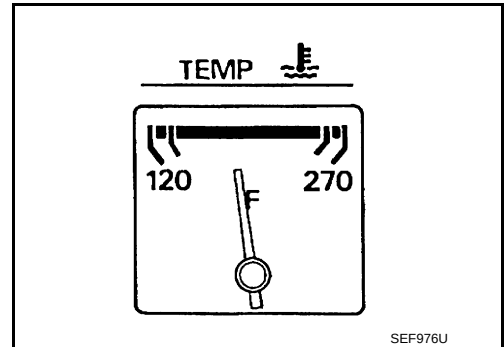
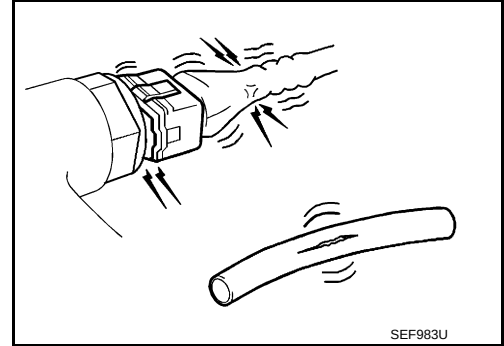
BASIC SERVICE PROCEDURE

Basic Inspection

INFOID:000000001645508

1.INSPECTION START

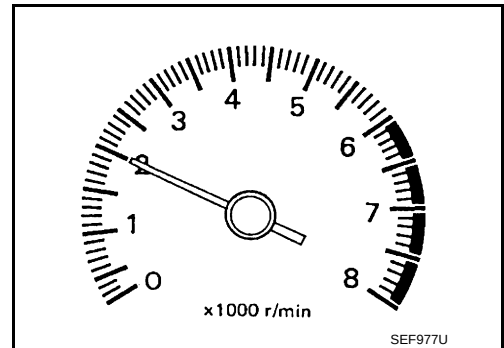
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Wiring harness for improper connections, pinches and cut
 - Vacuum hoses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



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

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-III

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-III. Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

A/T: 650 ± 50 rpm (in P or N position)

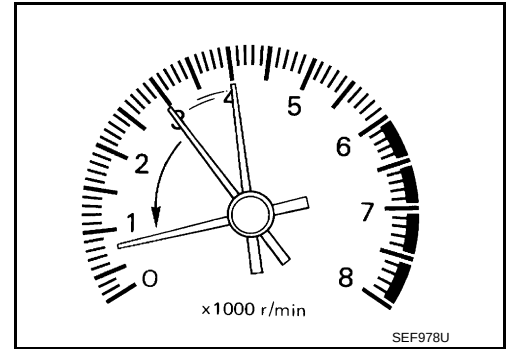
M/T: 650 ± 50 rpm (in Neutral position)

⊗ Without CONSULT-III

- 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"](#).

A/T: 650 ± 50 rpm (in P or N position)

M/T: 650 ± 50 rpm (in Neutral position)



OK or NG

OK >> GO TO 10.

NG >> GO TO 4.

4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 5.

5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-76, "Throttle Valve Closed Position Learning"](#).

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-77, "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-III

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

A/T: 650 ± 50 rpm (in P or N position)

M/T: 650 ± 50 rpm (in Neutral position)

⊗ Without CONSULT-III

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

A/T: 650 ± 50 rpm (in P or N position)

M/T: 650 ± 50 rpm (in Neutral position)

OK or NG

OK >> GO TO 10.

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

NG >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit.
Refer to [EC-375](#).
- Check crankshaft position sensor (POS) and circuit.
Refer to [EC-367](#).

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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-134](#).

>> GO TO 4.

10.CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

A : Timing indicator

Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

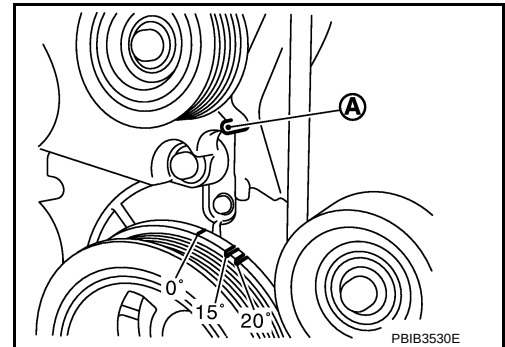
A/T: $16 \pm 5^\circ$ BTDC (in P or N position)

M/T: $16 \pm 5^\circ$ BTDC (in Neutral 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-76, "Accelerator Pedal Released Position Learning"](#).

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform [EC-76, "Throttle Valve Closed Position Learning"](#).

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Refer to [EC-77, "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-III**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-III.

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

A/T: 650 ± 50 rpm (in P or N position)

M/T: 650 ± 50 rpm (in Neutral position)

⊗ Without CONSULT-III

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"](#).

A/T: 650 ± 50 rpm (in P or N position)

M/T: 650 ± 50 rpm (in Neutral 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.

A : Timing indicator

Refer to [EC-75, "Idle Speed and Ignition Timing Check"](#).

A/T: $16 \pm 5^\circ$ BTDC (in P or N position)

M/T: $16 \pm 5^\circ$ BTDC (in Neutral position)

OK or NG

OK >> GO TO 19.

NG >> GO TO 16.

16.CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to [EM-53](#).

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-375](#).
- Check crankshaft position sensor (POS) and circuit.
Refer to [EC-367](#).

OK or NG

OK >> GO TO 18.

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

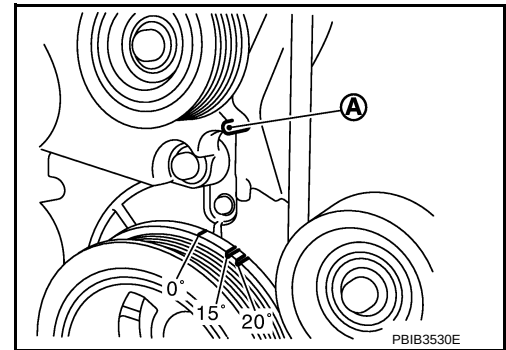
18.CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-134](#).

>> GO TO 4.

19.INSPECTION END

Did you replace the ECM, referring this Basic Inspection procedure?



BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

Yes or No

- Yes >> 1. Perform [EC-75, "VIN Registration"](#)
2. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
3. **INSPECTION END**
- No >> **INSPECTION END**

Idle Speed and Ignition Timing Check

INFOID:0000000001645509

IDLE SPEED

④ With CONSULT-III

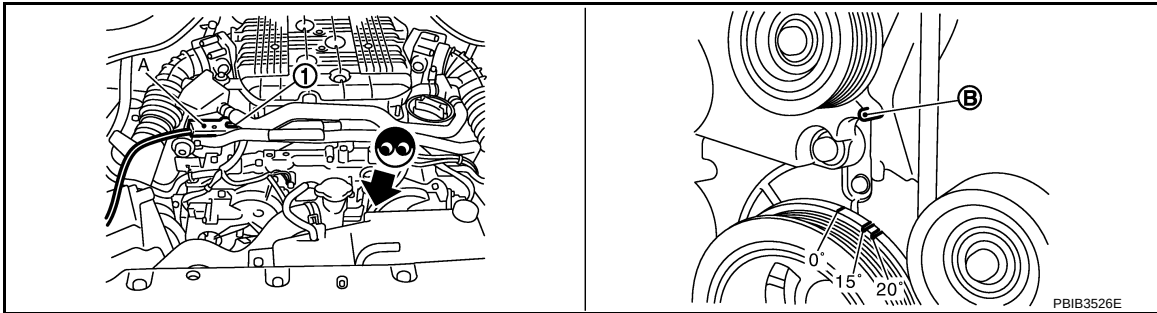
Check idle speed in "DATA MONITOR" mode with CONSULT-III.

④ With GST

Check idle speed in Service \$01 with GST.

IGNITION TIMING

1. Attach timing light to loop wire as shown.



1. Loop wire

A. Timing light

B. Timing indicator

2. Check ignition timing.

Procedure After Replacing ECM

INFOID:0000000001645510

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-135, "ECM Re-communicating Function"](#).
2. Perform [EC-75, "VIN Registration"](#).
3. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
4. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
5. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
6. Perform [EC-77, "Idle Air Volume Learning"](#).

VIN Registration

INFOID:0000000001645511

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

④ With CONSULT-III

1. Check the VIN of the vehicle and note it. Refer to [GI-43](#).
2. Turn ignition switch ON and engine stopped.
3. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

4. Follow the instruction of CONSULT-III display.

Exhaust Valve Timing Control Learning

INFOID:0000000001645512

DESCRIPTION

Exhaust Valve Timing Control Learning is an operation to learn the characteristic of exhaust valve timing control magnet retarder by comparing the target angle of exhaust camshaft with the actual retarded angle of exhaust camshaft. It must be performed each time exhaust valve timing control magnet retarder is disconnected or replaced, or ECM is replaced.

OPERATION PROCEDURE

With CONSULT-III

1. Start engine and warm it up to normal operation temperature.
2. Set shift lever in neutral position and confirm that following electrical or mechanical loads are not applied.
 - Headlamp switch is OFF
 - Air conditioner switch is OFF
 - Rear defogger switch is OFF
 - Steering wheel is in the straight-ahead position, etc
3. Keep the engine speed between 1,800 and 2,000 rpm.
4. Select "EXH V/T CONTROL LEARN" in "WORK SUPPORT" mode with CONSULT-III.
5. Touch "START" and wait 20 seconds.
6. Make sure that "CMPLT" is displayed on CONSULT-III screen.

Learning completed : CMPLT

Learning not yet : YET

Without CONSULT-III

1. Start engine and warm it up to normal operation temperature.
2. Set shift lever in neutral position and confirm that following electrical or mechanical loads are not applied.
 - Headlamp switch is OFF
 - Air conditioner switch is OFF
 - Rear defogger switch is OFF
 - Steering wheel is in the straight-ahead position, etc
3. Keep the engine speed between 1,800 and 2,000 rpm at 20 seconds.

Accelerator Pedal Released Position Learning

INFOID:0000000001645513

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:0000000001645514

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 >

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

Idle Air Volume Learning

INFOID:000000001645515

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)
- Transmission range switch (A/T models): ON
Park/neutral position (PNP) switch (M/Tmodels): 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 started, the headlamp will not be illuminated.

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

OPERATION PROCEDURE

With CONSULT-III

1. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
6. Touch "START" and wait 20 seconds.
7. Make sure that "CMPLT" is displayed on CONSULT-III 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 DIAGNOSIS PROCEDURE below.
8. 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	A/T: 650 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 16 ± 5° BTDC (in P or N position) M/T: 16 ± 5° BTDC (in Neutral position)

Without CONSULT-III

NOTE:

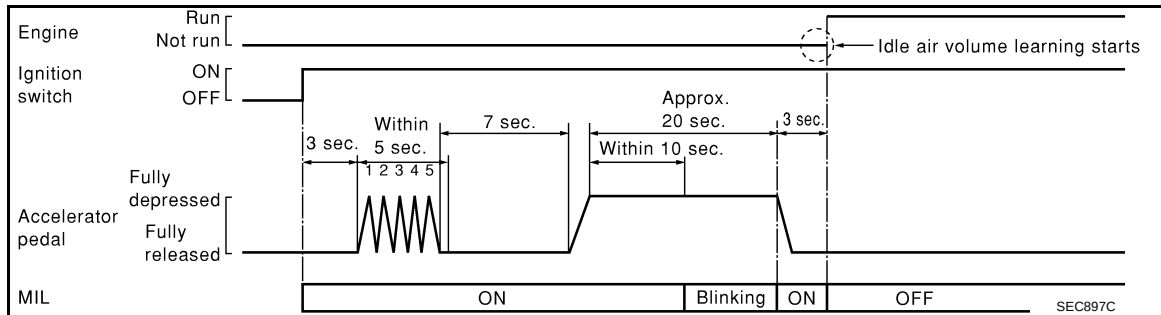
- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

1. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).

BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.
 - a. Fully depress the accelerator pedal.
 - b. Fully release the accelerator pedal.
8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.
11. Wait 20 seconds.



12. 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	A/T: 650 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 16 ± 5° BTDC (in P or N position) M/T: 16 ± 5° BTDC (in Neutral position)

13. 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:

1. Check that throttle valve is fully closed.
2. Check PCV valve operation.
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-126](#).
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:000000001645516

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
3. Start engine.

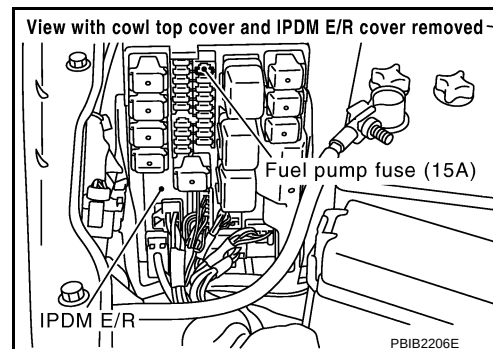
BASIC SERVICE PROCEDURE

< SERVICE INFORMATION >

4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

⊗ Without CONSULT-III

1. Remove fuel pump fuse (1) located in IPDM E/R (2).
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:

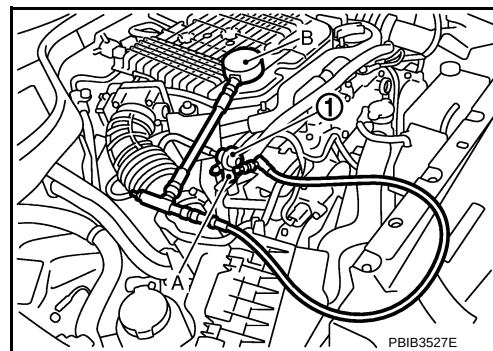
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because Z33 models do not have fuel return system.

Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Install the inline fuel quick disconnected fitting (A) between fuel damper (1) and fuel injector tube.
3. Connect the fuel pressure gauge (quick connector adapter hose) (B) to the inline fuel quick disconnected fitting.
4. Turn ignition switch ON and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.



At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

7. If result is unsatisfactory, go to next step.
8. Check fuel hoses and fuel tubes for clogging.
If OK, replace "fuel filter and fuel pump assembly".
If NG, repair or replace.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

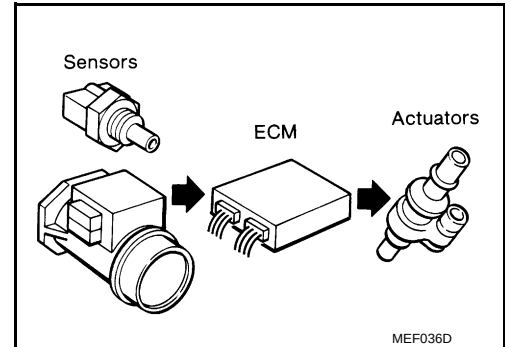
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

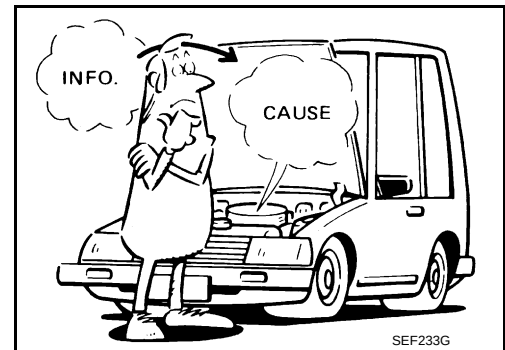
INFOID:000000001645517

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.



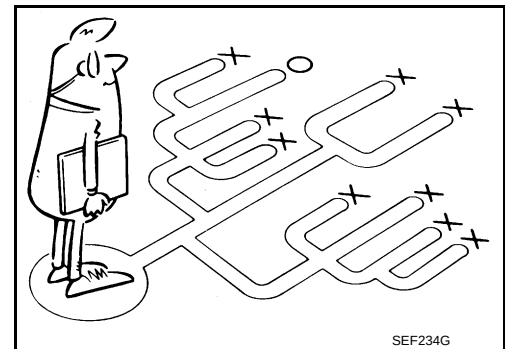
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-III (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.

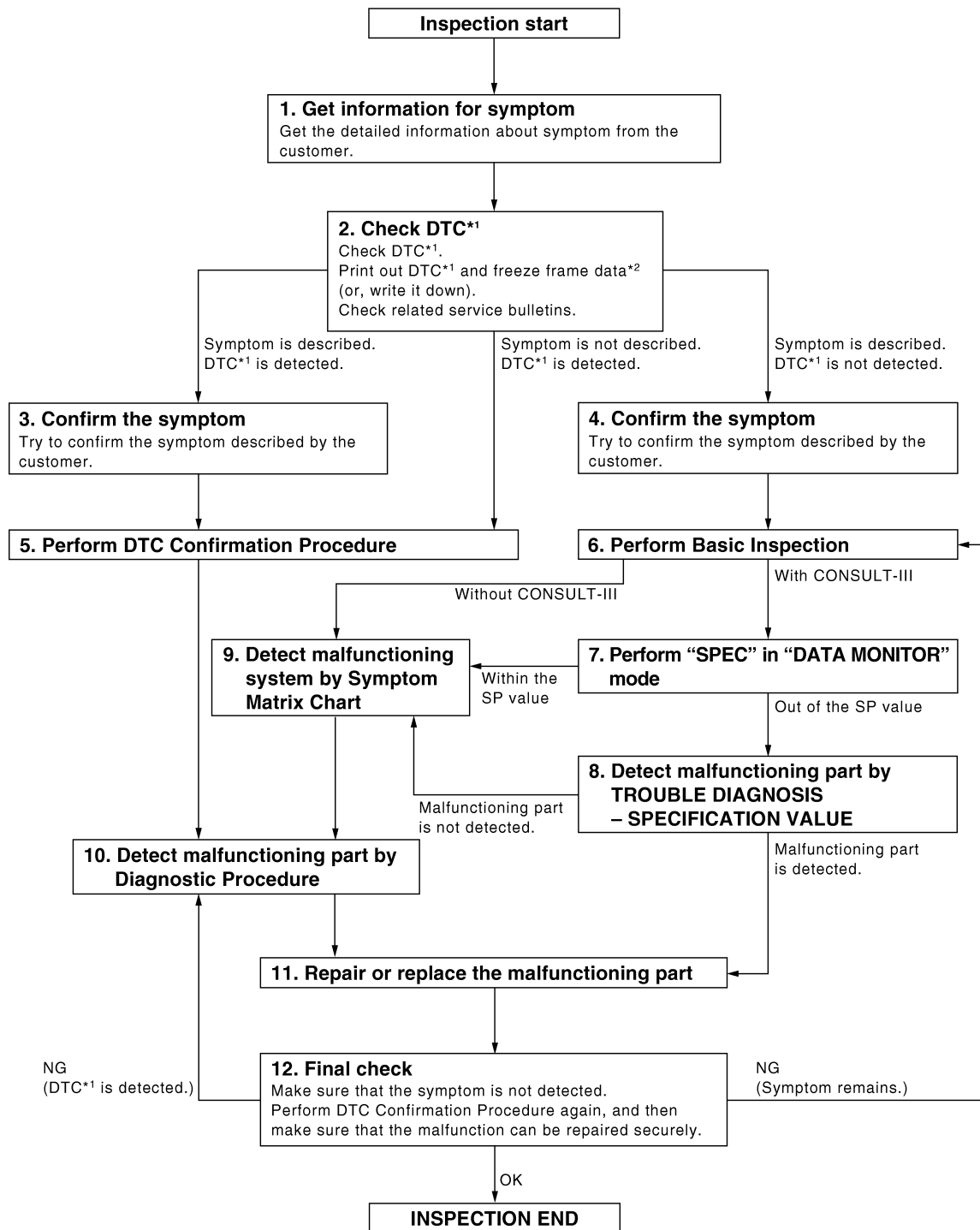


WORK FLOW

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Overall Sequence



*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

PBIB3456E

Detailed Flow

1.GET INFORMATION FOR SYMPTOM

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

>> GO TO 2.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

2. CHECK DTC*¹

1. Check DTC*¹.
2. Perform the following procedure if DTC*¹ is displayed.
 - Record DTC*¹ and freeze frame data*². (Print them out with CONSULT-III or GST.)
 - Erase DTC*¹. (Refer to [EC-46, "Emission-related Diagnostic Information"](#).)
 - Study the relationship between the cause detected by DTC*¹ and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-87, "Symptom Matrix Chart"](#).)
3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*¹ is displayed>>GO TO 3.

Symptom is described, DTC*¹ is not displayed>>GO TO 4.

Symptom is not described, DTC*¹ 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-III to the vehicle and check 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-III to the vehicle and check 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*¹, and then make sure that DTC*¹ is detected again.

If two or more DTCs*¹ are detected, refer to [EC-84, "DTC Inspection Priority Chart"](#) and determine trouble diagnosis order.

NOTE:

- Freeze frame data*² is useful if the DTC*¹ 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*¹ cannot be detected during this check.
If the result of Overall Function Check is NG, it is the same as the detection of DTC*¹ by DTC Confirmation Procedure.

Is DTC*¹ detected?

Yes >> GO TO 10.

No >> Check according to [EC-134](#).

6. PERFORM BASIC INSPECTION

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

With CONSULT-III>>GO TO 7.

Without CONSULT-III>>GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

Ⓟ With CONSULT-III

Make sure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", and "A/F ALPHA-B1", "A/F ALPHA-B2" are within the SP value using CONSULT-III "SPEC" in "DATA MONITOR" mode.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Refer to [EC-127, "Diagnosis Procedure"](#).

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-126](#).

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-87, "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-24, "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-III. Refer to [EC-121, "CONSULT-III Reference Value in Data Monitor"](#), [EC-100, "ECM Terminal and Reference Value"](#).

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-46, "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*¹ 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*¹ in ECM and TCM (Transmission Control Module). (Refer to [EC-46, "Emission-related Diagnostic Information"](#) and [AT-37, "OBD-II Diagnostic Trouble Code \(DTC\)"](#).)
- 2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to [EC-46, "Emission-related Diagnostic Information"](#).
- 3. **INSPECTION END**

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

< SERVICE INFORMATION >

- 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.

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

SF9071

Worksheet Sample

Customer name MR/MS		Model & Year	VIN		
Engine #		Trans.	Mileage		
Incident Date		Manuf. Date	In Service Date		
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.			
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [_____]			
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [_____]			
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [_____]			
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading			
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime			
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes			
Weather conditions		☐ Not affected			
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [_____]			
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F			
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed <table style="width: 80%; margin-left: auto;"> <tr> <td style="text-align: center;"> ----- </td> </tr> <tr> <td style="text-align: center;">0 2,000 4,000 6,000 8,000 rpm</td> </tr> </table>		-----	0 2,000 4,000 6,000 8,000 rpm

0 2,000 4,000 6,000 8,000 rpm					
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)			
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed <table style="width: 70%; margin-left: auto;"> <tr> <td style="text-align: center;"> ----- </td> </tr> <tr> <td style="text-align: center;">0 10 20 30 40 50 60 MPH</td> </tr> </table>		-----	0 10 20 30 40 50 60 MPH

0 10 20 30 40 50 60 MPH					
Malfunction indicator lamp		☐ Turned on ☐ Not turned on			

MTBI 0017

DTC Inspection Priority Chart

INFID:0000000001645518

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

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Priority	Detected items (DTC)	
1	• U1000 U1001 CAN communication line • U1010 CAN communication • P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0345 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 ECM • P0643 Sensor power supply • P0700 TCM • P0705 P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor	A EC C D E F
2	• P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater • P0075 P0081 Intake valve timing control solenoid valve • P0078 P0084 Exhaust valve timing control magnet retarder* • P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 P0158 P0159 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P0550 Power steering pressure sensor • P0603 ECM power supply • P0710 P0717 P0720 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P1730 P1752 P1757 P1762 P1767 P1772 P1774 A/T related sensors, solenoid valves and switches • P1078 P1084 Exhaust valve timing control position sensor • P1217 Engine over temperature (OVERHEAT) • P1233 P2101 Electric throttle control function • P1236 P2118 Throttle control motor • P1290 P2103 P2103 Throttle control motor relay • P1805 Brake switch	G H I J K L
3	• P0011 P0021 Intake valve timing control • P0014 P0024 Exhaust valve timing control* • P0171 P0172 P0174 P0175 Fuel injection system function • P0300 - P0306 Misfire • P0420 P0430 Three way catalyst function • P0442 EVAP control system (SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0456 EVAP control system (VERY SMALL LEAK) • P0506 P0507 Idle speed control system • P1148 P1168 Closed loop control • P1211 TCS control unit • P1212 TCS communication line • P1238 P2119 Electric throttle control actuator • P1421 Cold start control • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor	M N O P

Fail-Safe Chart

INFOID:000000001645519

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 P010C P010D	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 following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx 4 minutes or more after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 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.	
P1233 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.	
P1236 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.	
P1238 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 (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1290 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.	
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.

TROUBLE DIAGNOSIS

< 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

Symptom Matrix Chart

INFOID:000000001645520

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		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	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-639
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-78
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-634
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-31
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-42
	Incorrect idle speed adjustment						1	1	1	1		1			EC-71
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-523 , EC-539
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-71
	Ignition circuit	1	1	2	2	2		2	2			2			EC-645
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-135

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			
Mass air flow sensor circuit	1	1	2	2			2	2			2			EC-186 , EC-199		
Engine coolant temperature sensor circuit						3			3						EC-216 , EC-231	
Air fuel ratio (A/F) sensor 1 circuit						3			2							
Throttle position sensor circuit									2					2		EC-222 , EC-345 , EC-519 , EC-521 , EC-541
Accelerator pedal position sensor circuit					3	2			1							
Knock sensor circuit			2								3			EC-360		
Crankshaft position sensor (POS) circuit	2	2												EC-367		
Camshaft position sensor (PHASE) circuit	3	2												EC-375		
Vehicle speed signal circuit		2	3		3						3			EC-465		
Power steering pressure sensor circuit		2					3	3						EC-471		
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-476 , EC-480		
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-172		
Exhaust valve timing control magnet retarder circuit		3	2		1	3	2	2	3		3			EC-151		
Park/neutral position (PNP) switch circuit			3		3		3	3			3			EC-488		
Refrigerant pressure sensor circuit		2				3			3		4			EC-657		
Electrical load signal circuit							3							EC-632		
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-28		
VDC/TCS/ABS control unit ABS actuator and electric unit (control unit)			4											BRC-81 , BRC-43		

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

(continued on next page)

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

SYSTEM — ENGINE MECHANICAL & OTHER

		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							
Fuel	Fuel tank	5	5												FL-10						
	Fuel piping			5	5	5		5	5			5			EM-35						
	Vapor lock														—						
	Valve deposit									—											
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5		5		—								
Air	Air duct		5	5	5	5	5	5	5	5	5	5			EM-16						
	Air cleaner																			EM-16	
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5																			EM-16
	Electric throttle control actuator														5					EM-18	
	Air leakage from intake manifold/Collector/Gasket																			EM-18 , EM-21	
Cranking	Battery		1	1	1		1	1			1	1		1	SC-4						
	Generator circuit																		SC-17		
	Starter circuit	3								1				SC-8							
	Signal plate	6												EM-106							
	Park/neutral position (PNP) switch	4												MT-12 or AT-98							
Engine	Cylinder head	5	5	5	5	5		5	5			5	3		EM-89						
	Cylinder head gasket										4										
	Cylinder block	6	6	6	6	6		6	6		6	4		EM-106							
	Piston																				
	Piston ring																				
	Connecting rod																				
	Bearing																				
	Crankshaft																				

A

EC

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P

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		
Valve mecha- nism	Timing chain	5	5	5	5	5		5	5			5			EM-53	
	Camshaft														EM-72	
	Intake valve timing control														EM-53	
	Exhaust valve timing control														EM-53	
	Intake valve														3	EM-89
	Exhaust valve															
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-23 , EX-3	
	Three way catalyst															
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-27 , LU-9 , LU-8	
	Oil level (Low)/Filthy oil														LU-5	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-12 , CO-16	
	Thermostat														5	CO-25
	Water pump															CO-22
	Water gallery															CO-27
	Cooling fan														5	CO-20
	Coolant level (Low)/Contaminat- ed coolant															CO-9
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												EC-44 or BL-134	

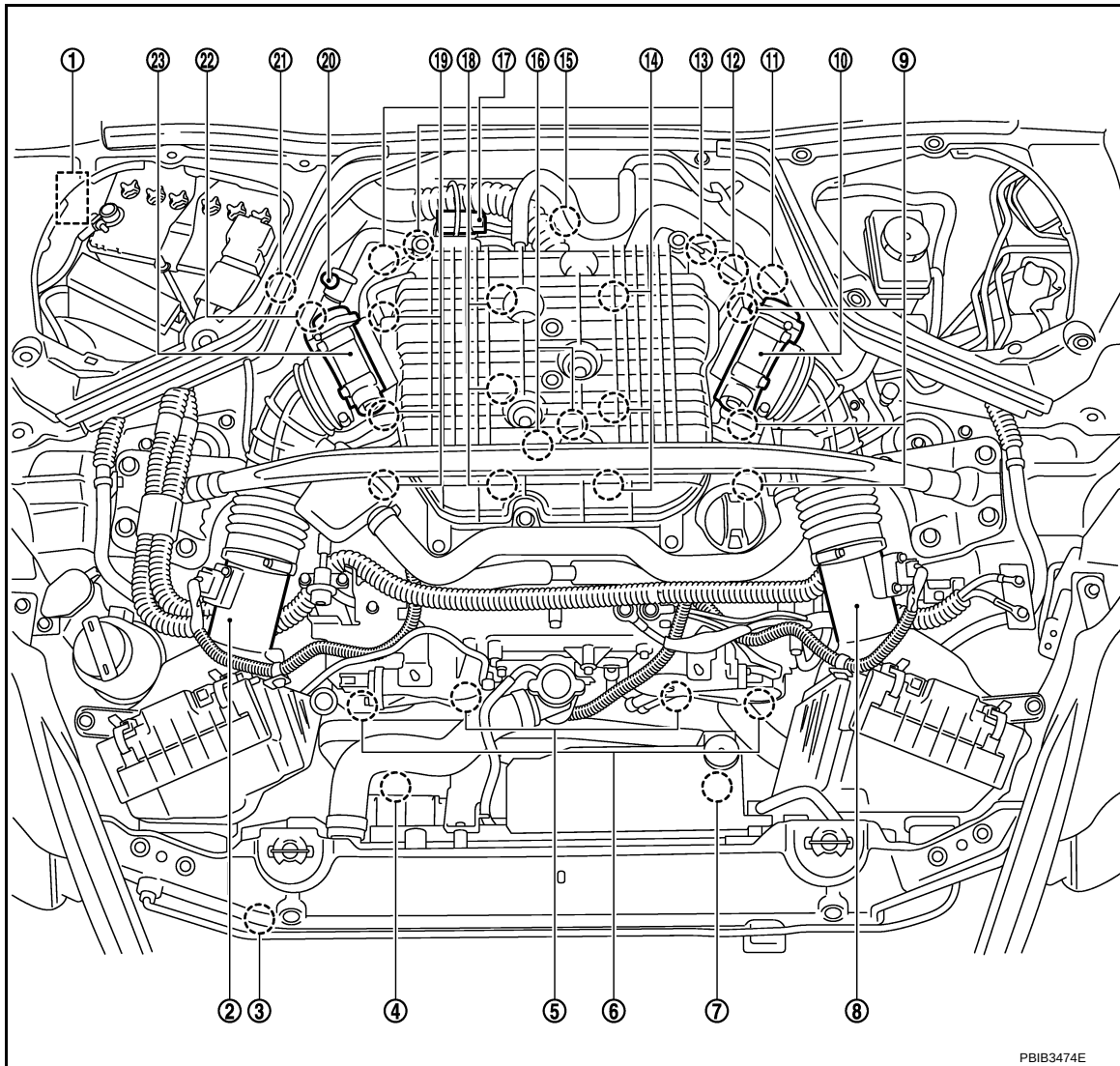
1 - 6: The numbers refer to the order of inspection.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Engine Control Component Parts Location

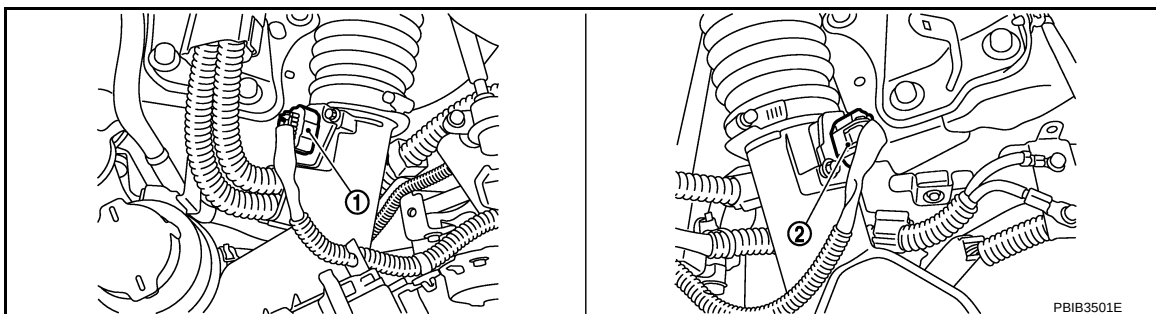
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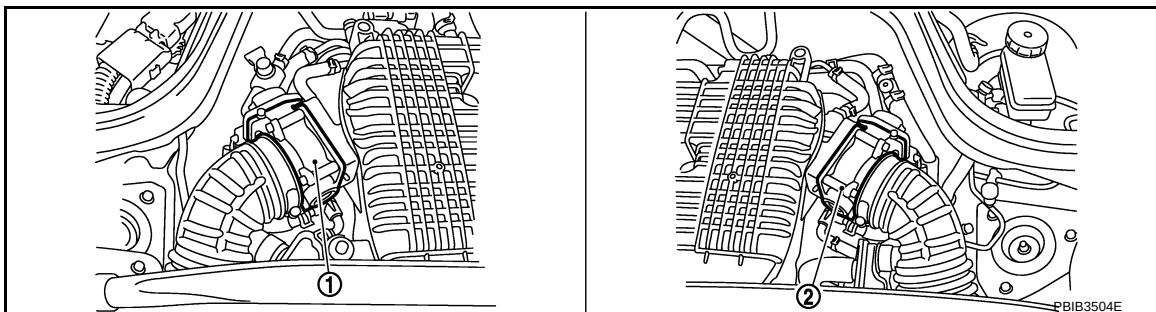
1. IPDM E/R	2. Mass air flow sensor (with intake air temperature sensor) (bank 1)	3. Refrigerant pressure sensor
4. Cooling fan motor-2	5. Intake valve timing control solenoid valve	6. Exhaust valve timing control magnet retarder
7. Cooling fan motor-1	8. Mass air flow sensor (with intake air temperature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

TROUBLE DIAGNOSIS

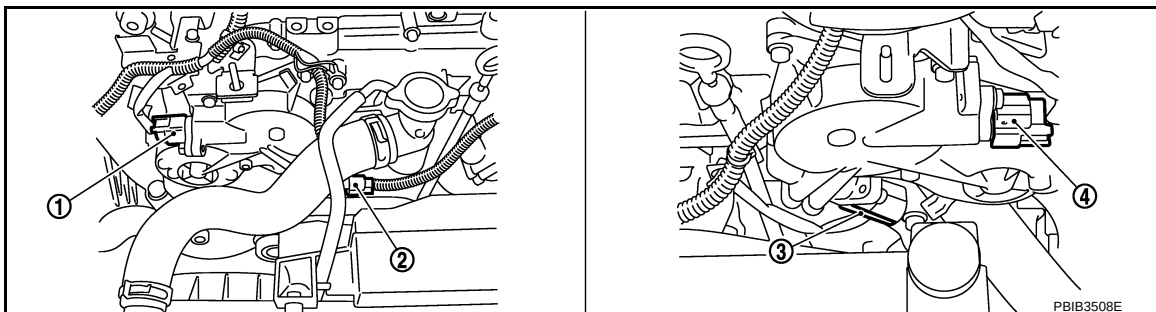
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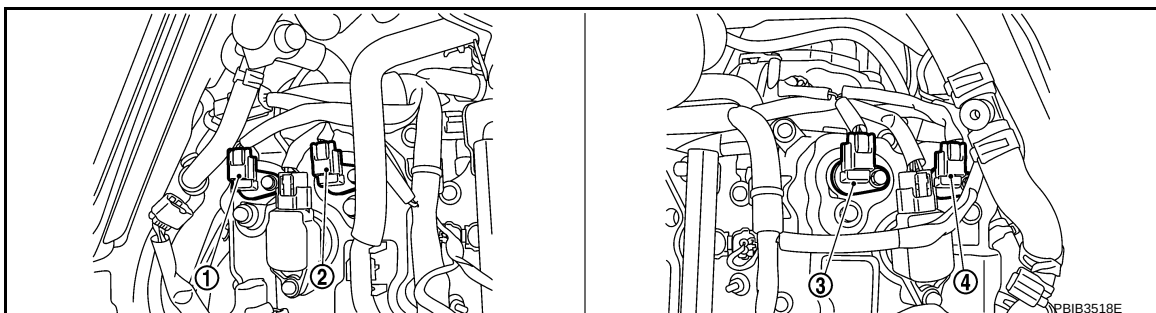
1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)



1. Electric throttle control actuator (bank 1)
2. Electric throttle control actuator (bank 2)



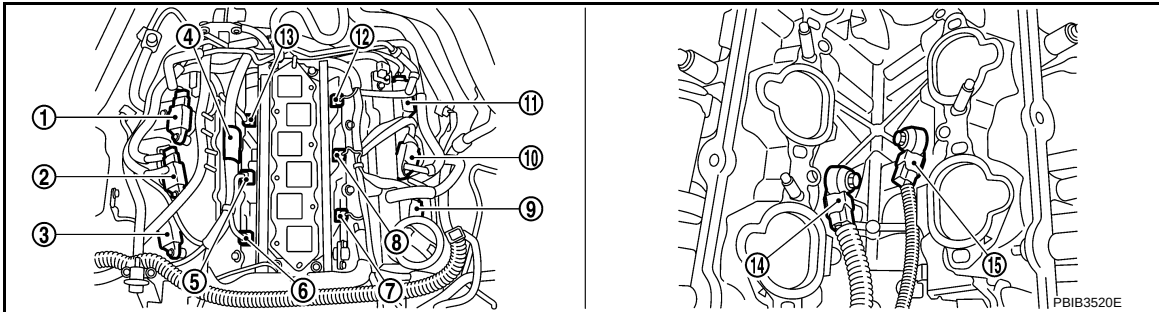
1. Exhaust valve timing control magnet retarder (bank 1) harness connector
2. Intake valve timing control solenoid valve (bank 1) harness connector
3. Intake valve timing control solenoid valve (bank 2) harness connector
4. Exhaust valve timing control magnet retarder (bank 2) harness connector



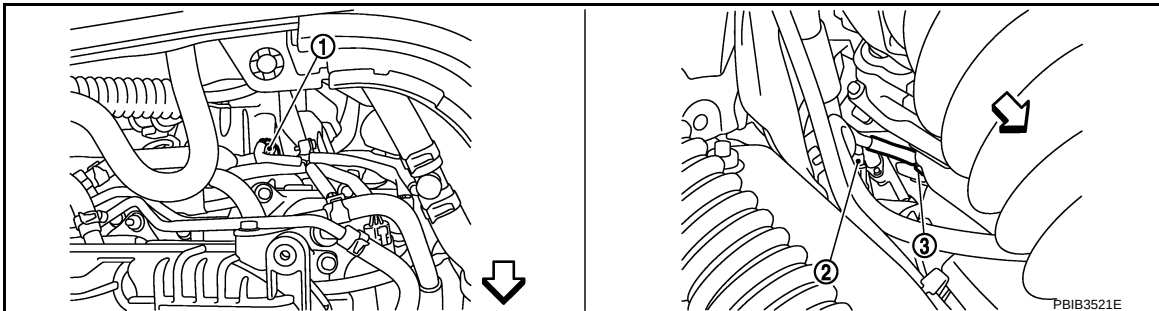
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

1. Exhaust valve timing control position sensor (bank 1)
2. Camshaft position sensor (PHASE) (bank 1)
3. Camshaft position sensor (PHASE) (bank 2)
4. Exhaust valve timing control position sensor (bank 2)

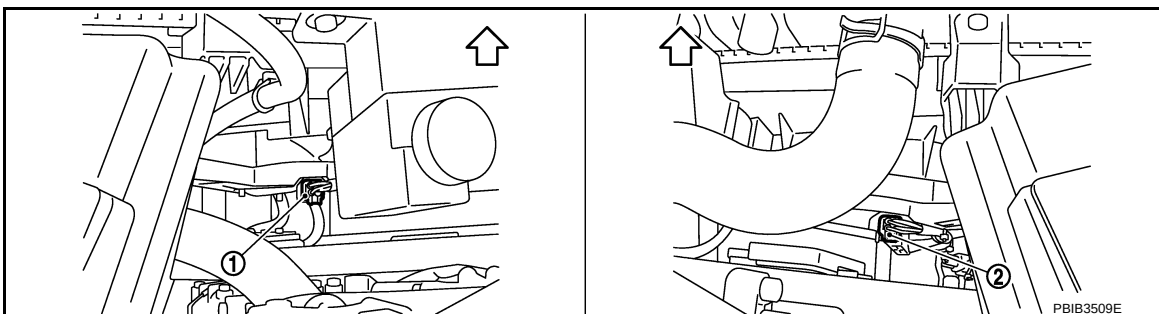


1. Ignition coil No.5 (with power transistor)
2. Ignition coil No.3 (with power transistor)
3. Ignition coil No.1 (with power transistor)
4. Condenser
5. Fuel injector No.3
6. Fuel injector No.1
7. Fuel injector No.2
8. Fuel injector No.4
9. Ignition coil No.2 (with power transistor)
10. Ignition coil No.4 (with power transistor)
11. Ignition coil No.6 (with power transistor)
12. Fuel injector No.6
13. Fuel injector No.5
14. Knock sensor (bank 1)
15. Knock sensor (bank 2)



1. Engine coolant temperature sensor
2. A/F sensor 1 (bank 1)
3. Crankshaft position sensor

↔ Vehicle front

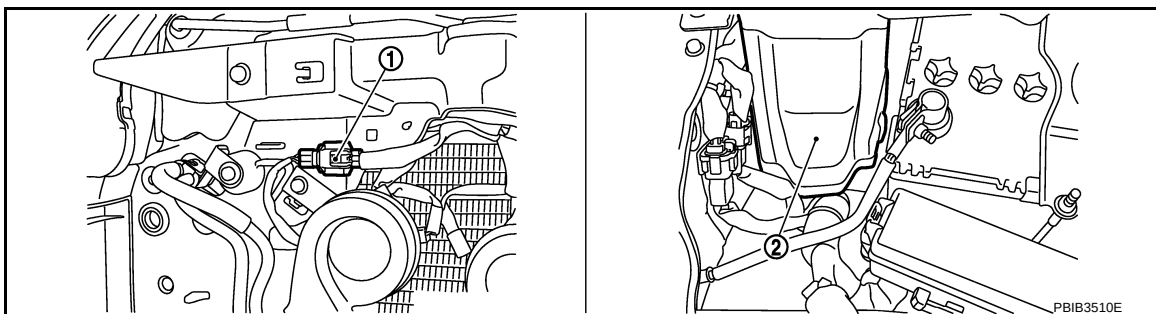


1. Cooling fan motor-1
2. Cooling fan motor-2

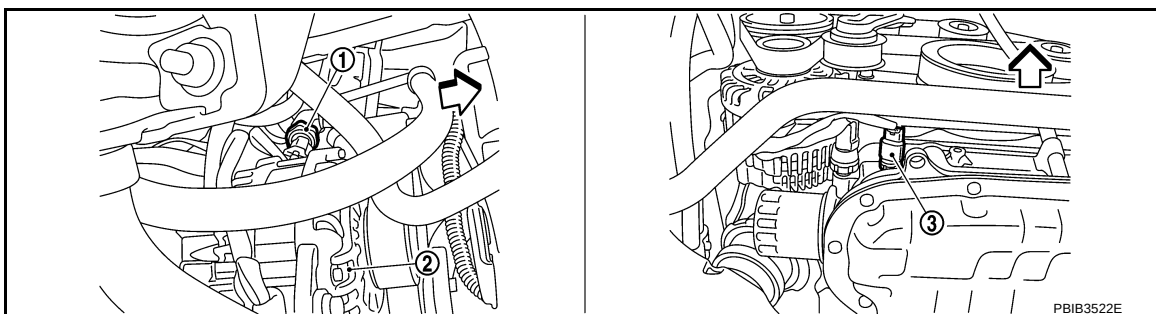
↔ Vehicle front

TROUBLE DIAGNOSIS

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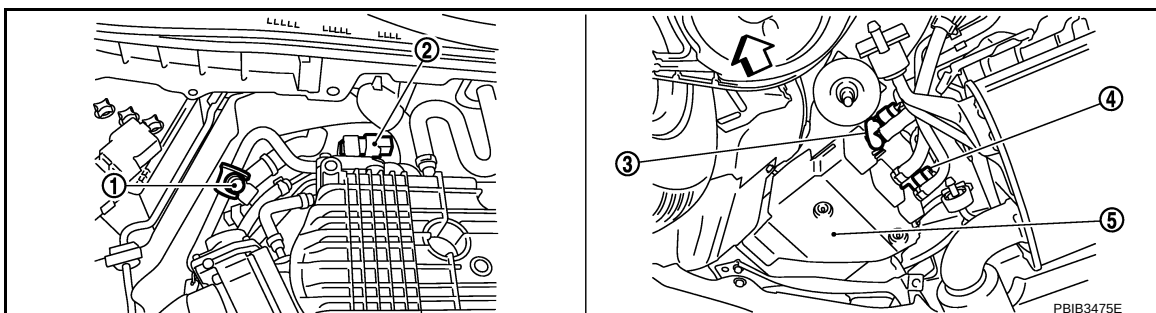


1. Refrigerant pressure sensor harness
2. IPDM E/R connector



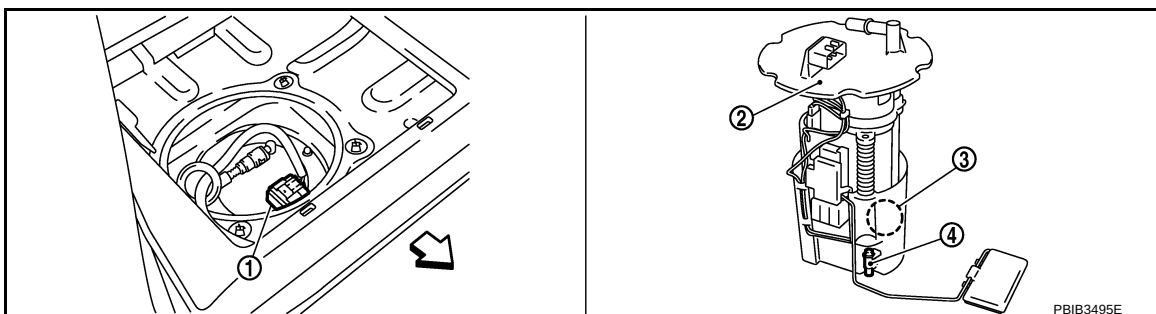
1. Power steering pressure sensor
2. Alternator
3. Engine oil temperature sensor

↩: Vehicle front



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

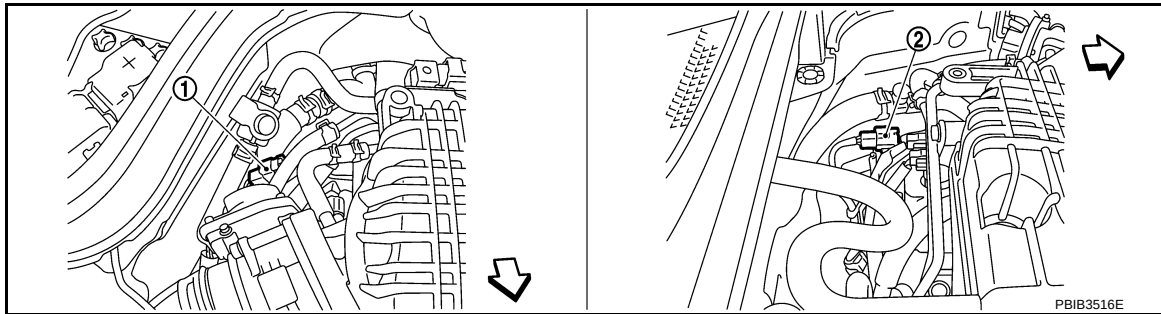
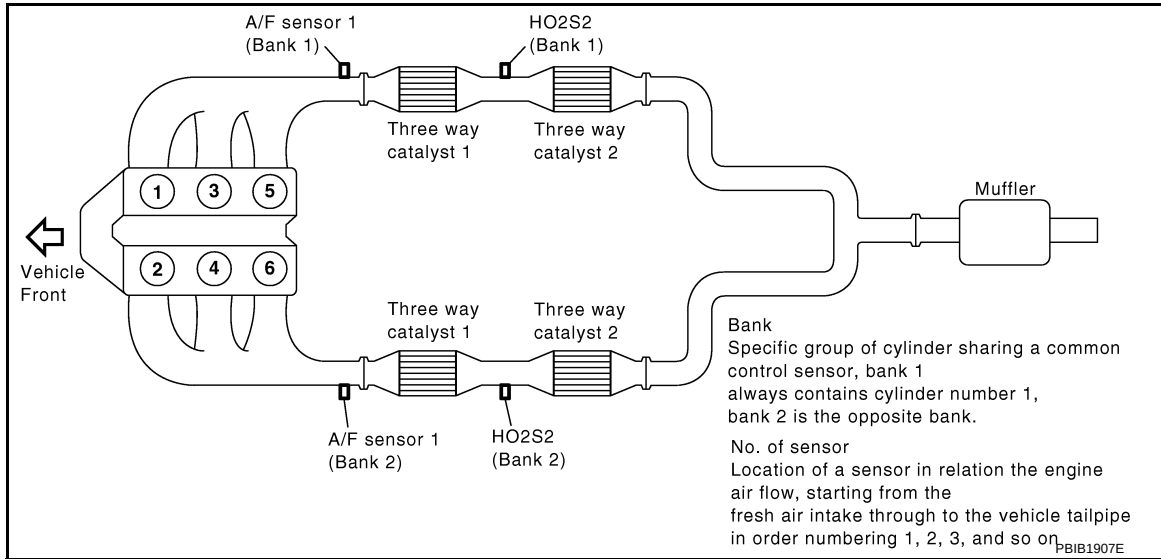
↩: Vehicle front



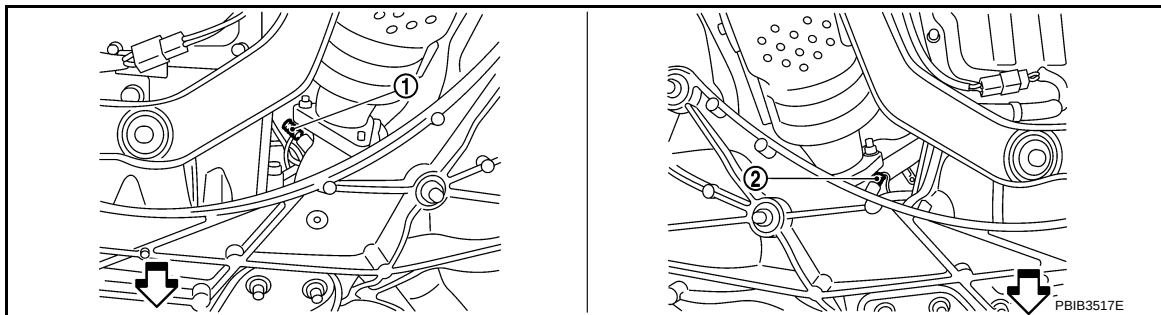
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

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



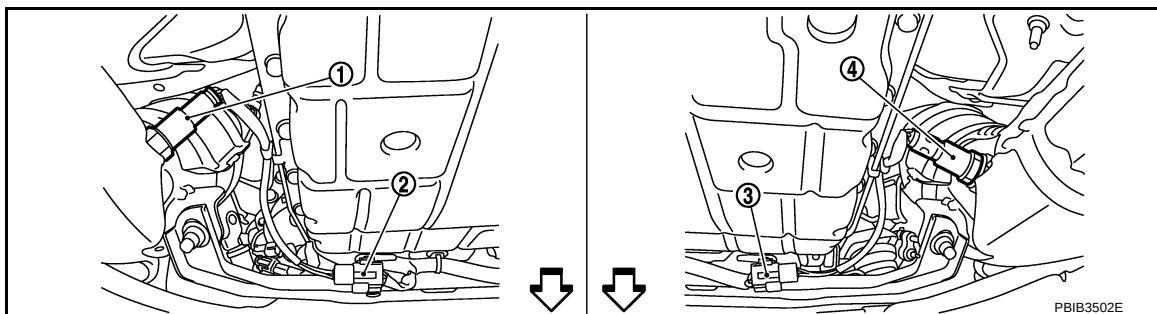
1. A/F sensor 1 (bank 1) harness connector
 2. A/F sensor 1 (bank 2) harness connector
-  Vehicle front



1. A/F sensor 1 (bank 1)
 2. A/F sensor 1 (bank 2)
-  Vehicle front

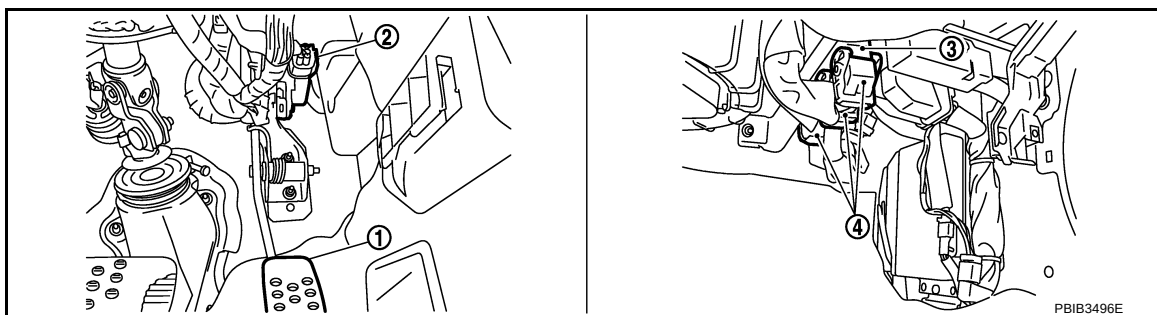
TROUBLE DIAGNOSIS

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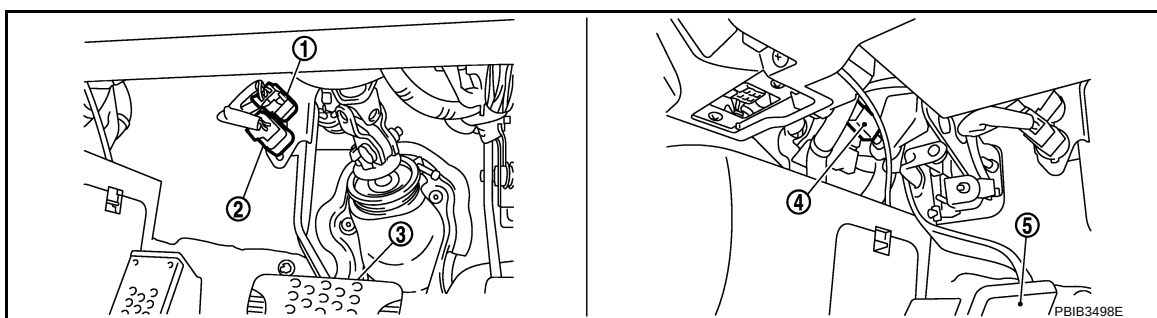


1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1)
4. Heated oxygen sensor 2 (bank 1) harness connector

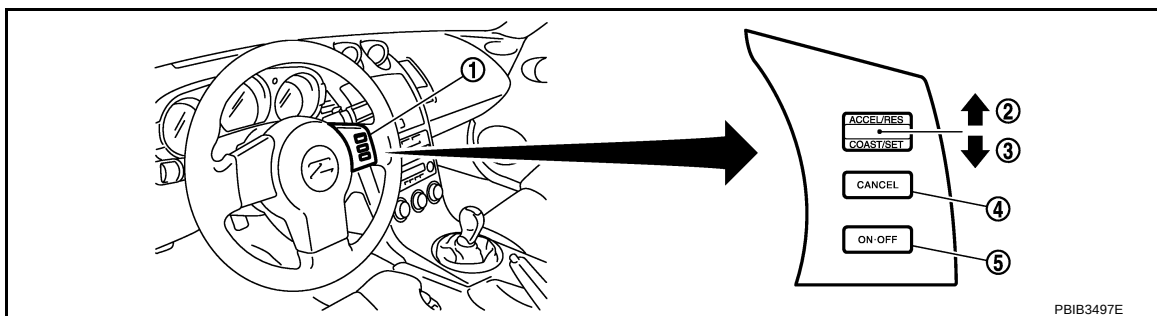
←: Vehicle front



1. Accelerator pedal
2. Accelerator pedal position sensor
3. ECM
4. ECM harness connector



1. Stop lamp switch
2. ASCD brake switch
3. Brake pedal
4. ASCD clutch switch
5. Clutch pedal



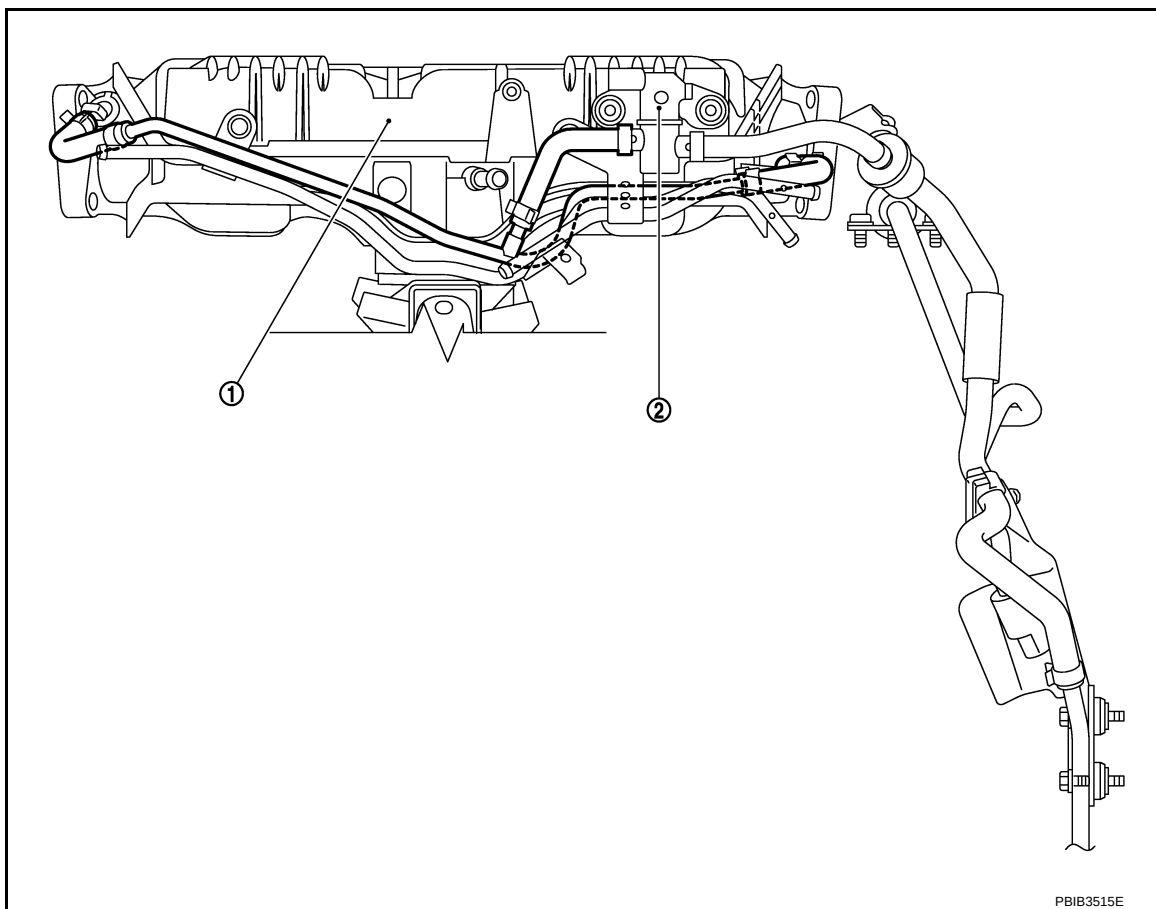
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

1. ASCD steering switch	2. RESUME/ACCELERATE switch	3. SET/COAST switch
4. CANCEL switch	5. MAIN switch	

Vacuum Hose Drawing

INFOID:000000001645522



1. Intake manifold collector	2. EVAP canister purge volume control solenoid valve

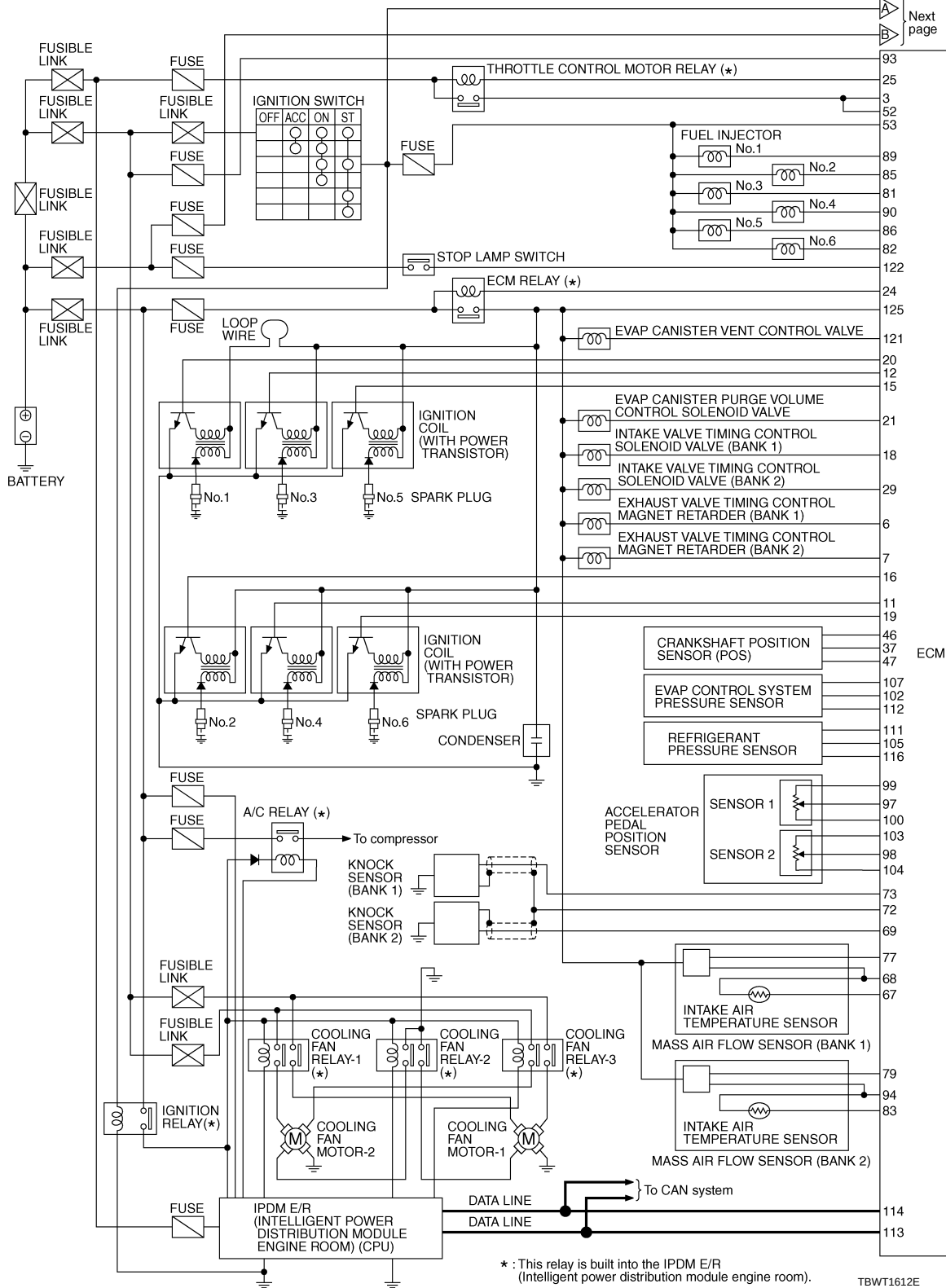
Refer to [EC-22, "Schematic"](#) for Vacuum Control System.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

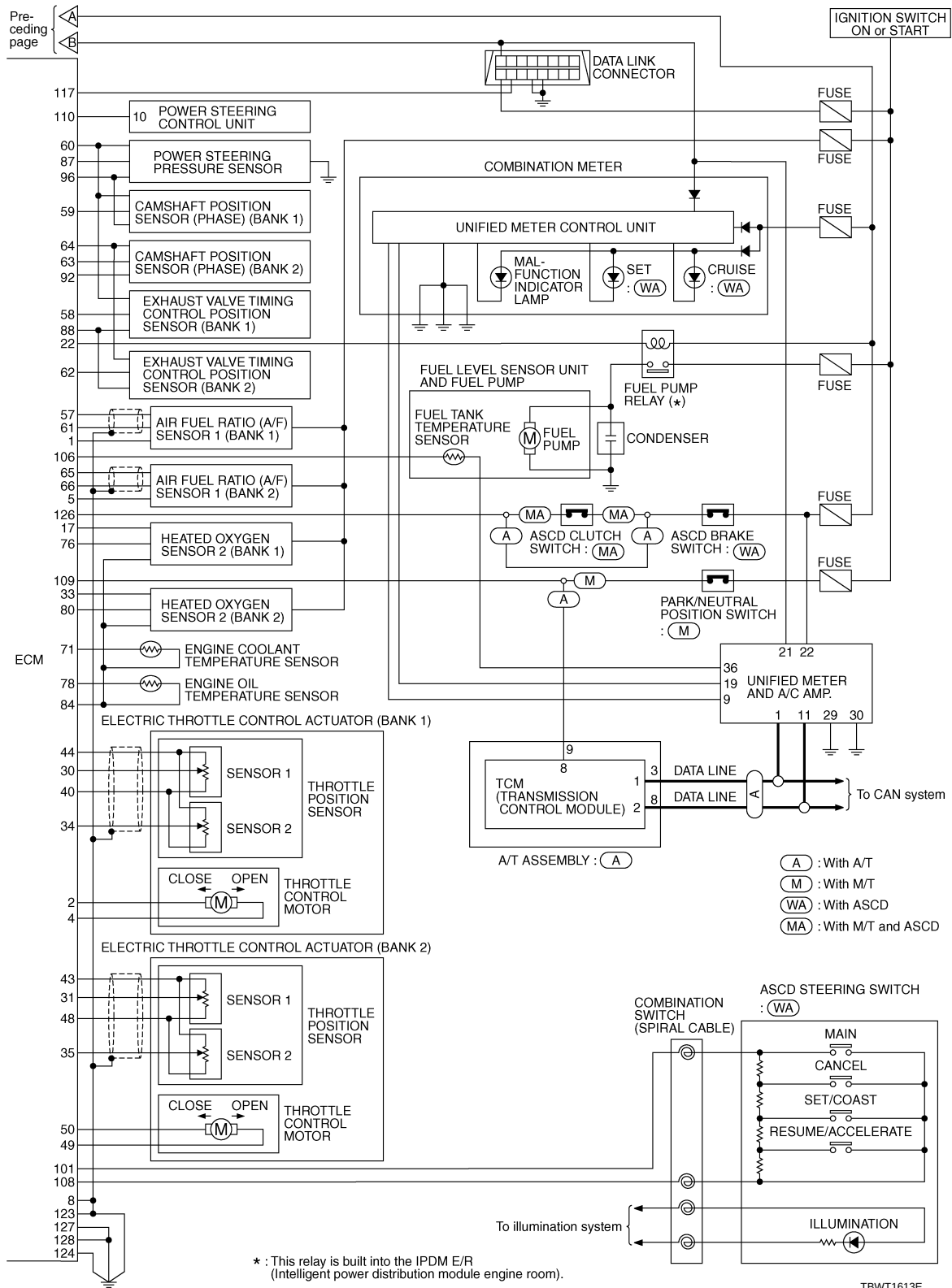
Circuit Diagram

INFOID:000000001645523



TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

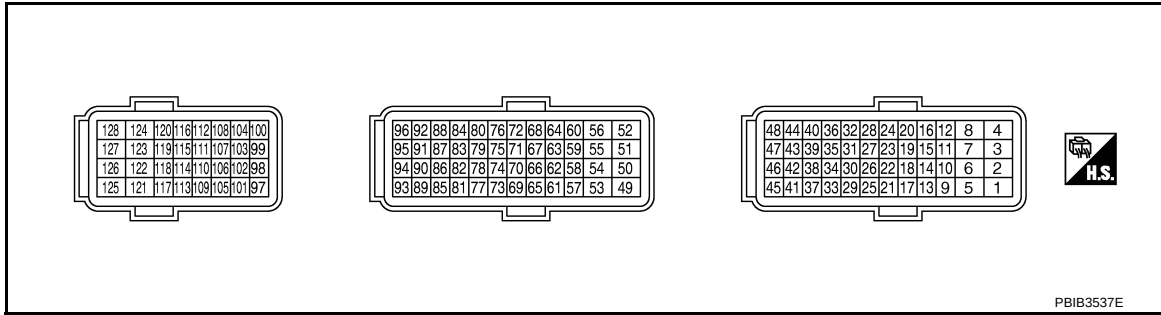


TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

ECM Harness Connector Terminal Layout

INFOID:000000001645524



PBIB3537E

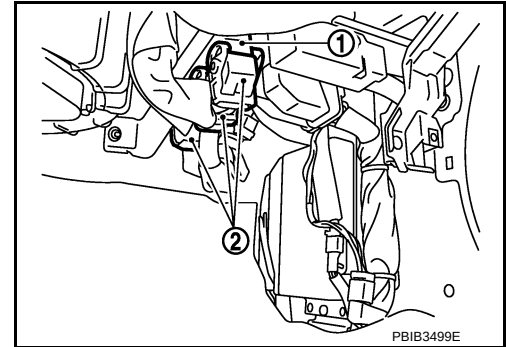
ECM Terminal and Reference Value

INFOID:000000001645525

PREPARATION

ECM (1) is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.

2 : ECM harness connector



PBIB3499E

ECM INSPECTION TABLE

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

CAUTION:

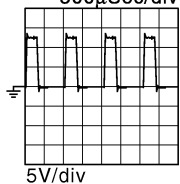
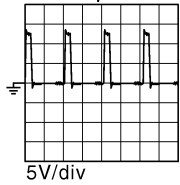
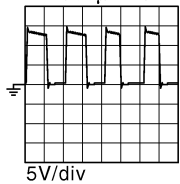
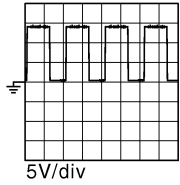
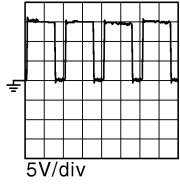
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] - Warm-up condition - Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★

PBIB3538E

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	G	Throttle control motor (Open) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 500μSec/div  5V/div PBIB3539E
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 500μSec/div  5V/div PBIB3540E
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	BR	Throttle control motor (Close) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 500μSec/div  5V/div PBIB3541E
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting en- gine)	2.9 - 8.8★ 50mSec/div  5V/div PBIB3538E
6	L/OR	Exhaust valve timing control magnet retarder (bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Around 2,500 rpm while the engine speed is rising	7 - 12V★  5V/div PBIB3542E

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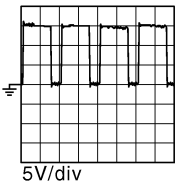
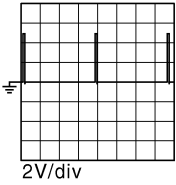
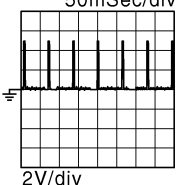
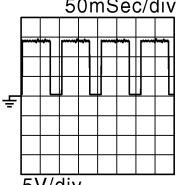
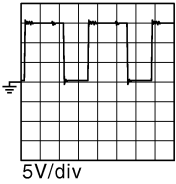
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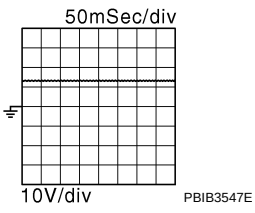
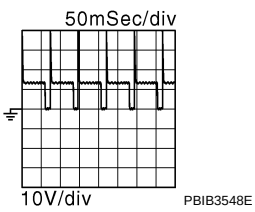
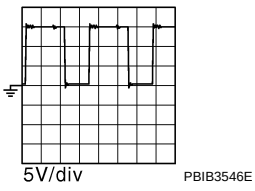
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/R	Exhaust valve timing control magnet retarder (bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Around 2,500 rpm while the engine speed is rising	7 - 12V★  5V/div PBIB3542E
8	B/P	ECM ground	[Engine is running] • Idle speed	Body ground
11 12 15 16 19 20	GY LG/R PU G/B L/R Y/B	Ignition signal No. 4 Ignition signal No. 3 Ignition signal No. 5 Ignition signal No. 2 Ignition signal No. 6 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 - 0.2V★ 50mSec/div  2V/div PBIB3543E
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4V★ 50mSec/div  2V/div PBIB3544E
17	P	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 50mSec/div  5V/div PBIB3545E
			[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
18	W/G	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: 2,000 rpm	7 - 12V★  5V/div PBIB3546E

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	GY/R	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★ 
22	L/W	Fuel pump relay	[Ignition switch: ON] For 1 second after turning ignition switch ON	0 - 1.5V
			[Engine is running] More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)
24	BR/Y	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)
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
29	G/W	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: 2,000 rpm	7 - 12V★ 
30	Y	Throttle position sensor 1 (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V

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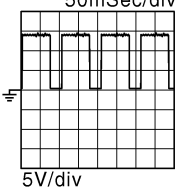
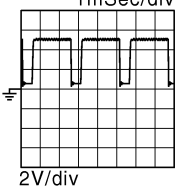
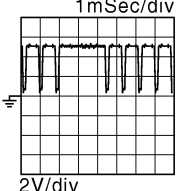
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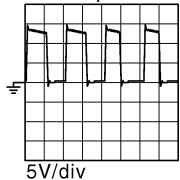
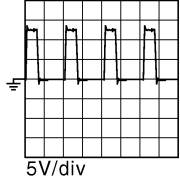
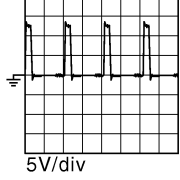
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
31	L/G	Throttle position sensor 1 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
33	PU/W	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
34	L	Throttle position sensor 2 (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	More than 0.36V
35	L/Y	Throttle position sensor 2 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	More than 0.36V
37	LG/B	Crankshaft position sensor (POS)	[Engine is running] Warm-up condition - Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★ 
			[Engine is running] Engine speed: 2,000 rpm	4.0 - 5.0V★ 
40	R	Sensor ground [Throttle position sensor (bank 1)]	[Engine is running] Warm-up condition - Idle speed	0V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	OR/L	Sensor power supply [Throttle position sensor (bank 2)]	[Ignition switch: ON]	5V
44	B	Sensor power supply [Throttle position sensor (bank 1)]	[Ignition switch: ON]	5V
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
47	Y/G	Sensor ground [Crankshaft position sensor (POS)]	[Engine is running] • Warm-up condition • Idle speed	0V
48	W/L	Sensor ground [Throttle position sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V
49	L/B	Throttle control motor (Close) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 500μSec/div  5V/div PBIB3541E
50	PU/W	Throttle control motor (Open) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 500μSec/div  5V/div PBIB3539E
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 500μSec/div  5V/div PBIB3540E
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
53	P/L	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V

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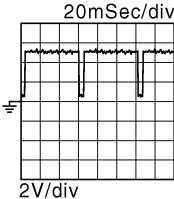
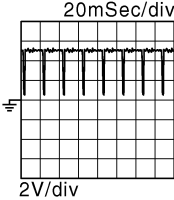
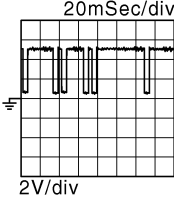
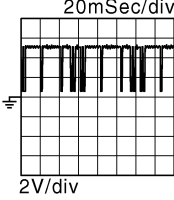
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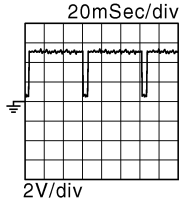
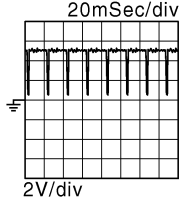
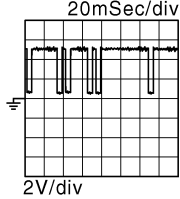
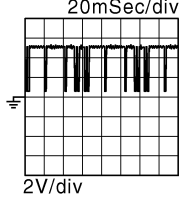
TROUBLE DIAGNOSIS

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	Y/G	Exhaust valve timing control position sensor (bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 - 5.0V★ 
59	BR/Y	Camshaft position sensor (PHASE) (bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	3.0 - 5.0V★ 
			[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0V★ 
60	R/L	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	[Ignition switch: ON]	5V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	B/Y	Exhaust valve timing control position sensor (bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★  PBIB3551E
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 - 5.0V★  PBIB3552E
63	SB	Camshaft position sensor (PHASE) (bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	3.0 - 5.0V★  PBIB3553E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB3554E
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
67	W/L	Intake air temperature sensor (bank 1)	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
68	B	Sensor ground [Mass air flow sensor (bank1), Intake air temperature sensor (bank 1)]	[Engine is running] • Warm-up condition • Idle speed	0V
69	W	Knock sensor (bank 2)	[Engine is running] • Idle speed	2.5V*
71	Y/B	Engine coolant temperature sensor	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.

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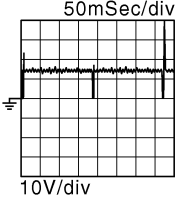
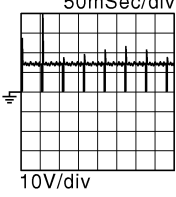
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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	—	Sensor ground [Knock sensor (bank 1), Knock sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
73	W	Knock sensor (bank 1)	[Engine is running] • Idle speed	2.5V*
76	W/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 - 1.0V
77	L/W	Mass air flow sensor (bank1)	[Engine is running] • Warm-up condition • Idle speed	0.8 - 1.1V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
78	G/W	Engine oil temperature sensor	[Engine is running]	0 - 4.8V Output voltage varies with engine oil temperature.
79	GY/R	Mass air flow sensor (bank2)	[Engine is running] • Warm-up condition • Idle speed	0.8 - 1.1V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
80	R/Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
81	R/B	Fuel injector No. 3	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  PBIB3555E
82	L/R	Fuel injector No. 6		
85	BR	Fuel injector No. 2		
86	W/B	Fuel injector No. 5		
89	G/Y	Fuel injector No. 1		
90	Y/R	Fuel injector No. 4		
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB3556E
83	G	Intake air temperature sensor (bank 2)	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.

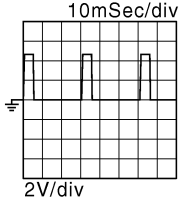
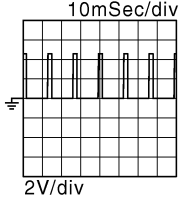
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil tempera- ture sensor)	[Engine is running] • Warm-up condition • Idle speed	0V	EC
87	Y	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V	C
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V	D
88	LG/B	Sensor ground [Exhaust valve timing con- trol position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V	E
92	B/P	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V	F
93	P	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)	G
94	L/Y	Sensor ground [Mass air flow sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V	H
96	P/L	Sensor ground [Camshaft position sensor (PHASE) (bank 1), Power steering pressure sensor]	[Engine is running] • Warm-up condition • Idle speed	0V	I
97	R	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.5 - 1.0V	J
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V	K
98	SB	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	1.95 - 2.40V	L
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V	M
99	L	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	5V	N
100	W	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	0V	O
101	G/Y	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	4V	
			[Ignition switch: ON] • MAIN switch: Pressed	0V	P
			[Ignition switch: ON] • CANCEL switch: Pressed	1V	
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V	
			[Ignition switch: ON] • SET/COAST switch: Pressed	2V	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	LG	EVAP control system pressure sensor	[Ignition switch: ON]	1.8 - 4.8V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
104	GY	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	0V
105	L	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates.)	1.0 - 4.0V
106	W	Fuel tank temperature sensor	[Engine is running]	0 - 4.8V Output voltage varies with fuel tank temperature.
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
108	B/Y	Sensor ground (ASCD steering switch)	[Engine is running] • Warm-up condition • Idle speed	0V
109	BR	Transmission range switch(A/T) Park/neutral position switch(M/T)	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T) position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Shift lever: Except above position	0V
110	Y	Engine speed output signal	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1V★ 
			[Engine is running] • Engine speed: 2,000 rpm	1V★ 
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V
112	PU	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	0V
113	P	CAN communication line	—	—
114	L	CAN communication line	—	—
116	W	Sensor ground (Refrigerant pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	0V

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	PU	Data link connector	[Ignition switch: ON] • GST: Disconnected	5V - Battery voltage (11 - 14V)
121	LG	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
123 124	B/W B/R	ECM ground	[Engine is running] • Idle speed	Body ground
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
126	L/OR	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
127 128	B B	ECM ground	[Engine is running] • Idle speed	Body ground

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

*: This may vary depending on internal resistance of the tester.

CONSULT-III Function (ENGINE)

INFOID:000000001645526

FUNCTION

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

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Item			DIAGNOSTIC TEST MODE						
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONI- TOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STA- TUS	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		×	×	×	×		
		Engine oil temperature sensor				×			
		Air Fuel ratio (A/F) sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Vehicle speed 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				×			
		Exhaust valve timing control position sensor		×		×			
		Fuel level sensor		×		×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
		ASCD clutch switch		×		×			

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Item		DIAGNOSTIC TEST MODE						
		WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	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	×		×	×		
		Exhaust valve timing control magnet retarder	×	×	×	×		
		Calculated load value		×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

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

*3: Always "CMPLT" is displayed.

INSPECTION PROCEDURE

Refer to [GI-33](#).

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	FUEL PUMP WILL STOP BY TOUCHING START DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. - IGN SW ON - ENGINE NOT RUNNING - AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). - NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM - FUEL TANK TEMP. IS MORE THAN 0°C (32°F). - WITHIN 10 MINUTES AFTER STARTING EVAP SYSTEM CLOSE - WHEN TRYING TO EXECUTE EVAP SYSTEM CLOSE UNDER THE CONDITION EXCEPT ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM
EXH V/T CONTROL LEARN	IN THIS MODE, OPERATION TO LEARN EXHAUST VALVE TIMING CONTROL MAGNET RETARDER CHARACTERISTIC.	When learning the exhaust valve timing control
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	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-46. "Emission-related Diagnostic Information".](#))

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-9.)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed. - One mode in the following is displayed.
FUEL SYS-B2	- 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
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	The throttle valve operating angle at the moment a malfunction is detected is displayed.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Freeze frame data item*	Description
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [°]	Always a certain value is displayed.
FTFMCH1	These items are not efficient for Z33 models.

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

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	- Accuracy becomes poor if engine speed drops below the idle rpm. - If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	The signal voltage of the mass air flow sensor is displayed.	When the engine is stopped, a certain value is indicated.
MAS A/F SE-B2			
B/FUEL SCHDL	msec	Base fuel schedule indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	- When the engine is stopped, a certain value is indicated. - This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2			
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of the A/F sensor 1 is displayed.	
A/F SEN1 (B2)			
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2)			
HO2S2 MNTR (B1)	RICH/LEAN	Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2)			
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	The accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1			
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Monitored item	Unit	Description	Remarks
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, "OFF" is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	[ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL	ON/OFF	- Indicates [ON/OFF] condition from the electrical load signal. - ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. - OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from heater fan switch signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2			
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	- Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. - The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2)			
EXH/V TIM B1	°CA	Indicates [°CA] of exhaust camshaft retarded angle.	
EXH/V TIM B2			

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Monitored item	Unit	Description	Remarks
INT/V SOL (B1)	%	- The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. - The advance angle becomes larger as the value increases.	
INT/V SOL (B2)			
VTC DTY EX B1	%	- The control value of the exhaust valve timing control magnet retarder (determined by ECM according to the input signals) is indicated. - The retard angle becomes larger as the value increases.	
VTC DTY EX B2			
TP SEN 1-B2	V	The throttle position sensor signal voltage is displayed.	TP SEN 2-B2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B2			
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1)	ON/OFF	Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2)			
I/P PULLY SPD	rpm	Indicates the engine speed computed from the Input speed sensor signal.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	Display the condition of idle air volume learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR (B1)	%	- A/F sensor 1 heater control value computed by ECM according to the input signals. - The current flow to the heater becomes larger as the value increases.	
A/F S1 HTR (B2)			
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	

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TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

Monitored item	Unit	Description	Remarks
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	For M/T models, always "OFF" is displayed.
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	For M/T models, always "OFF" is displayed.
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
EXH V/T LEARN	YET/CMPLT	Display the condition of Exhaust Valve Timing Control Learning. YET: Exhaust Valve Timing Control Learning has not been performed yet. CMPLT: Exhaust Valve Timing Control Learning has already been performed successfully.	
A/F ADJ-B1	—	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 A/F sensor 1 signal.	
A/F ADJ-B2			

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	- Engine: Return to the original trouble condition - Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Fuel injector - Air fuel ratio (A/F) sensor 1
IGNITION TIMING	- Engine: Return to the original trouble condition - Timing light: Set - Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BALANCE	- Engine: After warming up, idle the engine. - A/C switch OFF - Shift lever: P or N (A/T), Neutral (M/T) - Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	- Harness and connectors - Compression - Fuel injector - Power transistor - Spark plug - Ignition coil
COOLING FAN*	- Ignition switch: ON - Turn the cooling fan "HI", "LOW" and "OFF" using CONSULT-III.	Cooling fan moves and stops.	- Harness and connectors - Cooling fan motor - IPDM E/R
ENG COOLANT TEMP	- Engine: Return to the original trouble condition - Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Engine coolant temperature sensor - Fuel injector
FUEL PUMP RELAY	- Ignition switch: ON (Engine stopped) - Turn the fuel pump relay "ON" and "OFF" using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	- Harness and connectors - Fuel pump relay
PURG VOL CONT/V	- Engine: After warming up, run engine at 1,500 rpm. - Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	- Harness and connectors - Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT-III.		
VENT CONTROL/V	- Ignition switch: ON (Engine stopped) - Turn solenoid valve "ON" and "OFF" with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	- Harness and connectors - Solenoid valve
INT V/T ASSIGN ANGLE	- Engine: Return to the original trouble condition - Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	- Engine: Return to the original trouble condition - Change exhaust valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	- Harness and connectors - Exhaust valve timing control magnet retarder

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to [EC-46, "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	EC-390
	EVP SML LEAK P0442/P1442*	P0442	EC-395
	EVP V/S LEAK P0456/P1456*	P0456	EC-452
	PURG VOL CN/V P1444	P0443	EC-401
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-239
	A/F SEN1 (B1) P1278/P1279	P0133	EC-263
	A/F SEN1 (B2) P1286	P0150	EC-239
	A/F SEN1 (B2) P1288/P1289	P0153	EC-263
HO2S2	HO2S2 (B1) P0139	P0139	EC-296
	HO2S2 (B1) P1146	P0138	EC-283
	HO2S2 (B1) P1147	P0137	EC-273
	HO2S2 (B2) P0159	P0159	EC-296
	HO2S2 (B2) P1166	P0158	EC-283
	HO2S2 (B2) P1167	P0157	EC-273

*: DTC P1442 and P1456 does not apply to Z33 models but appears in DTC WORK SUPPORT Mode screens.

Generic Scan Tool (GST) Function

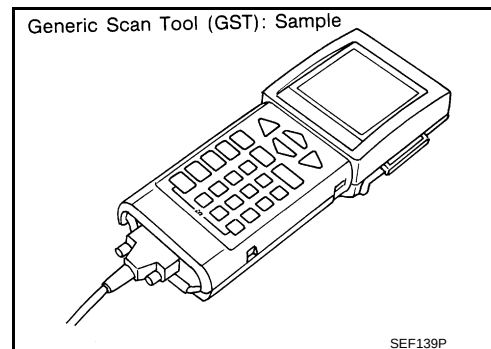
INFOID:000000001645527

DESCRIPTION

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

ISO15765-4 is used as the protocol.

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



FUNCTION

Diagnostic 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 EC-46, "Emission-related Diagnostic Information" .
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$06 and \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.

TROUBLE DIAGNOSIS

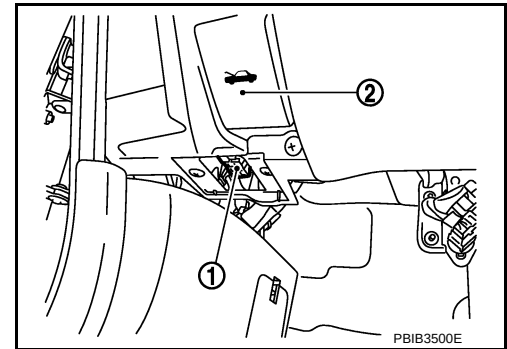
< SERVICE INFORMATION >

Diagnostic test mode		Function
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, the EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

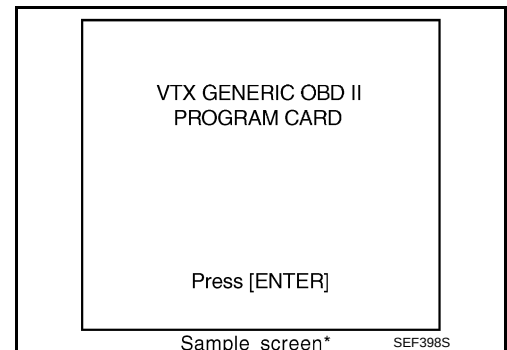
INSPECTION PROCEDURE

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

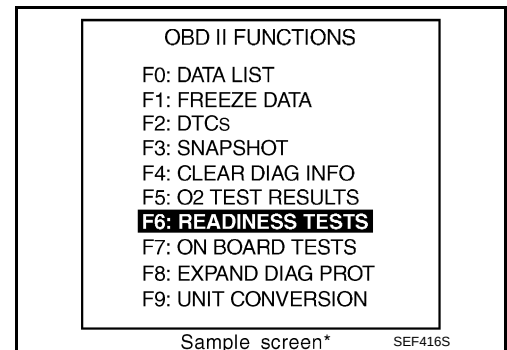
2 : Hood opener handle



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.)



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



CONSULT-III Reference Value in Data Monitor

INFOID:000000001645528

Remarks:

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

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

* 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	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
MAS A/F SE-B1	See EC-126 .		
MAS A/F SE-B2	See EC-126 .		
B/FUEL SCHDL	See EC-126 .		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-126 .		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V
HO2S2 (B1) HO2S2 (B2)	• 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 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR(B1) HO2S2 MNTR(B2)	• 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		LEAN ↔ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
TP SEN 1-B1 TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T) or 1st (M/T) position	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
FUEL T/TMP SE	• Ignition switch: ON		Indicates fuel tank temperature
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8V
FUEL LEVEL SE	• Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T) position	ON
		Shift lever: Except above position	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	6° - 16° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	5% - 35%
		2,500 rpm	5% - 35%
MASS AIRFLOW	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM(B1) INT/V TIM(B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	-5° - 5°CA
		2,000 rpm	Approx. 0° - 30°CA
EXH/V TIM B1 EXH/V TIM B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	-5° - 5°CA
		Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
INT/V SOL(B1) INT/V SOL(B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%
VTC DTY EX B1 VTC DTY EX B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	0% - 2%
		Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%
TP SEN 1-B2 TP SEN 2-B2* ¹	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T) or 1st (M/T) position	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

A

EC

C

D

E

F

G

H

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J

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P

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
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
COOLING FAN	- Engine: After warming up, idle the engine - Air conditioner switch: OFF	Engine coolant temperature is 97°C (206°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
TRVL AFTER MIL	Ignition switch: ON	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)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
AC PRESS SEN	- Engine: Idle - Both A/C switch and blower switch are ON. (Compressor operates.)		1.0 - 4.0V
VHCL SPEED SE	Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
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

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANSEL	• Ignition switch: ON		OFF
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 (89MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
EXH V/T LEARN	• Engine: Running	Exhaust Valve Timing Control Learning has not been performed yet.	YET
		Exhaust Valve Timing Control Learning has not been performed yet.	CMPLT
A/F ADJ-B1	• Engine: Running		-0.330 - 0.330
A/F ADJ-B2	• Engine: Running		-0.330 - 0.330

*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.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:000000001645529

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

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

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

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

Testing Condition

INFOID:000000001645530

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- For A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- For M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

Inspection Procedure

INFOID:000000001645531

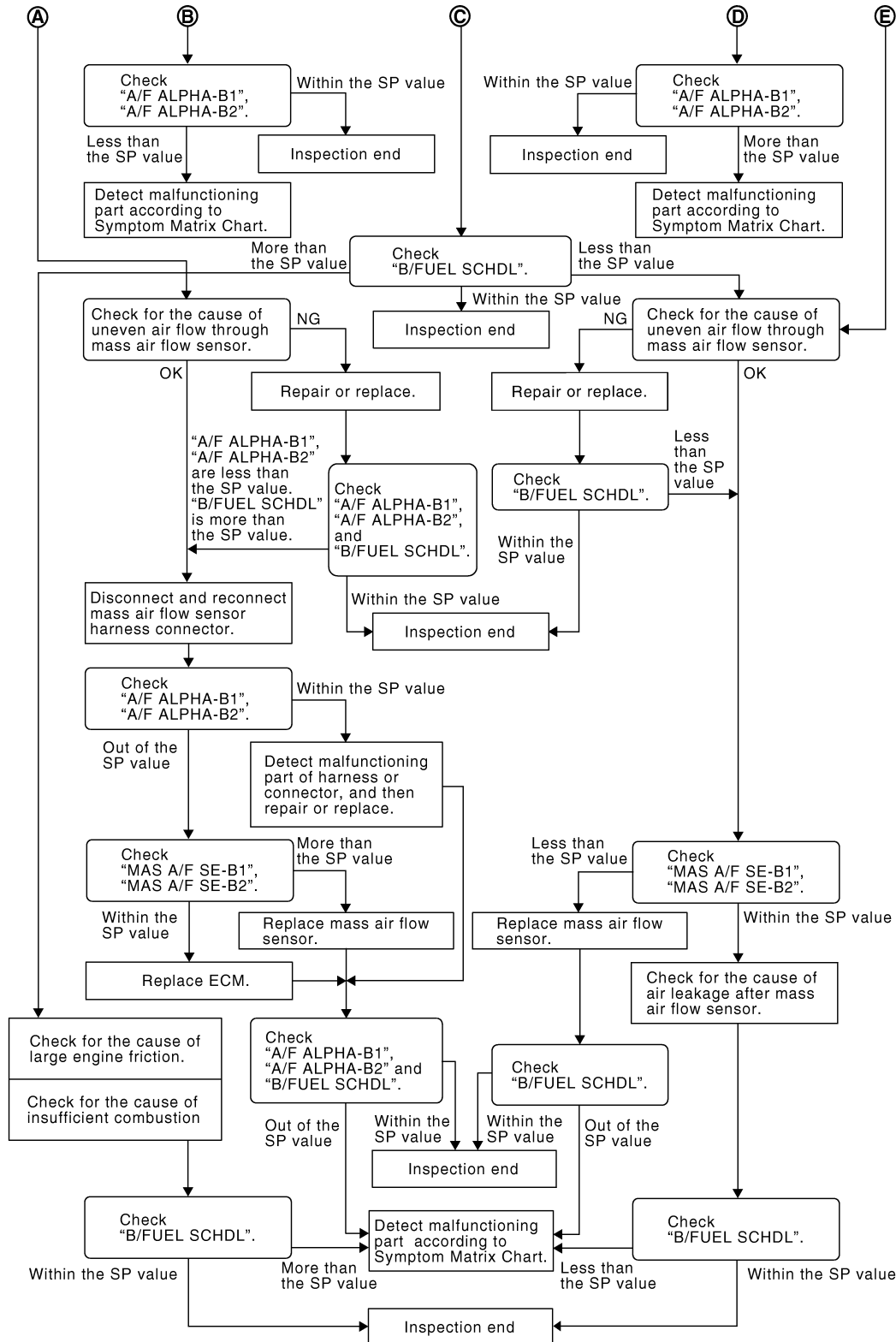
NOTE:

Perform "SPEC" in "DATA MONITOR" 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", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
4. Make sure that monitor items are within the SP value.
5. If NG, go to [EC-127, "Diagnosis Procedure"](#).

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >



PBIB3531E

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-126. "Testing Condition"](#).
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" in mode, and make sure that the each indication is within the SP value.

NOTE:

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

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 "SPEC" of "DATA MONITOR" 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 "SPEC" of "DATA MONITOR" 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 "SPEC" of "DATA MONITOR" 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

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to [EC-78, "Fuel Pressure Check"](#).)

OK or NG

OK >> GO TO 9.

NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to [EC-78, "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-639](#).)
2. If NG, repair or replace the malfunctioning part. (Refer to [EC-78, "Fuel Pressure Check"](#).)
If OK, replace fuel pressure regulator.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

>> 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 "SPEC" of "DATA MONITOR" 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.

10. DETECT MALFUNCTIONING PART

1. Check the following.
 - Ignition coil and its circuit (Refer to [EC-645](#).)
 - Fuel injector and its circuit (Refer to [EC-634](#).)
 - Intake air leakage
 - Low compression pressure (Refer to [EM-89, "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 "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

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-239, "DTC Confirmation Procedure"](#).
- For DTC P0131, P0151, refer to [EC-255, "DTC Confirmation Procedure"](#).
- For DTC P0132, P0152, refer to [EC-609, "DTC Confirmation Procedure"](#).
- For DTC P0133, P0153, refer to [EC-263, "DTC Confirmation Procedure"](#).
- For DTC P2A00, P2A03, refer to [EC-609, "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 "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

OK or NG

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

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 "SPEC" of "DATA MONITOR" 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-87. "Symptom Matrix Chart"](#).

17.CHECK "B/FUEL SCHDL"

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

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
 - 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 "SPEC" of "DATA MONITOR" 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.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

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 "SPEC" of "DATA MONITOR" 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-186](#).
2. GO TO 29.

NG >> GO TO 23.

23.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" 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 NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs.
Refer to [BL-135, "ECM Re-communicating Function"](#).
3. Perform [EC-75, "VIN Registration"](#).
4. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "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 "SPEC" of "DATA MONITOR" 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", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" 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.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

< SERVICE INFORMATION >

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 "SPEC" of "DATA MONITOR" 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-87, "Symptom Matrix Chart"](#).

30.CHECK "B/FUEL SCHDL"

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

OK or NG

OK >> **INSPECTION END**

NG >> Detect malfunctioning part according to [EC-87, "Symptom Matrix Chart"](#).

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000001645533

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-III 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:000000001645534

1.INSPECTION START

Erase (1st trip) DTCs.

Refer to [EC-46, "Emission-related Diagnostic Information"](#).

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-142, "Ground Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-24, "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-21, "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 >

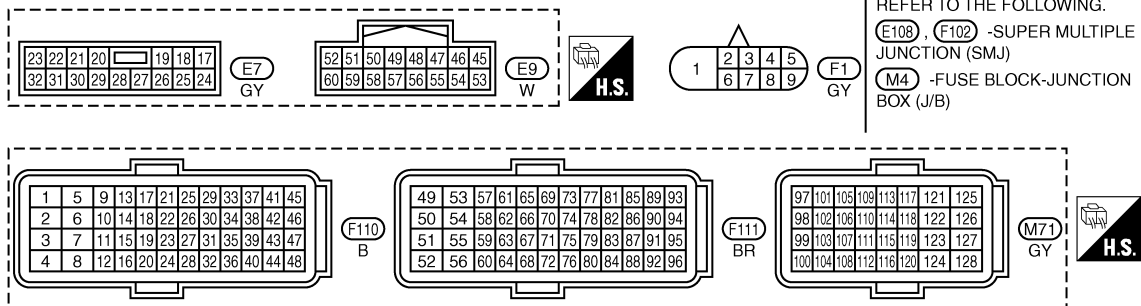
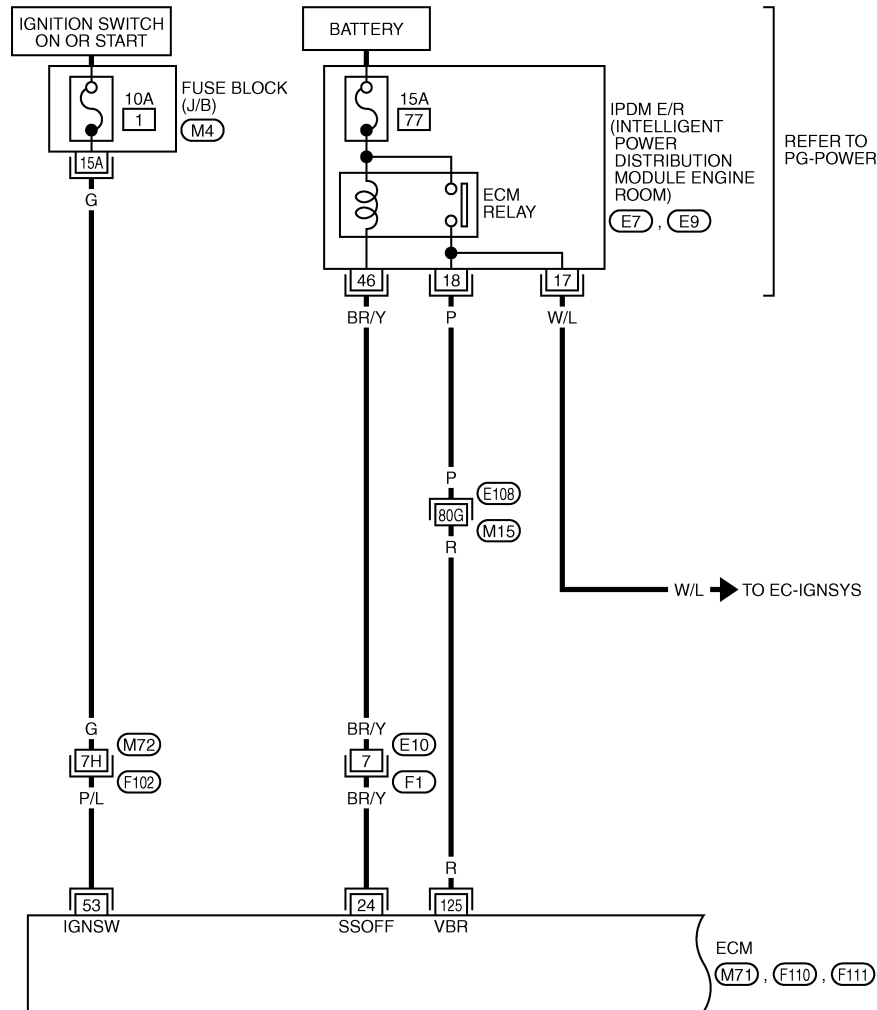
POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:000000001645535

EC-MAIN-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1614E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

POWER SUPPLY AND GROUND CIRCUIT

< 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.

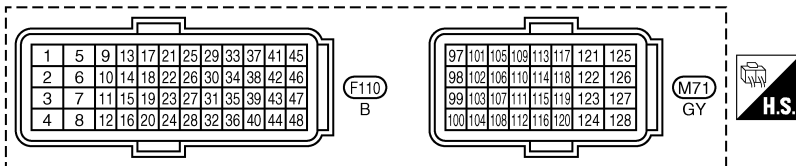
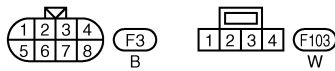
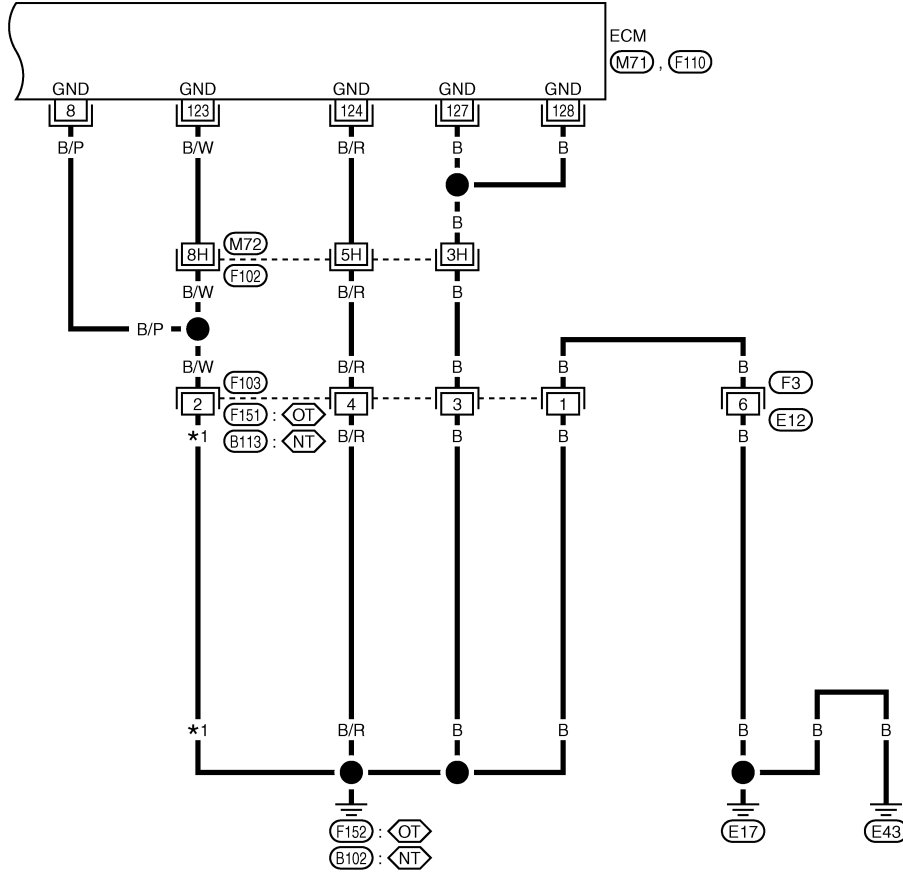
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
53	P/L	Ignition switch	[Ignition switch: OFF]	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

EC-MAIN-02

- : DETECTABLE LINE FOR DTC
- - - : NON-DETECTABLE LINE FOR DTC
(NT) : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE
(OT) : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE
 *1 B : **(NT)**
 B/W : **(OT)**



REFER TO THE FOLLOWING.
(F102) -SUPER MULTIPLE JUNCTION (SMJ)

TBWT1615E

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)
8	B/P	ECM ground	[Engine is running] • Idle speed	Body ground
123 124	B/W B/R	ECM ground	[Engine is running] • Idle speed	Body ground
127 128	B B	ECM ground	[Engine is running] • Idle speed	Body ground

Diagnosis Procedure

INFOID:000000001645536

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

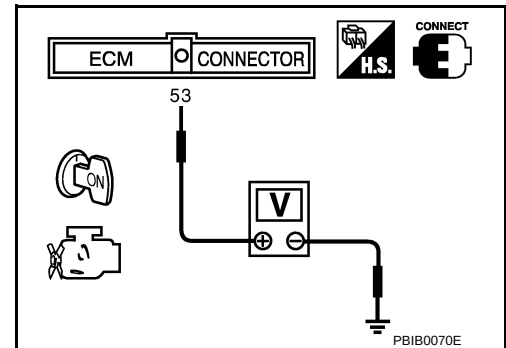
1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 53 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ECM and fuse

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

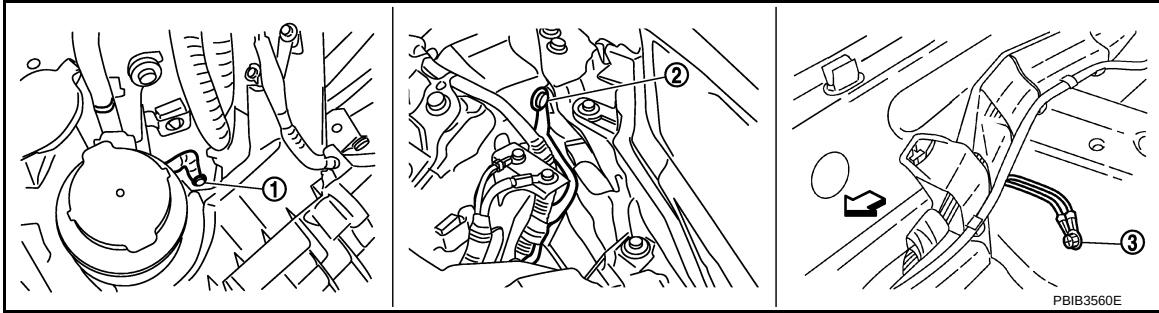
4. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >



1. Body ground E17

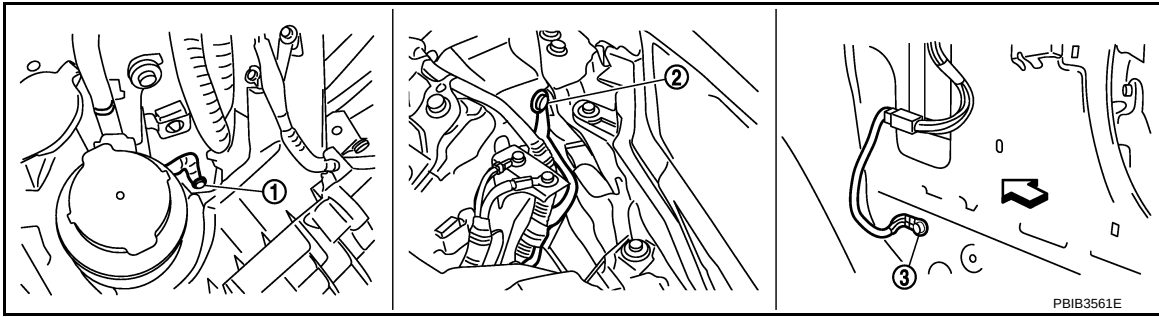
2. Body ground E43

3. Body ground B102

⇐ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

⇐ Vehicle front

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 8, 123, 124, 127, 128 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 M72, F102
- Harness connectors F103, B113 (Models with VDC system, navigation system or telephone) or F151 (Models without VDC system, navigation system and telephone)
- Harness connectors F3, E12
- Harness for open or short between ECM and ground

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

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

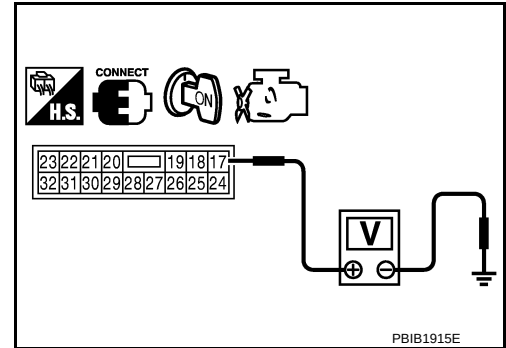
7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector disconnected.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 17 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> Go to [EC-645](#).
NG >> GO TO 8.



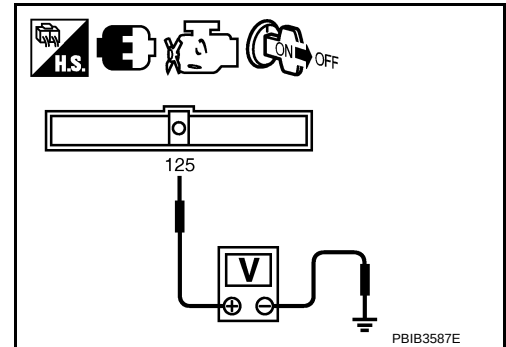
8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 125 and ground with CONSULT-III 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 15.
NG (Battery voltage does not exist.) >> GO TO 9.
NG (Battery voltage exists for more than a few seconds.) >> GO TO 12.



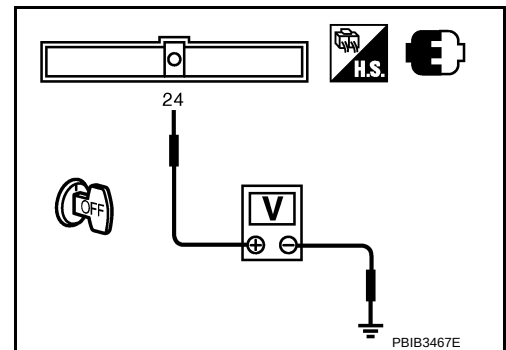
9. CHECK ECM POWER SUPPLY CIRCUIT-IV

Check voltage between ECM terminal 24 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 10.
NG >> GO TO 12.



10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E7.
3. Check harness continuity between ECM terminals 125 and IPDM E/R terminal 18. 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 18.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

- Harness or connectors E108, M15
- Harness for open or short between ECM and IPDM E/R

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

12.CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect IPDM E/R harness connector E9.
2. Check harness continuity between ECM terminal 24 and IPDM E/R terminal 46.
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 >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E10, F1
- Harness for open or short between ECM and IPDM E/R

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

14.CHECK 15A FUSE

1. Disconnect 15A fuse from IPDM E/R.
2. Check 15A fuse.

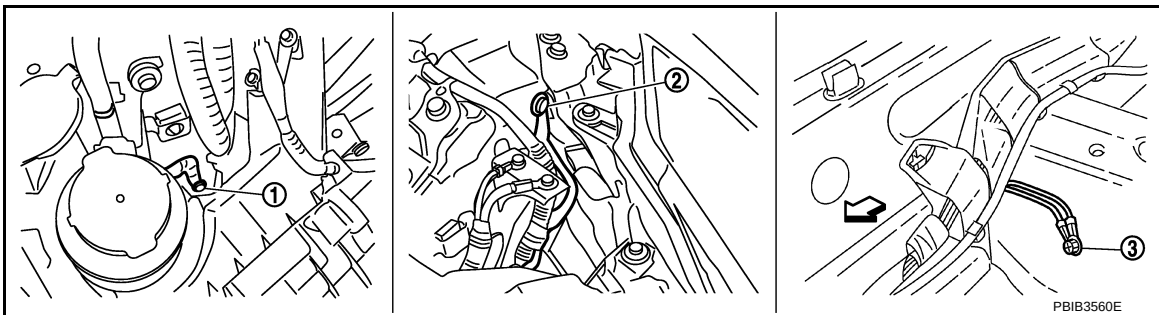
OK or NG

- OK >> GO TO 18.
- NG >> Replace 15A fuse.

15.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

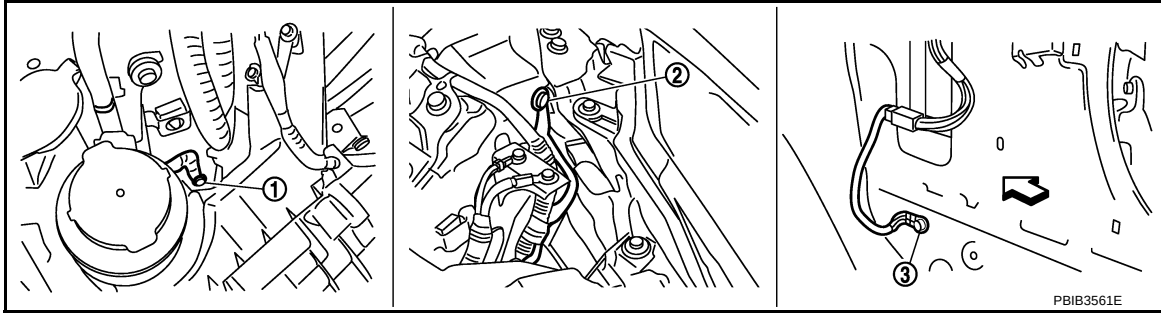
↶ Vehicle front

Models without VDC system, navigation system and telephone

1. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

←: Vehicle front

OK or NG

OK >> GO TO 16.

NG >> Repair or replace ground connections.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 8, 123, 124, 127, 128 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 18.

NG >> GO TO 17.

17.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F103, B113 (Models with VDC system, navigation system or telephone) or F151 (Models without VDC system, navigation system and telephone)
- Harness or connectors F3, E12
- Harness or connectors M72, F102
- Harness for open or short between ECM and ground.

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

18.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

OK >> Replace IPDM E/R. Refer to [PG-16](#).

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

Ground Inspection

INFOID:000000001645537

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:

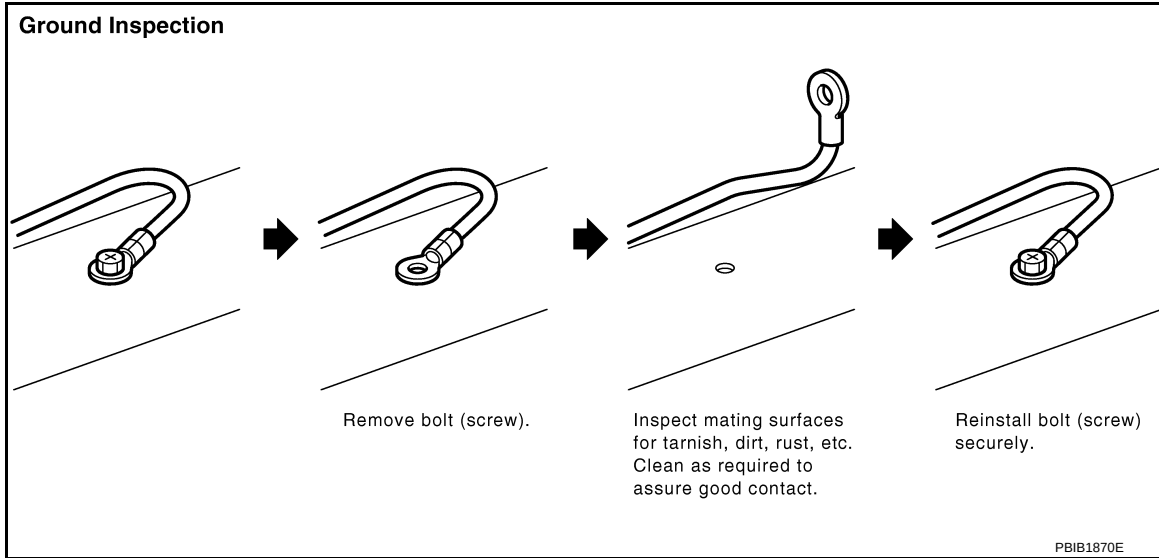
- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.

POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

- 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.
- 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-25, "Ground Distribution"](#).



DTC U1000, U1001 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

DTC U1000, U1001 CAN COMMUNICATION LINE

Description

INFOID:0000000001645538

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:0000000001645539

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 1001*2		• 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.

DTC Confirmation Procedure

INFOID:0000000001645540

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-145, "Diagnosis Procedure"](#).

DTC U1000, U1001 CAN COMMUNICATION LINE

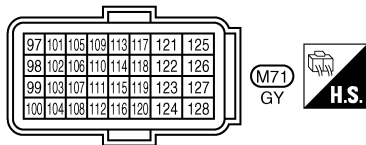
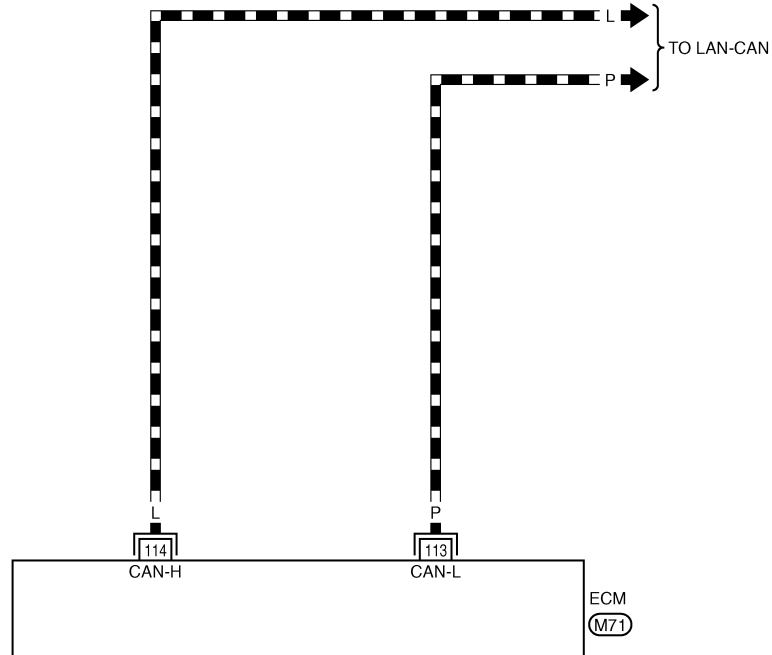
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645541

EC-CAN-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC
- - - : DATA LINE



TBWT1616E

Diagnosis Procedure

Go to [LAN-41. "CAN System Specification Chart"](#).

INFOID:000000001645542

DTC U1010 CAN COMMUNICATION

< SERVICE INFORMATION >

DTC U1010 CAN COMMUNICATION

Description

INFOID:000000001645543

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:000000001645544

- **This self-diagnosis has one trip detection logic (A/T models).**
- **The MIL will not light up for this self-diagnosis (M/T models).**

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:000000001645545

1. Turn ignition switch ON.
2. Check DTC.
3. If DTC is detected, go to [EC-146, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645546

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-146, "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-146, "DTC Confirmation Procedure"](#).
4. Is the DTC U1010 displayed again?

Yes or No

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

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-135, "ECM Re-communicating Function"](#).
3. Perform [EC-75, "VIN Registration"](#).
4. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#)
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

DTC P0011, P0021 IVT CONTROL

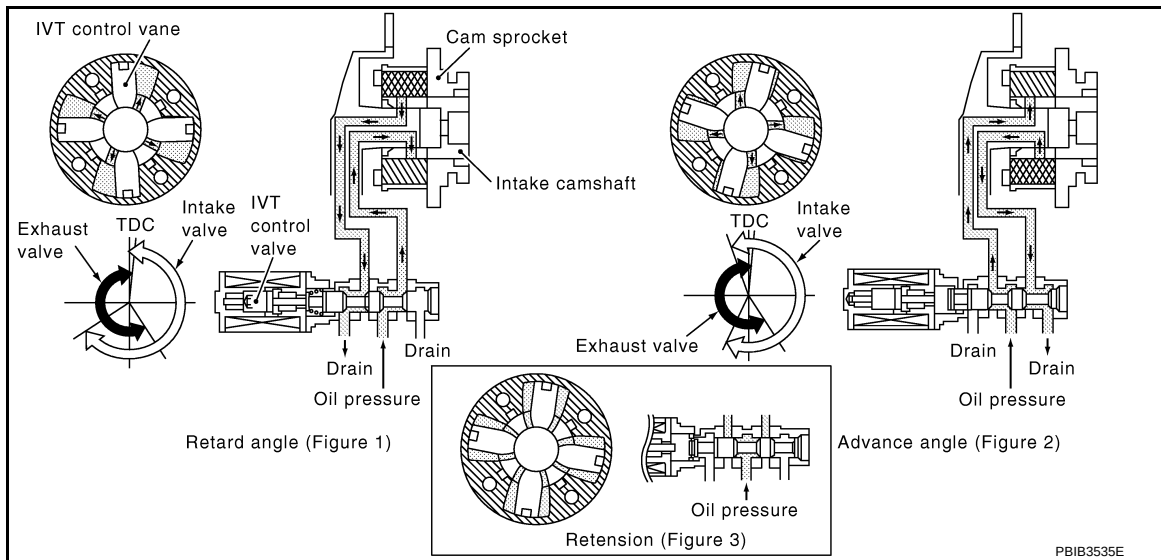
Description

INFOID:000000001645547

SYSTEM DESCRIPTION

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

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645548

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM(B1) INT/V TIM(B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	-5° - 5°CA
		2,000 rpm	Approx. 0° - 30°CA
INT/V SOL(B1) INT/V SOL(B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645549

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011 (Bank 1)	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve timing control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control
P0021 0021 (Bank 2)			

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:000000001645550

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform trouble diagnosis for DTC P0075 or P0081. Refer to [EC-172](#).
- 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.

WITH CONSULT-III

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

ENG SPEED	500 - 2,000 rpm (A constant rotation is maintained.)
COOLANT TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Shift lever	P or N (A/T), neutral (M/T) position

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-149. "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
7. Maintain the following conditions for at least 20 consecutive seconds.

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

8. Check 1st trip DTC.

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

9. If 1st trip DTC is detected, go to [EC-149, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

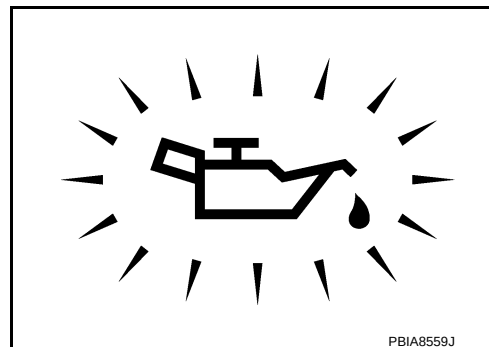
INFOID:000000001645551

1.CHECK OIL PRESSURE WARNING LAMP

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

OK or NG

- OK >> GO TO 2.
NG >> Go to [LU-5, "Inspection"](#).



2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EC-150, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace malfunctioning intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-373, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-383, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace malfunctioning camshaft position sensor (PHASE).

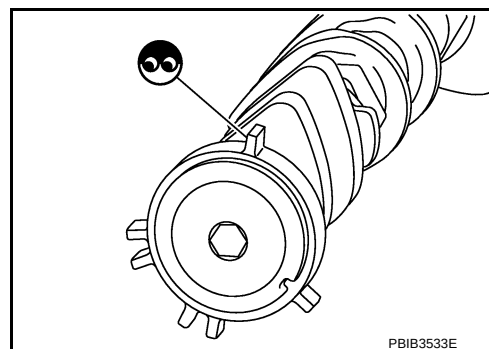
5.CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

- OK >> GO TO 6.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6.CHECK TIMING CHAIN INSTALLATION

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

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

Yes or No

- Yes >> Check timing chain installation. Refer to [EM-53](#).

DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to [EM-72, "Removal and Installation"](#).

OK or NG

OK >> GO TO 8.

NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

For Wiring Diagram, refer to [EC-369](#) for crankshaft position sensor (POS) and [EC-377](#) for camshaft position sensor (PHASE).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645552

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 as follows.

Terminal	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.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
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.

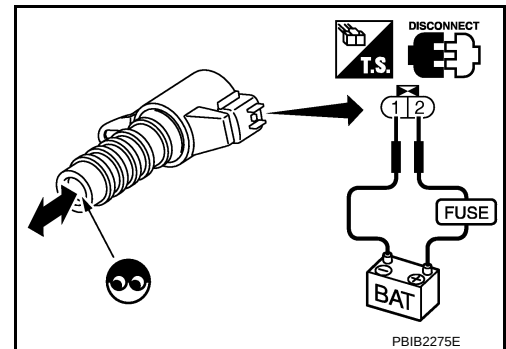
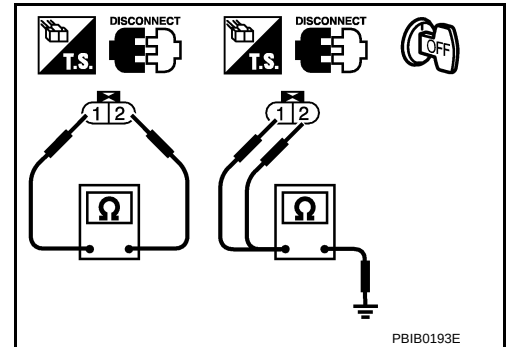
CAUTION:

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:000000001645553

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

DTC P0014 P0024 EVT CONTROL

< SERVICE INFORMATION >

DTC P0014 P0024 EVT CONTROL

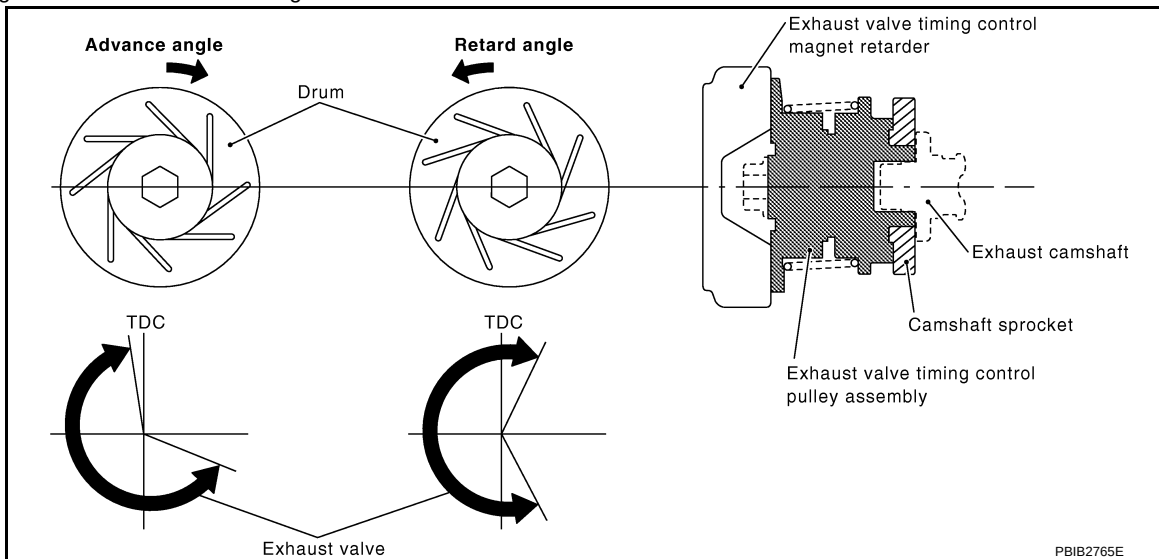
Description

INFOID:000000001645554

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Exhaust valve timing control	Exhaust valve timing control magnet retarder
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Exhaust valve timing control position sensor	Exhaust valve timing signal		
Wheel sensor	Vehicle speed*		

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



This mechanism magnetically controls cam phases continuously with the fixed operating angle of the exhaust 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 exhaust valve timing control magnet retarder depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645555

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EXH/V TIM B1 EXH/V TIM B2	- Engine: After warming up - Shift lever: Neutral - Air conditioner switch: OFF - No load	Idle	-5° - 5°C
		Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°C
VTC DTY EX B1 VTC DTY EX B2	- Engine: After warming up - Shift lever: Neutral - Air conditioner switch: OFF - No load	Idle	0% - 2%
		Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%

DTC P0014 P0024 EVT CONTROL

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645556

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0014 0014 (Bank 1)	Exhaust valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Exhaust valve timing control position sensor • Exhaust valve timing control magnet retarder • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Exhaust valve timing control pulley assembly
P0024 0024 (Bank 2)			

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Exhaust valve timing control	The signal is not energized to the Exhaust valve timing control magnet retarder and the magnet retarder control does not function.

DTC Confirmation Procedure

INFOID:000000001645557

CAUTION:

Always drive at a safe speed.

NOTE:

- If DTC P0014 or P0024 is displayed with DTC P0078, P0084, P1078 or P1084, first perform trouble diagnosis for DTC P0078, P0084 or P1078, P1084. Refer to [EC-179](#) or [EC-496](#).
- 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.

WITH CONSULT-III

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

ENG SPEED	500 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Shift lever	P or N (A/T), neutral (M/T) position

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-153, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
7. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

DTC P0014 P0024 EVT CONTROL

< SERVICE INFORMATION >

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to [EC-153, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:000000001645558

1. INSPECTION START

Do you have CONSULT-III?

Yes or No

- Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK FUNCTION OF EXHAUST VALVE TIMING CONTROL-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select "EXH V/T ANGLE" in "ACTIVE TEST" mode with CONSULT-III.
3. Start engine and keep the engine speed at 2,500 rpm, then touch "START".
4. Make sure that the values of "EXH/V TIM B1" and "EXH/V TIM B2" change when touching "UP" or "DOWN".

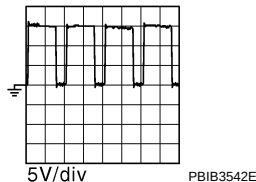
OK or NG

- OK >> GO TO 12.
NG >> GO TO 4.

3. CHECK FUNCTION OF EXHAUST VALVE TIMING CONTROL-II

Without CONSULT-III

1. Start engine and keep the engine speed at 2,500 rpm, then touch "START".
2. Read the voltage signal between ECM terminal 6 (bank 1), 7 (bank 2) and ground with oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



OK or NG

- OK >> GO TO 12.
NG >> GO TO 4.

4. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to [EC-154, "Component Inspection"](#).

OK or NG

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

5. REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Replace exhaust valve timing control magnet retarder.
2. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).

>> INSPECTION END

6. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to [EC-505, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> Replace malfunctioning exhaust valve timing control position sensor.

DTC P0014 P0024 EVT CONTROL

< SERVICE INFORMATION >

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-373, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace crankshaft position sensor (POS).

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-383, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace malfunctioning camshaft position sensor (PHASE).

9. CHECK CAMSHAFT (EXH)

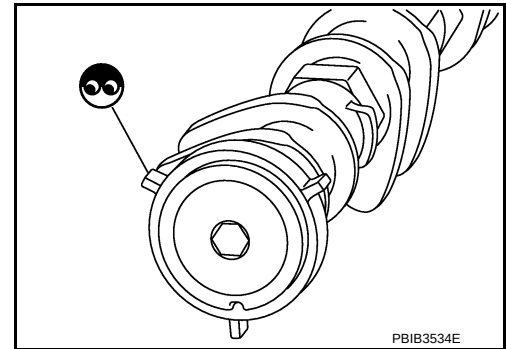
Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.

NG >> Remove debris and clean the signal plate of camshaft rear end or malfunctioning replace camshaft.



10. 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-53](#).

No >> GO TO 11.

11. REPLACE EXHAUST VALVE TIMING CONTROL PULLEY ASSEMBLY

1. Replace exhaust valve timing control pulley assembly and exhaust valve timing control magnet retarder. Refer to [EM-72](#) and [EM-44](#).
2. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

For Wiring Diagram, refer to [EC-369](#) for crankshaft position sensor (POS) and [EC-377](#) for camshaft position sensor (PHASE).

>> **INSPECTION END**

Component Inspection

INFOID:0000000001645559

EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Disconnect exhaust valve timing control magnet retarder harness connector.

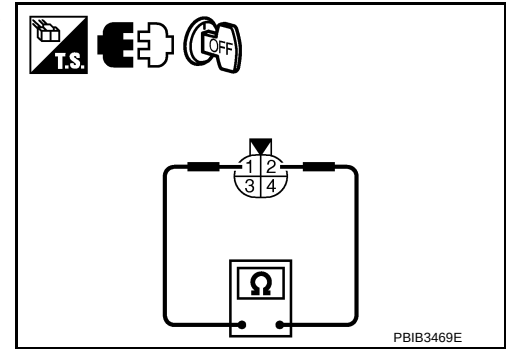
DTC P0014 P0024 EVT CONTROL

< SERVICE INFORMATION >

2. Check resistance between exhaust valve timing control magnet retarder terminals 1 and 2.

Resistance: 9.0 - 11.0Ω [at 20°C (68°F)]

3. If NG, replace exhaust valve timing control magnet retarder and go to the next step.
4. Perform [EC-76. "Exhaust Valve Timing Control Learning"](#).



INFOID:000000001645560

Removal and Installation

EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to [EM-44](#).

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

< SERVICE INFORMATION >

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

Description

INFOID:000000001645561

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-III Reference Value in Data Monitor Mode

INFOID:000000001645562

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 (More than 140 seconds after starting engine)	4 - 100%

On Board Diagnosis Logic

INFOID:000000001645563

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 input	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 A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 heater
P0032 0032 (Bank 1) P0052 0052 (Bank 2)			
	Air fuel ratio (A/F) sensor 1 heater control circuit high input	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 A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is shorted.) • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

INFOID:000000001645564

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.

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-160, "Diagnosis Procedure"](#).

< SERVICE INFORMATION >

Wiring Diagram

INFOID:0000000001645565

BANK 1

EC-AF1HB1-01

EC

REFER TO PG-POWER.

■ : DETECTABLE LINE FOR DTC

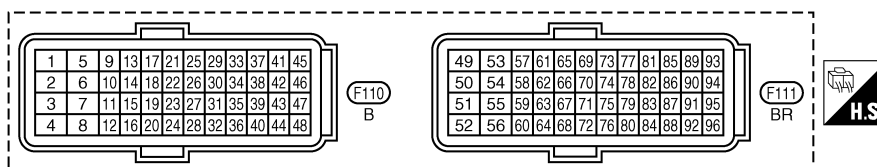
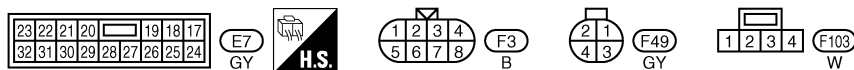
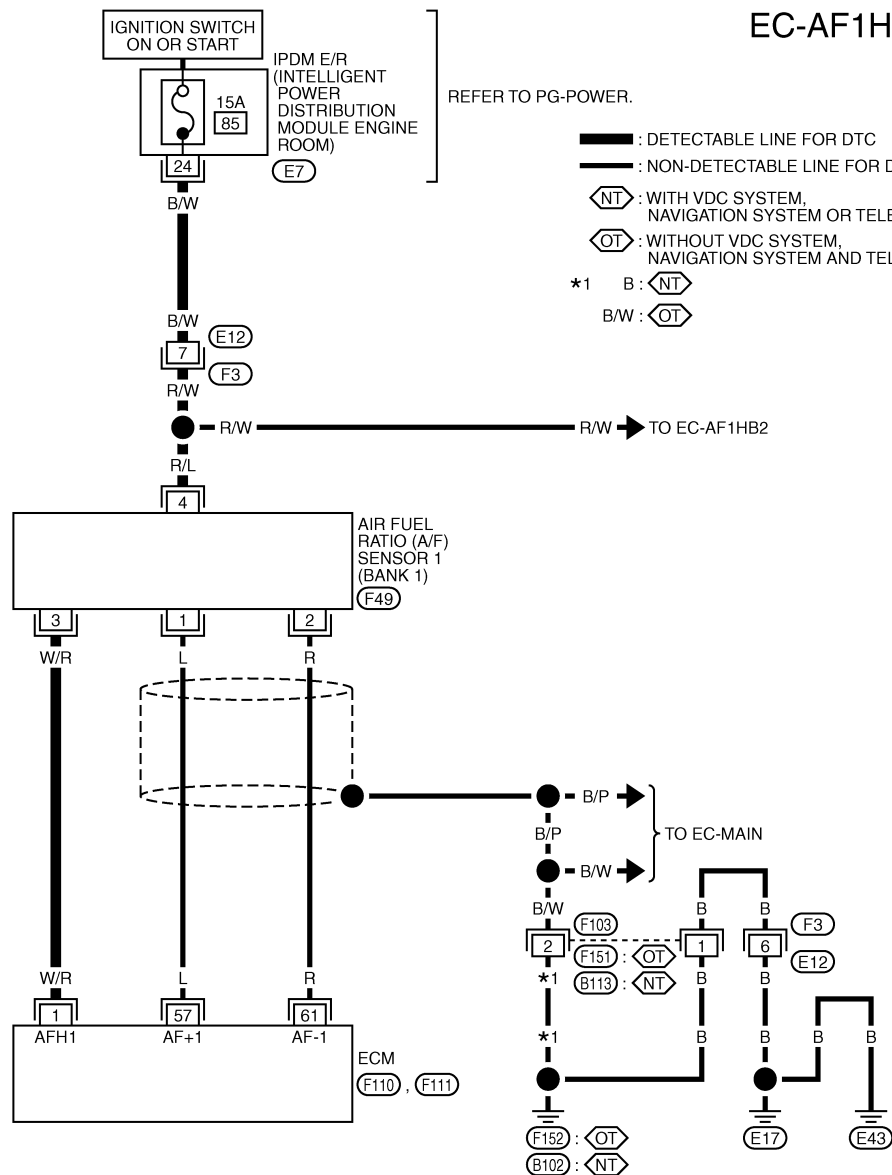
— : NON-DETECTABLE LINE FOR DTC

 : WITH VDC SYSTEM,
NAVIGATION SYSTEM OR TELEPHONE

OT : WITHOUT VDC SYSTEM,
NAVIGATION SYSTEM AND TELEPHONE

*1 B: 

B/W :



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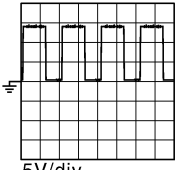
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

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

< 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)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  5V/div PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

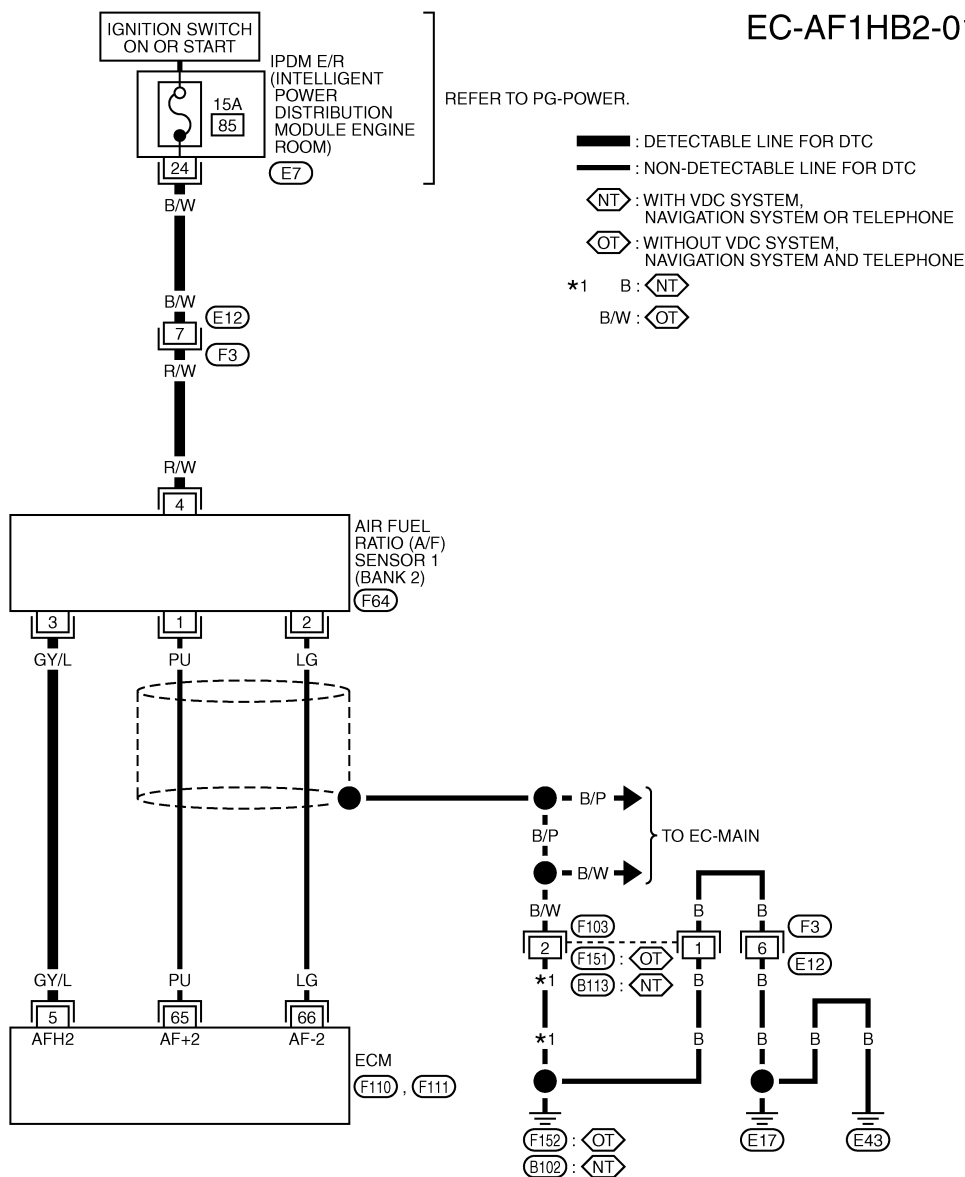
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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

< SERVICE INFORMATION >

BANK 2

EC-AF1HB2-01



23	22	21	20	19	18	17
32	31	30	29	28	27	26
25	24					



1	2	3	4
5	6	7	8

F3

B

2	1
4	3

F64

GY

1	2	3	4

F103

W

1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

F110

B

49	53	57	61	65	69	73	77	81	85	89	93
50	54	58	62	66	70	74	78	82	86	90	94
51	55	59	63	67	71	75	79	83	87	91	95
52	56	60	64	68	72	76	80	84	88	92	96

F111

BR



TBWT1618E

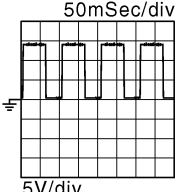
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

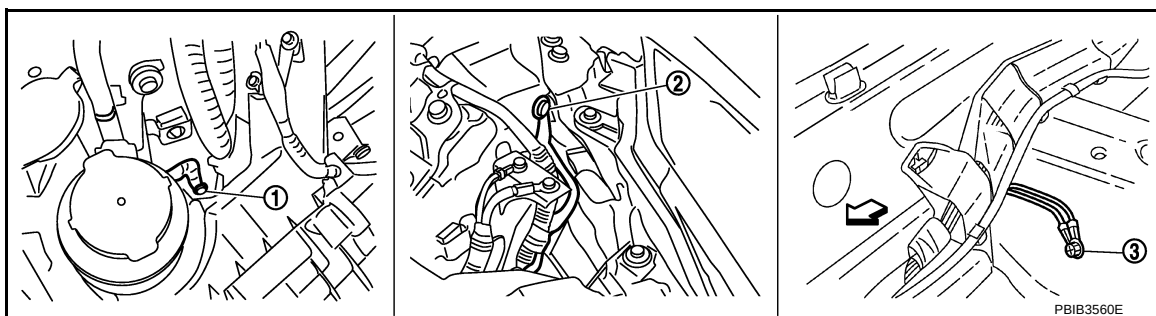
Diagnosis Procedure

INFOID:000000001645566

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

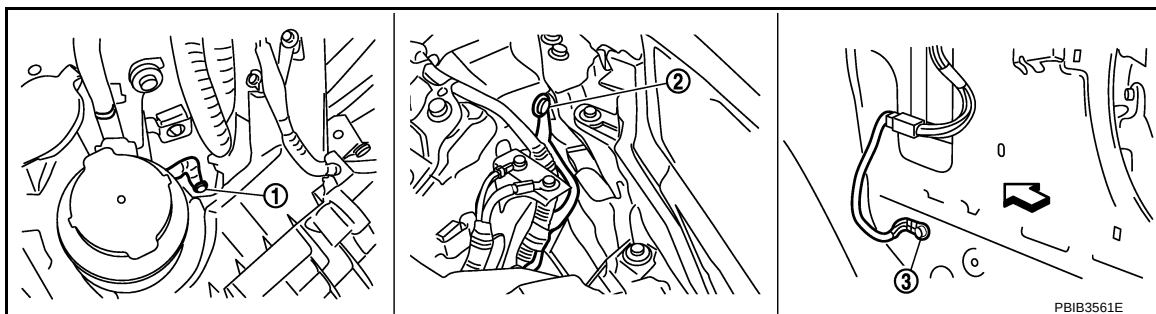
2. Body ground E43

3. Body ground B102

↩: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



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

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩ Vehicle front

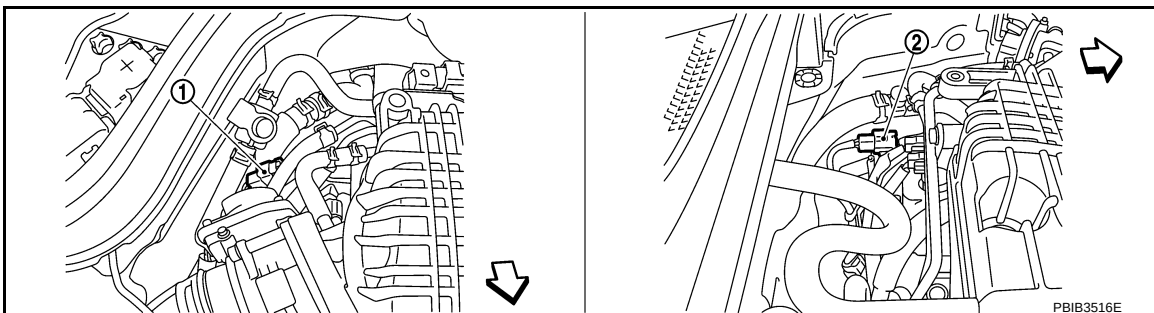
OK or NG

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.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

↩ Vehicle front

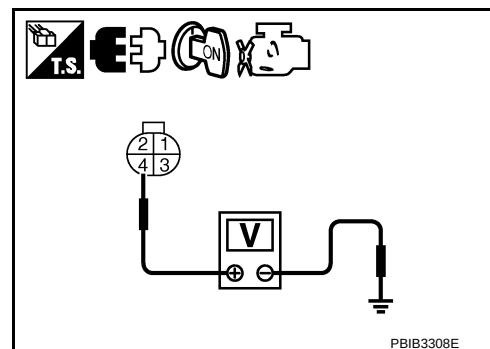
2. Turn ignition switch ON.
3. Check voltage between air fuel ratio sensor (A/F) sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- 15A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (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 1 (bank 1) or 5 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 3.
Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

< SERVICE INFORMATION >

OK >> GO TO 5.

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

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

Refer to [EC-162. "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-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645567

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 1.8 - 2.44Ω [at 25°C (77°F)]

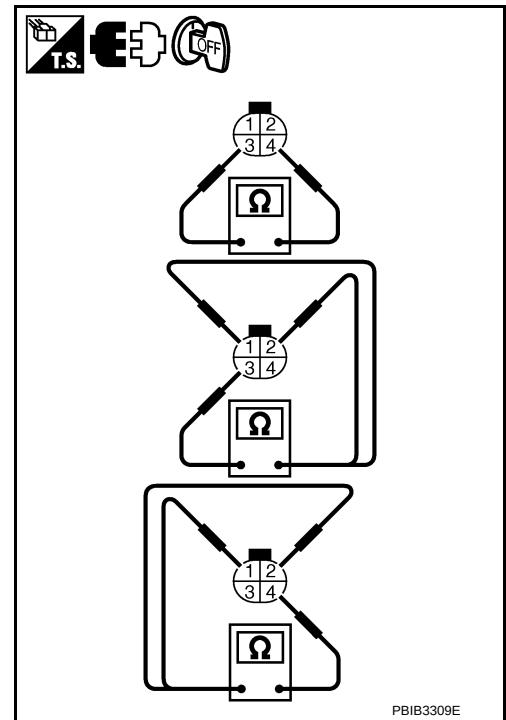
Check continuity between terminals 3 and 1, 2, terminals 4 and 1, 2.

Continuity should not exist.

If NG, replace the 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.



PBIB3309E

INFOID:000000001645568

Removal and Installation

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

Description

INFOID:000000001645569

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 (HO2S2) heater control	Heated oxygen sensor 2 (HO2S2) heater
Crankshaft position sensor (POS)			
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 (HO2S2) 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. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645570

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

INFOID:000000001645571

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037 (Bank 1)	HO2S2 heater control circuit low	The current amperage in the HO2S2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the HO2S2 heater.)	- Harness or connectors (The HO2S2 heater circuit is open or shorted.) - HO2S2 heater
P0057 0057 (Bank 2)			
P0038 0038 (Bank 1)	HO2S2 heater control circuit high	The current amperage in the HO2S2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the HO2S2 heater.)	- Harness or connectors (The HO2S2 heater circuit is shorted.) - HO2S2 heater
P0058 0058 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645572

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 P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11V and 16V at idle.

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 the engine and keep the engine speed between 3,500 rpm and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-168. "Diagnosis Procedure"](#).

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

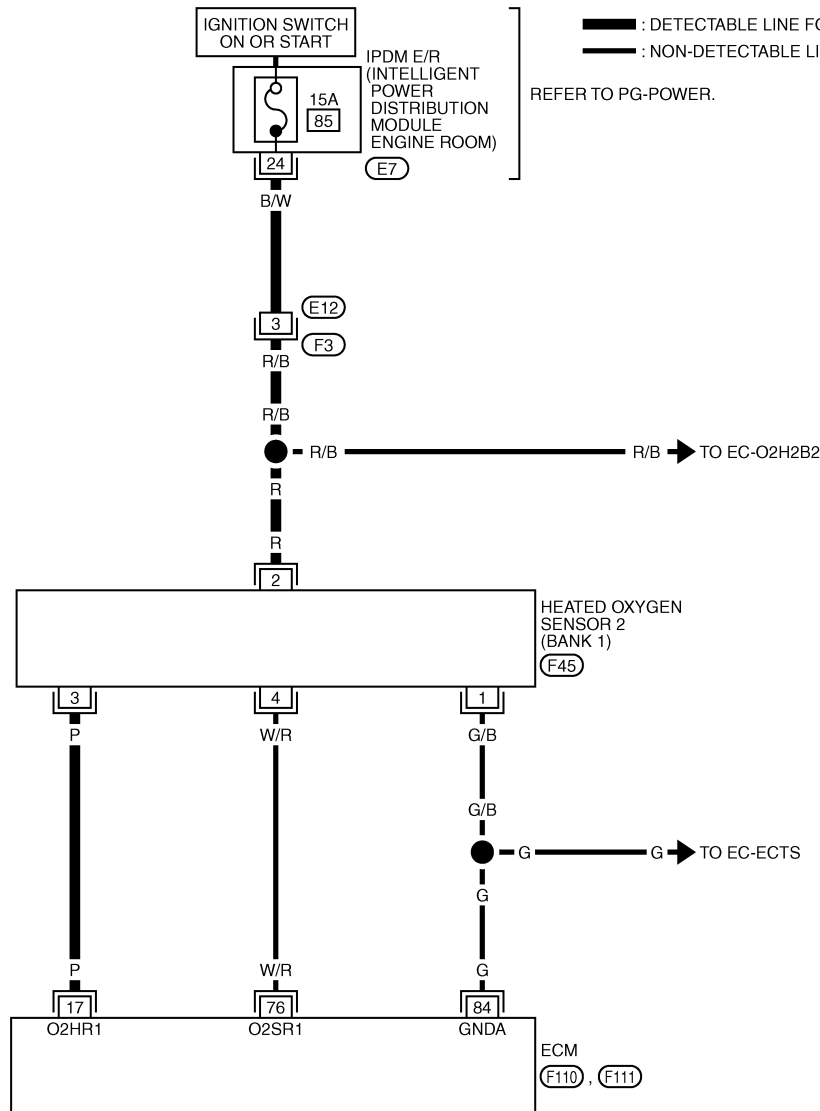
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645573

BANK 1

EC-O2H2B1-01



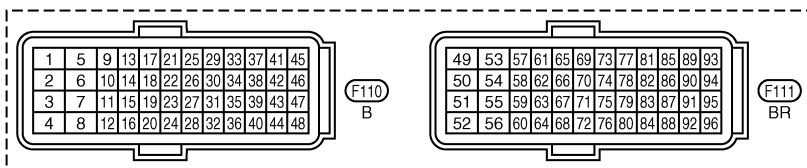
23	22	21	20	19	18	17
32	31	30	29	28	27	26
25	24					



1	2	3	4
5	6	7	8



2	1
4	3



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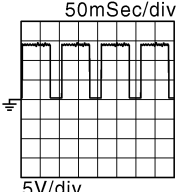
Specification data are reference values and are measured between each terminal and ground.

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 P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

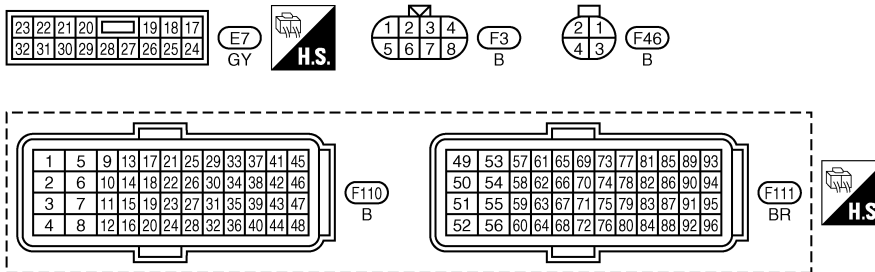
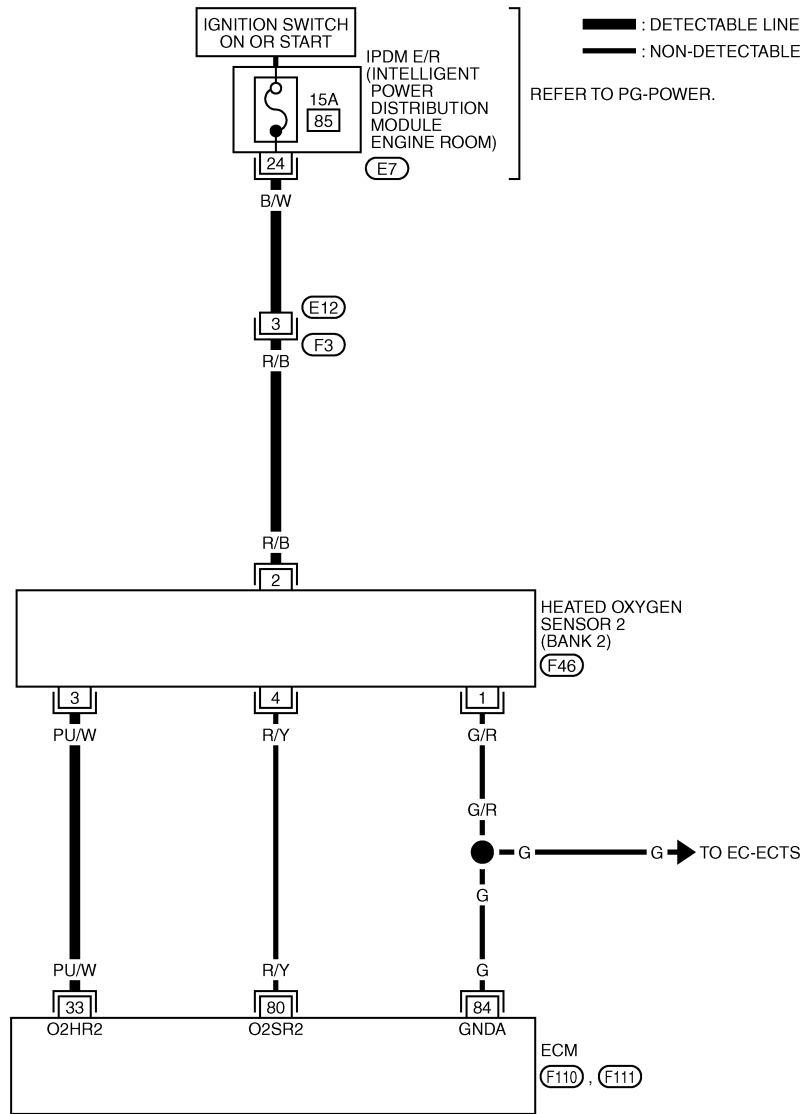
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	P	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★  5V/div
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
76	W/R	Heated oxygen sensor 2 (bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

BANK 2

EC-O2H2B2-01



Specification data are reference values and are measured between each terminal and ground.

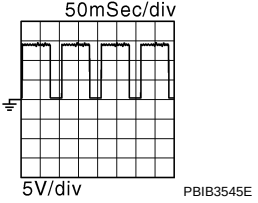
CAUTION:

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.

TBWT1620E

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	PU/W	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
80	R/Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

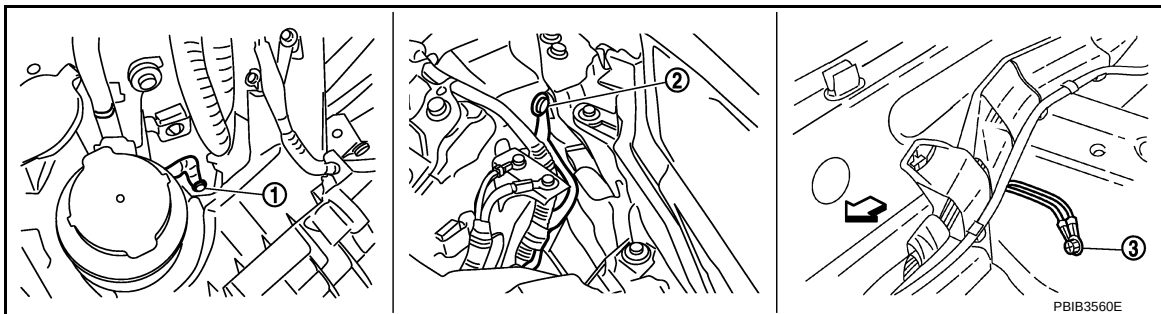
Diagnosis Procedure

INFOID:000000001645574

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

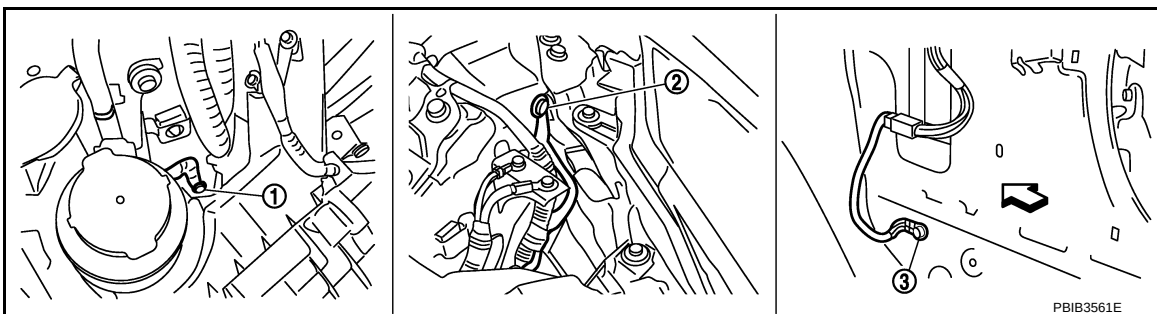
←: Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side finisher removed)

⇐ Vehicle front

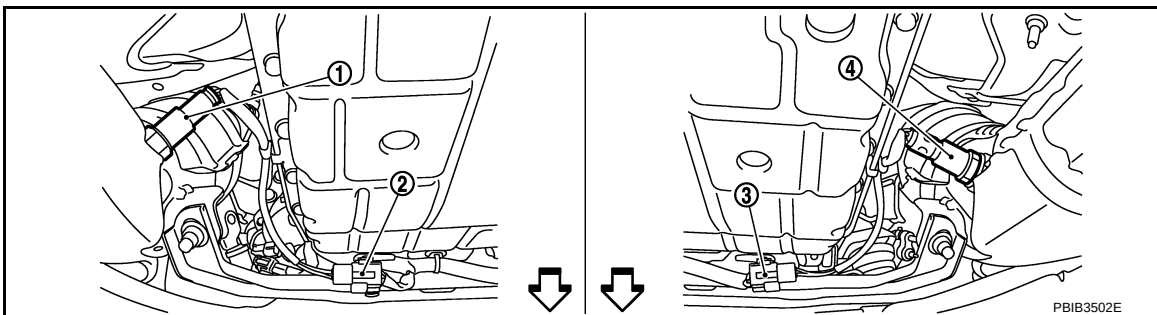
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)

2. Heated oxygen sensor 2 (bank 2)
harness connector

3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1)
harness connector

⇐ Vehicle front

2. Turn ignition switch ON.

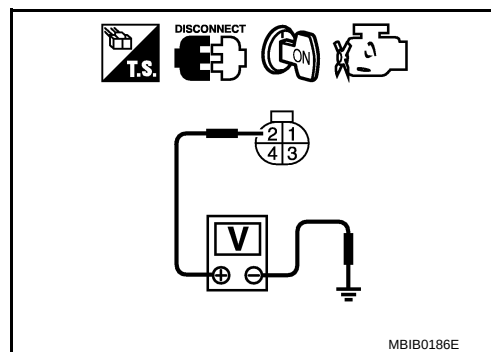
3. Check voltage between HO2S2 terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

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

4. CHECK HO2S2 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	17	3	1
P0057, P0058	33	3	2

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 HEATED OXYGEN SENSOR 2 HEATER

Refer to [EC-170, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645575

HEATED OXYGEN SENSOR 2 HEATER

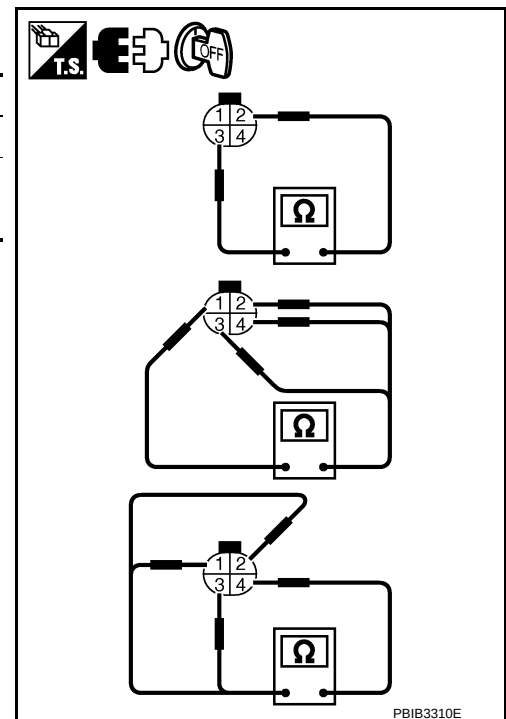
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$ (Continuity should not exist)
4 and 1, 2, 3	

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.



DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

Removal and Installation

INFOID:000000001645576

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

EC

A
C
D
E
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:000000001645577

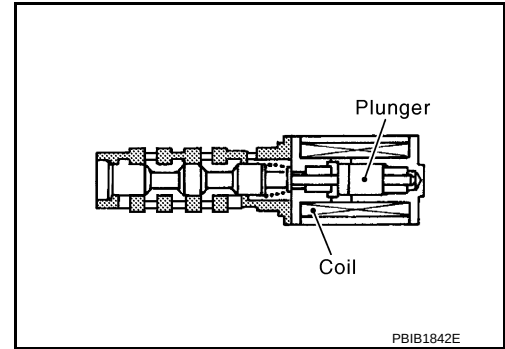
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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-III Reference Value in Data Monitor Mode

INFOID:000000001645578

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL(B1) INT/V SOL(B2)	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%

On Board Diagnosis Logic

INFOID:000000001645579

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.	- Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.) - Intake valve timing control solenoid valve
P0081 0081 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645580

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.

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-176. "Diagnosis Procedure"](#).

DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

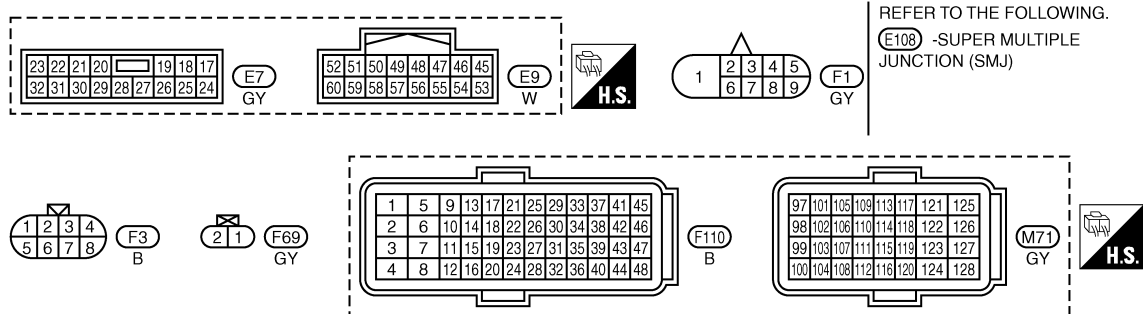
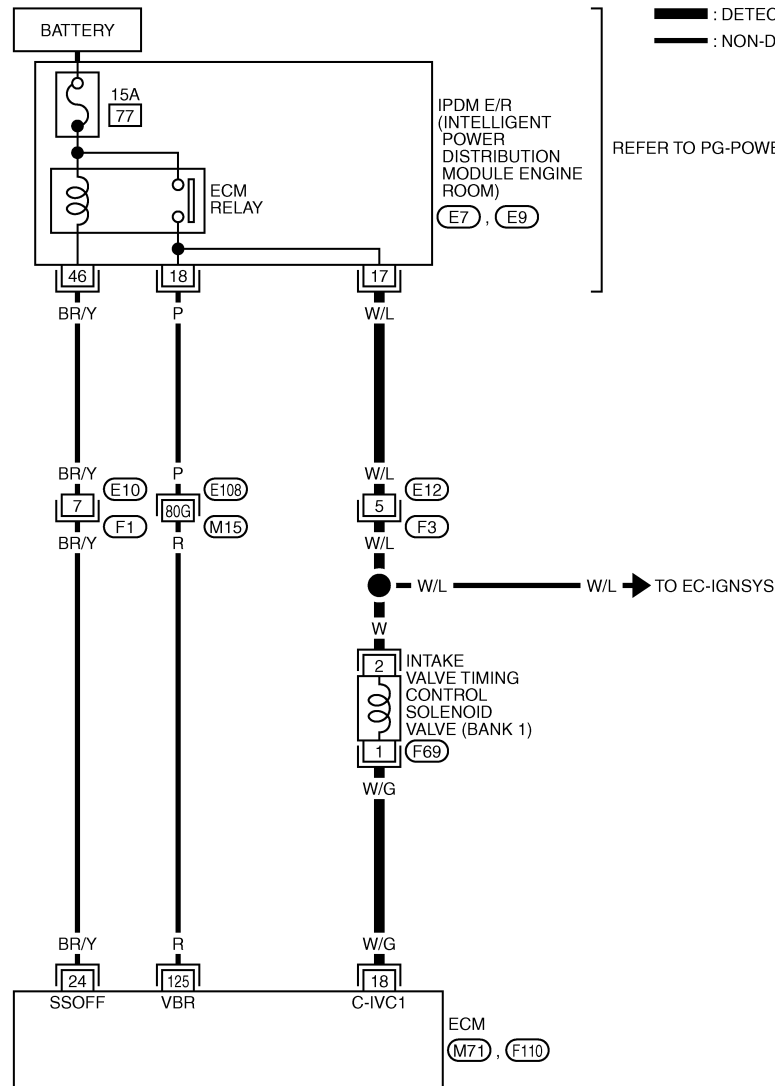
Wiring Diagram

INFOID:000000001645581

BANK 1

EC-IVCB1-01

EC



TBWT1621E

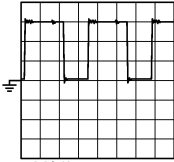
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

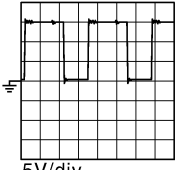
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	W/G	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: 2,000 rpm	7 - 12V★  5V/div PBIB3546E
24	BR/Y	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)
125	R	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 P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	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)
29	G/W	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: 2,000 rpm	7 - 12V★ 
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

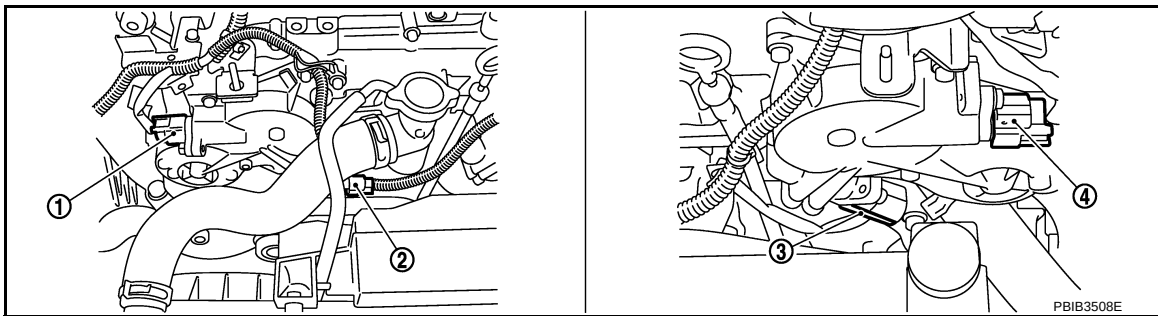
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000001645582

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

- Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve harness connector.



- Exhaust valve timing control magnet retarder (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector
- Exhaust valve timing control magnet retarder (bank 2) harness connector

- Turn ignition switch ON.

DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

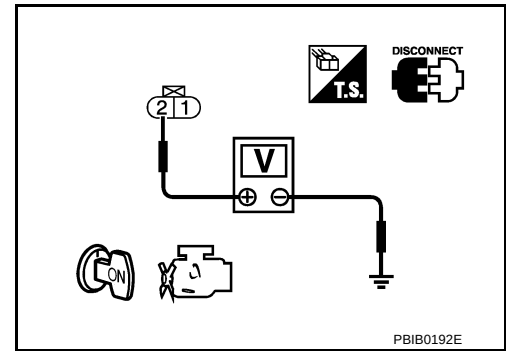
< SERVICE INFORMATION >

4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-III 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 E12, F3
- 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 ECM terminal 18 (bank 1) or 29 (bank 2) and intake valve timing control solenoid valve 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-177, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace malfunctioning intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645583

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 >

2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.5Ω [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.

If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
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.

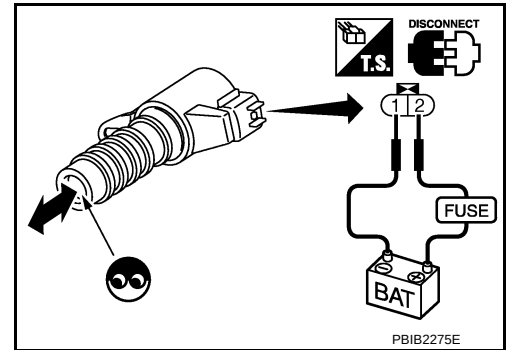
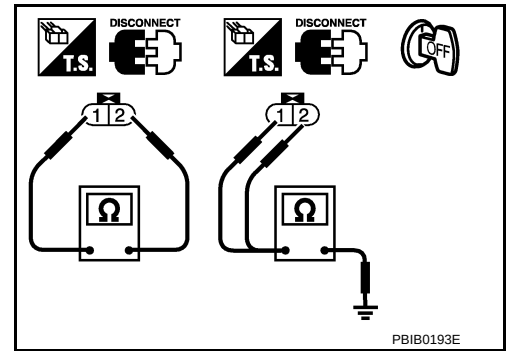
CAUTION:

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

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to [EM-53](#).

INFOID:000000001645584

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

< SERVICE INFORMATION >

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

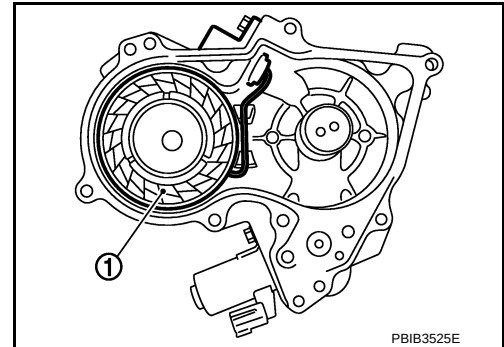
Component Description

INFOID:000000001645585

Exhaust valve timing control magnet retarder (1) controls the shut/open timing of the exhaust valve by ON/OFF pulse duty signals sent from the ECM.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645586

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VTC DTY EX B1 VTC DTY EX B2	• Engine: After warming up • Shift lever: Neutral	Idle	0% - 2%
	• Air conditioner switch: OFF • No load	Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%

On Board Diagnosis Logic

INFOID:000000001645587

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0078 0078 (Bank 1)	Exhaust valve timing control magnet retarder circuit	An improper voltage is sent to the ECM through exhaust valve timing control magnet retarder.	• Harness or connectors (Exhaust valve timing control magnet retarder circuit is open or shorted.) • Exhaust valve timing control magnet retarder
P0084 0084 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645588

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.

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-183, "Diagnosis Procedure"](#).

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

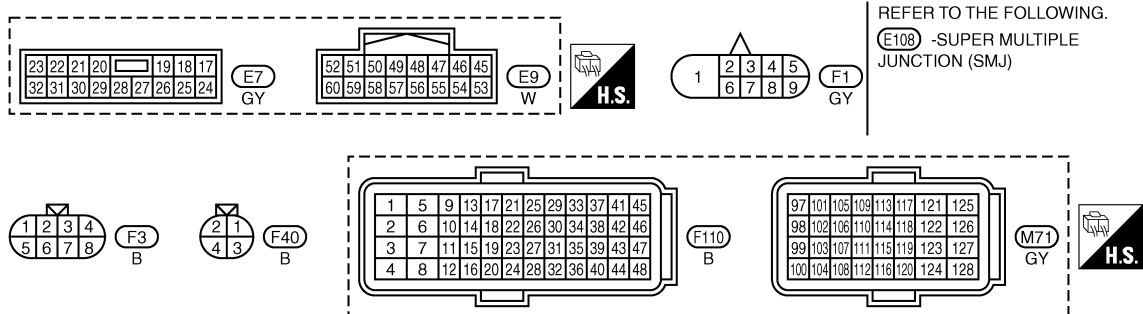
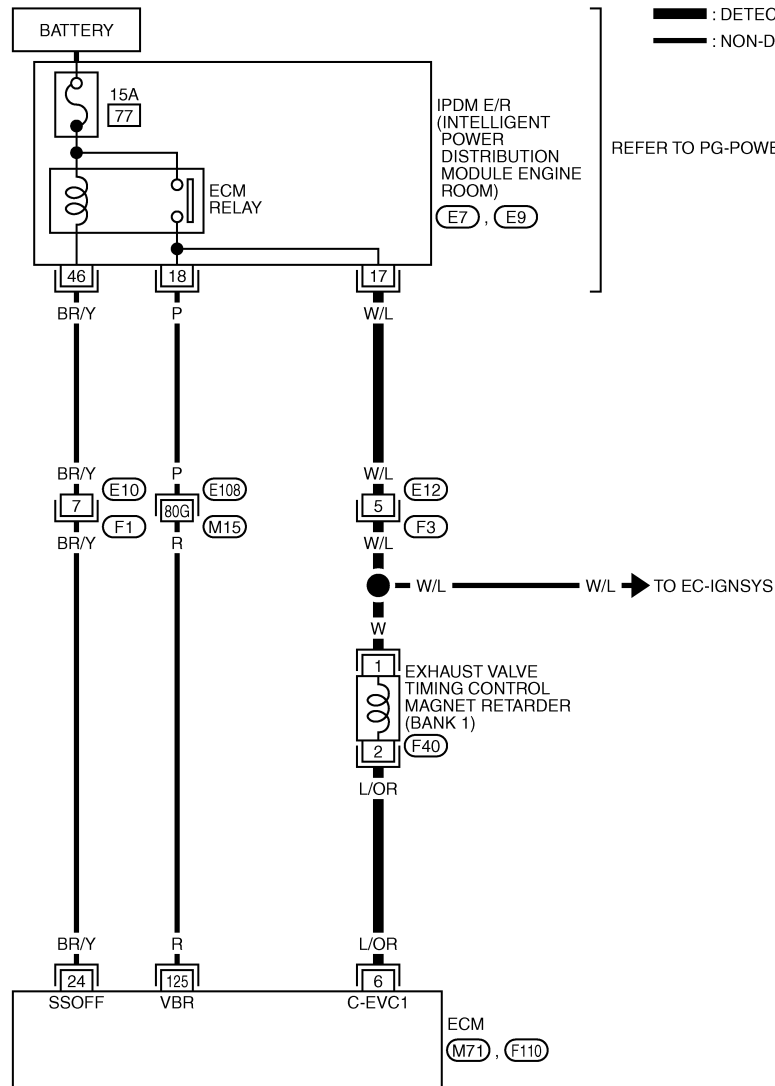
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645589

BANK 1

EC-EVCB1-01



TBWT1623E

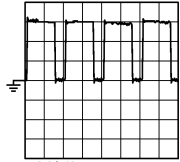
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

< 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)
6	L/OR	Exhaust valve timing control magnet retarder (bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Around 2,500 rpm while the engine speed is rising	7 - 12V★  5V/div PBIB3542E
24	BR/Y	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)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

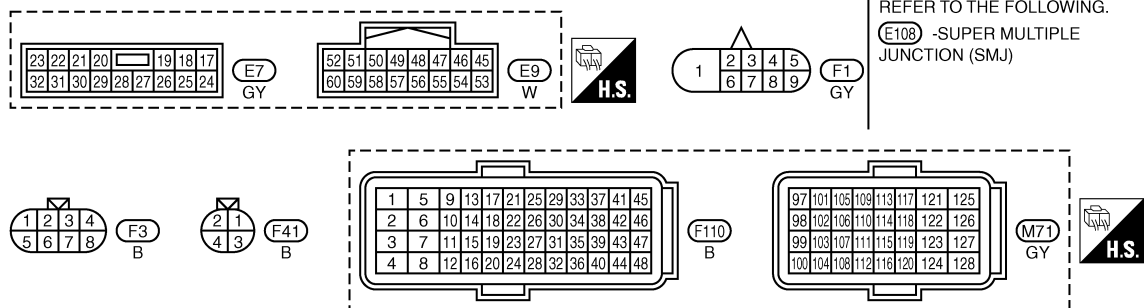
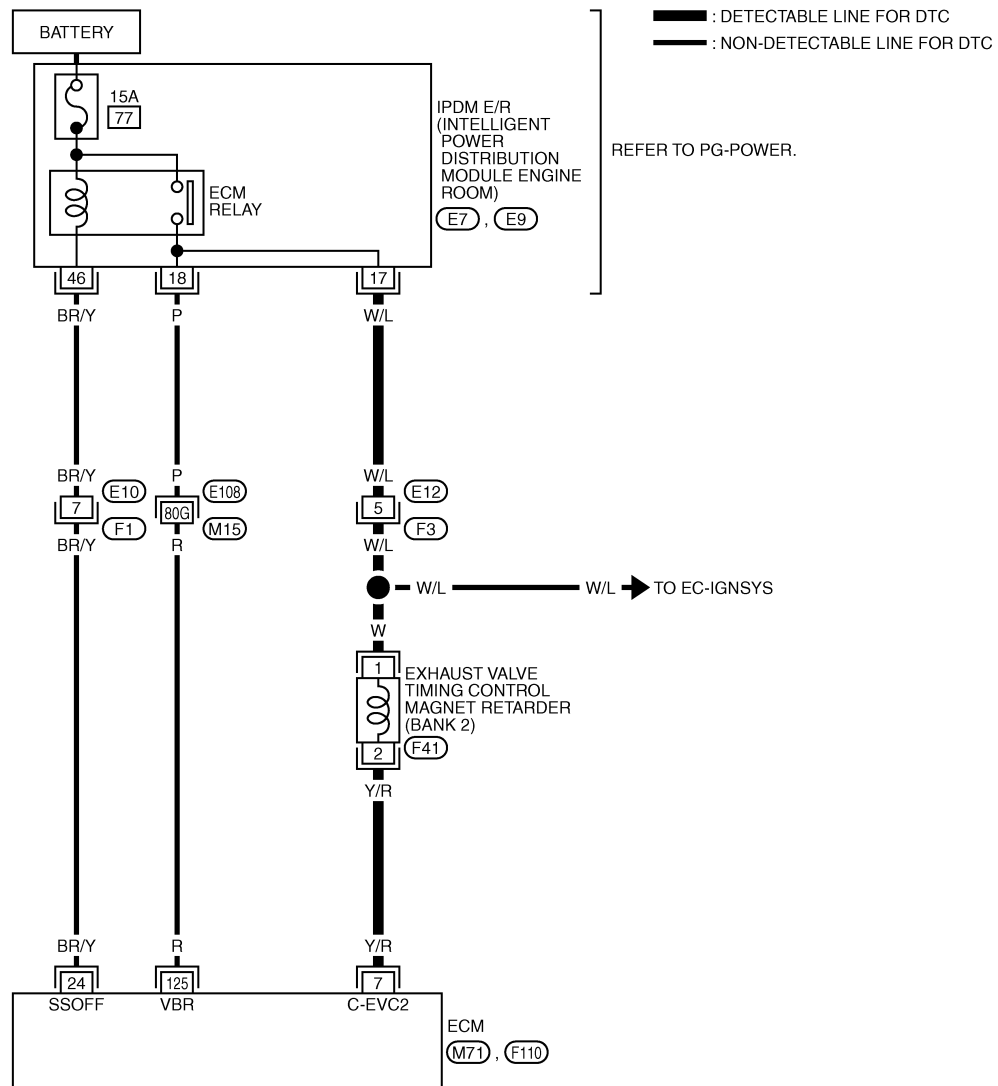
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

< SERVICE INFORMATION >

BANK 2

EC-EVCB2-01



TBWT1624E

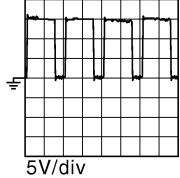
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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 P0078 P0084 EVT CONTROL MAGNET RETARDER

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/R	Exhaust valve timing control magnet retarder (bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Warm-up condition • Around 2,500 rpm while the engine speed is rising	7 - 12V★ 
24	BR/Y	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)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

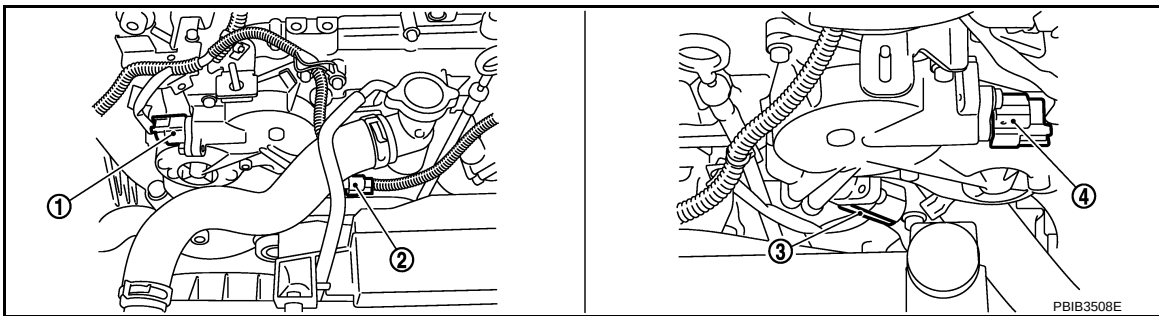
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:000000001645590

1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect exhaust valve timing control magnet retarder harness connector.



- Exhaust valve timing control magnet retarder (bank 1) harness connector
 - Intake valve timing control solenoid valve (bank 1) harness connector
 - Intake valve timing control solenoid valve (bank 2) harness connector
 - Exhaust valve timing control magnet retarder (bank 2) harness connector
3. Turn ignition switch ON.

DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

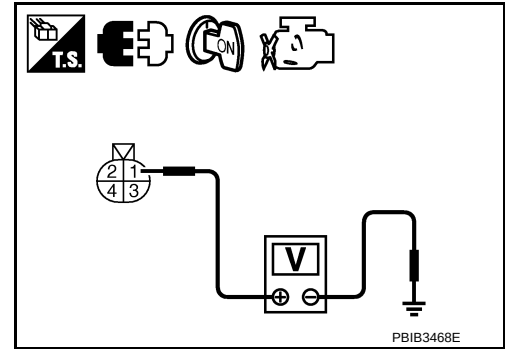
< SERVICE INFORMATION >

4. Check voltage between exhaust valve timing control magnet retarder terminal 1 and ground with CONSULT-III 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 E12, F3
- Harness for open or short between exhaust valve timing control magnet retarder and IPDM E/R

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

3.CHECK EXHAUST VALVE TIMING CONTROLMAGNET RETARDER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Checking harness continuity between exhaust valve timing control magnet retarder terminal 2 and ECM terminal 6 (bank 1), 7 (bank 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 EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to [EC-184, "Component Inspection"](#).

OK or NG

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

5.REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Replace malfunctioning exhaust valve timing control magnet retarder.
2. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).

>> **INSPECTION END**

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645591

EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Disconnect exhaust valve timing control magnet retarder harness connector.

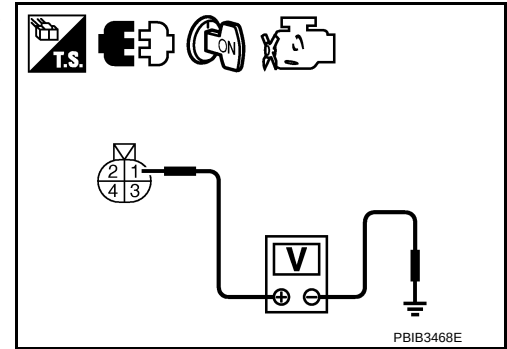
DTC P0078 P0084 EVT CONTROL MAGNET RETARDER

< SERVICE INFORMATION >

2. Check resistance between exhaust valve timing control magnet retarder terminals 1 and 2.

Resistance: 9.0 - 11.0Ω [at 20°C (68°F)]

3. If NG, replace exhaust valve timing control magnet retarder and go to the next step.
4. Perform [EC-76. "Exhaust Valve Timing Control Learning"](#).



INFOID:000000001645592

Removal and Installation

EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to [EM-44](#).

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

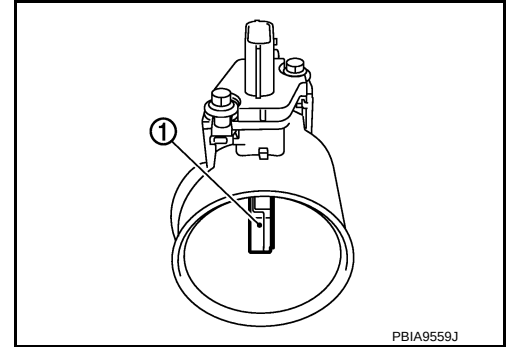
DTC P0101, P010B MAF SENSOR

Component Description

INFOID:000000001645593

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

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645594

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-126 .		
MAS A/F SE-B2			
CAL/LD VALUE	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	5% - 35%
		2,500 rpm	5% - 35%
MASS AIRFLOW	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645595

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 0101 (Bank 1)	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor
P010B 010B (Bank 2)		A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:000000001645596

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:

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.

1. Start engine and warm it up to normal operating temperature.
2. Run engine for at least 10 seconds at idle speed.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-194, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

NOTE:

Check vehicle specifications and VIN, then select the procedure to be performed. (Refer to the table below.)

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

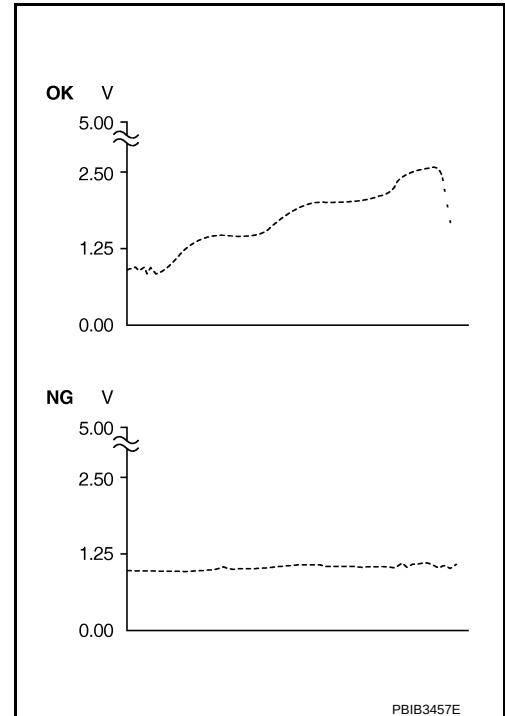
×: Applicable —: Not applicable

Vehicle specification		Vehicle serial number	Procedure
Body type	SRS side air bags		
Coupe	—	Up to 705587	B-a
		From 705588	B-b
	×	Up to 752588	B-a
		From 752589	B-b
Roadster	×	Up to 852654	B-a
		From 852655	B-b

Procedure for Malfunction B-a

④ WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
If engine cannot be started, go to [EC-194, "Diagnosis Procedure"](#).
2. Select "DATA MONITOR" mode with CONSULT-III.
3. Check the voltage of "MAS A/F SE-B1" and "MAS A/F SE-B2" with "DATA MONITOR".
4. Increases engine speed to about 4,000 rpm.
5. Monitor the linear voltage rise in response to engine speed increases.
If NG, go to [EC-194, "Diagnosis Procedure"](#).
If OK, go to following step.



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

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 3 V
TP SEN 2-B1	More than 3 V
TP SEN 1-B2	More than 3 V
TP SEN 2-B2	More than 3 V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

CAUTION:

Always drive vehicle at a safe speed.

7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-194, "Diagnosis Procedure"](#).

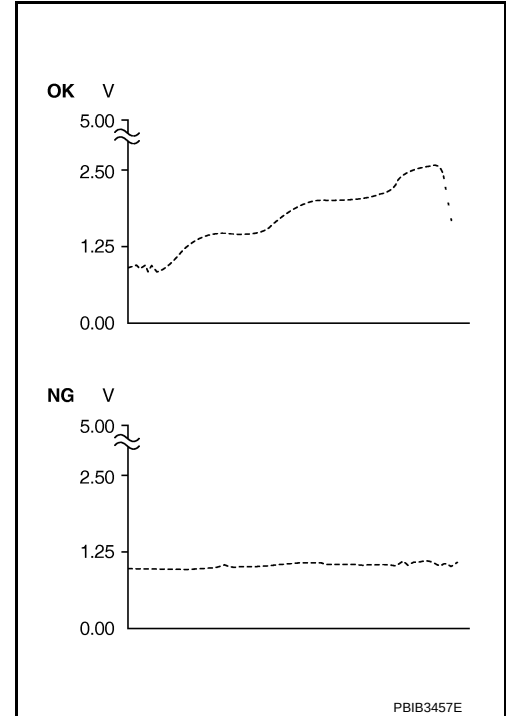
Procedure for Malfunction B-b

④ WITH CONSULT-III

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

1. Start engine and warm it up to normal operating temperature.
If engine cannot be started, go to [EC-194, "Diagnosis Procedure"](#).
2. Select "DATA MONITOR" mode with CONSULT-III.
3. Check the voltage of "MAS A/F SE-B1" and "MAS A/F SE-B2" with "DATA MONITOR".
4. Increases engine speed to about 4,000 rpm.
5. Monitor the linear voltage rise in response to engine speed increases.
If NG, go to [EC-194, "Diagnosis Procedure"](#).
If OK, go to following step.



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

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1 V
TP SEN 2-B1	More than 1 V
TP SEN 1-B2	More than 1 V
TP SEN 2-B2	More than 1 V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

CAUTION:

Always drive vehicle at a safe speed.

7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-194, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000001645597

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.

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

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-194. "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
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

DTC P0101, P010B MAF SENSOR

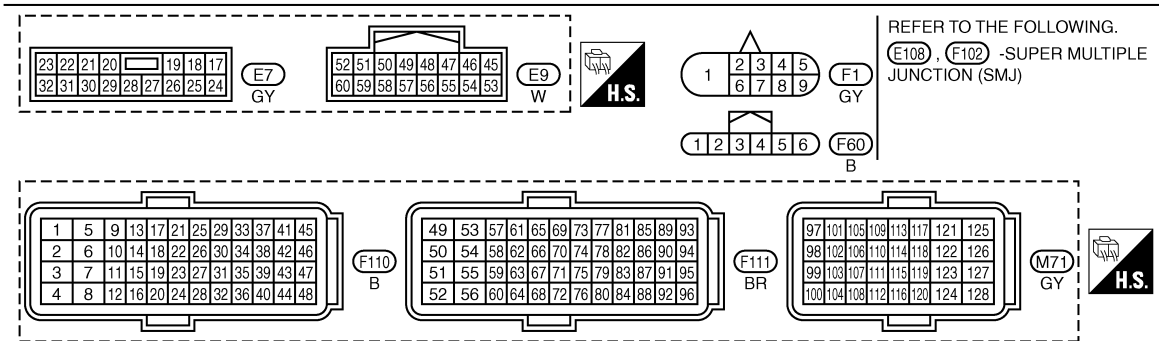
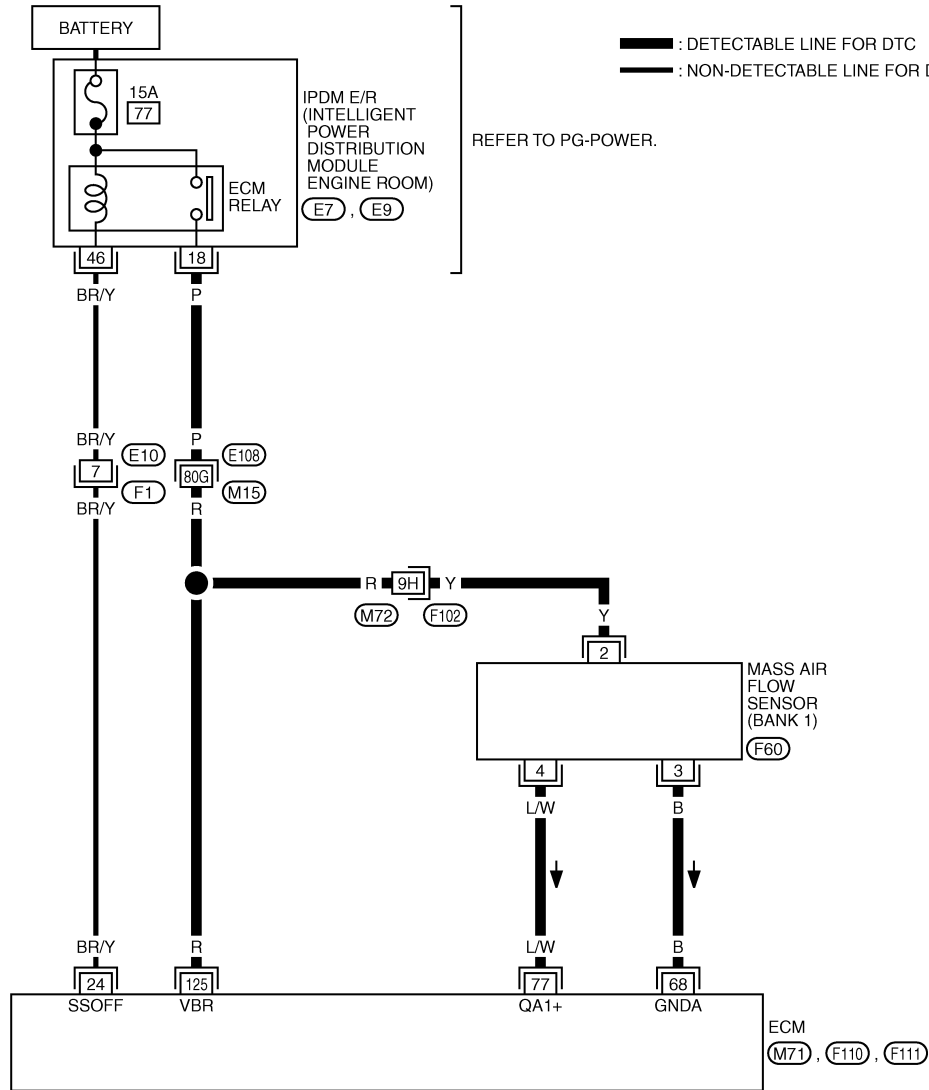
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645598

BANK 1

EC-MAFSB1-01



TBWT1625E

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, P010B MAF SENSOR

< SERVICE INFORMATION >

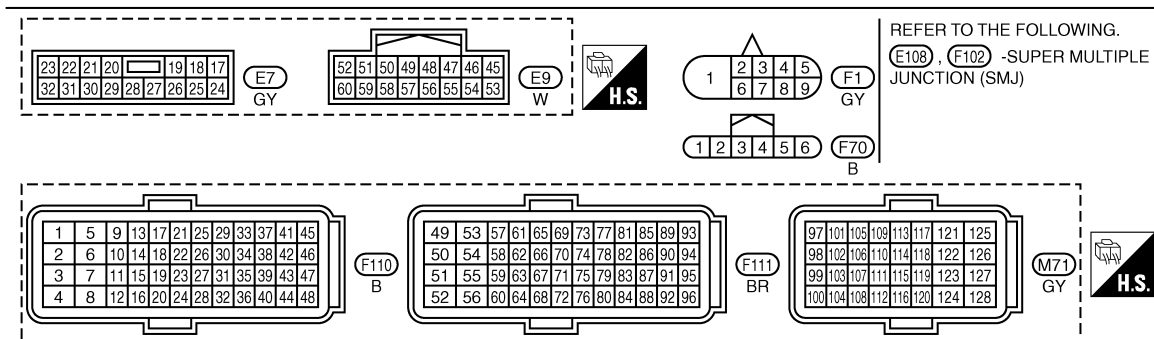
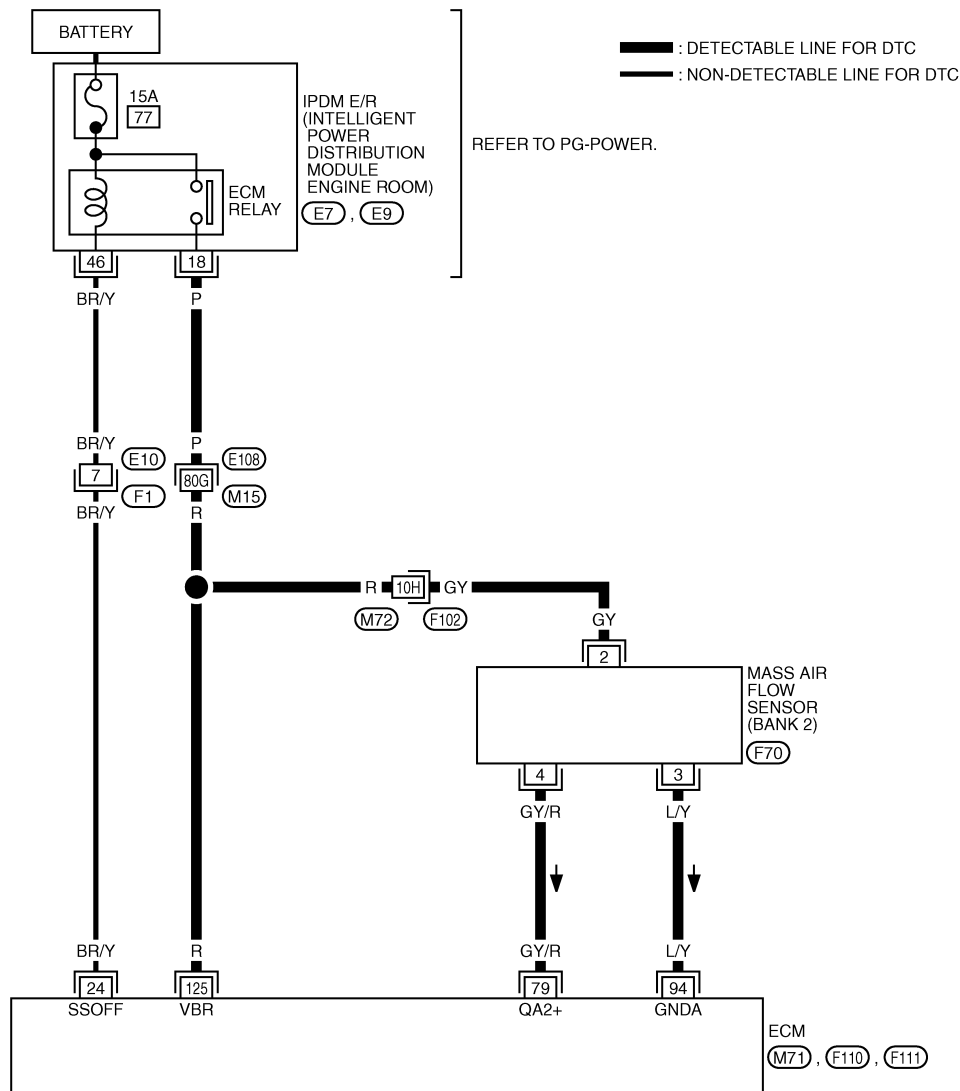
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
68	B	Sensor ground [Mass air flow sensor (bank1), Intake air temperature sensor (bank 1)]	[Engine is running] Warm-up condition - Idle speed	0V
77	L/W	Mass air flow sensor (bank1)	[Engine is running] Warm-up condition - Idle speed	0.8 - 1.1V
			[Engine is running] Warm-up condition - Engine speed: 2,500 rpm	1.4 - 1.7V
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

BANK 2

EC-MAFSB2-01



TBWT1626E

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, P010B MAF SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V
79	GY/R	Mass air flow sensor (bank2)	[Engine is running] • Warm-up condition • Idle speed	0.8 - 1.1V
			[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
94	L/Y	Sensor ground [Mass air flow sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001645599

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 and intake manifold

OK or NG

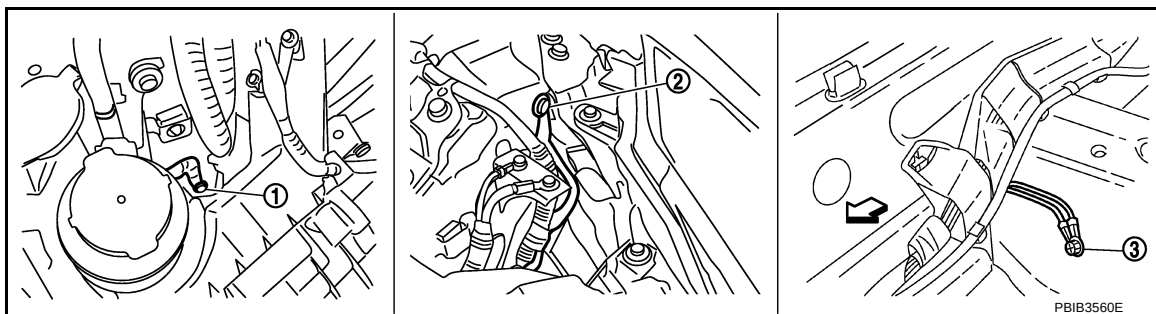
OK >> GO TO 3.

NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

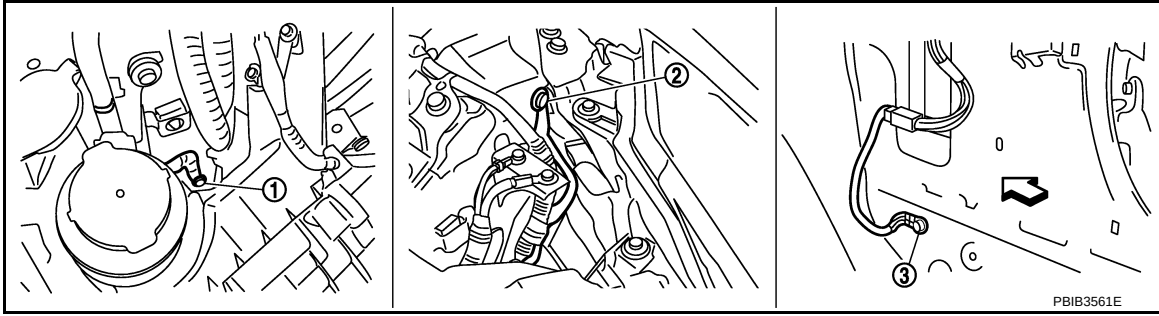
↶ Vehicle front

Models without VDC system, navigation system and telephone

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side finisher removed)

↩ Vehicle front

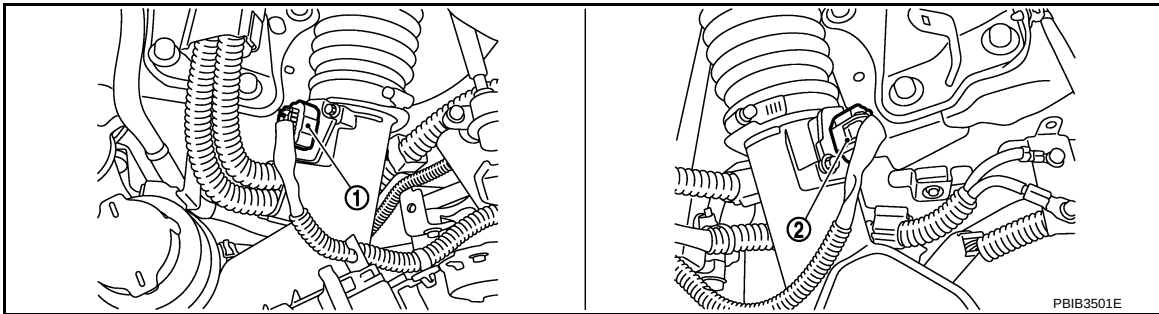
OK or NG

OK >> GO TO 4.

NG >> Repair or replace ground connections.

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)

2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

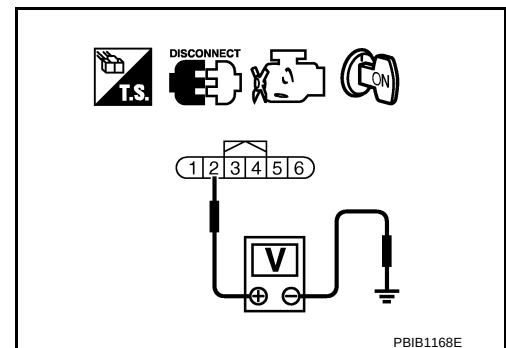
2. Turn ignition switch ON.
3. Check voltage between mass air flow sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- 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

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

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

6. CHECK MASS AIR FLOW 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 3 and ECM terminal 68 (bank 1), 94 (bank 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 >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 77 (bank 1), 79 (bank 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 8.

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

8. CHECK INTAKE AIR TEMPERATURE SENSOR

Check mass air flow sensor (with intake air temperature sensor) (bank 1).

Refer to [EC-236, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1).

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-428, "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-196, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace malfunctioning mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645600

MASS AIR FLOW SENSOR

Ⓔ With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check indication under the following conditions.

Monitor item	Condition	Indication
MAS A/F SE-B1 MAS A/F SE-B2	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7V
	Idle to about 4,000 rpm	0.8 - 1.1V to Approx. 2.4V*

*: 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.

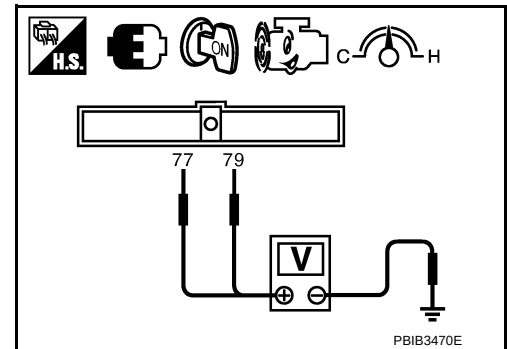
⊗ Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 77 [Mass air flow sensor (bank 1) signal], 79 [Mass air flow sensor (bank 2) signal] and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 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.



DTC P0101, P010B MAF SENSOR

< SERVICE INFORMATION >

Removal and Installation

INFOID:000000001645601

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

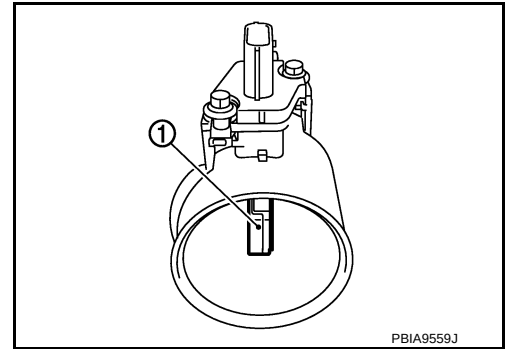
DTC P0102, P0103, P010C, P010D MAF SENSOR

Component Description

INFOID:000000001645602

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

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645603

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-126 .		
MAS A/F SE-B2			
CAL/LD VALUE	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	5% - 35%
		2,500 rpm	5% - 35%
MASS AIRFLOW	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) - Air conditioner switch: OFF - No load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

INFOID:000000001645604

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102 (Bank 1)	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted.) - Intake air leaks - Mass air flow sensor
P010C 010C (Bank 2)			
P0103 0103 (Bank 1)	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	- Harness or connectors (The sensor circuit is open or shorted.) - Mass air flow sensor
P010D 010D (Bank 2)			

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 P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645605

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, P010C

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-204, "Diagnosis Procedure"](#).

PROCEDURE FOR DTC P0103, P010D

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-204, "Diagnosis Procedure"](#).
If DTC is not detected, go to next step.
4. Start engine and wait at least 5 seconds.
5. Check DTC.
6. If DTC is detected, go to [EC-204, "Diagnosis Procedure"](#).

DTC P0102, P0103, P010C, P010D MAF SENSOR

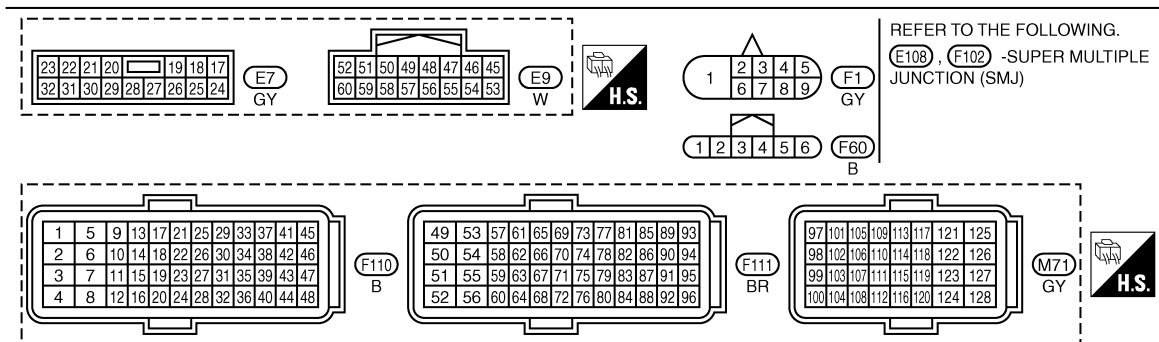
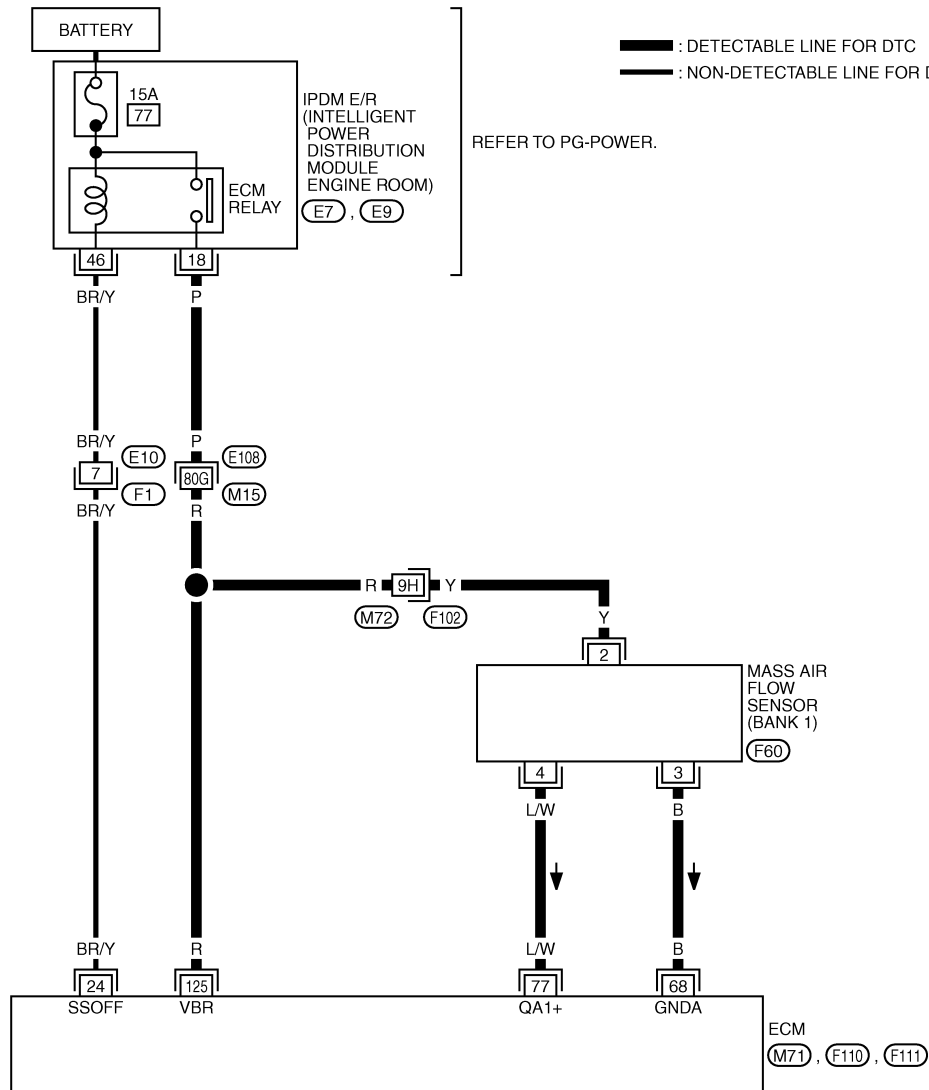
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645606

BANK 1

EC-MAFSB1-01



TBWT1625E

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, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

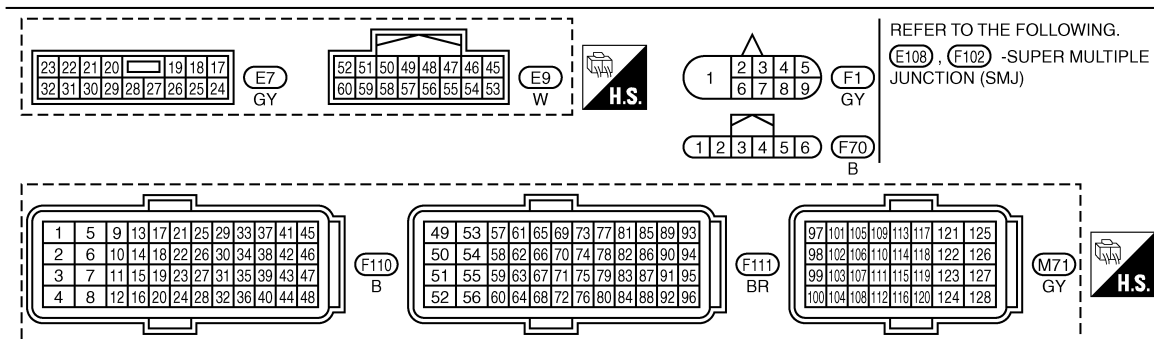
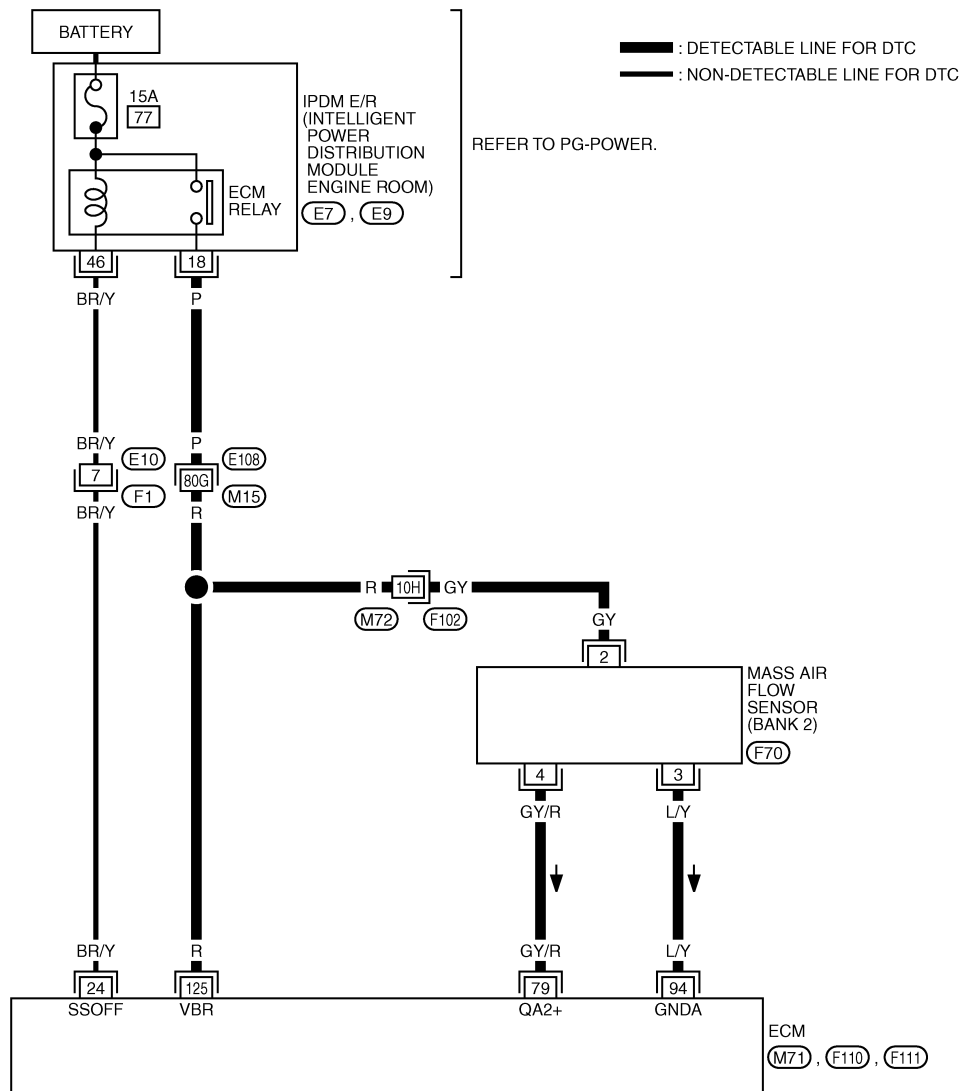
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
68	B	Sensor ground [Mass air flow sensor (bank1), Intake air temperature sensor (bank 1)]	[Engine is running] Warm-up condition - Idle speed	0V
77	L/W	Mass air flow sensor (bank1)	[Engine is running] Warm-up condition - Idle speed	0.8 - 1.1V
			[Engine is running] Warm-up condition - Engine speed: 2,500 rpm	1.4 - 1.7V
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

DTC P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

BANK 2

EC-MAFSB2-01



TBWT1626E

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, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
79	GY/R	Mass air flow sensor (bank2)	[Engine is running] Warm-up condition - Idle speed	0.8 - 1.1V
			[Engine is running] Warm-up condition - Engine speed: 2,500 rpm	1.4 - 1.7V
94	L/Y	Sensor ground [Mass air flow sensor (bank 2)]	[Engine is running] Warm-up condition - Idle speed	0V
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000001645607

1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102, P010C>>GO TO 2.

P0103, P010D>>GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

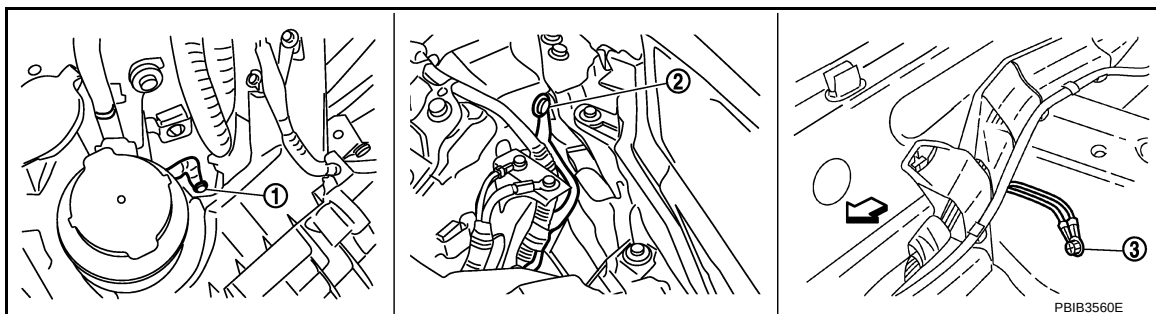
OK >> GO TO 3.

NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

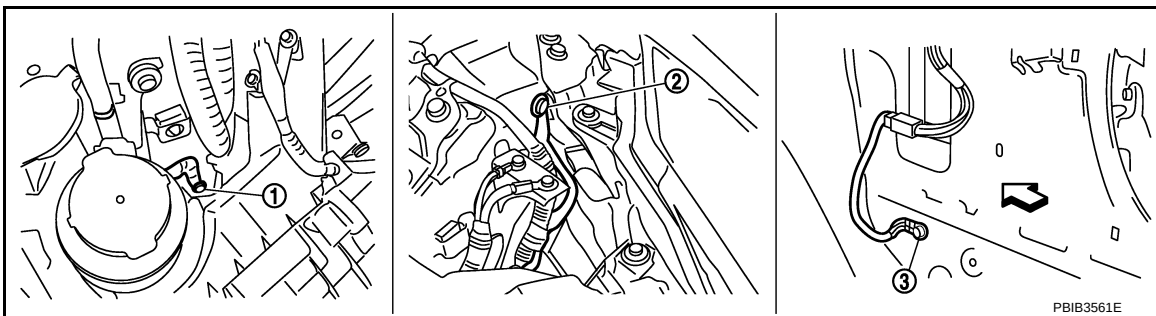
←: Vehicle front

Models without VDC system, navigation system and telephone

DTC P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↩ Vehicle front

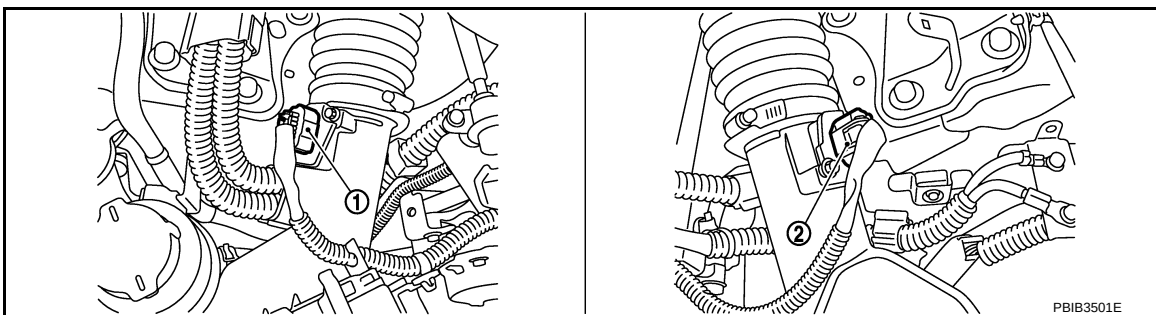
OK or NG

OK >> GO TO 4.

NG >> Repair or replace ground connections.

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.



1. Mass air flow sensor (with intake air
temperature sensor) (bank 1)

2. Mass air flow sensor (with intake air
temperature sensor) (bank 2)

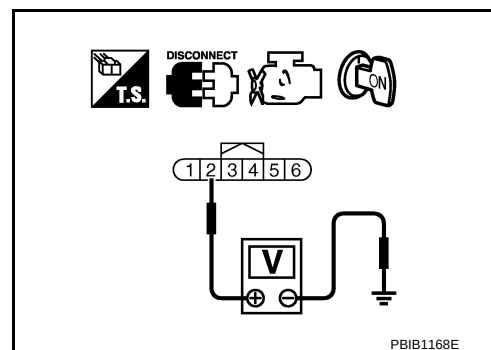
2. Turn ignition switch ON.
3. Check voltage between mass air flow sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- 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

DTC P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

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

6. CHECK MASS AIR FLOW 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 3 and ECM terminal 68 (bank 1), 94 (bank 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 >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 77 (bank 1), 79 (bank 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 8.

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

8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-206, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace malfunctioning mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:0000000001645608

MASS AIR FLOW SENSOR

ⓘ With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check indication under the following conditions.

Monitor item	Condition	Indication
MAS A/F SE-B1 MAS A/F SE-B2	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7V
	Idle to about 4,000 rpm	0.8 - 1.1V to Approx. 2.4V*

*: 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.

DTC P0102, P0103, P010C, P010D MAF SENSOR

< SERVICE INFORMATION >

- 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-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 77 [Mass air flow sensor (bank 1) signal], 79 [Mass air flow sensor (bank 2) signal] and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to Approx. 2.4*

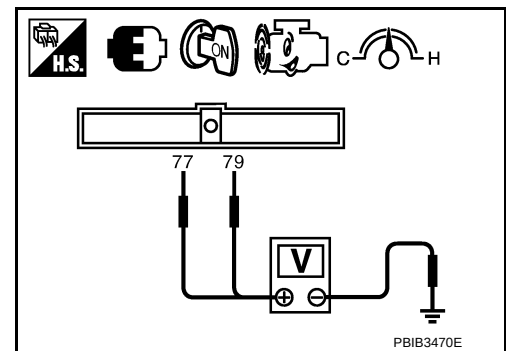
*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

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-16](#).



INFOID:000000001645609

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

DTC P0112, P0113 IAT SENSOR

Component Description

INFOID:0000000001645610

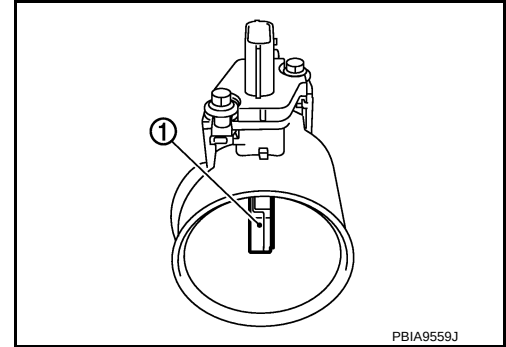
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

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

NOTE:

ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis.

It does not use the intake air temperature sensor (bank 2)



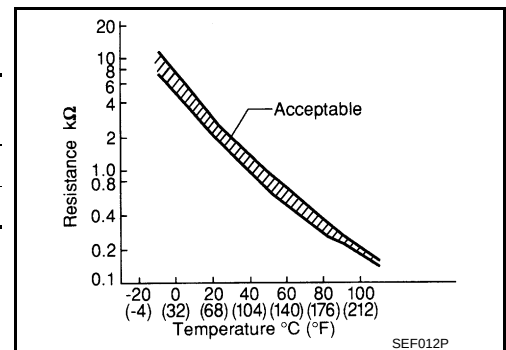
<Reference data>

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 values and is measured between ECM terminal 67 (Intake air temperature sensor) (bank 1) 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:0000000001645611

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112 (Bank 1)	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113 (Bank 1)	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000001645612

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.

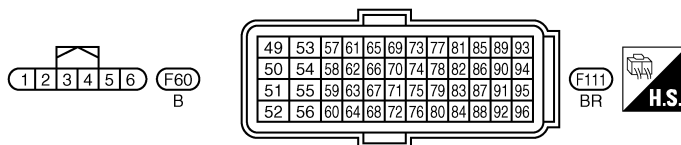
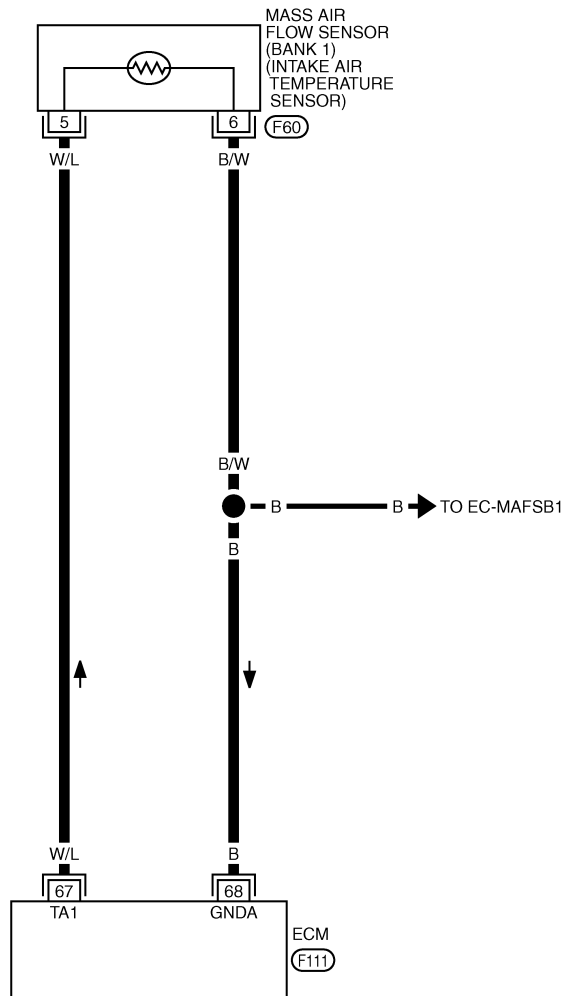
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-209. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:0000000001645613

EC-IATSB1-01

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



TBWT1627E

Diagnosis Procedure

INFOID:0000000001645614

1.CHECK GROUND CONNECTIONS

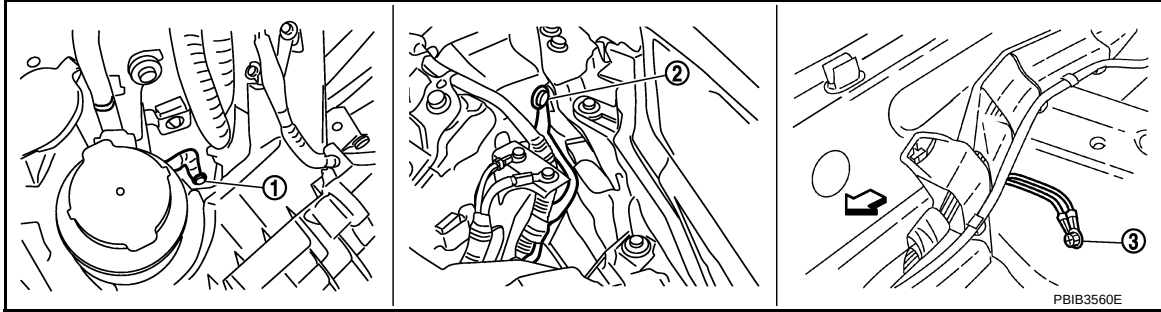
Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.

DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >

- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

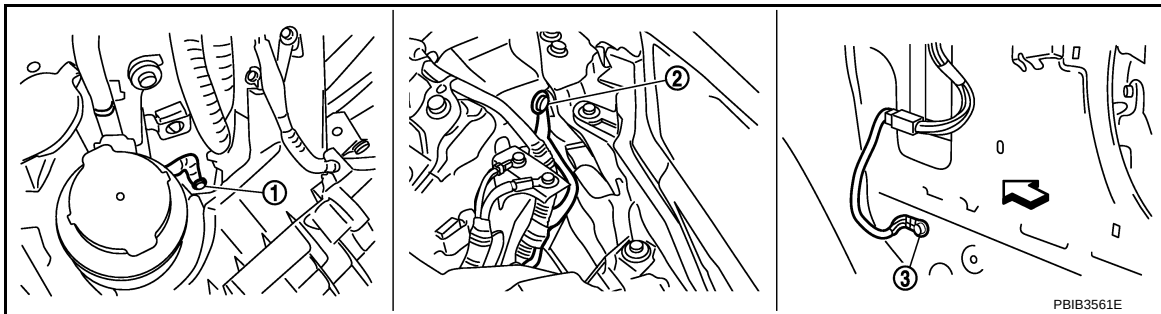
2. Body ground E43

3. Body ground B102

⇐: Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

⇐: Vehicle front

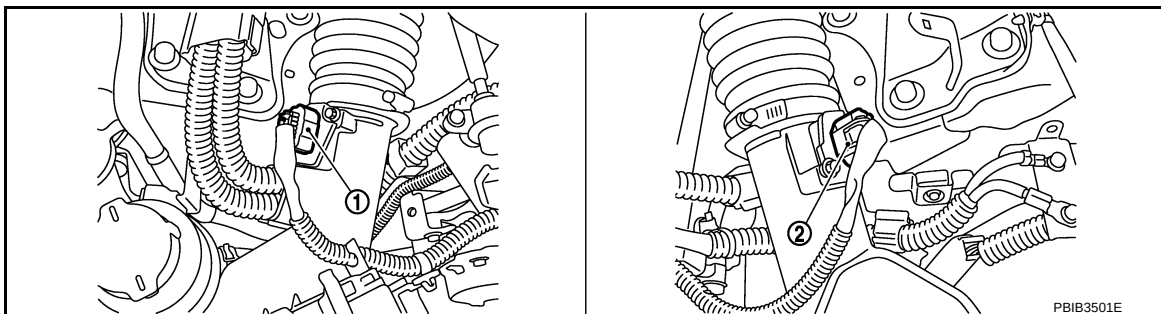
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow sensor (with intake air temperature sensor) (bank 1) harness connector.



1. Mass air flow sensor (with intake air
temperature sensor) (bank 1)

2. Mass air flow sensor (with intake air
temperature sensor) (bank 2)

- Turn ignition switch ON.

DTC P0112, P0113 IAT SENSOR

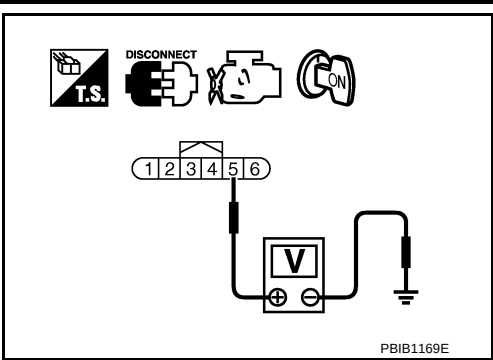
< SERVICE INFORMATION >

3. Check voltage between mass air flow sensor (with intake air temperature sensor) (bank 1) terminal 5 and ground with CONSULT-III 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 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 (with intake air temperature sensor) (bank 1) terminal 6 and ECM terminal 68.
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-211, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1).

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

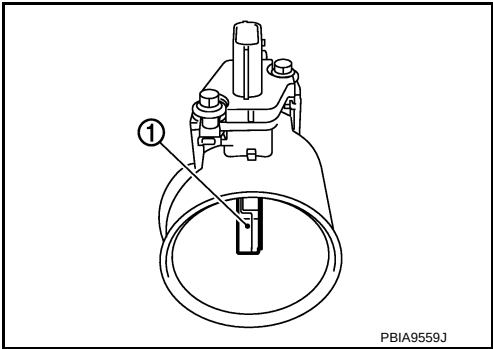
INFOID:0000000001645615

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (with intake air temperature sensor) (bank 1) (1) terminals 5 and 6 under the following conditions.

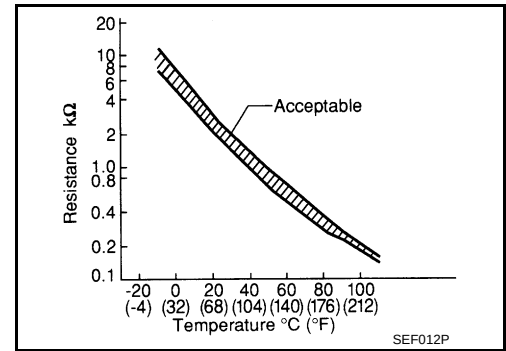
Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor) (bank 1).



DTC P0112, P0113 IAT SENSOR

< SERVICE INFORMATION >



Removal and Installation

INFOID:000000001645616

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0116 ECT SENSOR

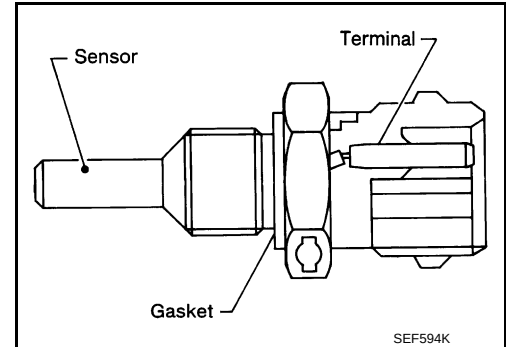
< SERVICE INFORMATION >

DTC P0116 ECT SENSOR

Component Description

INFOID:000000004936792

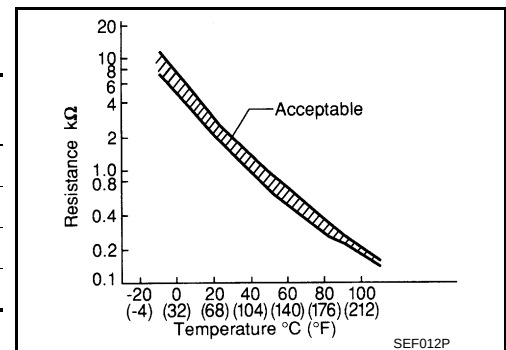
The engine coolant temperature (ECT) sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. 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	2.37 - 2.63
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 71 (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:000000004936793

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to [EC-216](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116 0116	Engine coolant temperature sensor circuit range/performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	• Harness or connectors (High or low resistance in the circuit) • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:000000004936794

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, do not add fuel.

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to 2,000 rpm for more than 10 minutes.
3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
4. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5.
5. Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 becomes 0.5 kΩ higher than the value measured before soaking.

CAUTION:

Never turn ignition switch ON during soaking time.

DTC P0116 ECT SENSOR

< SERVICE INFORMATION >

NOTE:

Soak time changes depending on ambient air temperature. It may take several hours.

6. Start engine and let it idle for 5 minutes.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-214, "Diagnosis Procedure"](#).

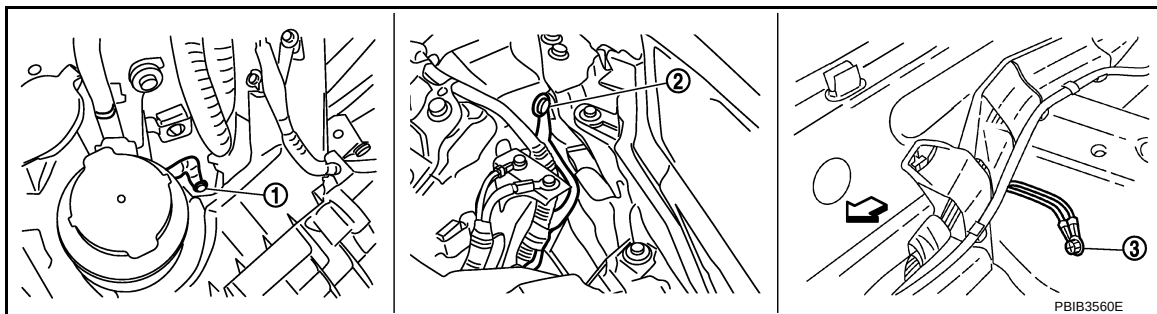
Diagnosis Procedure

INFOID:000000004936795

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

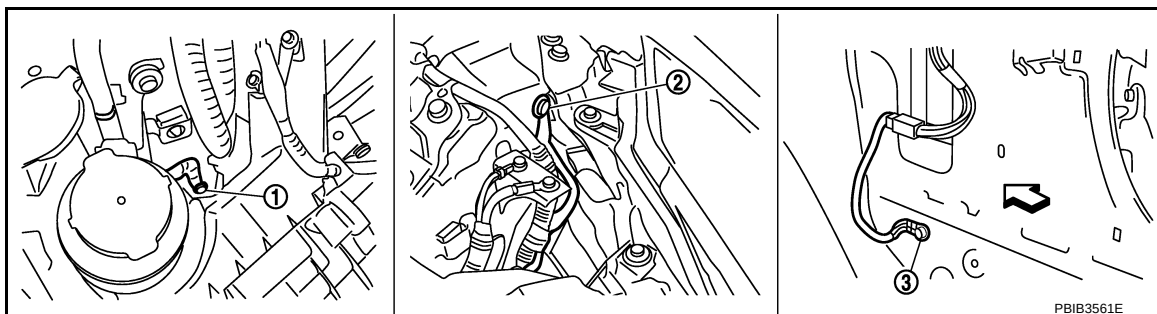
2. Body ground E43

3. Body ground B102

↩: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↩: Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-215, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3.CHECK INTERMITTENT INCIDENT

DTC P0116 ECT SENSOR

< SERVICE INFORMATION >

Refer to [EC-134](#).

Refer to [EC-218](#), "Wiring Diagram".

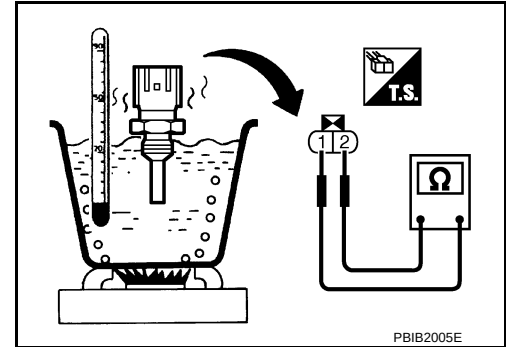
>> INSPECTION END

Component Inspection

INFOID:0000000004936796

ENGINE COOLANT TEMPERATURE SENSOR

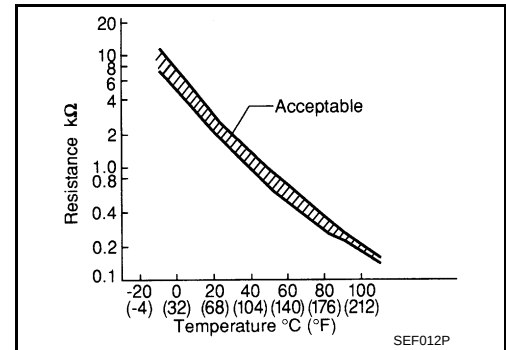
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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.



INFOID:0000000004936797

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-27](#).

DTC P0117, P0118 ECT SENSOR

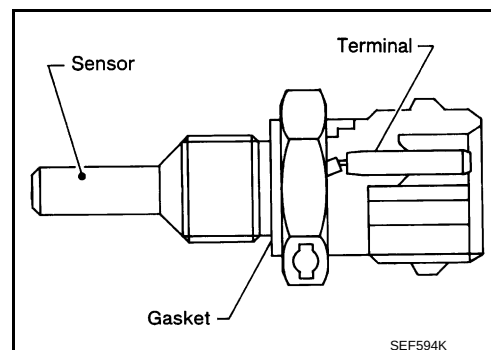
< SERVICE INFORMATION >

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:000000001645617

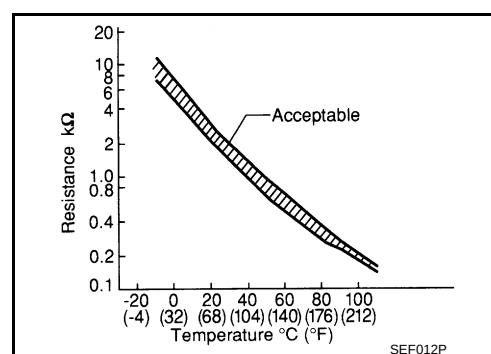
The engine coolant temperature (ECT) sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. 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	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 71 (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:000000001645618

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.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
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 following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-III display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	Approx 4 minutes or more after engine starting	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.		

DTC Confirmation Procedure

INFOID:000000001645619

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.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to [EC-218, "Diagnosis Procedure"](#).

DTC P0117, P0118 ECT SENSOR

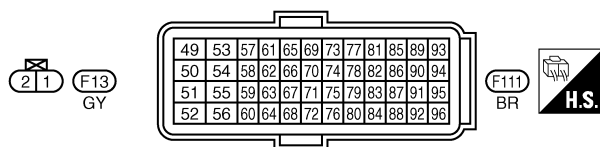
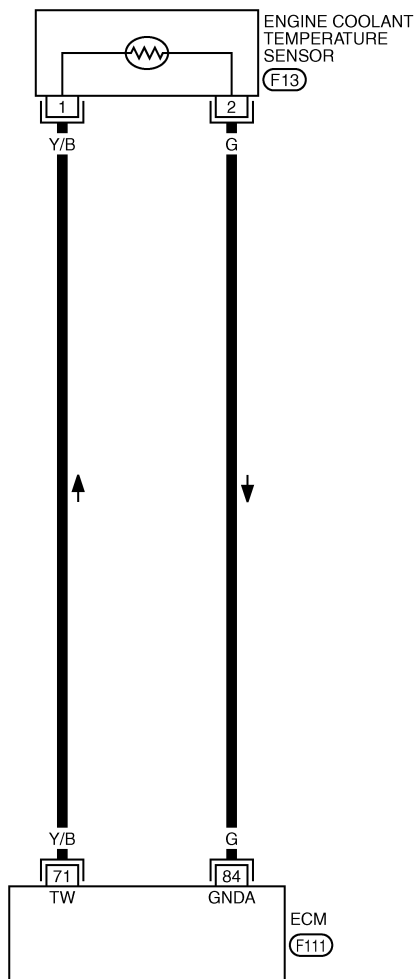
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645620

EC-ECTS-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1629E

Diagnosis Procedure

INFOID:000000001645621

1. CHECK GROUND CONNECTIONS

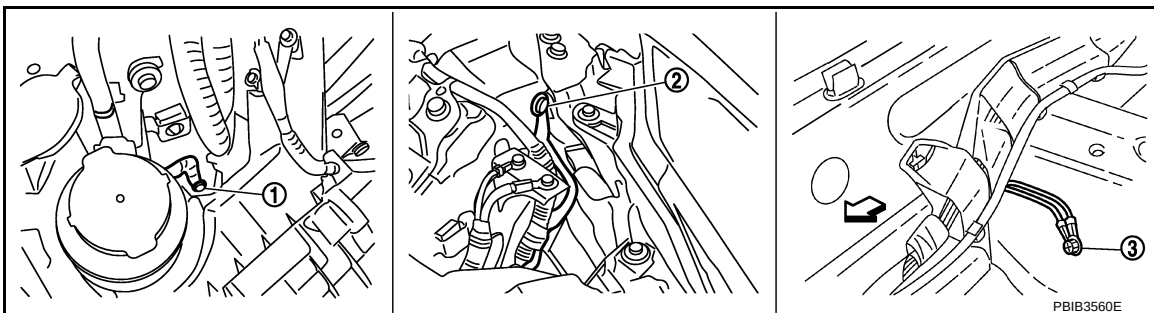
Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.

DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

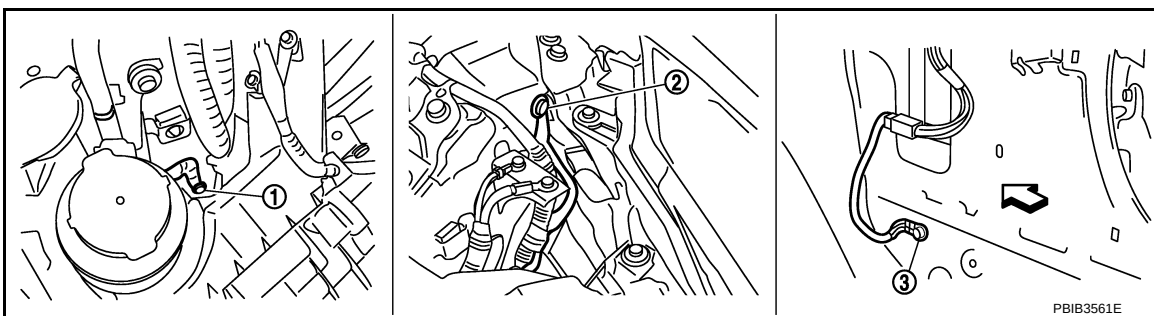
2. Body ground E43

3. Body ground B102

↶ Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↶ Vehicle front

OK or NG

OK >> GO TO 2.

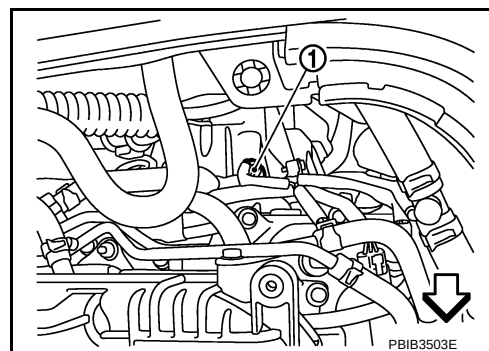
NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Disconnect engine coolant temperature sensor harness connector (1).

↶ : Vehicle front

- Turn ignition switch ON.



DTC P0117, P0118 ECT SENSOR

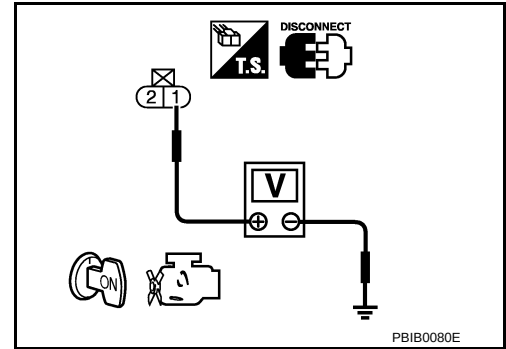
< SERVICE INFORMATION >

3. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-III 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 ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ENGINE COOLANT TEMPERATURE sensor terminal 2 and ECM terminal 84.
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 ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-220, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

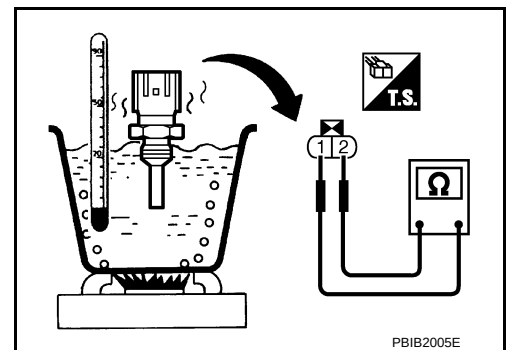
>> INSPECTION END

Component Inspection

INFOID:000000001645622

ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



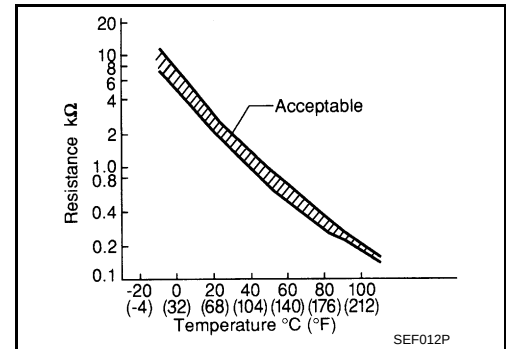
DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.37 - 2.63
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

- If NG, replace engine coolant temperature sensor.



INFOID:000000001645623

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-27](#).

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

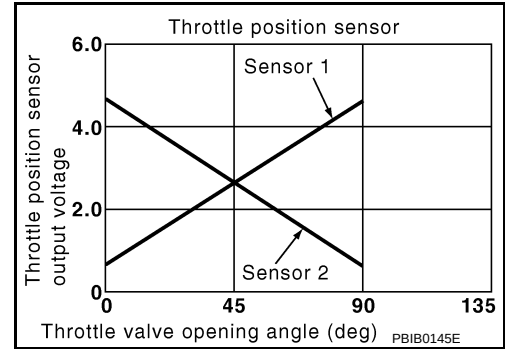
DTC P0122, P0123, P0227, P0228 TP SENSOR

Component Description

INFOID:000000001645624

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

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645625

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 1-B2 TP SEN 2-B1* TP SEN 2-B2*	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T), 1st (M/T)	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:000000001645626

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P0122, P0123, P0227 or P0228 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-482](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122 (Bank 1) P0227 0227 (Bank 2)	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	- Harness or connectors (TP sensor 2 circuit is open or shorted.) - Electric throttle control actuator (TP sensor 2)
P0123 0123 (Bank 1) P0228 0228 (Bank 2)	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 P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:0000000001645627

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-227, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:0000000001645628

Bank 1

A

EC

C

D

E

F

G

H

I

J

K

L

M

N

O

P

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

EC-TPS2B1-01

— : DETECTABLE LINE FOR DTC

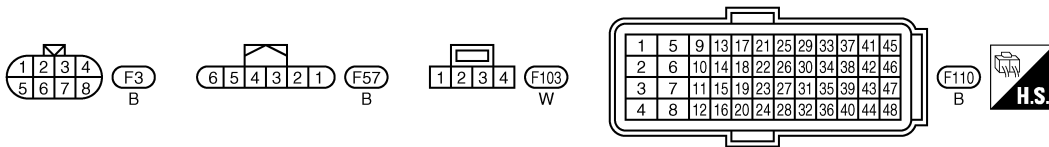
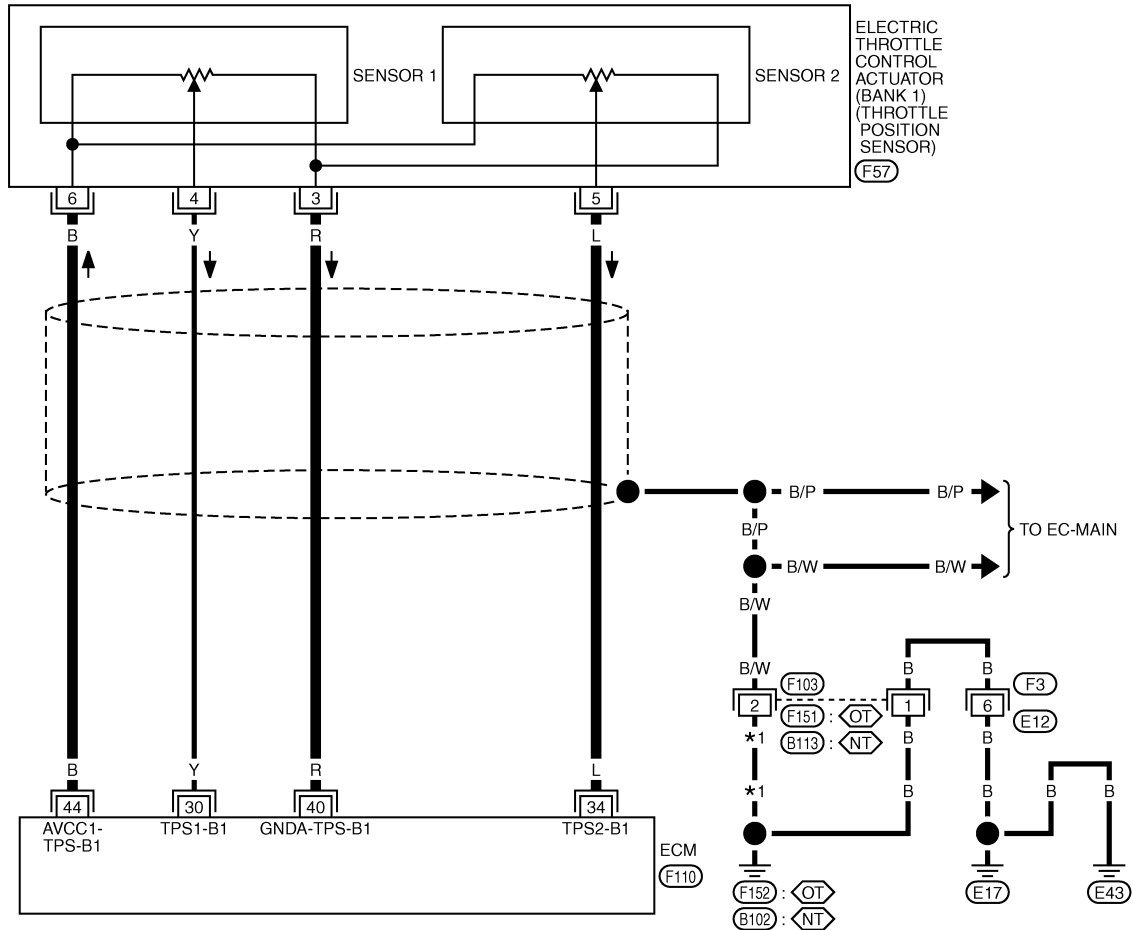
— : NON-DETECTABLE LINE FOR DTC

⬢ : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE

⬢ : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE

*1 B : ⬢

B/W : ⬢



TBWT1630E

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, P0227, P0228 TP SENSOR

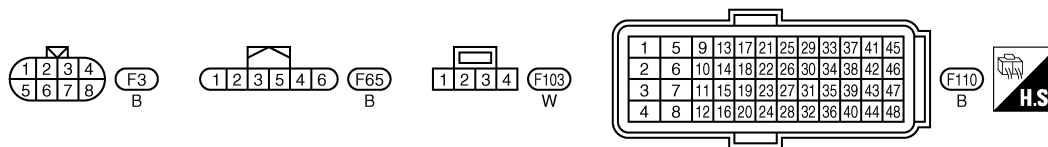
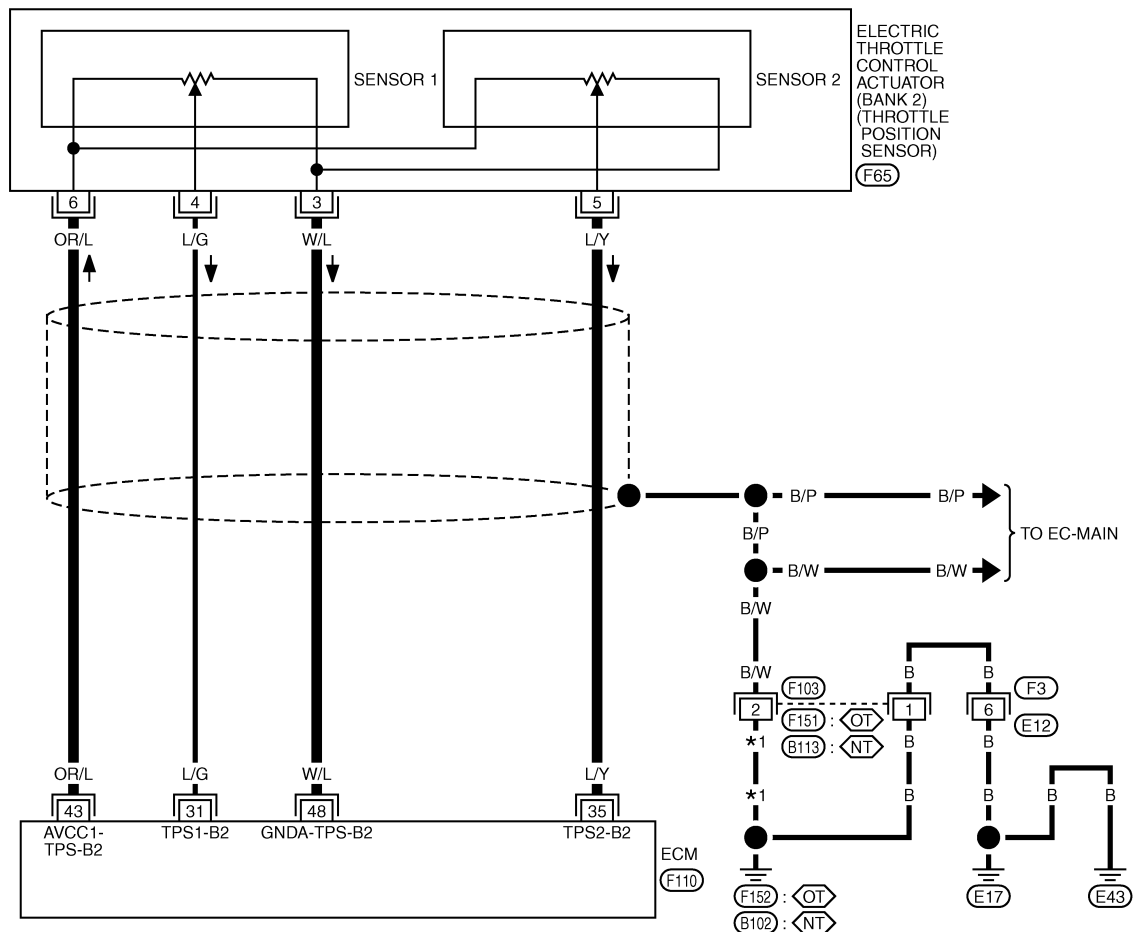
< SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
30	Y	Throttle position sensor 1 (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
34	L	Throttle position sensor 2 (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	More than 0.36V
40	R	Sensor ground [Throttle position sensor (bank 1)]	[Engine is running] Warm-up condition - Idle speed	0V
44	B	Sensor power supply [Throttle position sensor (bank 1)]	[Ignition switch: ON]	5V

Bank 2

< SERVICE INFORMATION >

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC
 : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE
 : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE
 *1 B: 
 B/W: 



2008 350Z

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
31	L/G	Throttle position sensor 1 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
35	L/Y	Throttle position sensor 2 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	More than 0.36V
43	OR/L	Sensor power supply [Throttle position sensor (bank 2)]	[Ignition switch: ON]	5V
48	W/L	Sensor ground [Throttle position sensor (bank 2)]	[Engine is running] - Warm-up condition - Idle speed	0V

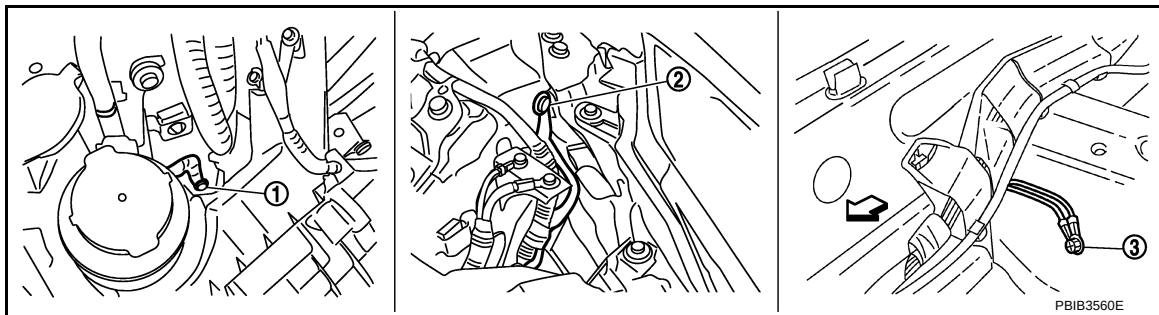
Diagnosis Procedure

INFOID:000000001645629

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

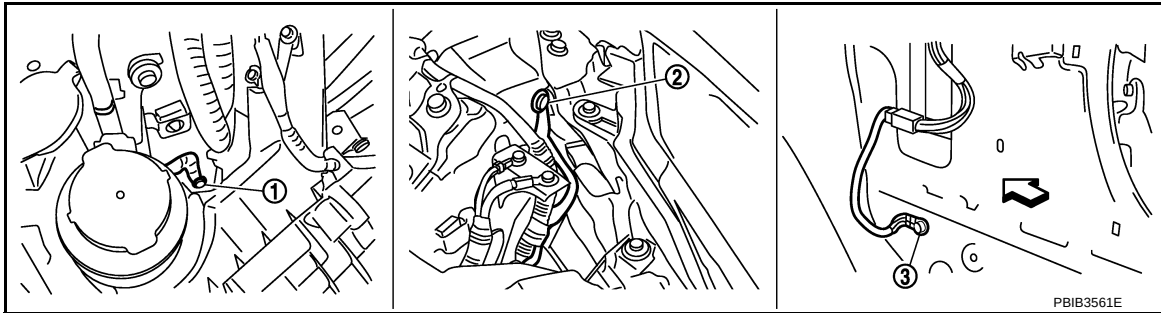
⇐ Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

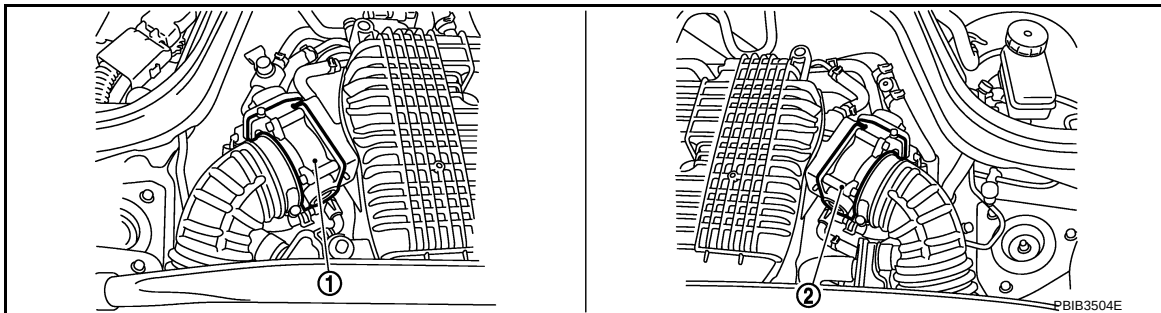
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

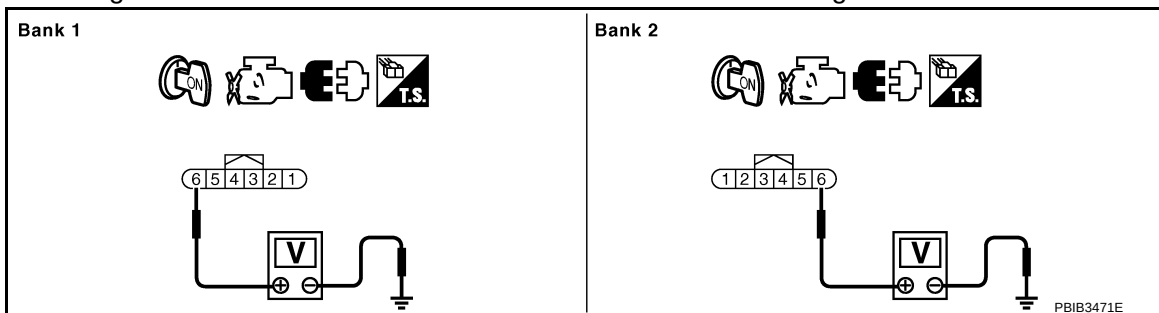
1. Disconnect electric throttle control actuator harness connector.



1. Electric throttle control actuator
(bank 1)

2. Electric throttle control actuator
(bank 2)

2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 6 and ground with CONSULT-III 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 connectors.

3. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

3. Check harness continuity between electric throttle control actuator terminal 3 and ECM terminal 40 (bank 1) or 48 (bank 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 34 (bank 1) or 35 (bank 2) and electric throttle control actuator 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 5.

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

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-229. "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Perform [EC-76. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77. "Idle Air Volume Learning"](#).

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

INFOID:0000000001645630

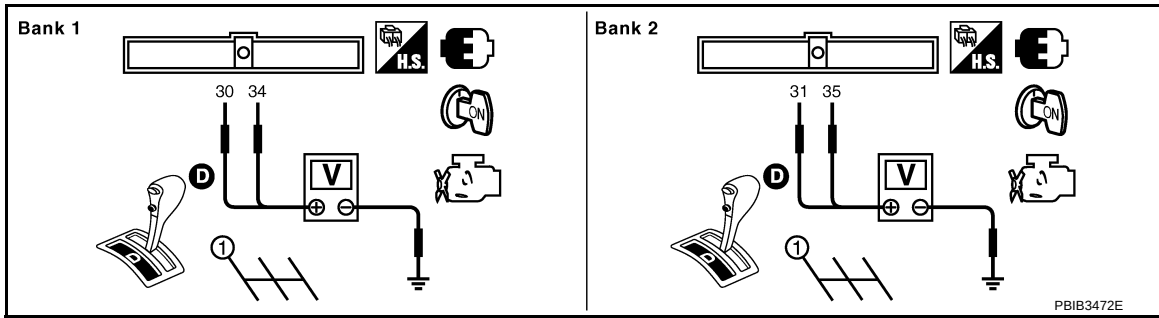
THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-76. "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set shift lever to D (A/T) or 1st (M/T) position.

DTC P0122, P0123, P0227, P0228 TP SENSOR

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 30 [TP sensor 1 (bank 1) signal], 31 [TP sensor 1 (bank 2) signal], 34 [TP sensor 2 (bank 1) signal], 35 [TP sensor 2 (bank 2) signal] and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
30 [TP sensor 1 (bank 1)]	Fully released	More than 0.36V
31 [TP sensor 1 (bank 2)]	Fully depressed	Less than 4.75V
34 [TP sensor 2 (bank 1)]	Fully released	Less than 4.75V
35 [TP sensor 2 (bank 2)]	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-76. "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-77. "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:0000000001645631

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P0125 ECT SENSOR

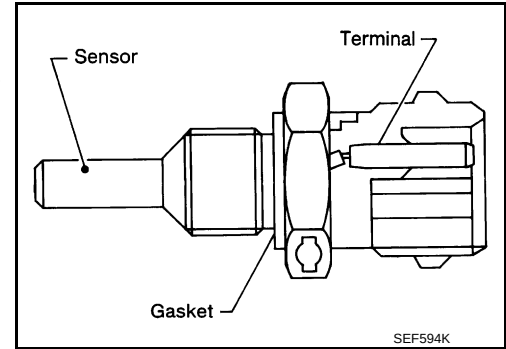
< SERVICE INFORMATION >

DTC P0125 ECT SENSOR

Component Description

INFOID:000000001645632

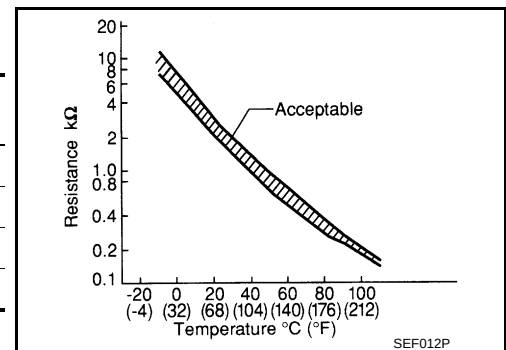
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 71 (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:000000001645633

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118.

Refer to [EC-216](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	- Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. - Engine coolant temperature is insufficient for closed loop fuel control.	- Harness or connectors (High resistance in the circuit) - Engine coolant temperature sensor - Thermostat

DTC Confirmation Procedure

INFOID:000000001645634

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.

④ WITH CONSULT-III

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that "COOLAN TEMP/S" is above 10°C (50°F).
If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.

DTC P0125 ECT SENSOR

< SERVICE INFORMATION >

4. Start engine and run it for 65 minutes at idle speed.
If **"COOLANT TEMP/S"** increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-232, "Diagnosis Procedure"](#).

Ⓢ WITH GST

Follow the procedure "WITH CONSULT-III" above.

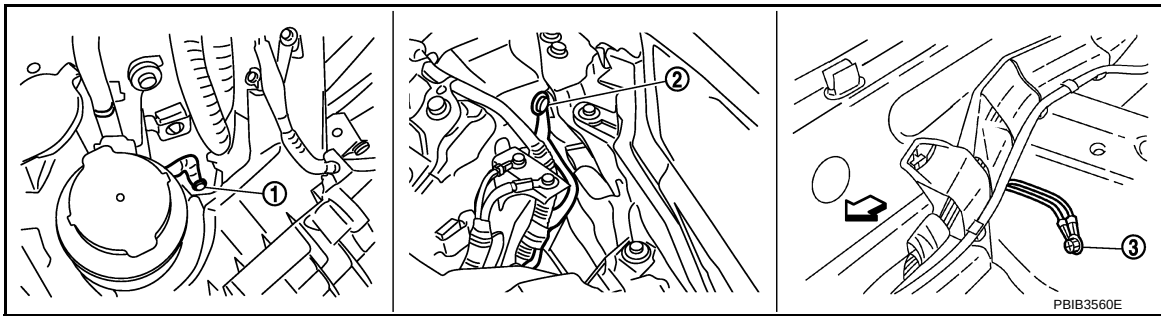
Diagnosis Procedure

INFOID:000000001645635

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

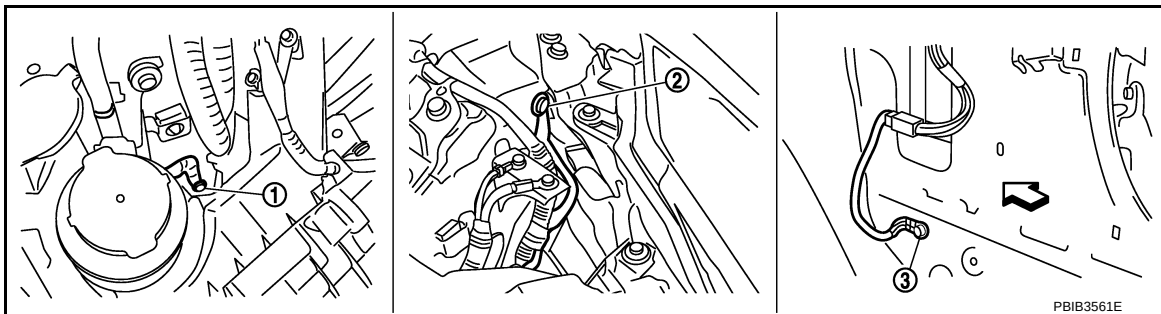
2. Body ground E43

3. Body ground B102

↶ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↶ Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-233, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

DTC P0125 ECT SENSOR

< SERVICE INFORMATION >

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-25](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

Refer to [EC-218](#). "Wiring Diagram".

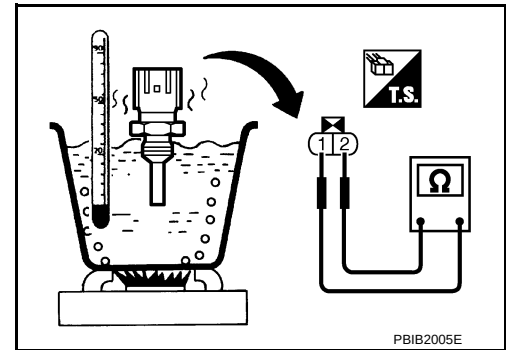
>> **INSPECTION END**

Component Inspection

INFOID:000000001645636

ENGINE COOLANT TEMPERATURE SENSOR

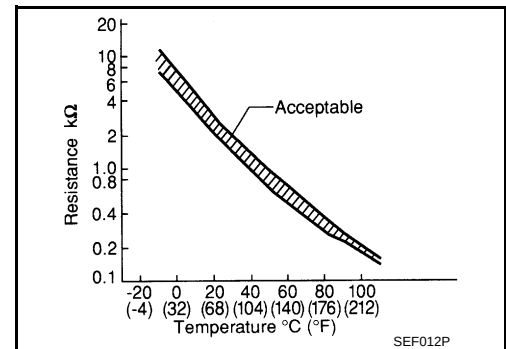
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.37 - 2.63
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



INFOID:000000001645637

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-27](#).

DTC P0127 IAT SENSOR

< SERVICE INFORMATION >

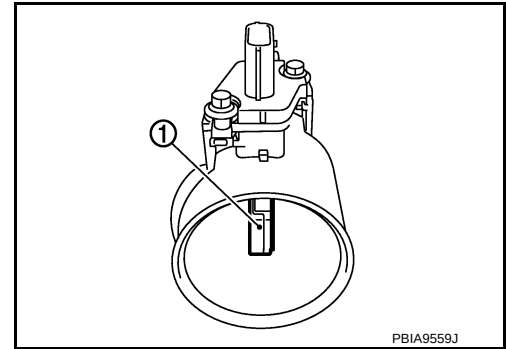
DTC P0127 IAT SENSOR

Component Description

INFOID:000000001645638

The intake air temperature sensor (1) 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.



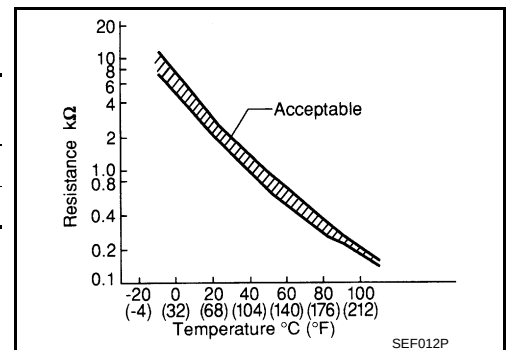
<Reference data>

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 values and is measured between ECM terminal 67 [Intake air temperature sensor (bank 1)] 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:000000001645639

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.	• Harness or connectors (The sensor circuit is open or shorted) • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:000000001645640

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-III

1. Wait until engine coolant temperature is less than 90°C (194°F)
 - a. Turn ignition switch ON.
 - b. Select "DATA MONITOR" mode with CONSULT-III.
 - 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.

NOTE:

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

DTC P0127 IAT SENSOR

< SERVICE INFORMATION >

2. Turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-235, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

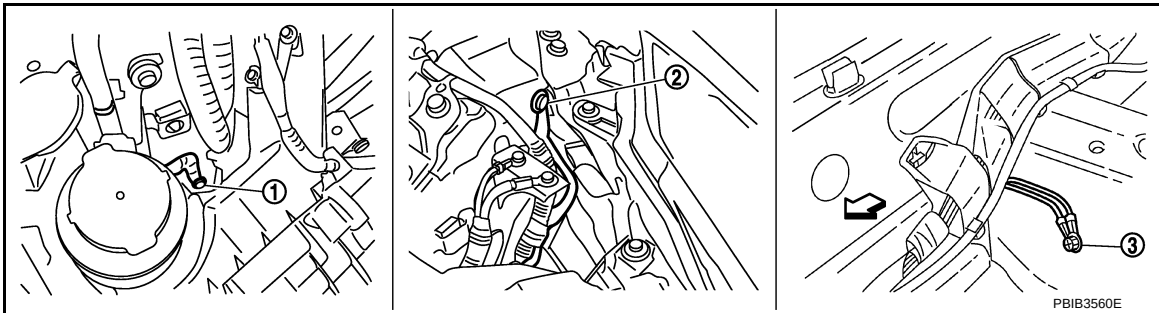
Diagnosis Procedure

INFOID:000000001645641

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

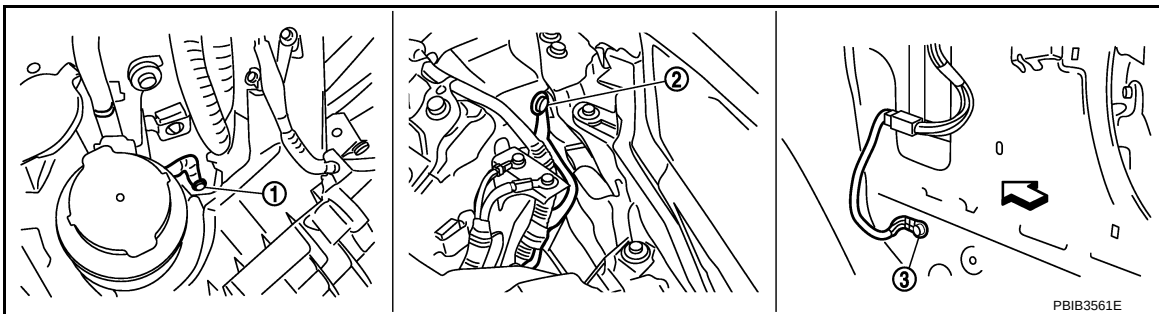
2. Body ground E43

3. Body ground B102

 Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

 Vehicle front

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-211, "Component Inspection"](#).

OK or NG

DTC P0127 IAT SENSOR

< SERVICE INFORMATION >

- OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1).

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

Refer to [EC-209](#), "Wiring Diagram".

>> **INSPECTION END**

Component Inspection

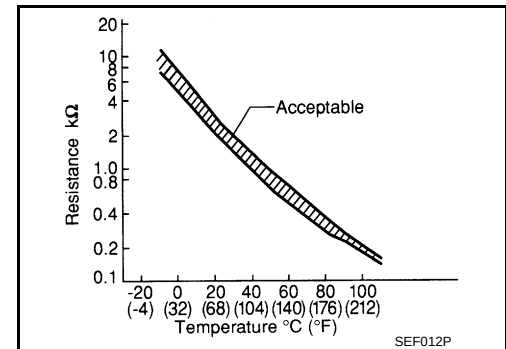
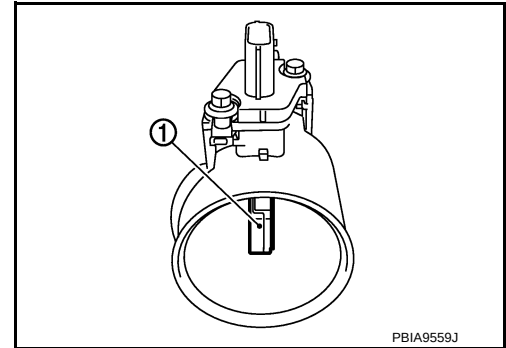
INFOID:0000000001645642

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (with intake air temperature sensor) (bank 1) (1) 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) (bank 1).



Removal and Installation

INFOID:0000000001645643

MASS AIR FLOW SENSOR

Refer to [EM-16](#).

DTC P0128 THERMOSTAT FUNCTION

< SERVICE INFORMATION >

DTC P0128 THERMOSTAT FUNCTION

On Board Diagnosis Logic

INFOID:000000001645644

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.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:000000001645645

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:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 68°C (154°F).

WITH CONSULT-III

1. Replace thermostat with new one. Refer to [CO-25](#). 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-III.
4. Check the indication of "COOLAN TEMP/S".
If it is below 68°C (154°F), go to following step.
If it is above 68°C (154°F), cool down the engine to less than 60°C (140°F), then go to next step.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-237. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:000000001645646

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-237. "Component Inspection"](#).

OK or NG

- OK >> **INSPECTION END**
- NG >> Replace engine coolant temperature sensor.

Component Inspection

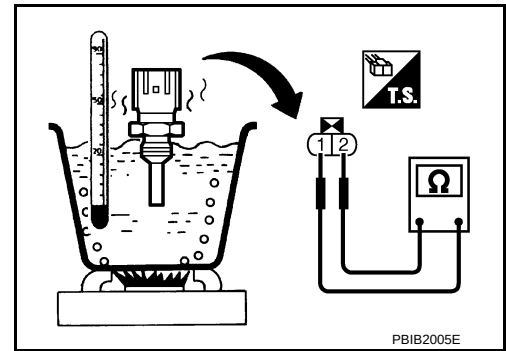
INFOID:000000001645647

ENGINE COOLANT TEMPERATURE SENSOR

DTC P0128 THERMOSTAT FUNCTION

< SERVICE INFORMATION >

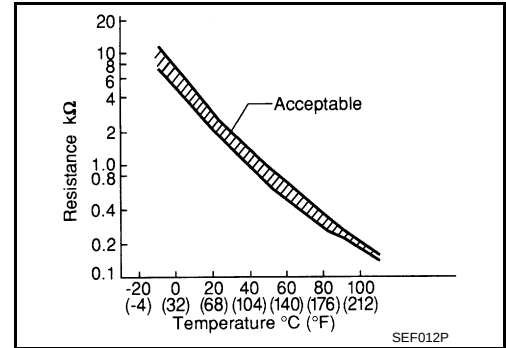
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.37 - 2.63
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



INFOID:000000001645648

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to [CO-27](#).

DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

DTC P0130, P0150 A/F SENSOR 1

Component Description

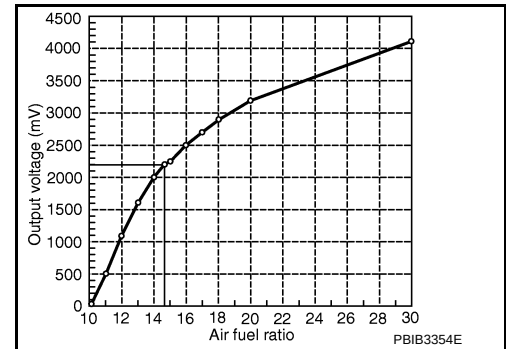
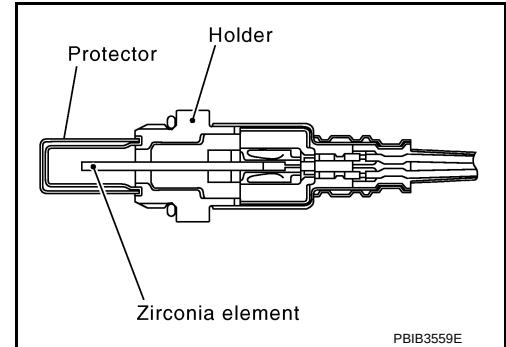
INFOID:0000000001645649

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645650

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:0000000001645651

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.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	
P0150 0150 (Bank 2)		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.	
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	

DTC Confirmation Procedure

INFOID:0000000001645652

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.

DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

TESTING CONDITION:

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

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for 2 minutes.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-244, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-III

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-III.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 2.2V and does not fluctuates, go to [EC-244, "Diagnosis Procedure"](#).
If the indication fluctuates around 2.2V, go to next step.
4. Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".
6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,100 - 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 (A/T) 5th position (M/T)

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

7. Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

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-244, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:0000000001645653

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 (A/T) or 5th position (M/T), 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-244, "Diagnosis Procedure"](#).

INFOID:0000000001645654

REFER TO PG-POWER.

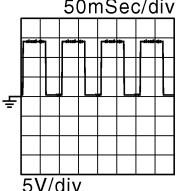


2008 350Z

DTC P0130, P0150 A/F SENSOR 1

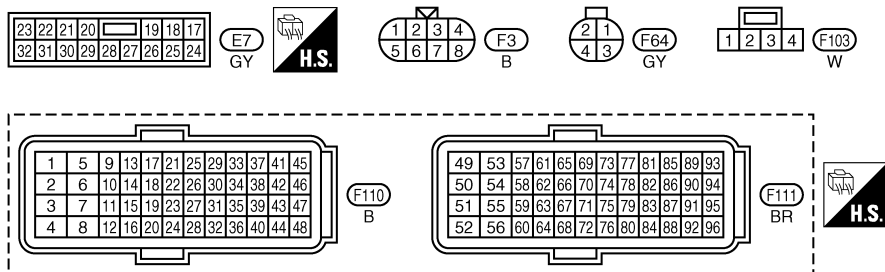
< SERVICE INFORMATION >

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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  5V/div PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

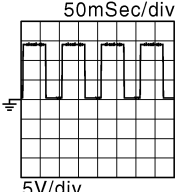
BANK 2



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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

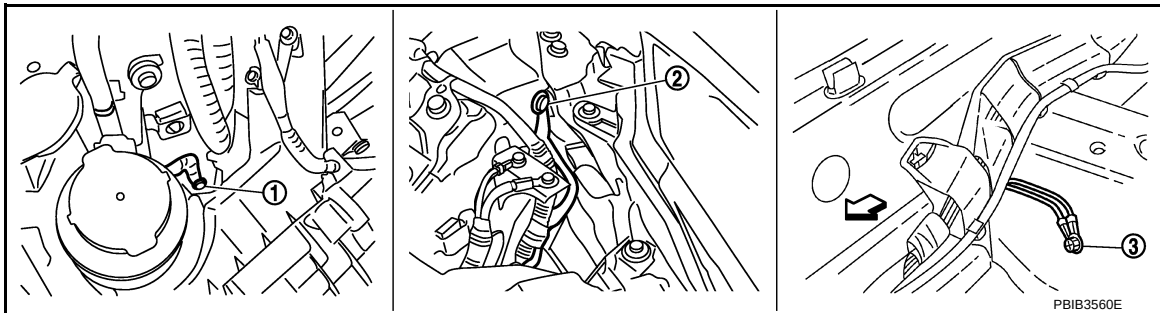
Diagnosis Procedure

INFOID:000000001645655

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

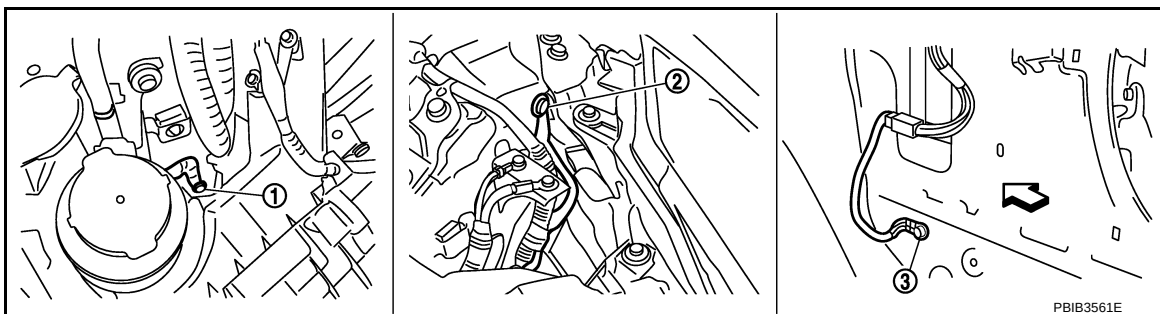
2. Body ground E43

3. Body ground B102

⇐: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩ Vehicle front

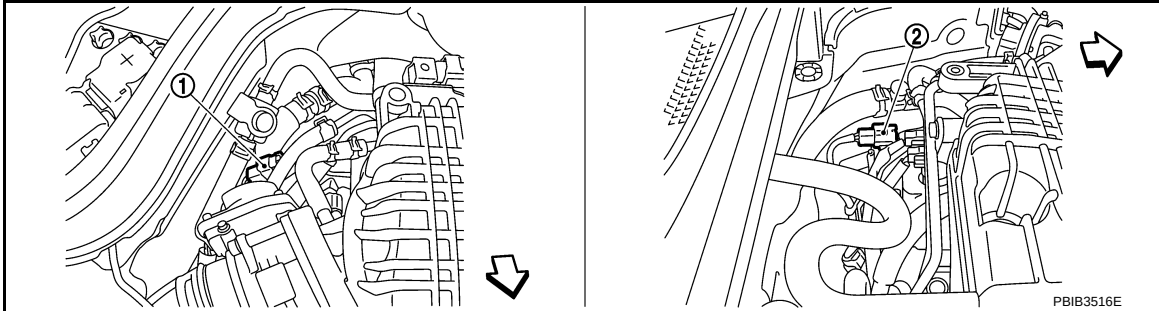
OK or NG

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.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

↩ Vehicle front

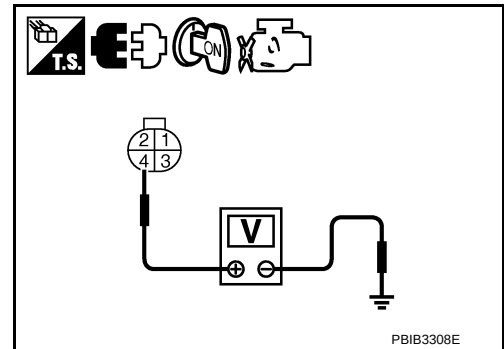
2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- 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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	57
	2	61

DTC P0130, P0150 A/F SENSOR 1

< SERVICE INFORMATION >

Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

Continuity should not exist.

5. 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-134](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

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

Replace malfunctioning 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:0000000001645656

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

DTC P0131, P0151 A/F SENSOR 1

Component Description

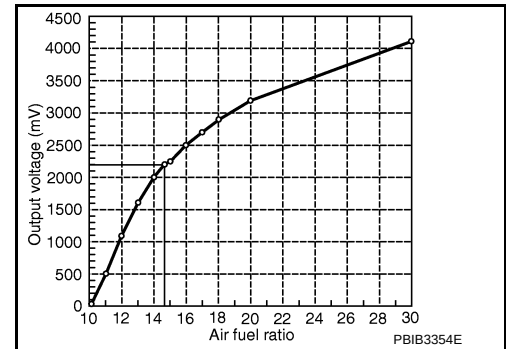
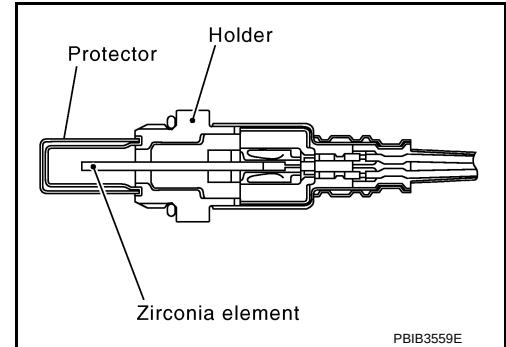
INFOID:000000001645657

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645658

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:000000001645659

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
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.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1
P0151 0151 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645660

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:

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

Ⓜ WITH CONSULT-III

DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

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-III.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 0V, go to [EC-252. "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.

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
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
 - If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.
7. Check 1st trip DTC.
 8. If 1st trip DTC is displayed, go to [EC-252. "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT-III" above.

DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

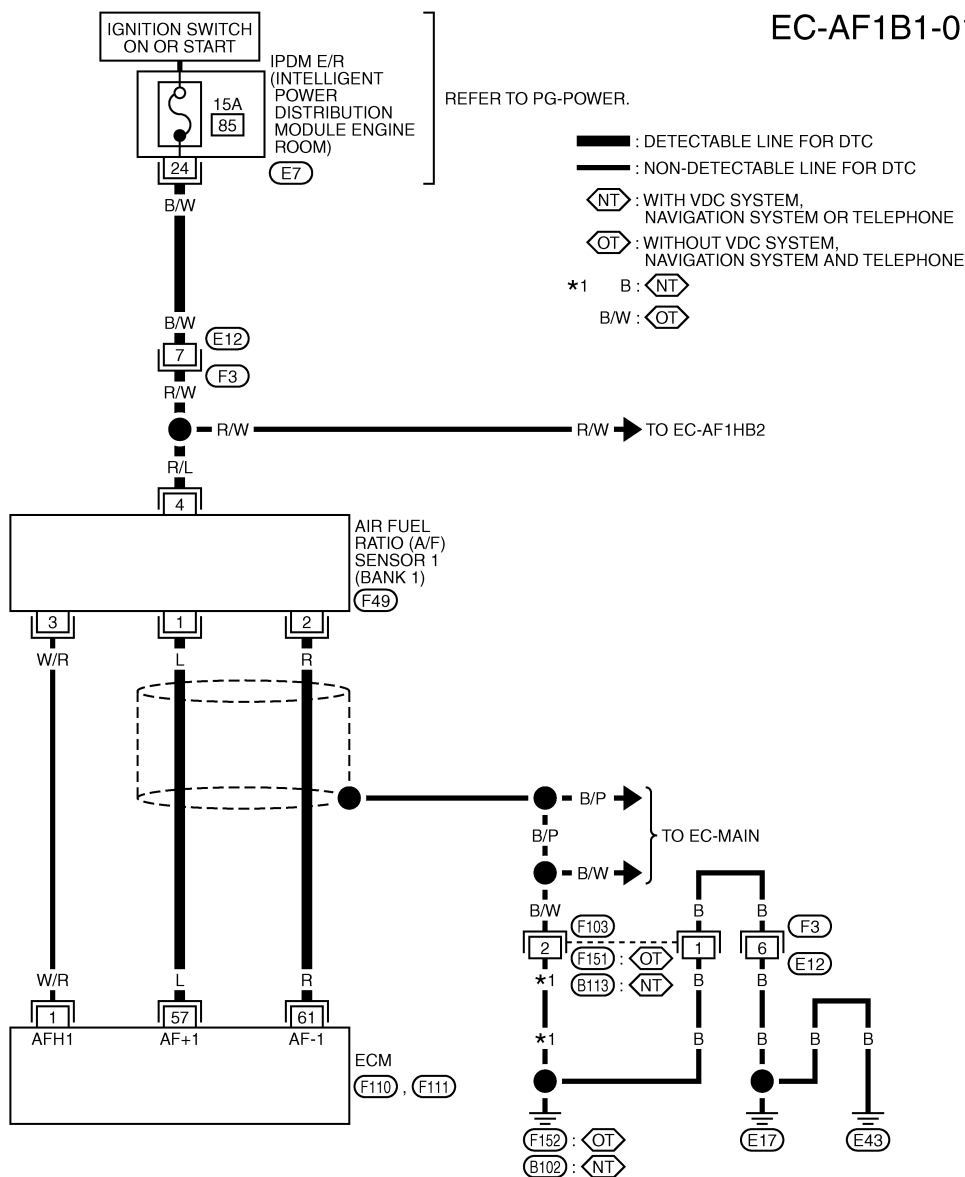
Wiring Diagram

INFOID:000000001645661

BANK 1

EC-AF1B1-01

EC



23	22	21	20	19	18	17
32	31	30	29	28	27	26
25	24					



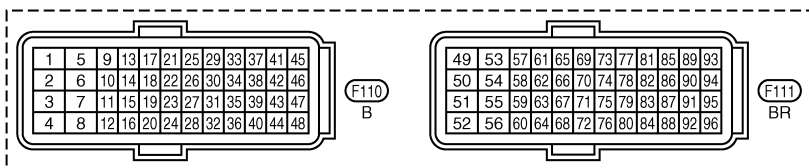
1	2	3	4
5	6	7	8



2	1
4	3



1	2	3	4



TBWT1632E

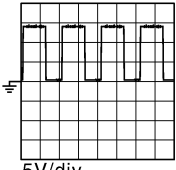
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

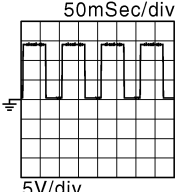
BANK 2



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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

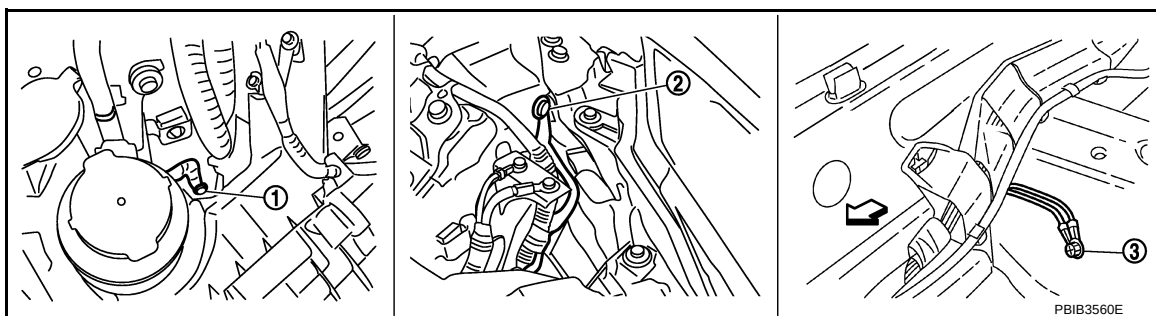
Diagnosis Procedure

INFOID:000000001645662

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .



1. Body ground E17

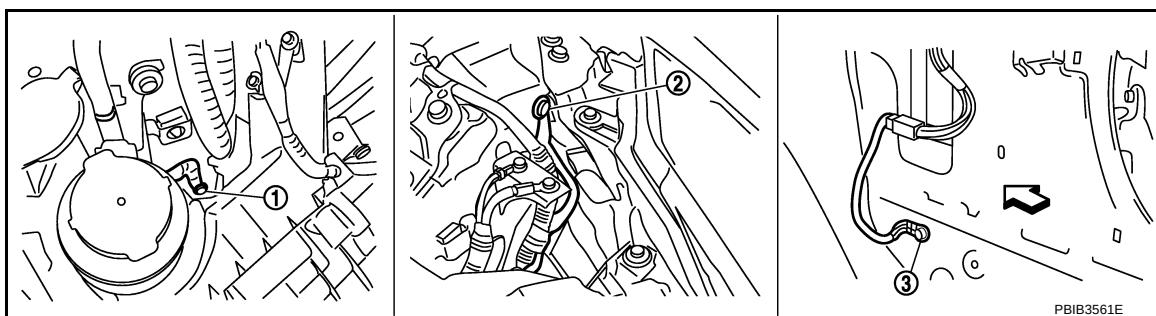
2. Body ground E43

3. Body ground B102

↶: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .



DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

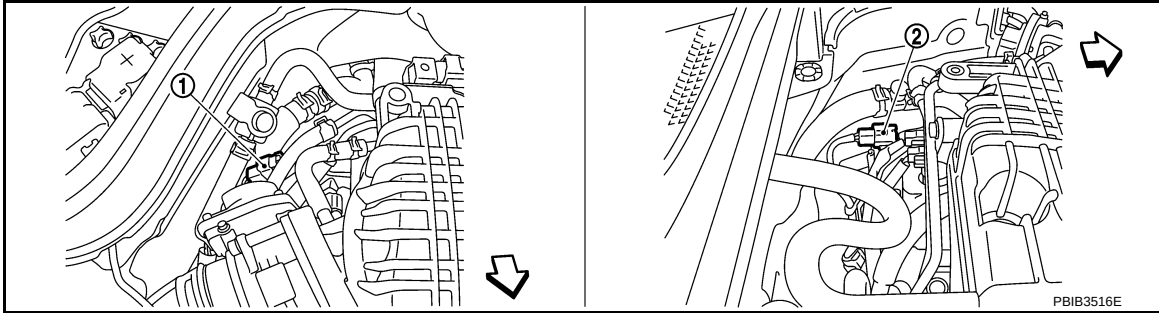
↩ Vehicle front

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.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

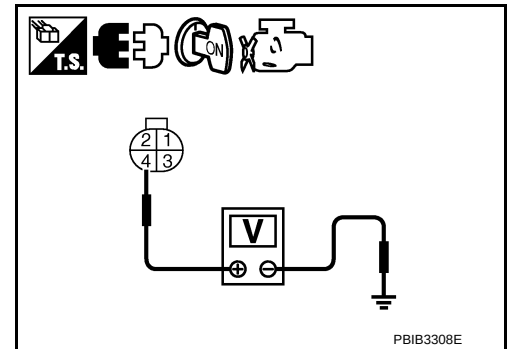
↩ Vehicle front

2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III 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 E12, F3
- 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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	57
	2	61

DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

Continuity should not exist.

5. 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-134](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

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

Replace malfunctioning 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:0000000001645663

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P0132, P0152 A/F SENSOR 1

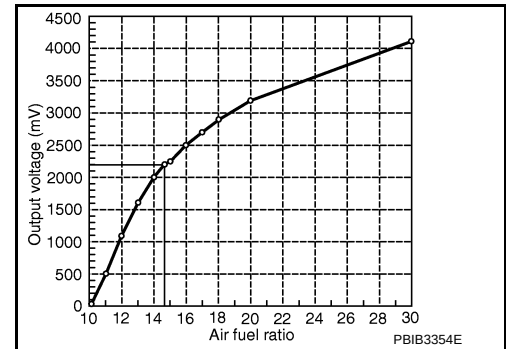
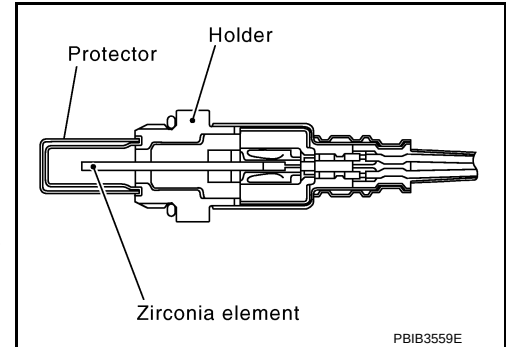
< SERVICE INFORMATION >

DTC P0132, P0152 A/F SENSOR 1

Component Description

INFOID:000000001645664

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich. Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645665

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:000000001645666

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
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.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1
P0152 0152 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645667

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:

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

Ⓛ WITH CONSULT-III

DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

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-III.
3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
If the indication is constantly approx. 5V, go to [EC-260. "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.

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
Shift lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
 - If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.
7. Check 1st trip DTC.
 8. If 1st trip DTC is displayed, go to [EC-260. "Diagnosis Procedure"](#).



WITH GST

Follow the procedure "WITH CONSULT-III" above.

DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

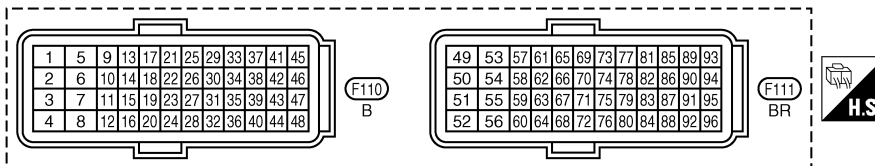
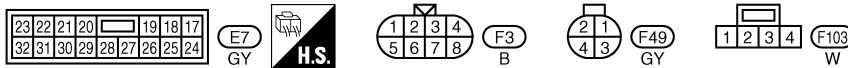
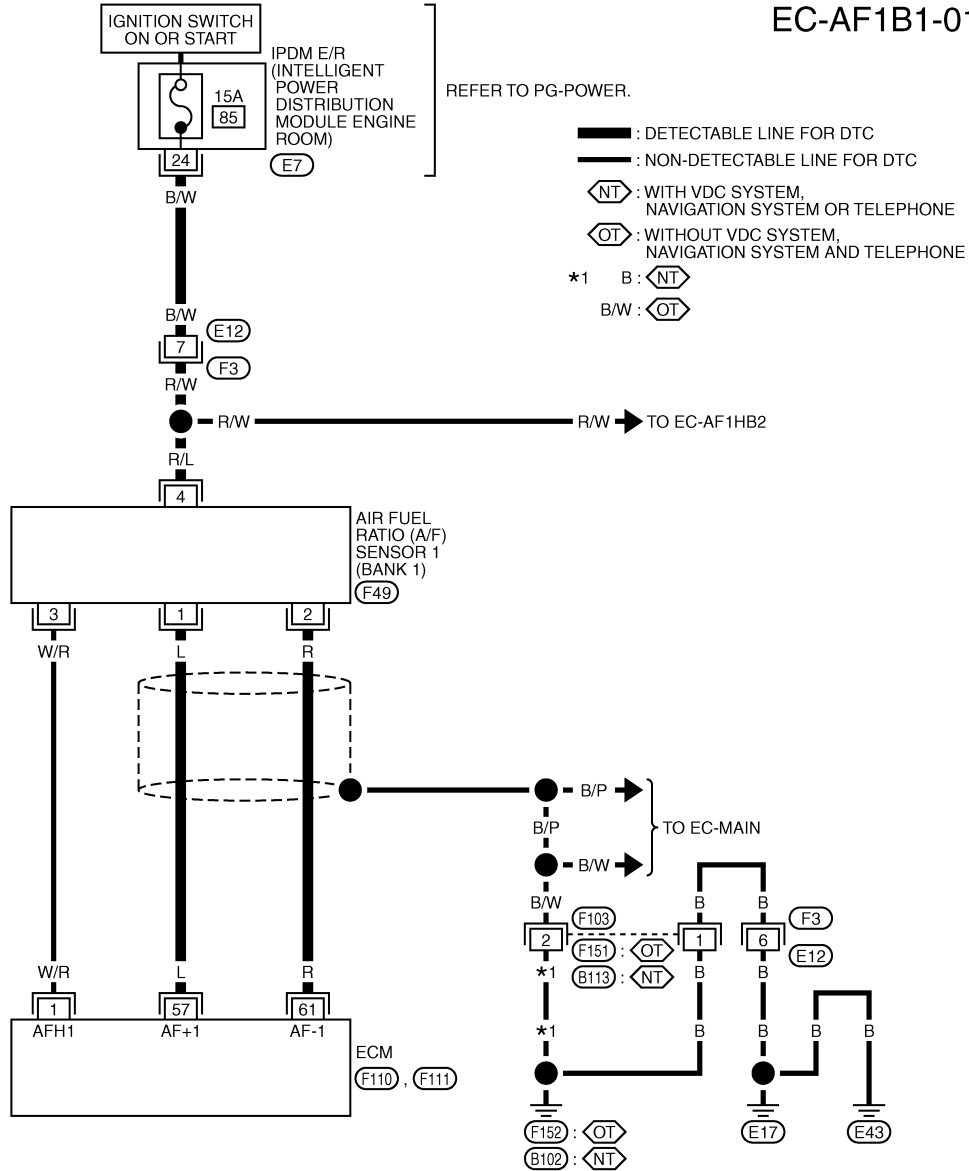
Wiring Diagram

INFOID:000000001645668

BANK 1

EC-AF1B1-01

EC



TBWT1632E

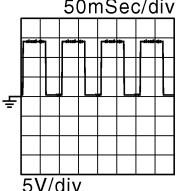
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  5V/div PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

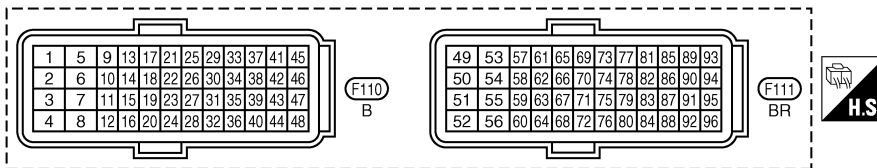
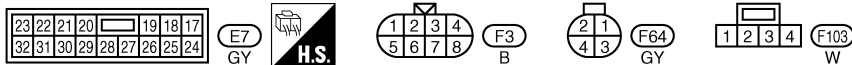
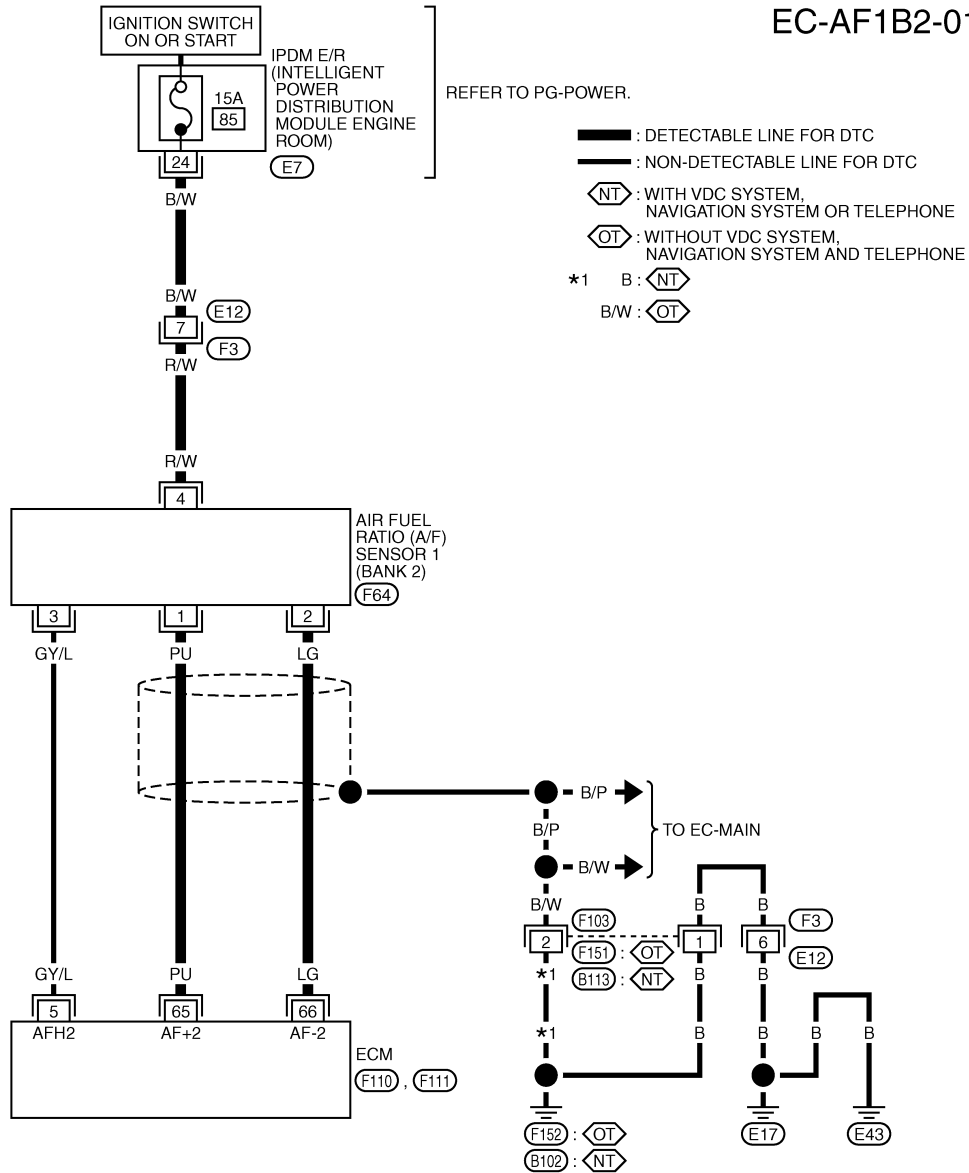
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



TBWT1633E

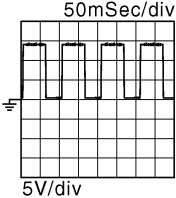
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

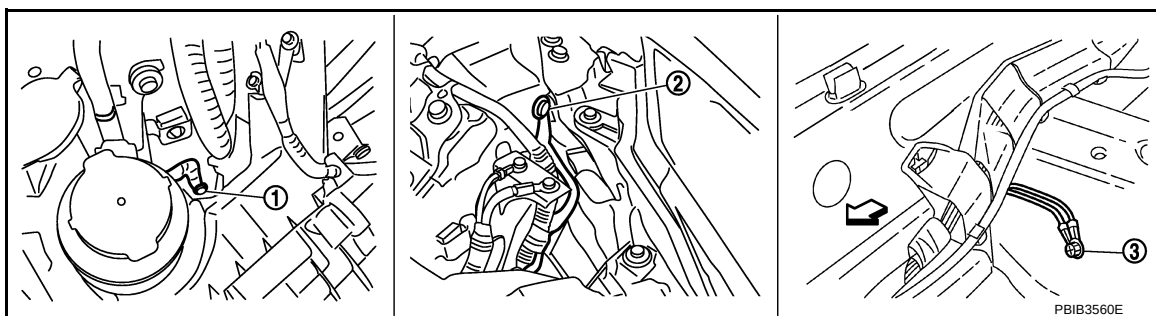
Diagnosis Procedure

INFOID:000000001645669

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .



1. Body ground E17

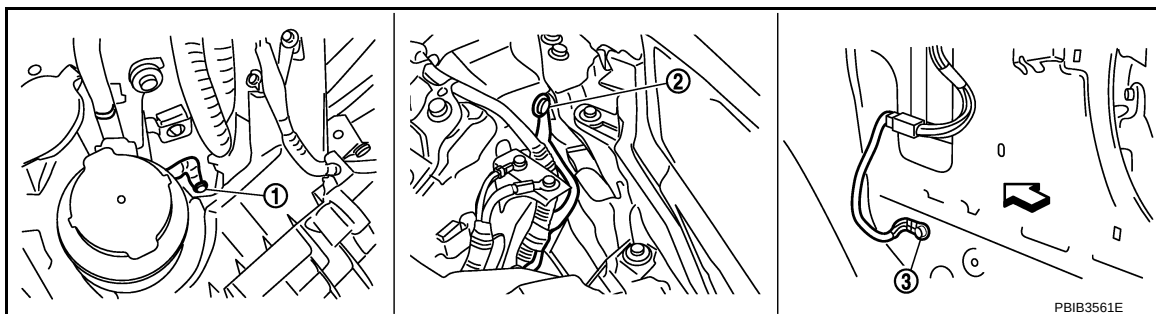
2. Body ground E43

3. Body ground B102

↶: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .



DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

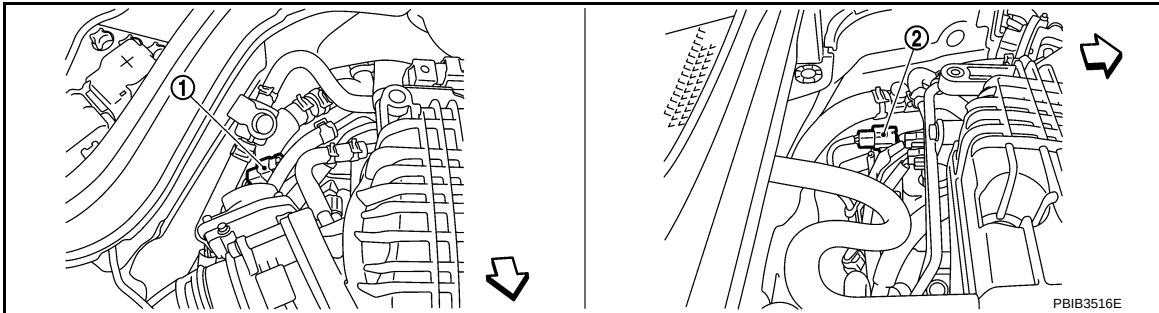
↩ Vehicle front

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.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

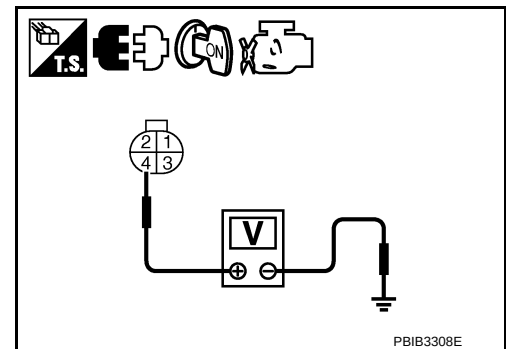
↩ Vehicle front

2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III 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 E12, F3
- 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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	57
	2	61

DTC P0132, P0152 A/F SENSOR 1

< SERVICE INFORMATION >

Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

Continuity should not exist.

5. 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-134](#).

OK or NG

OK >> GO TO 6.

NG >> Repair or replace.

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

Replace malfunctioning 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:0000000001645670

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

DTC P0133, P0153 A/F SENSOR 1

Component Description

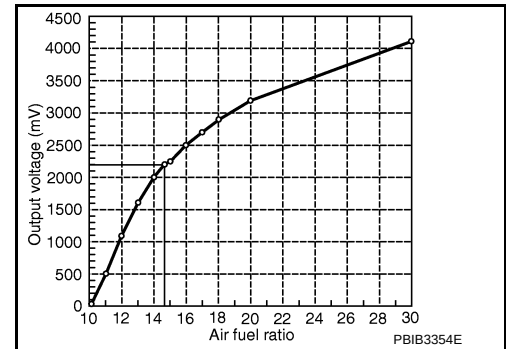
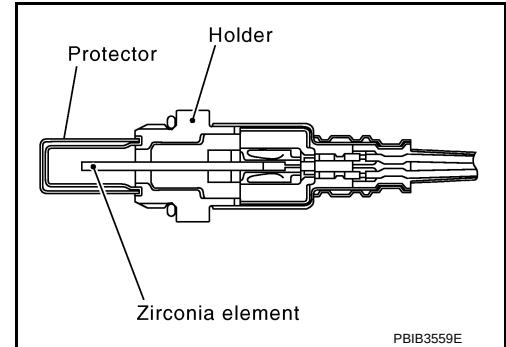
INFOID:0000000001645671

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645672

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:0000000001645673

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.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor
P0153 0153 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000001645674

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-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B2) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
6. Touch "START".
If "COMPLETED" appears on CONSULT-III screen, go to step 10.
If "COMPLETED" does not appear on CONSULT-III screen, go to the following step.
7. After perform the following procedure, "TESTING" will be displayed on the CONSULT-III 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-126](#).
8. Wait for about 20 seconds at idle at under the condition that "TESTING" is displayed on the CONSULT-III screen.
9. Make sure that "TESTING" changes to "COMPLETED".
If "TESTING" changed to "OUT OF CONDITION", refer to [EC-126](#).
10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULT".
If "NG" is displayed, go to [EC-268, "Diagnosis Procedure"](#).

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
 - 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 1st trip DTC is detected, go to [EC-268, "Diagnosis Procedure"](#).

DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

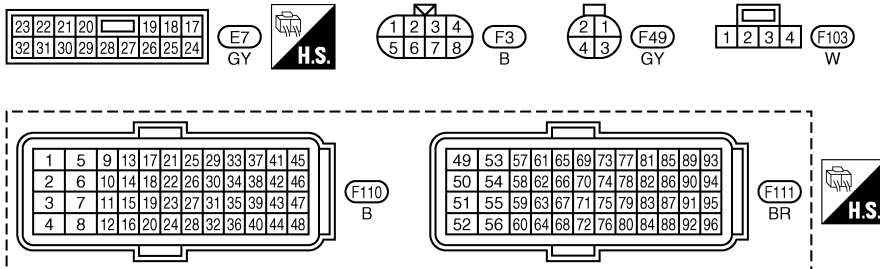
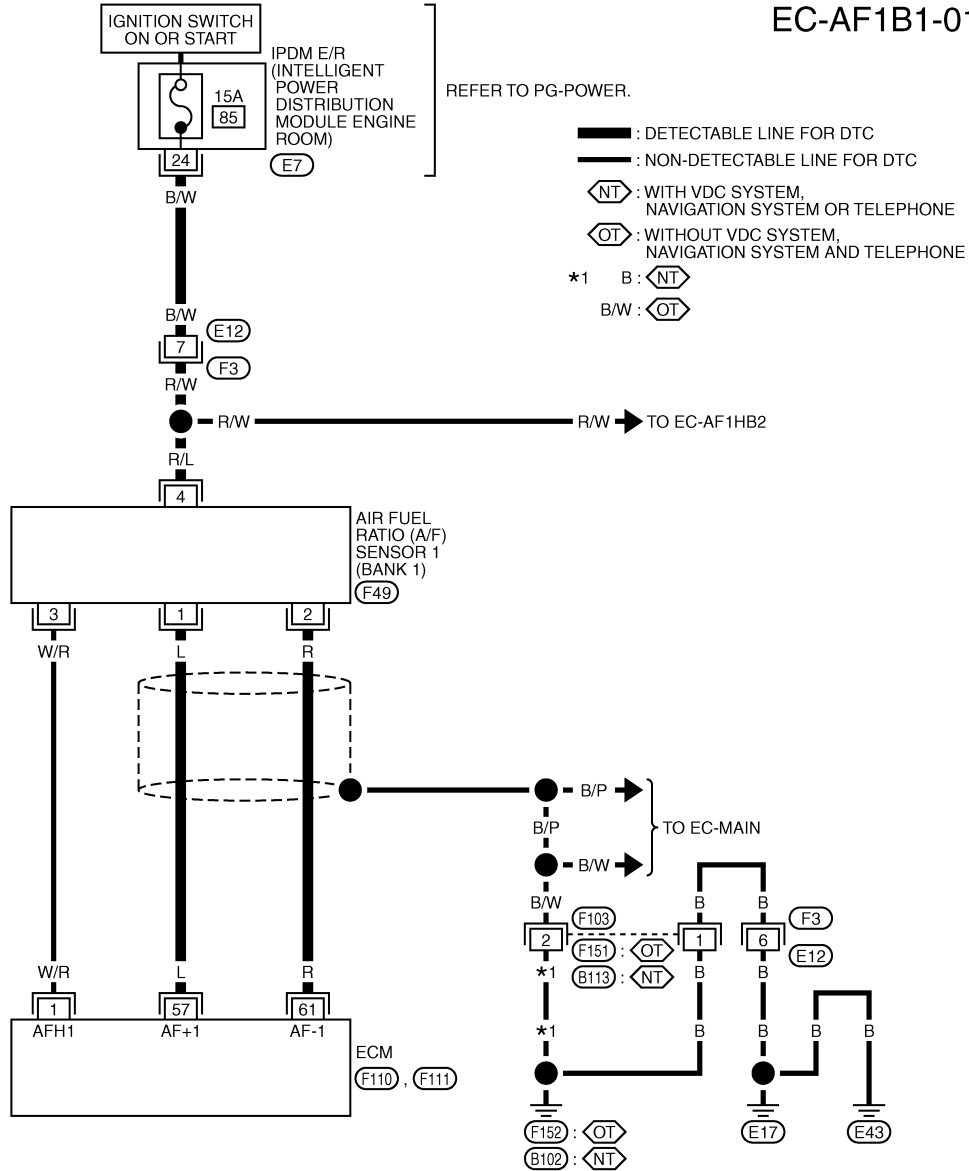
Wiring Diagram

INFOID:000000001645675

BANK 1

EC-AF1B1-01

EC



TBWT1632E

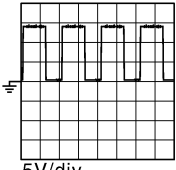
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

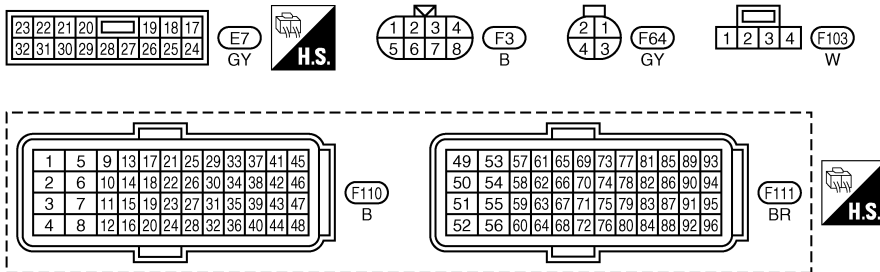
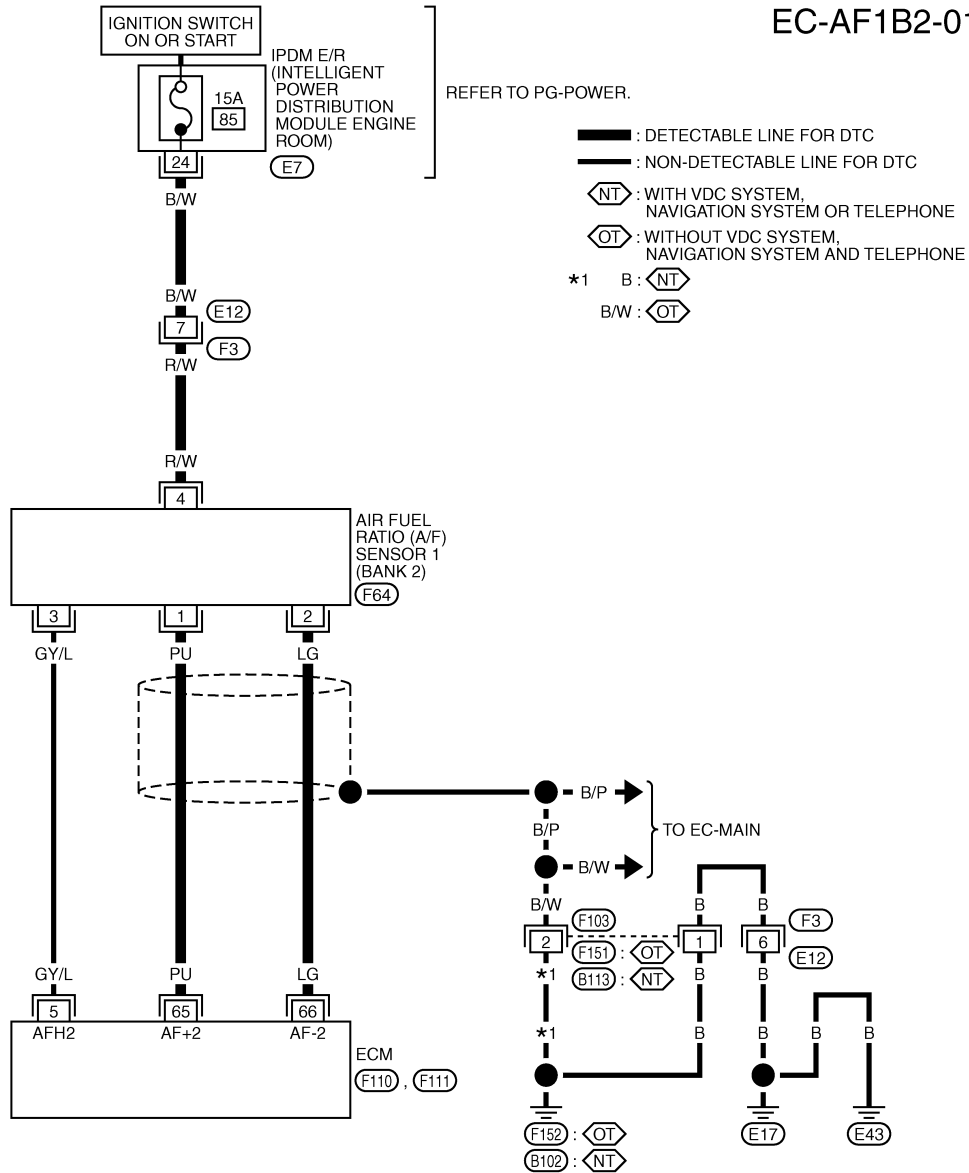
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



TBWT1633E

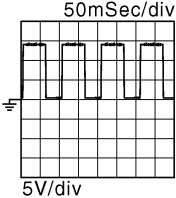
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

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)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

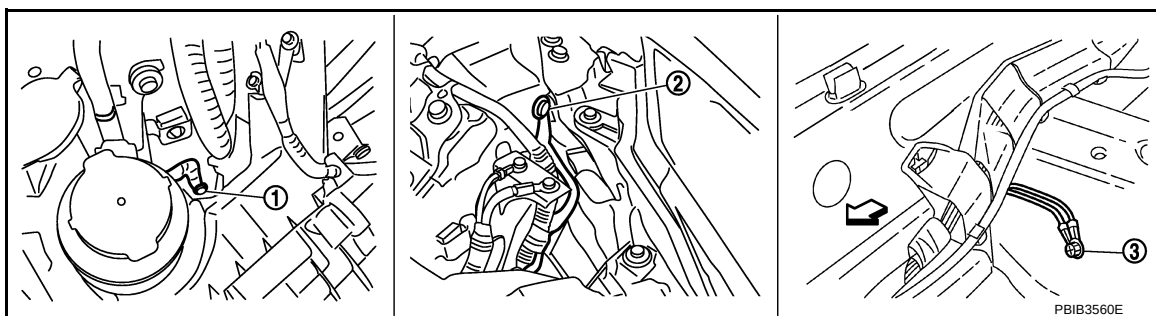
Diagnosis Procedure

INFOID:000000001645676

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

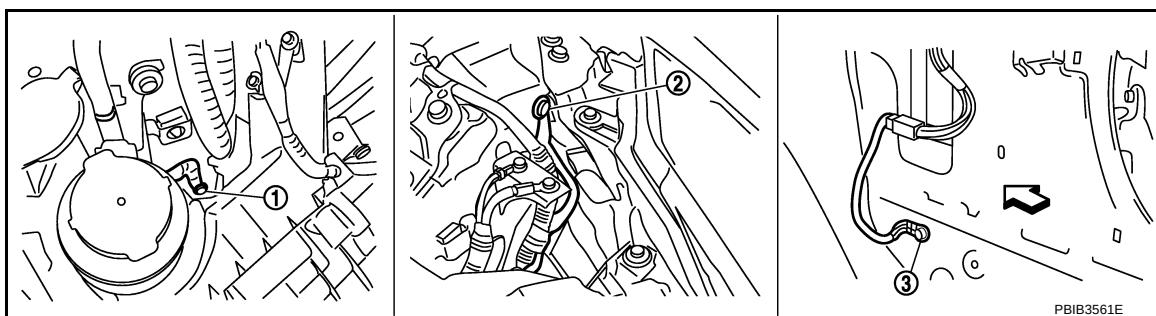
2. Body ground E43

3. Body ground B102

↶: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩: Vehicle front

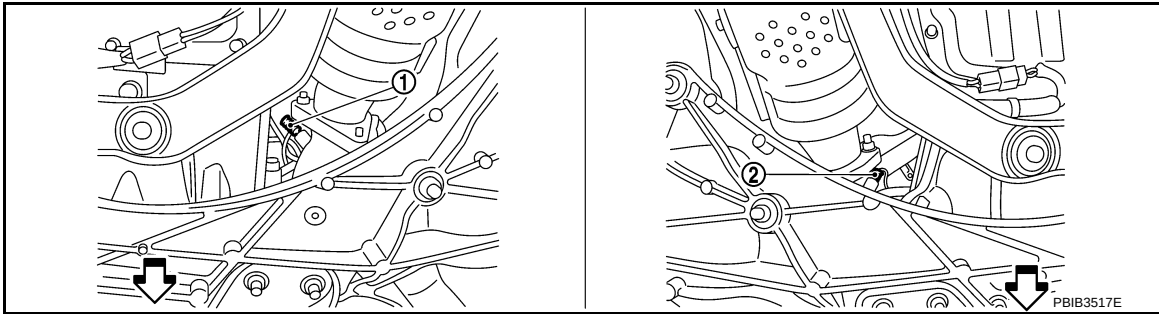
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to [EM-23, "Removal and Installation"](#)



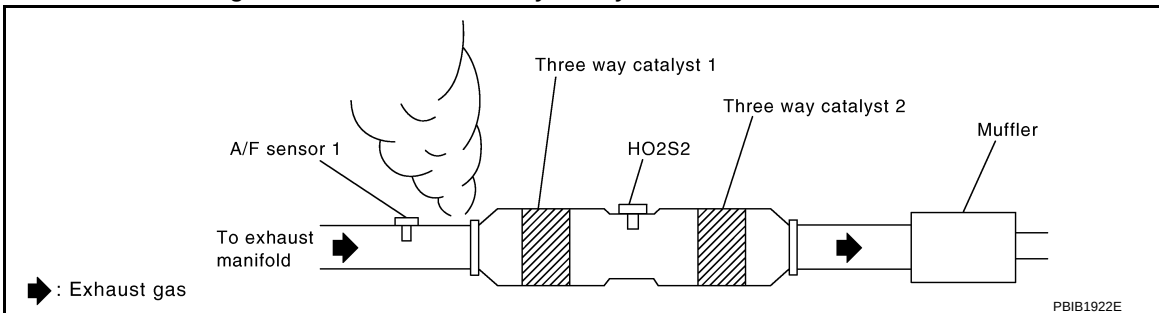
1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)

↩: Vehicle front

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



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-III

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR" or "START".
4. Run engine for at least 10 minutes at idle speed.

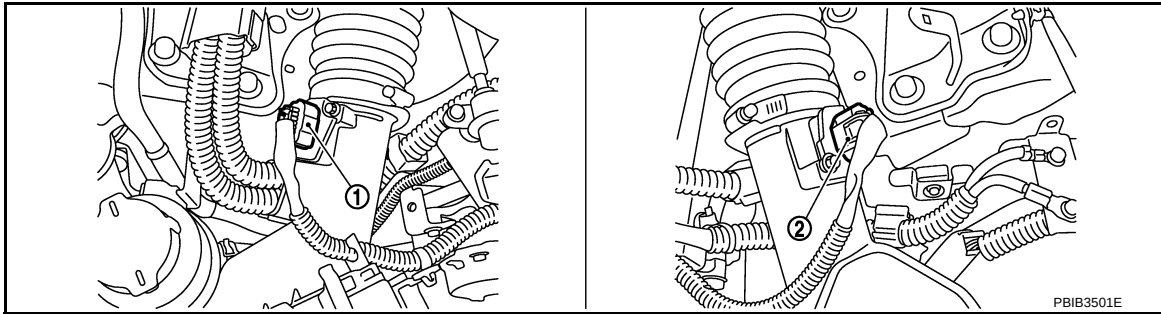
Is the 1st trip DTC P0171, P0174 or P0172 or P0175 detected? Is it difficult to start engine?

DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

⊗ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector.



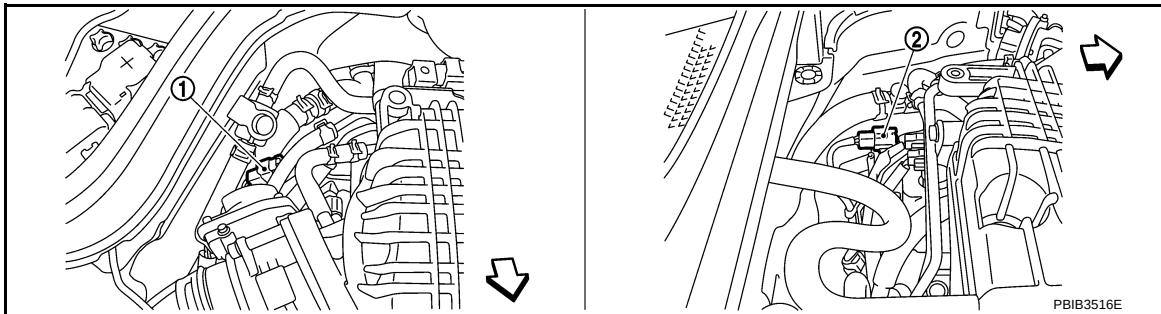
1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-46, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171, P0174 or P0172 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-306](#) or [EC-317](#).
No >> GO TO 6.

6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.



1. A/F sensor 1 harness connector (bank 1)
2. A/F sensor 1 harness connector (bank 2)

↔ Vehicle front

3. Turn ignition switch ON.

DTC P0133, P0153 A/F SENSOR 1

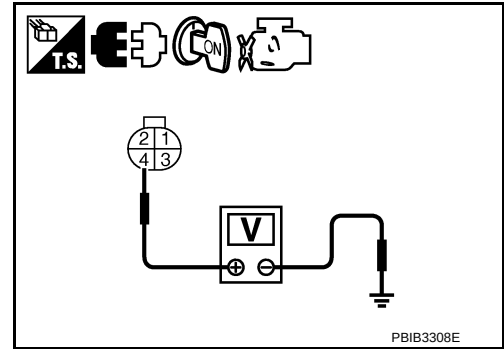
< SERVICE INFORMATION >

4. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III 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 E12, F3
- 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 the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	57
	2	61
Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

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 AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162. "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
NG >> Replace malfunctioning A/F sensor 1.

10.CHECK MASS AIR FLOW SENSOR

DTC P0133, P0153 A/F SENSOR 1

< SERVICE INFORMATION >

Refer to [EC-196, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace malfunctioning mass air flow sensor.

11.CHECK PCV VALVE

Refer to [EC-42](#).

OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

12.CHECK INTERMITTENT INCIDENT

Perform [EC-134](#).

OK or NG

OK >> GO TO 13.

NG >> Repair or replace.

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

Replace malfunctioning 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:0000000001645677

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

DTC P0137, P0157 HO2S2

Component Description

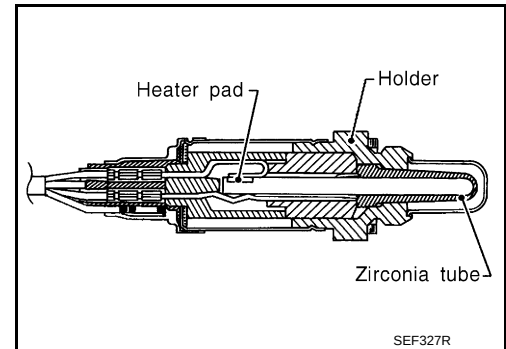
INFOID:000000001645678

The heated oxygen sensor 2, after three way catalyst 1, 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-III Reference Value in Data Monitor Mode

INFOID:000000001645679

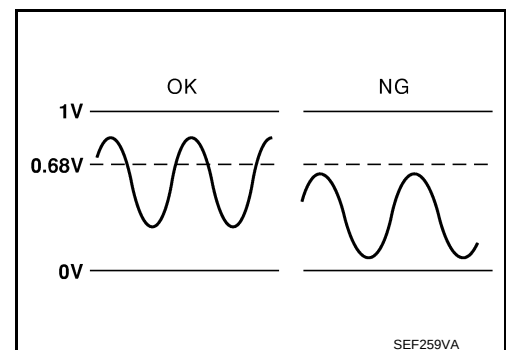
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	- 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 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR(B1) HO2S2 MNTR(B2)	- 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	LEAN ↔ RICH

On Board Diagnosis Logic

INFOID:000000001645680

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 before the three way catalyst 1 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.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks
P0157 0157 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645681

NOTE:

DTC P0137, P0157 HO2S2

< 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.

WITH CONSULT-III

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-III
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-III.
9. Start engine and following the instruction of CONSULT-III.

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-278, "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.

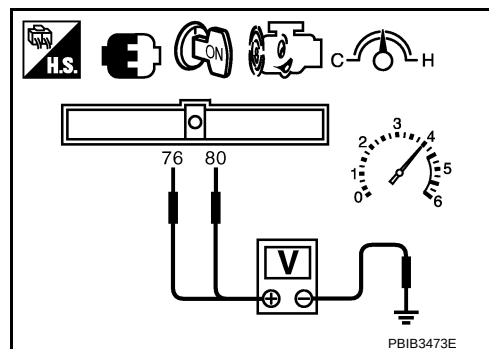
Overall Function Check

INFOID:000000001645682

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 76 [HO2S2 (B1) signal] or 80 [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 0.68V 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 (A/T), 4th gear position (M/T).
The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to [EC-278, "Diagnosis Procedure"](#).



DTC P0137, P0157 HO2S2

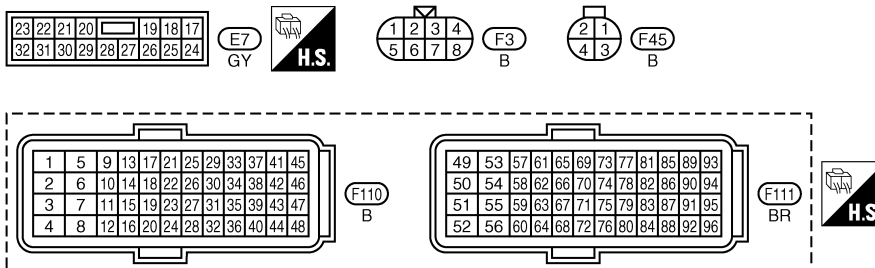
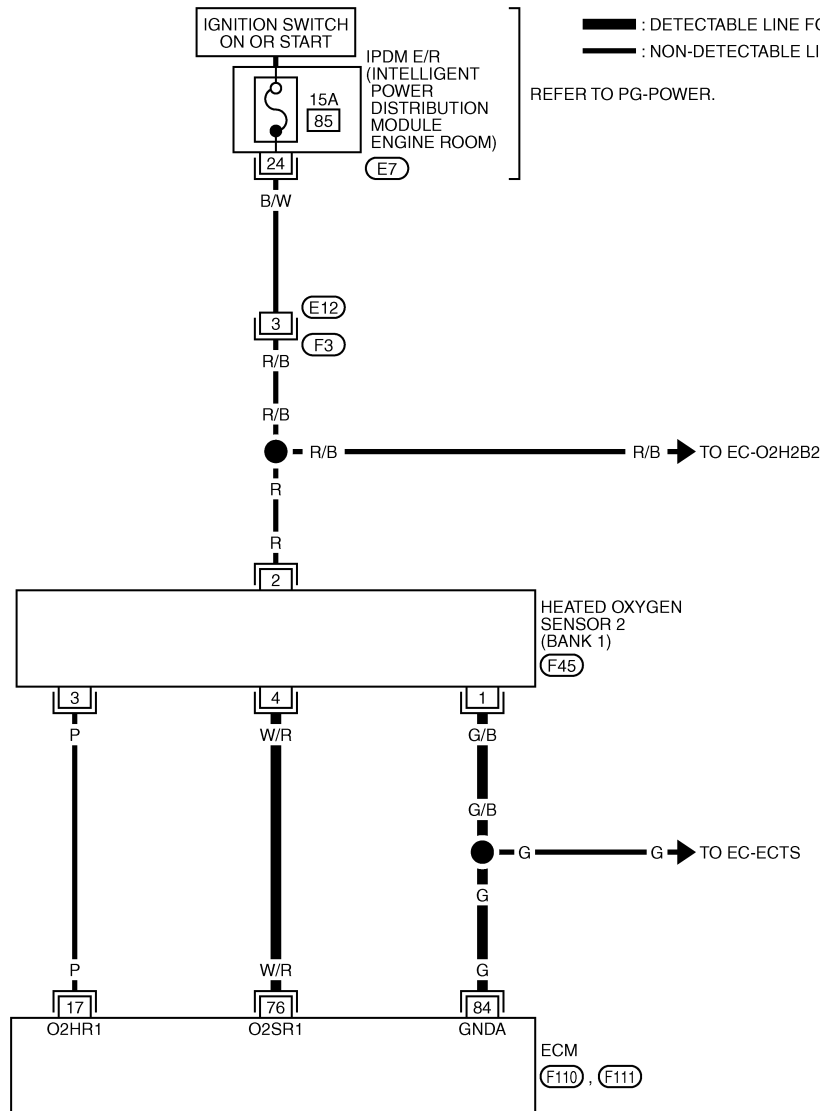
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645683

BANK 1

EC-O2S2B1-01



TBWT1634E

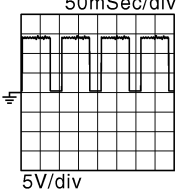
Specification data are reference values and are measured between each terminal and ground.

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 >

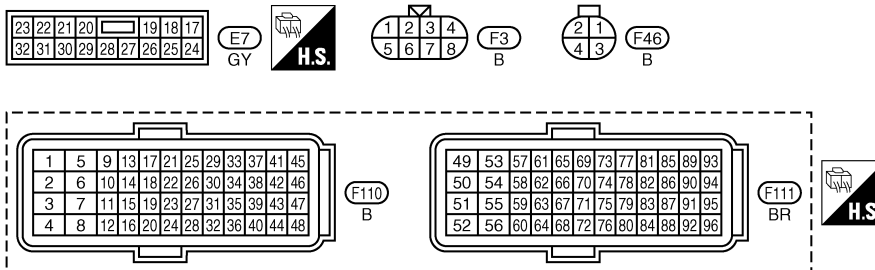
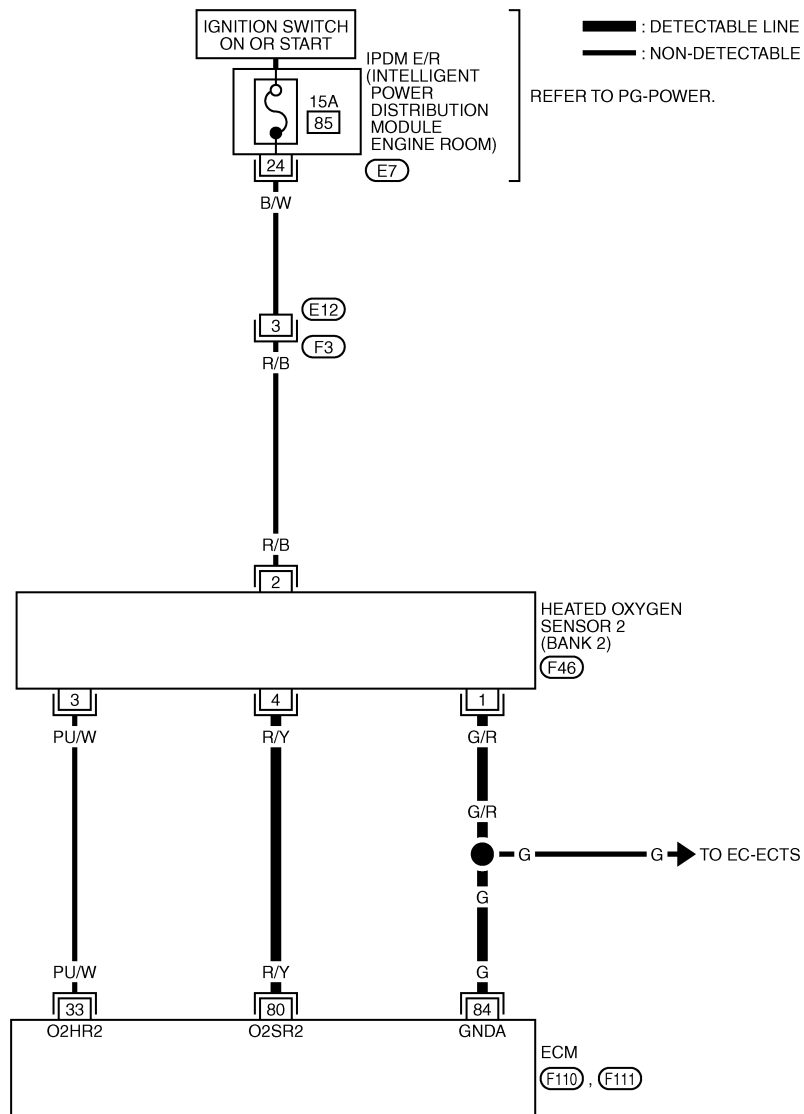
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	P	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★  5V/div PBIB3545E
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
76	W/R	Heated oxygen sensor 2 (bank 1)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil tempera- ture sensor)	[Engine is running] Warm-up condition - Idle speed	0V

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



TBWT1635E

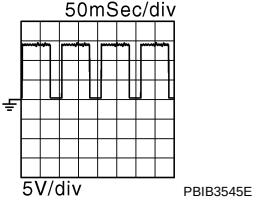
Specification data are reference values and are measured between each terminal and ground.

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)
33	PU/W	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
80	R/Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] - Revvng engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

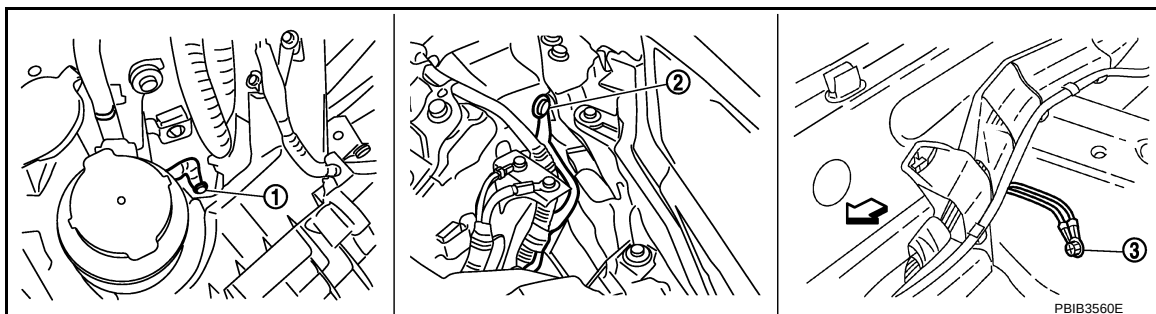
Diagnosis Procedure

INFOID:000000001645684

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

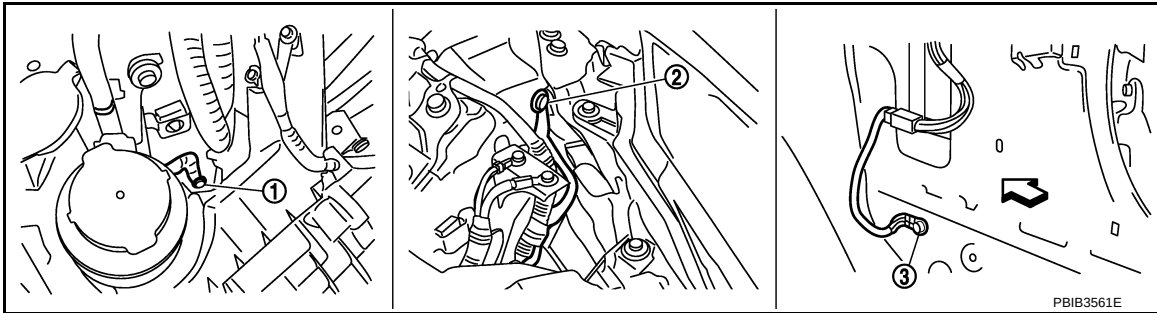
←: Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

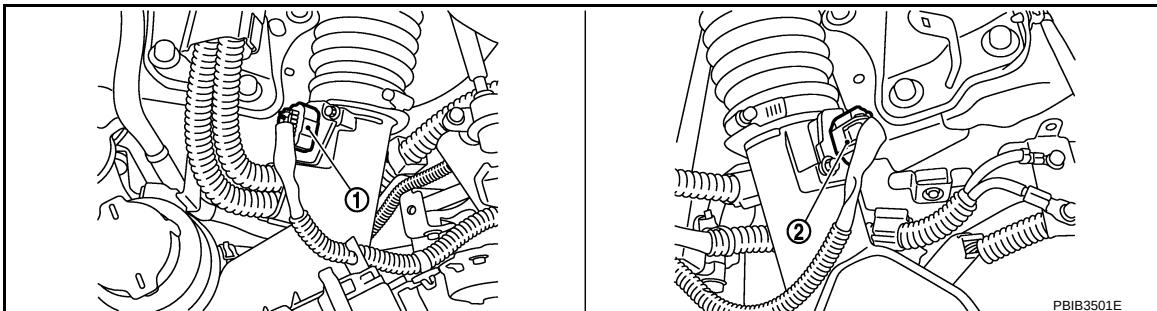
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0174 detected?

Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector, and restart and run engine for at least 5 seconds at idle speed.



1. Mass air flow sensor (with intake air
temperature sensor) (bank 1)

2. Mass air flow sensor (with intake air
temperature sensor) (bank 2)

4. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
 5. Make sure DTC P0102 is displayed.
 6. Erase the DTC memory. Refer to [EC-46, "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-306](#).

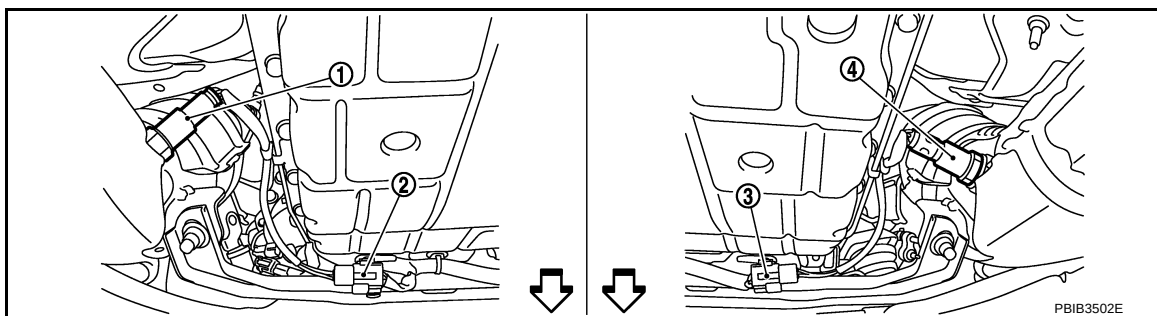
No >> GO TO 3.

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1) harness connector

←: Vehicle front

4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 84.
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	
P0137	76	4	1
P0157	80	4	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	76	4	1
P0157	80	4	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

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-281](#), "Component Inspection".

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

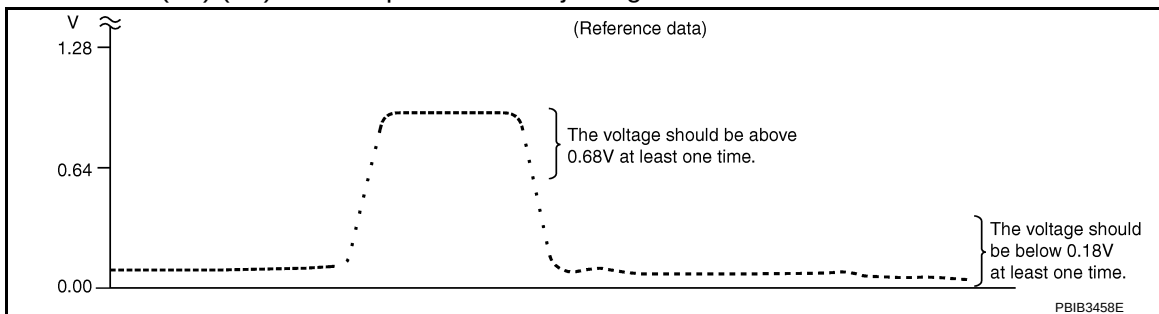
Component Inspection

INFOID:000000001645685

HEATED OXYGEN SENSOR 2

① With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
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. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V 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.

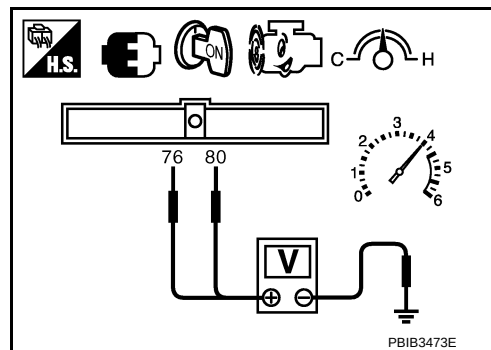
⊗ Without CONSULT-III

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 76 [HO2S2 (B1) signal] or 80 [HO2S2 (B2) signal] and ground.

DTC P0137, P0157 HO2S2

< SERVICE INFORMATION >

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 0.68V at least once during this procedure.
If the voltage is above 0.68V 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 (A/T), 4th gear position (M/T).
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:0000000001645686

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

DTC P0138, P0158 HO2S2

Component Description

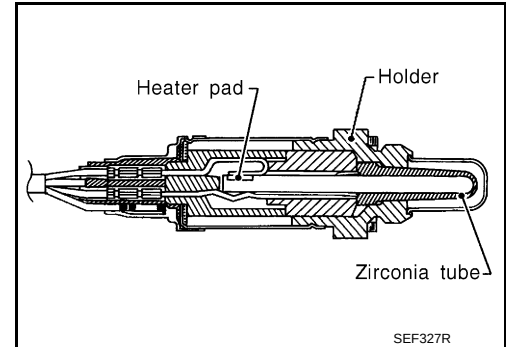
INFOID:000000001645687

The heated oxygen sensor 2, after three way catalyst 1, 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-III Reference Value in Data Monitor Mode

INFOID:000000001645688

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	- 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 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR(B1) HO2S2 MNTR(B2)	- 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	LEAN ↔ RICH

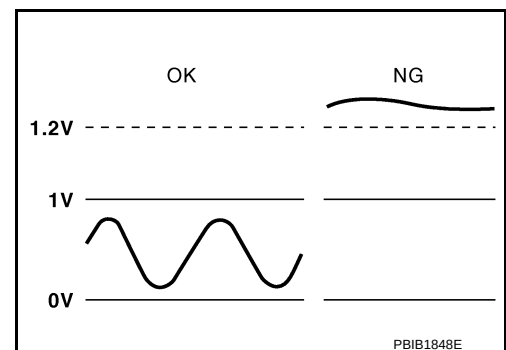
On Board Diagnosis Logic

INFOID:000000001645689

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time.

MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

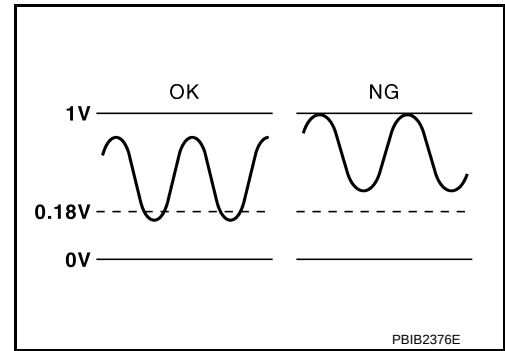


MALFUNCTION B

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
P0158 0158 (Bank 2)		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC Confirmation Procedure

INFOID:000000001645690

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

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 2 minutes.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-289, "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

With CONSULT-III

TESTING CONDITION:

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

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. 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).
6. Open engine hood.
7. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
8. Start engine and following the instruction of CONSULT-III.

NOTE:

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

9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If "NG" is displayed, refer to [EC-289, "Diagnosis Procedure"](#).

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

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

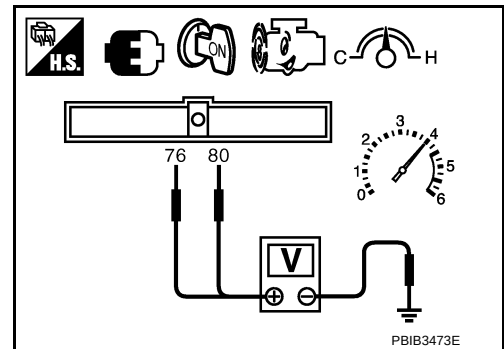
INFOID:0000000001645691

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 76 [HO2S2 (B2) signal] or 80 [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-289, "Diagnosis Procedure"](#).



DTC P0138, P0158 HO2S2

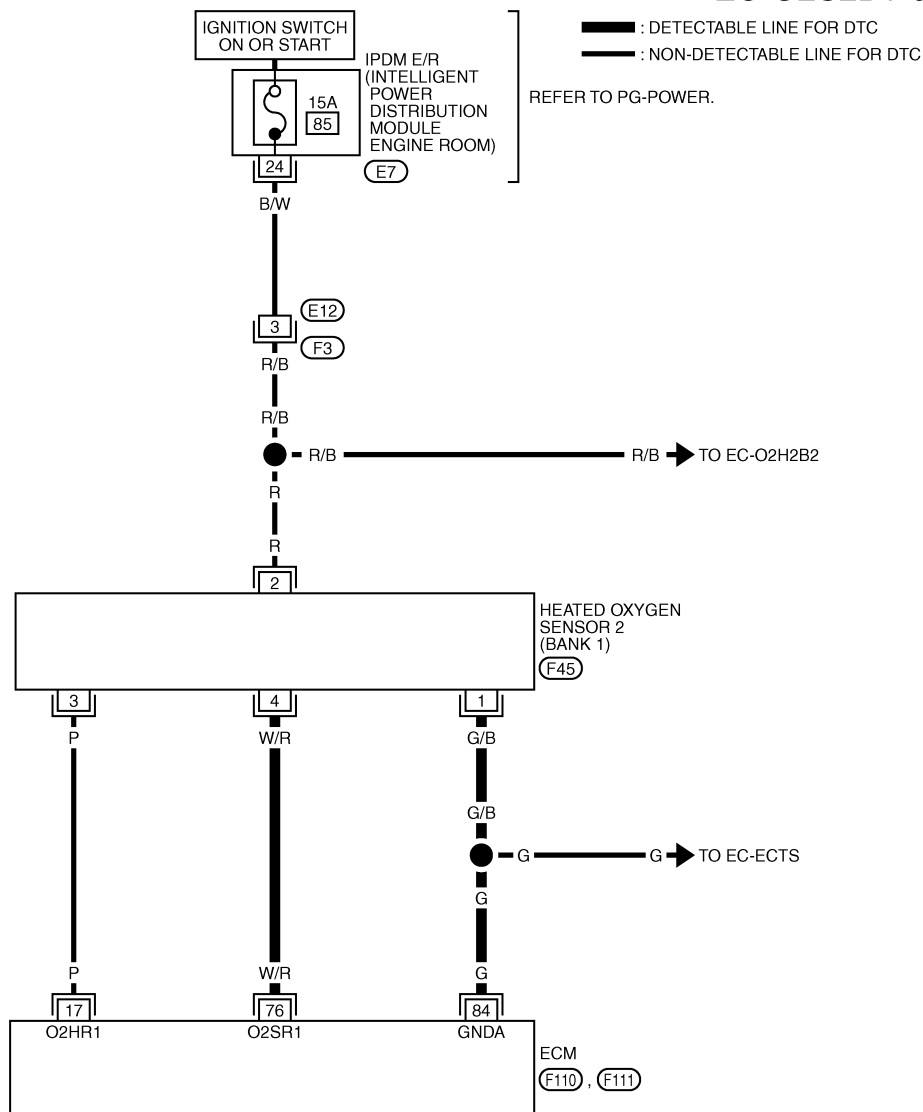
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645692

BANK 1

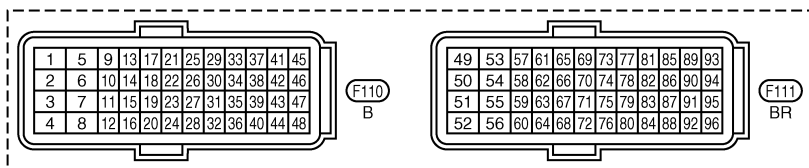
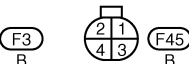
EC-O2S2B1-01



23	22	21	20	19	18	17
32	31	30	29	28	27	26
25	24					



1	2	3	4
5	6	7	8



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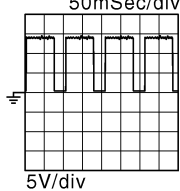
Specification data are reference values and are measured between each terminal and ground.

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 P0138, P0158 HO2S2

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	P	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
76	W/R	Heated oxygen sensor 2 (bank 1)	[Engine is running] - Revsing engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

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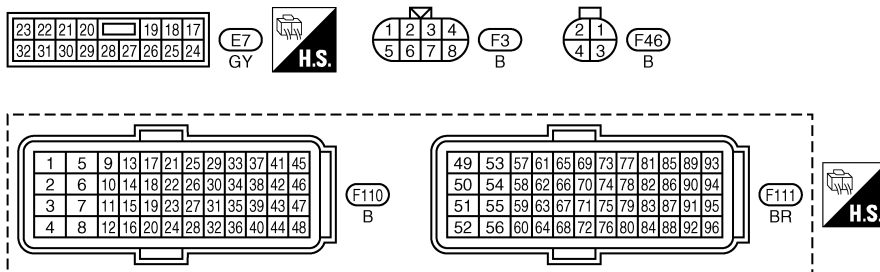
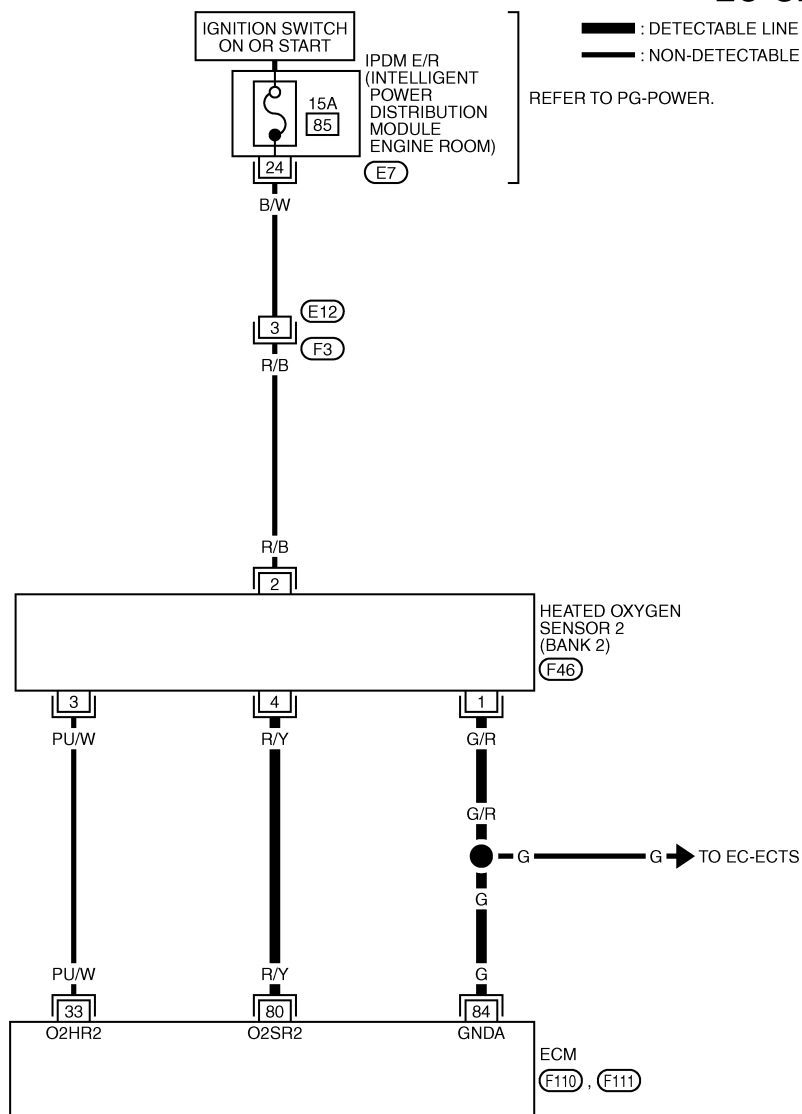
P

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

BANK 2

EC-O2S2B2-01



TBWT1635E

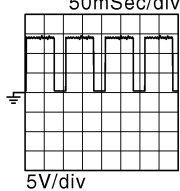
Specification data are reference values and are measured between each terminal and ground.

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)
33	PU/W	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
80	R/Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] - Revsing engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

Diagnosis Procedure

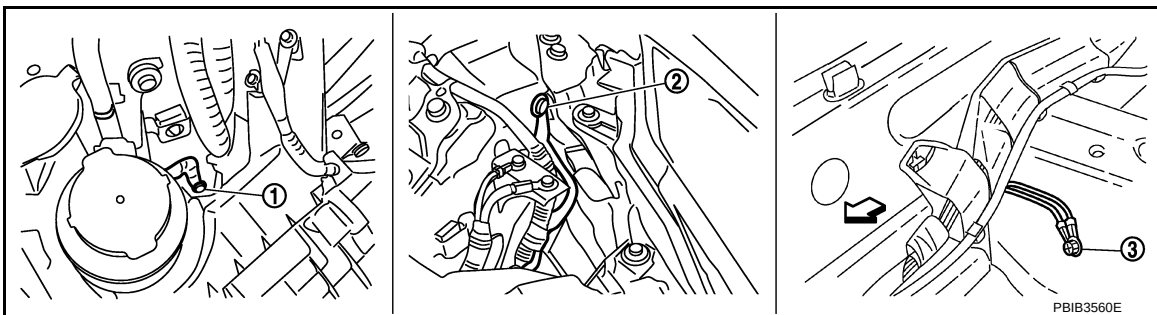
INFOID:000000001645693

PROCEDURE FOR MALFUNCTION A

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

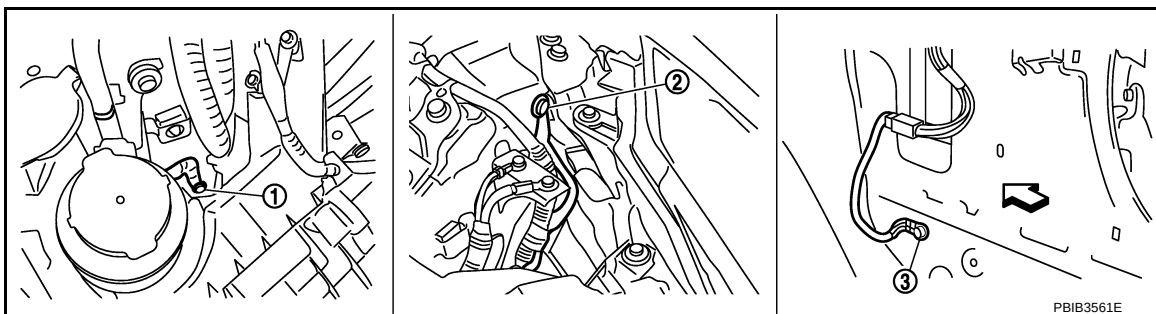
← Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

⇐: Vehicle front

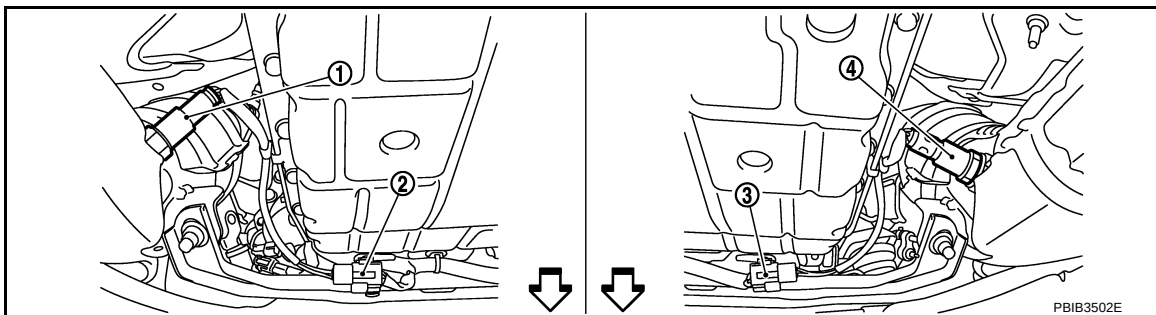
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)

2. Heated oxygen sensor 2 (bank 2)
harness connector

3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1)
harness connector

⇐: Vehicle front

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 1 and ECM terminal 84.
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 P0138, P0158 HO2S2

< SERVICE INFORMATION >

DTC	Terminals		Bank
	ECM	Sensor	
P0138	76	4	1
P0158	80	4	2

Continuity should exist.

- Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	76	4	1
P0158	80	4	2

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 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

Refer to [EC-281, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

PROCEDURE FOR MALFUNCTION B

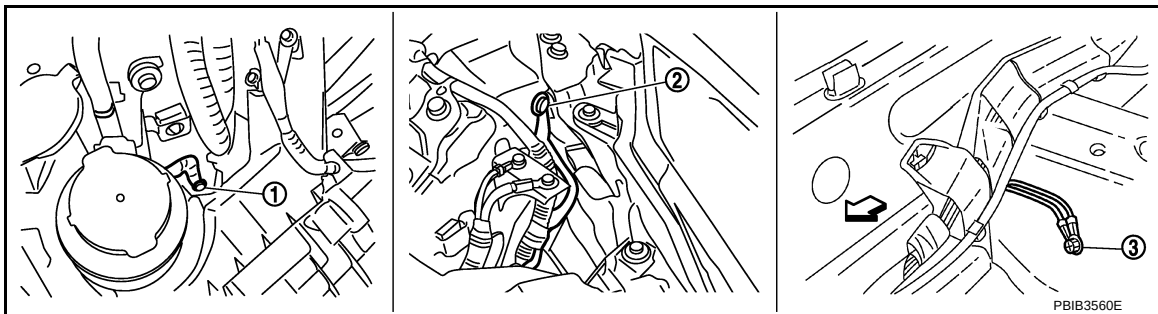
1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >



1. Body ground E17

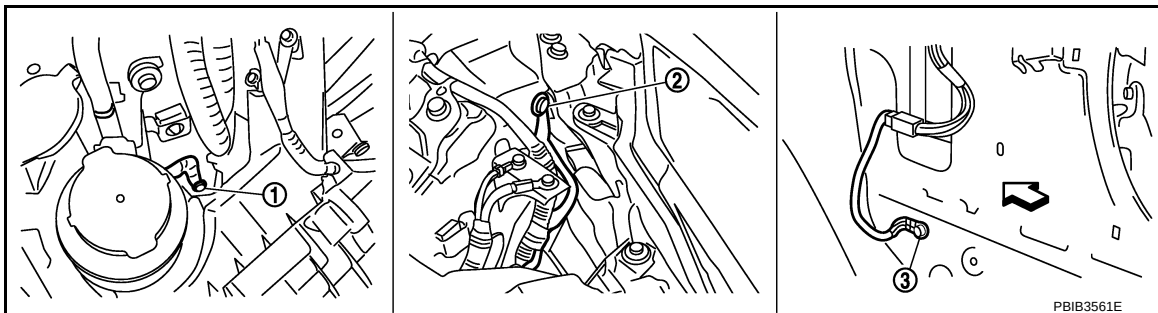
2. Body ground E43

3. Body ground B102

← Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

Ⓟ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear 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?

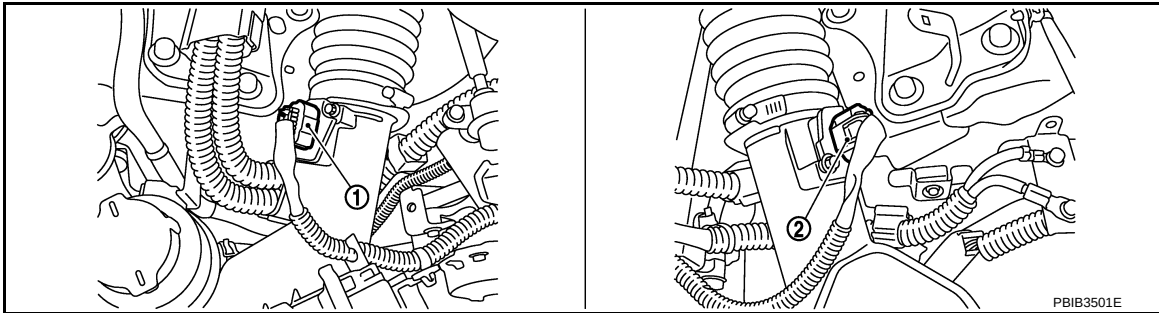
Is it difficult to start engine?

ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector, and restart and run engine for at least 5 seconds at idle speed.

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

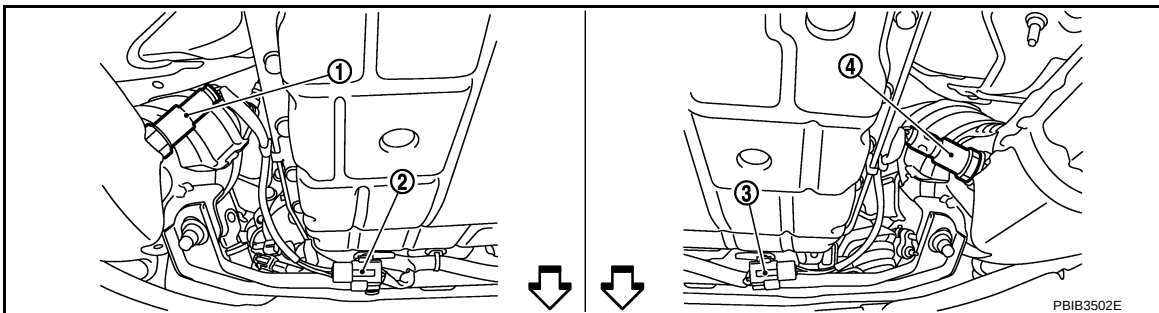
4. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-46, "Emission-related Diagnostic Information"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 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-317](#).
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.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1)
4. Heated oxygen sensor 2 (bank 1) harness connector

← Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 84.
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.

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	76	4	1
P0158	80	4	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	76	4	1
P0158	80	4	2

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-281, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

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HEATED OXYGEN SENSOR 2

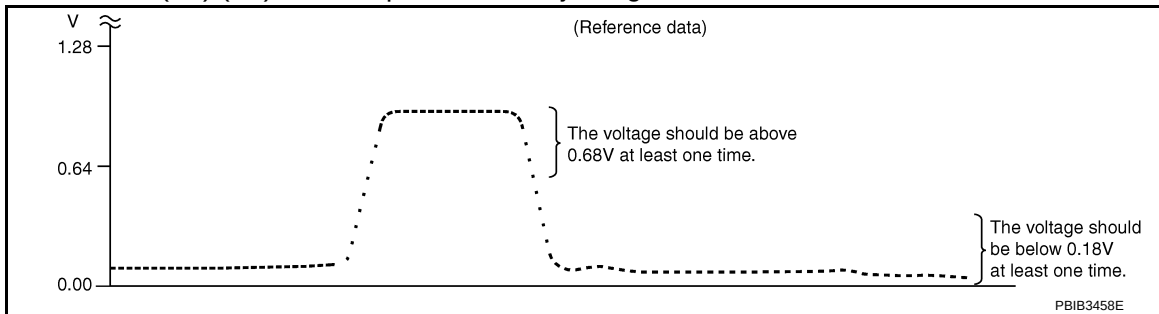
 With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
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. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.

DTC P0138, P0158 HO2S2

< SERVICE INFORMATION >

7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

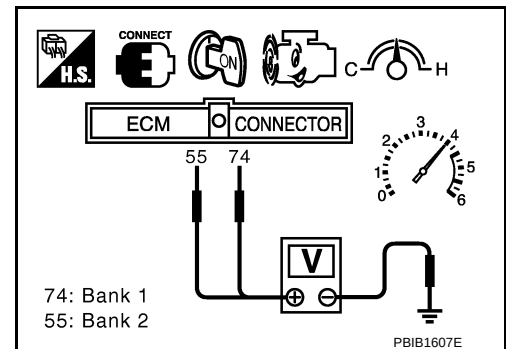
"HO2S2 (B1)/(B2)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

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-III

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 76 [HO2S2 (B1) signal] or 80 [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 0.68V at least once during this procedure.
If the voltage is above 0.68V 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 (A/T), 4th gear position (M/T).
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:000000001645695

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

DTC P0139, P0159 HO2S2

Component Description

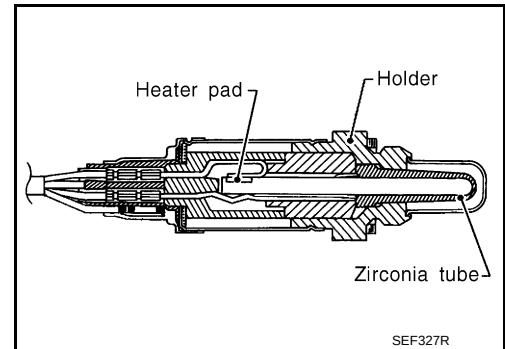
INFOID:000000001645696

The heated oxygen sensor 2, after three way catalyst 1, 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-III Reference Value in Data Monitor Mode

INFOID:000000001645697

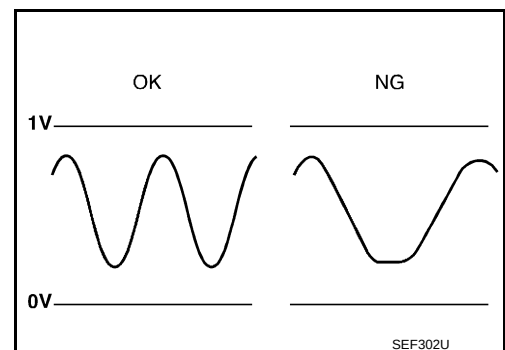
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• 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 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR(B1) HO2S2 MNTR(B2)	• 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	LEAN ↔ RICH

On Board Diagnosis Logic

INFOID:000000001645698

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 before the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during 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.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks
P0159 0159 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645699

NOTE:

DTC P0139, P0159 HO2S2

< 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.

WITH CONSULT-III

TESTING CONDITION:

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

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. 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).
6. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
7. Start engine and following the instruction of CONSULT-III.

NOTE:

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

8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If "NG" is displayed, refer to [EC-301. "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.

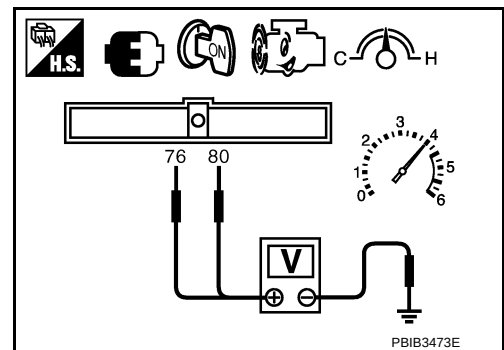
Overall Function Check

INFOID:000000001645700

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 76 [HO2S2 (B1) signal] or 80 [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 0.24V 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 (A/T), 4th gear position (M/T).
A change of voltage should be more than 0.24V for 1 second during this procedure.
8. If NG, go to [EC-301. "Diagnosis Procedure"](#).



DTC P0139, P0159 HO2S2

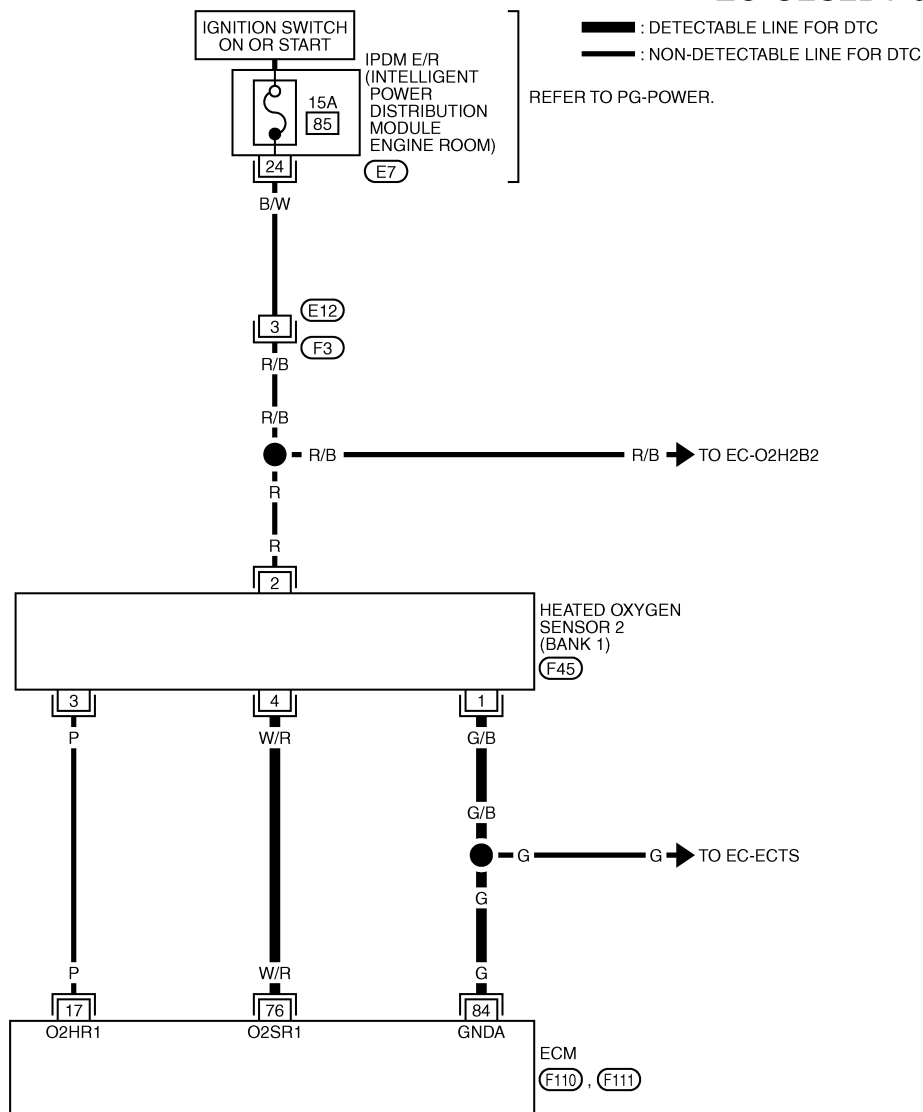
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645701

BANK 1

EC-O2S2B1-01



23	22	21	20	19	18	17
32	31	30	29	28	27	26
25	24					



1	2	3	4
5	6	7	8



2	1
4	3



1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

F110
B

49	53	57	61	65	69	73	77	81	85	89	93
50	54	58	62	66	70	74	78	82	86	90	94
51	55	59	63	67	71	75	79	83	87	91	95
52	56	60	64	68	72	76	80	84	88	92	96

F111
BR



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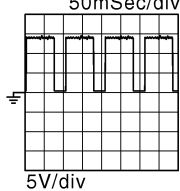
Specification data are reference values and are measured between each terminal and ground.

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)
17	P	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★  5V/div PBIB3545E
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
76	W/R	Heated oxygen sensor 2 (bank 1)	[Engine is running] - Revsing engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

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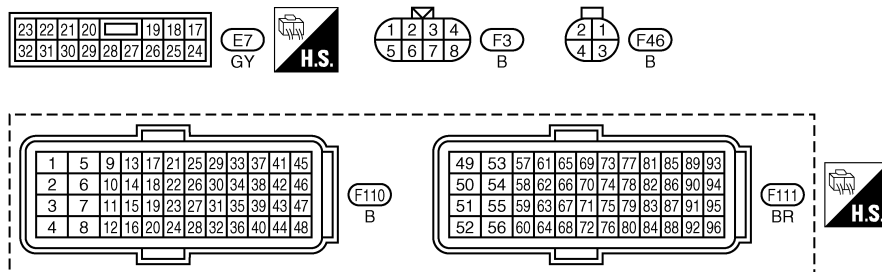
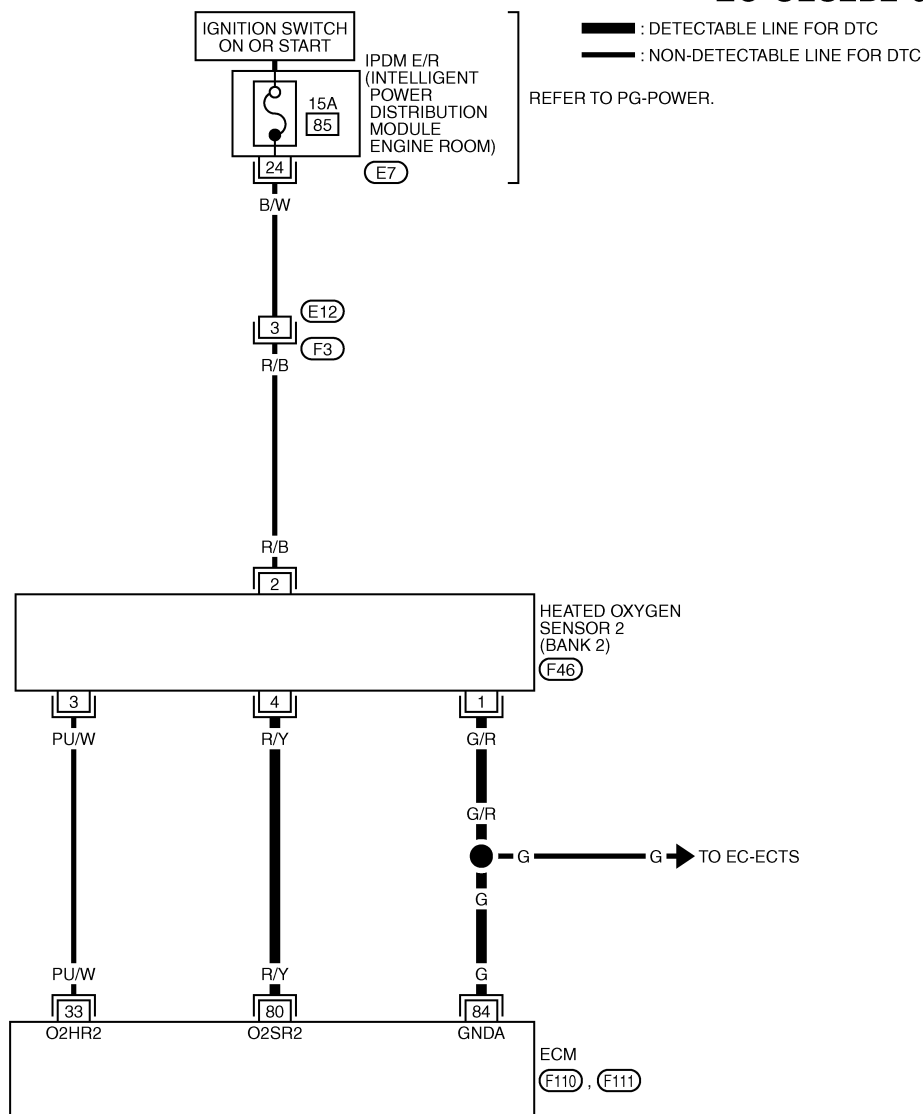
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P

BANK 2

EC-O2S2B2-01



TBWT1635F

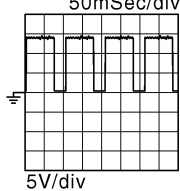
Specification data are reference values and are measured between each terminal and ground.

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)
33	PU/W	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
80	R/Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] - Revs engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0V
84	G	Sensor ground (Heated oxygen sensor 2, Engine coolant temperature sensor, Engine oil temperature sensor)	[Engine is running] Warm-up condition - Idle speed	0V

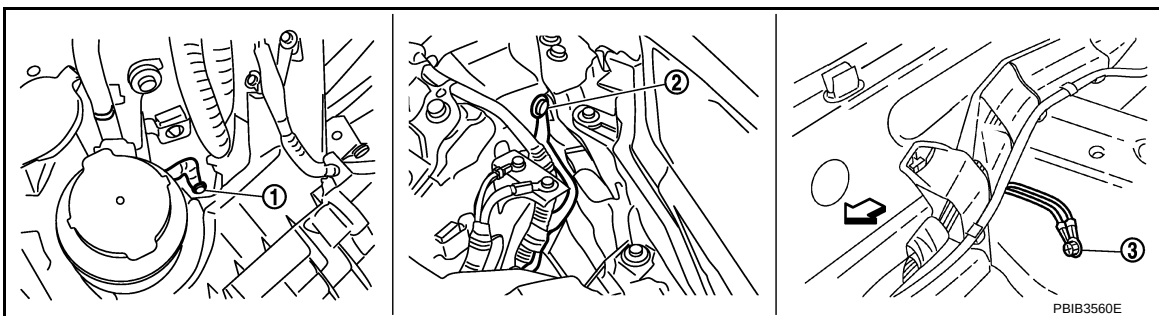
Diagnosis Procedure

INFOID:000000001645702

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

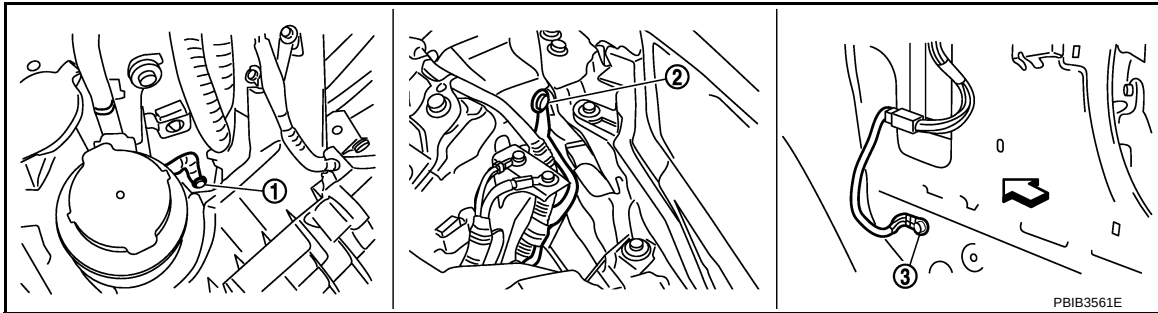
← Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

←: Vehicle front

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

① With CONSULT-III

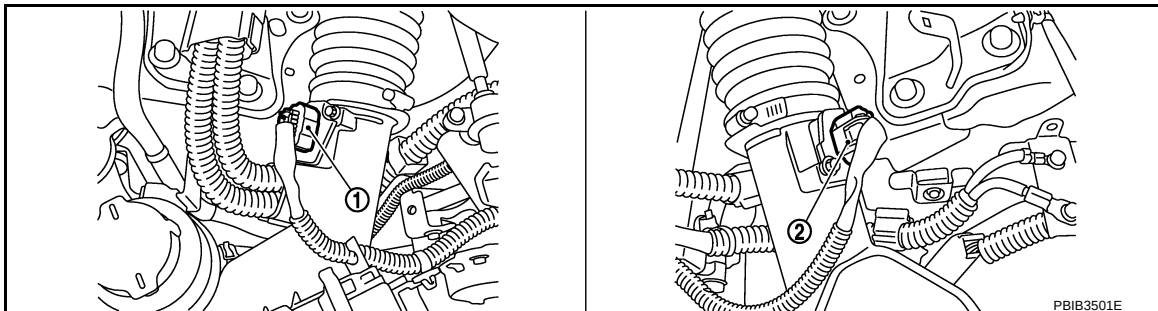
1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?

Is it difficult to start engine?

② Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector, and restart and run engine for at least 5 seconds at idle speed.



1. Mass air flow sensor (with intake air
temperature sensor) (bank 1)

2. Mass air flow sensor (with intake air
temperature sensor) (bank 2)

4. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-46, "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-306](#) or [EC-317](#).

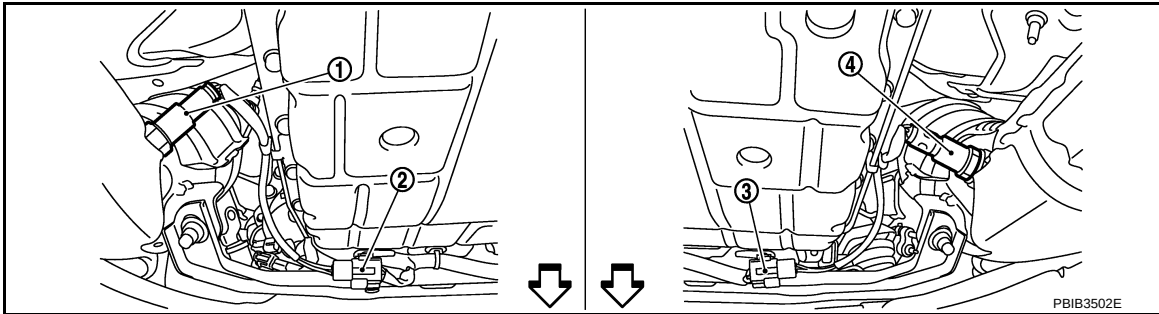
No >> GO TO 3.

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1)
4. Heated oxygen sensor 2 (bank 1) harness connector

⇐: Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 84. 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	
P0139	76	4	1
P0159	80	4	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	76	4	1
P0159	80	4	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

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-304, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

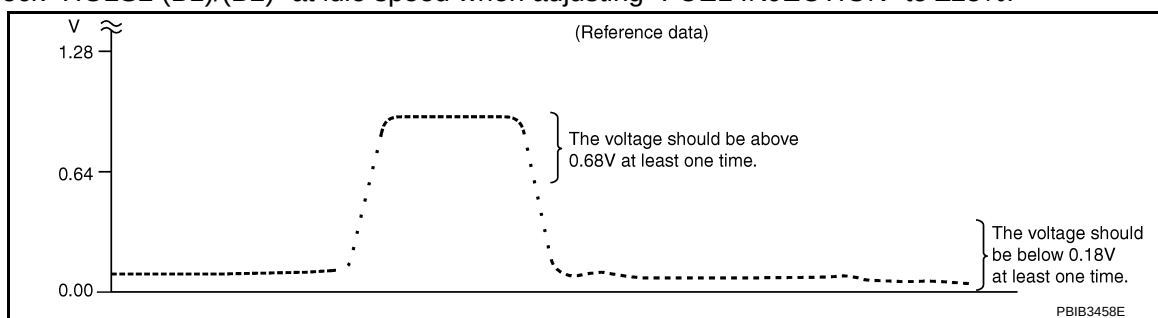
Component Inspection

INFOID:0000000001645703

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
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. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.



"HO2S2 (B1)/(B2)" should be above 0.68V 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.

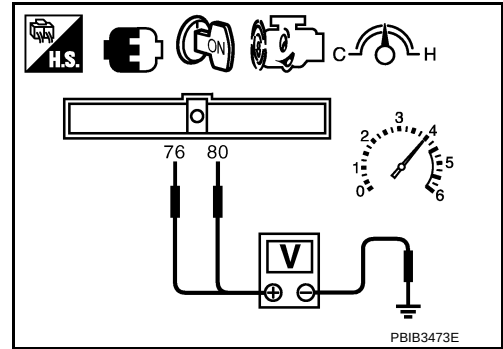
Without CONSULT-III

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 76 [HO2S2 (B1) signal] or 80 [HO2S2 (B2) signal] and ground.

DTC P0139, P0159 HO2S2

< SERVICE INFORMATION >

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 0.68V at least once during this procedure.
If the voltage is above 0.68V 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 (A/T), 4th gear position (M/T).
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:000000001645704

HEATED OXYGEN SENSOR 2

Refer to [EM-23](#).

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:0000000001645705

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 air fuel ratio (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
Air fuel ratio (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	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	- Intake air leaks - Air fuel ratio (A/F) sensor 1 - Fuel injector - Exhaust gas leaks - Incorrect fuel pressure - Lack of fuel - Mass air flow sensor - Incorrect PCV hose connection
P0174 0174 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000001645706

NOTE:

Check vehicle specifications and VIN, then select the procedure to be performed. (Refer to the table below.)

×: Applicable —: Not applicable

Vehicle specification		Vehicle serial number	Procedure
Body type	SRS side air bags		
Coupe	—	Up to 705587	A
		From 705588	B
	×	Up to 752588	A
		From 752589	B
Roadster	×	Up to 852654	A
		From 852655	B

PROCEDURE A

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-III

- 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-III.
- Clear the self-learning control coefficient by touching "CLEAR".
- Start engine again and let it idle for at least 10 minutes.
- Check 1st trip DTC.
The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-313, "Diagnosis Procedure"](#).

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and select "DATA MONITOR" mode with CONSULT-III.
- 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.

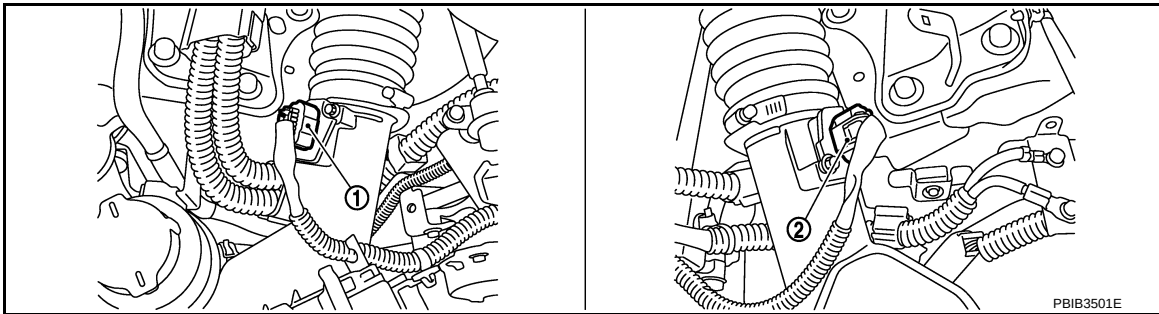
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

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).

- If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- Crank engine while depressing accelerator pedal. If engine starts, go to [EC-313, "Diagnosis Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

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 (bank 1) harness connector.



- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
- Select Service \$03 with GST. Make sure DTC P0102 is detected.
- Select Service \$04 with GST and erase the DTC P0102.
- Start engine again and let it idle for at least 10 minutes.
- 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-313, "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).

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-313, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.

PROCEDURE 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.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching "CLEAR".
5. Start engine again and let it idle for at least 5 minutes.
6. Check 1st trip DTC.
The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-313, "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 select "DATA MONITOR" mode with CONSULT-III.
- c. 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).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

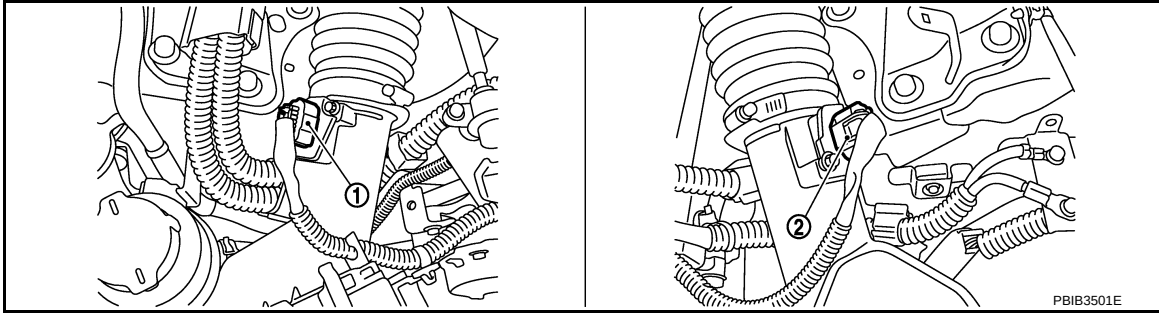
8. Crank engine while depressing accelerator pedal. If engine starts, go to [EC-313, "Diagnosis Procedure"](#).
If engine does not start, check exhaust and intake air leak visually.

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 (bank 1) harness connector.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (bank 1) 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 5 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-313, "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-313, "Diagnosis Procedure"](#). If engine does not start, check exhaust and intake air leak visually.

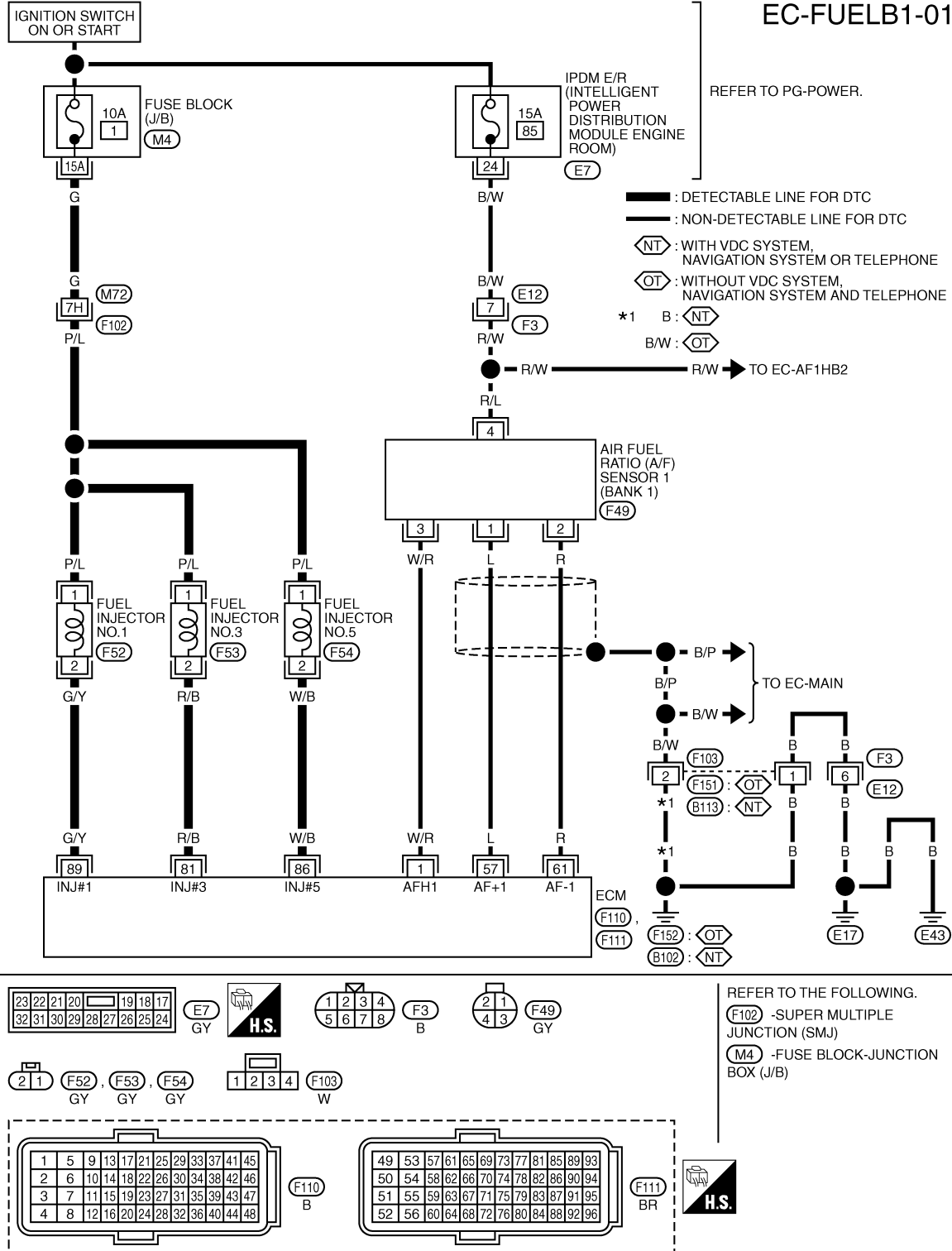
DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645707

BANK 1



TBWT1636E

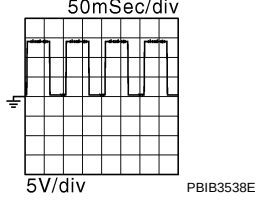
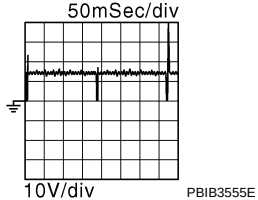
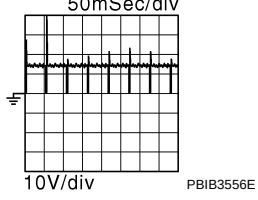
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

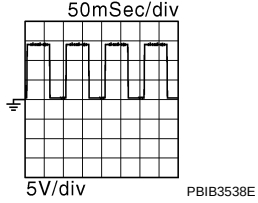
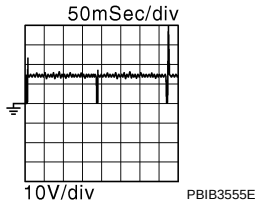
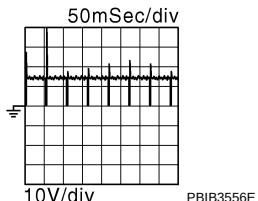
< SERVICE INFORMATION >

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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★ 
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
81 86 89	R/B W/B G/Y	Fuel injector No. 3 Fuel injector No. 5 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

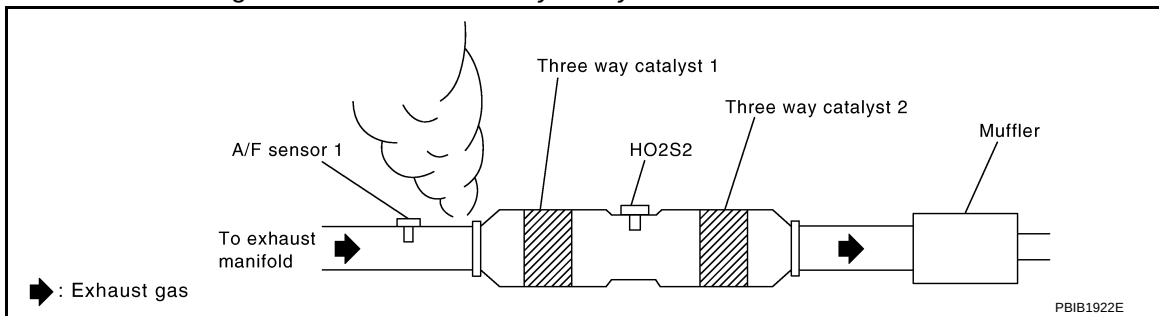
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
82 85 90	L/R BR Y/R	Fuel injector No. 6 Fuel injector No. 2 Fuel injector No. 4	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

Diagnosis Procedure

INFOID:000000001645708

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



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.
2. Check PCV hose connection.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

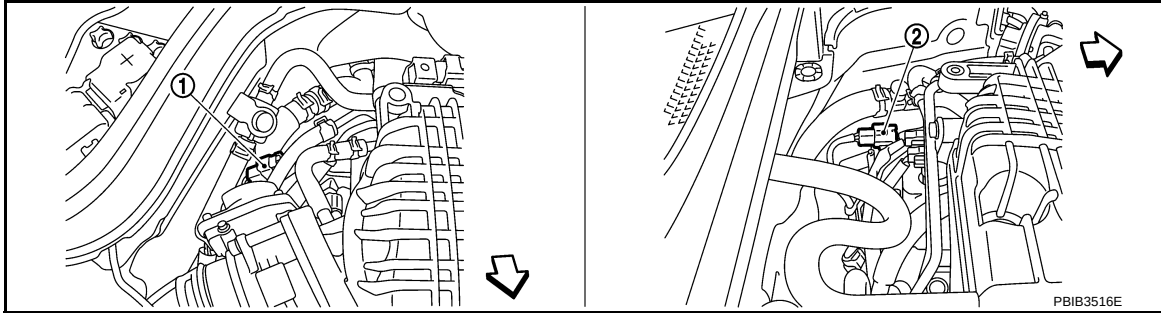
< SERVICE INFORMATION >

OK or NG

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

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



1. A/F sensor 1 harness connector (bank 1) 2. A/F sensor 1 harness connector (bank 2)

← Vehicle front

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	57
	2	61
Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

Continuity should not exist.

6. 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

1. Release fuel pressure to zero. Refer to [EC-78, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-78, "Fuel Pressure Check"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-639](#).)
- Fuel pressure regulator (Refer to [EC-78](#), "Fuel Pressure Check")
- Fuel lines (Refer to [FL-3](#), "Checking Fuel Line".)
- Fuel filter for clogging

>> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up normal temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Start engine and warm it up normal temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 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 ground. Refer to [EC-186](#).

7.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

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

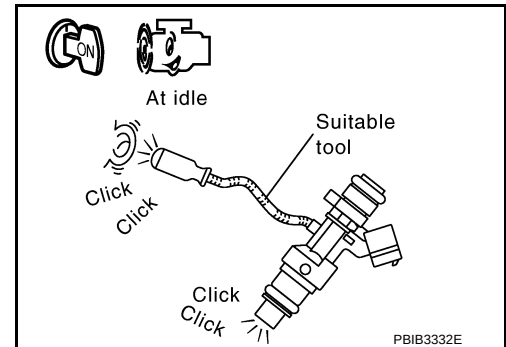
Without CONSULT-III

1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

OK or NG

- OK >> GO TO 8.
- NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-634](#).



8.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel injector gallery assembly. Refer to [EM-35](#).
Keep fuel hose and all fuel injectors connected to fuel injector gallery.
5. For DTC P0171, reconnect fuel injector harness connectors on bank 1.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

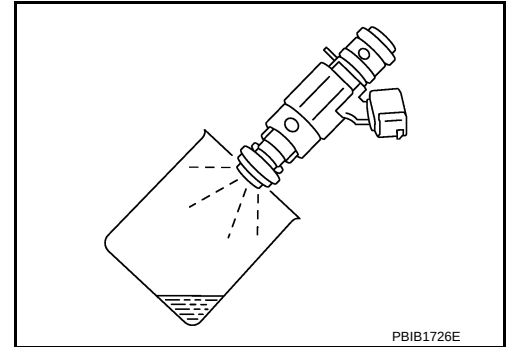
For DTC P0174, reconnect fuel injector harness connectors on bank 2.

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

Refer to [EC-134](#).

>> INSPECTION END

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:000000001645709

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 air fuel ratio (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
Air fuel ratio (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) P0175 0175 (Bank 2)	Fuel injection system too rich	- Fuel injection system does not operate properly. - The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	- Air fuel ratio (A/F) sensor 1 - Fuel injector - Exhaust gas leaks - Incorrect fuel pressure - Mass air flow sensor

DTC Confirmation Procedure

INFOID:000000001645710

NOTE:

Check vehicle specifications and VIN, then select the procedure to be performed. (Refer to the table below.)

×: Applicable —: Not applicable

Vehicle specification		Vehicle serial number	Procedure
Body type	SRS side air bags		
Coupe	—	Up to 705587	A
		From 705588	B
	×	Up to 752588	A
		From 752589	B
Roadster	×	Up to 852654	A
		From 852655	B

PROCEDURE A

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-III

- 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-III.
- Clear the self-learning control coefficient by touching "CLEAR".
- Start engine again and let it idle for at least 10 minutes.
- Check 1st trip DTC.

The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists.

If so, go to [EC-324, "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.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

- b. Start engine and select "DATA MONITOR" mode with CONSULT-III.
- c. 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.

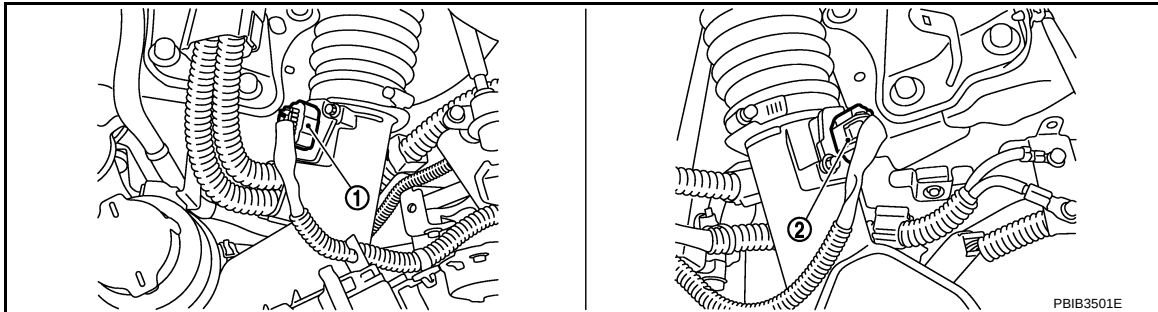
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 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).

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-324, "Diagnosis Procedure"](#). If engine does not start, remove ignition 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 (bank 1) harness connector. Then restart and run engine for at least 5 seconds at idle speed.



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)
4. Stop engine and reconnect mass air flow sensor (bank 1) 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-324, "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 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 $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)

DTC P0172, P0175 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).

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-324, "Diagnosis Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.

PROCEDURE 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.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching "CLEAR".
5. Start engine again and let it idle for at least 5 minutes.
6. Check 1st trip DTC.
The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists.
If so, go to [EC-324, "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 select "DATA MONITOR" mode with CONSULT-III.
- c. 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 $\pm$ 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).

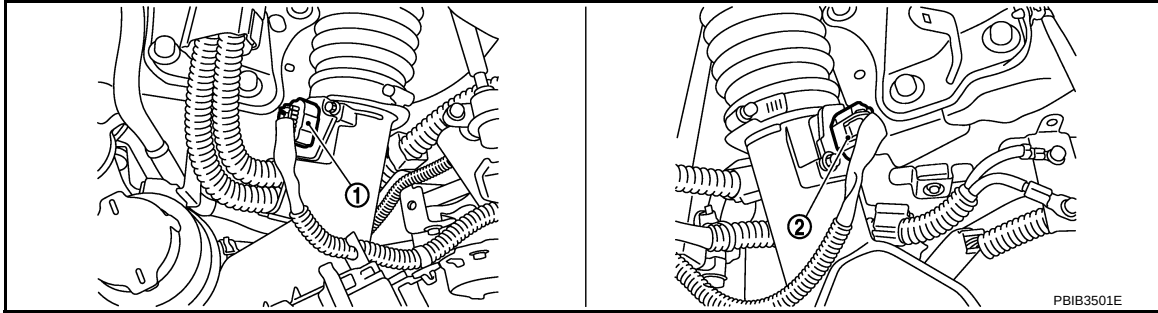
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
If engine starts, go to [EC-324, "Diagnosis Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.

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 (bank 1) harness connector. Then restart and run engine for at least 5 seconds at idle speed.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

4. Stop engine and reconnect mass air flow sensor (bank 1) 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 5 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-324, "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 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 $\pm$ 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-324, "Diagnosis Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.

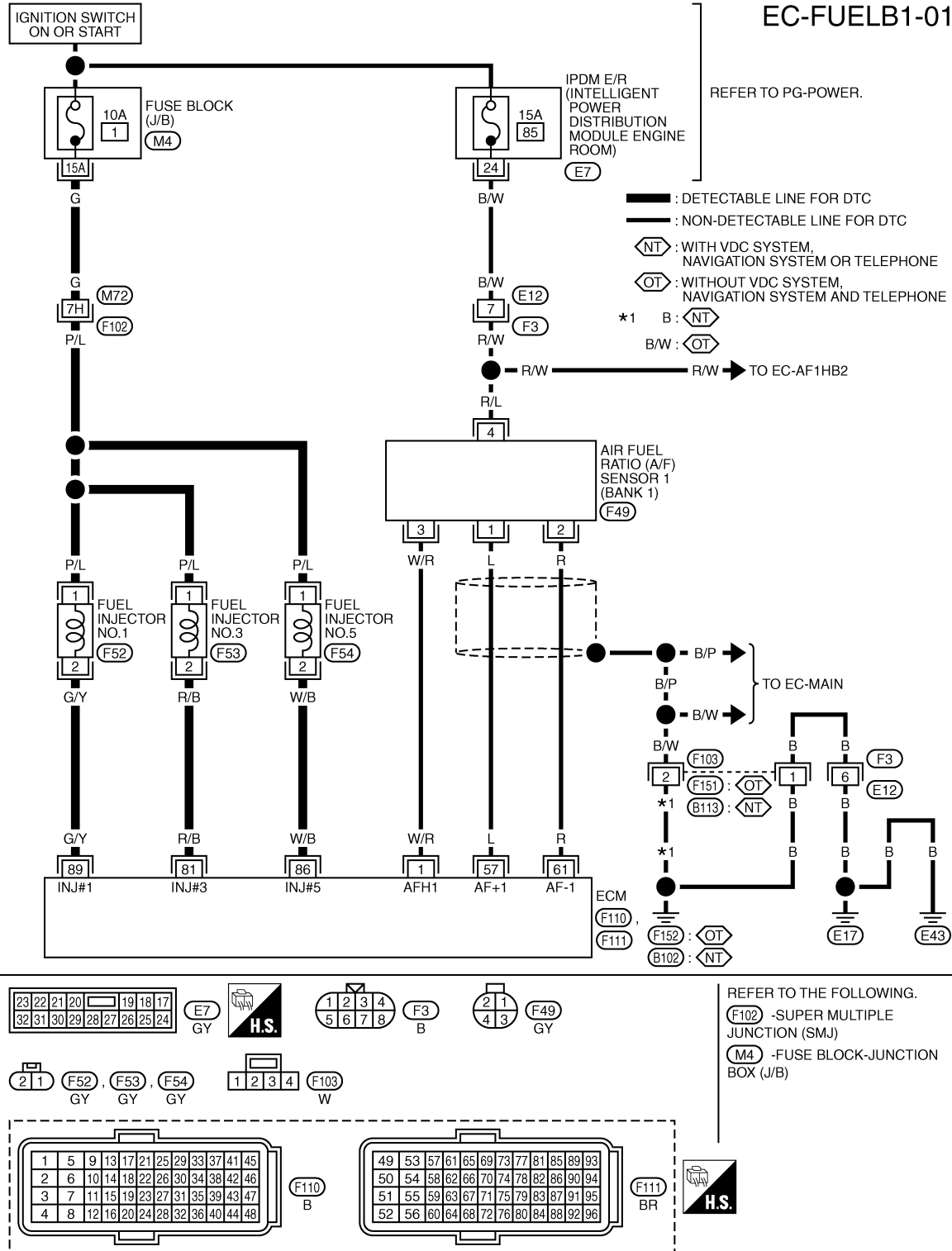
DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645711

BANK 1



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

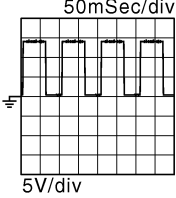
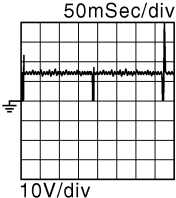
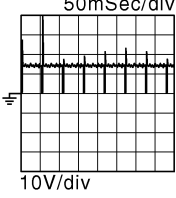
CAUTION:

TBWT1636E

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

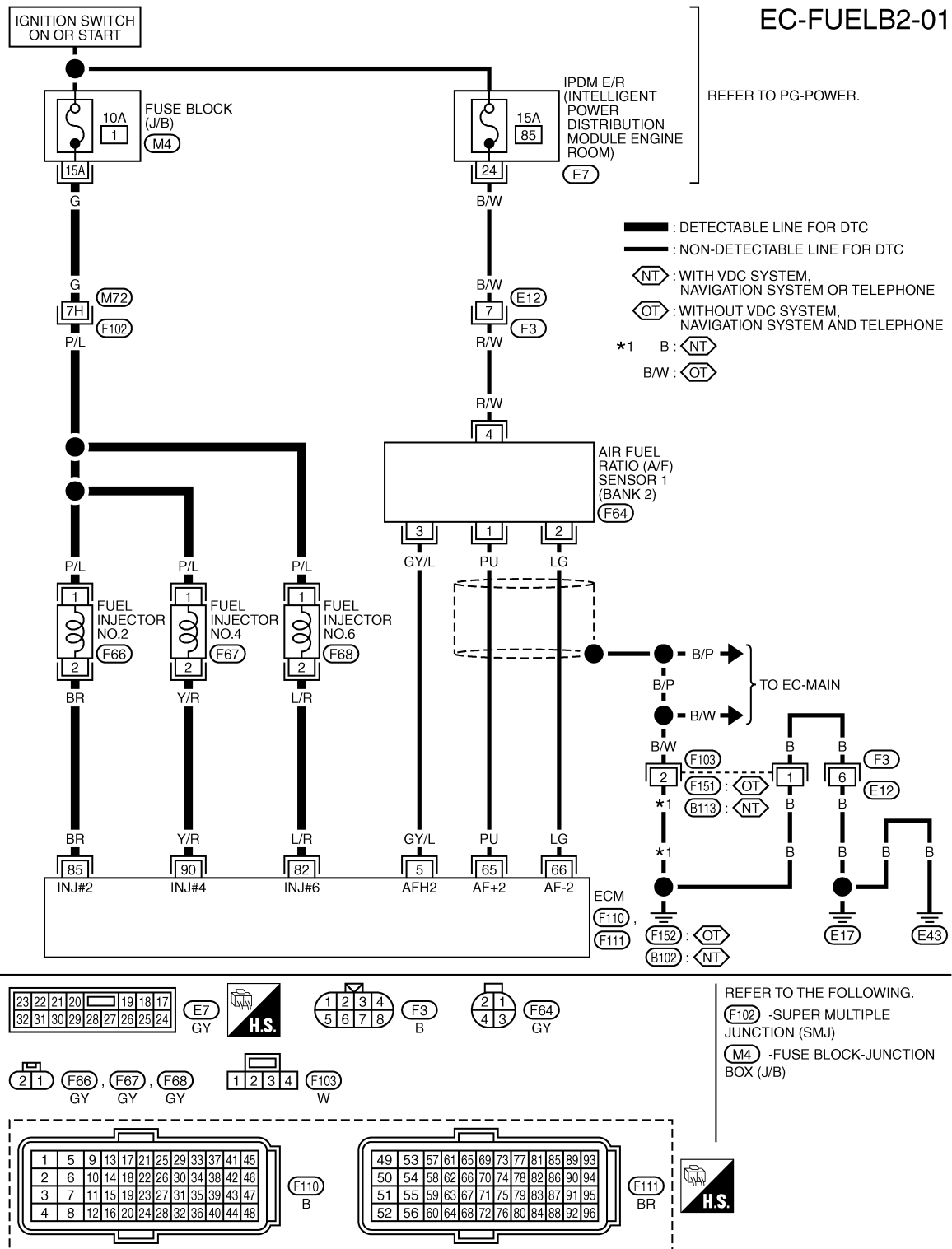
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★ 
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
81 86 89	R/B W/B G/Y	Fuel injector No. 3 Fuel injector No. 5 Fuel injector No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

BANK 2



TBWT1638E

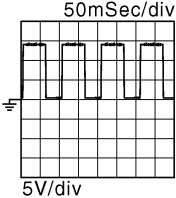
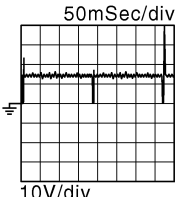
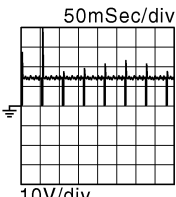
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

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 P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

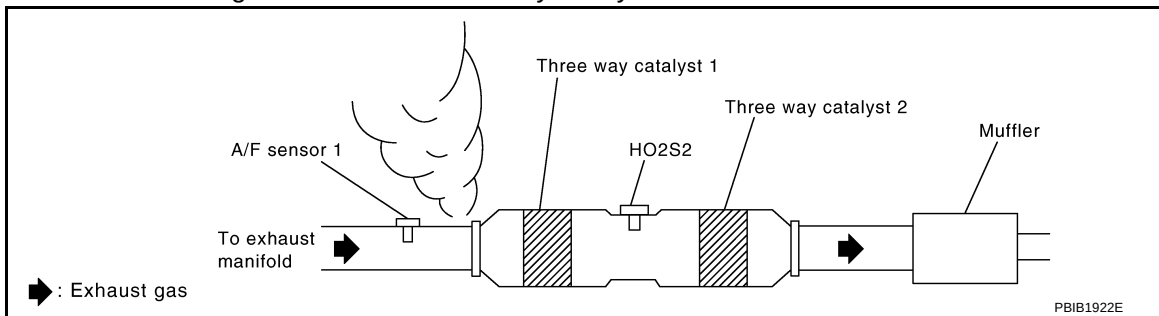
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
82 85 90	L/R BR Y/R	Fuel injector No. 6 Fuel injector No. 2 Fuel injector No. 4	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

Diagnosis Procedure

INFOID:000000001645712

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.



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.

OK or NG

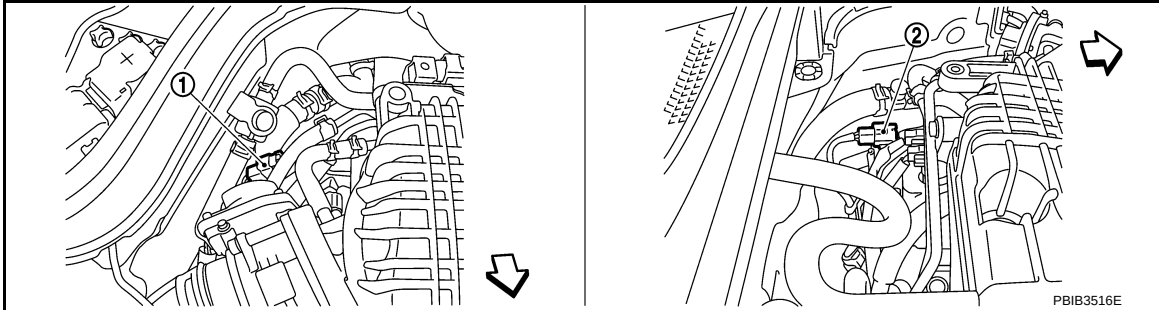
DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

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

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



1. A/F sensor 1 harness connector (bank 1)
2. A/F sensor 1 harness connector (bank 2)

↔ Vehicle front

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	57
	2	61
Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

Continuity should not exist.

6. 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

1. Release fuel pressure to zero. Refer to [EC-78, "Fuel Pressure Check"](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-78, "Fuel Pressure Check"](#).

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

OK or NG

- OK >> GO TO 6.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to [EC-639](#).)
- Fuel pressure regulator (Refer to [EC-78](#), "Fuel Pressure Check".)

>> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal temperature.
3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal temperature.
3. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 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 ground. Refer to [EC-186](#).

7.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

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

Without CONSULT-III

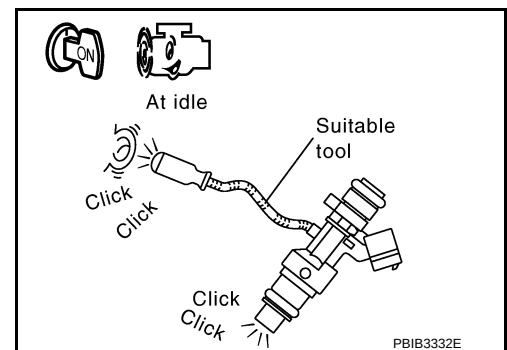
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-634](#).



8.CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to [EM-35](#).
Keep fuel hose and all fuel injectors connected to fuel injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
Make sure fuel does not drip from fuel injector.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

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

Refer to [EC-134](#).

>> INSPECTION END

A

EC

C

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DTC P0181 FTT SENSOR

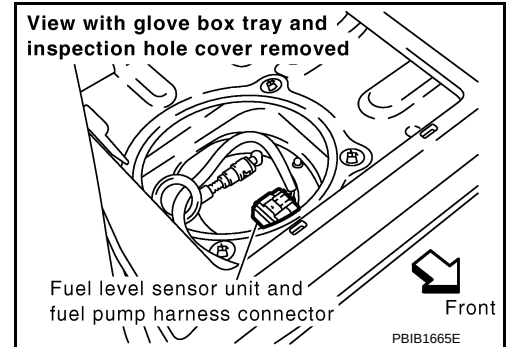
< SERVICE INFORMATION >

DTC P0181 FTT SENSOR

Component Description

INFOID:000000001645713

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.



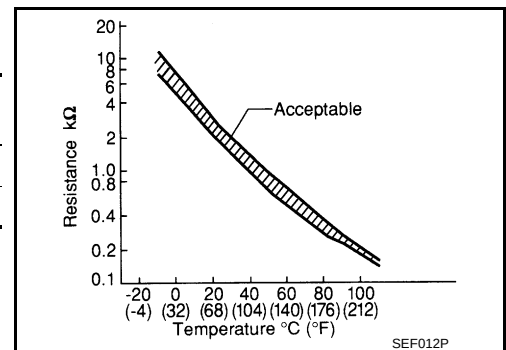
<Reference data>

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 values and is measured between ECM terminal 106 (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:000000001645714

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.	• Harness or connectors (The sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC Confirmation Procedure

INFOID:000000001645715

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-III

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.
If 1st trip DTC is detected, go to [EC-329. "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to following step.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. 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.
5. Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-329. "Diagnosis Procedure"](#).

DTC P0181 FTT SENSOR

< SERVICE INFORMATION >

 WITH GST

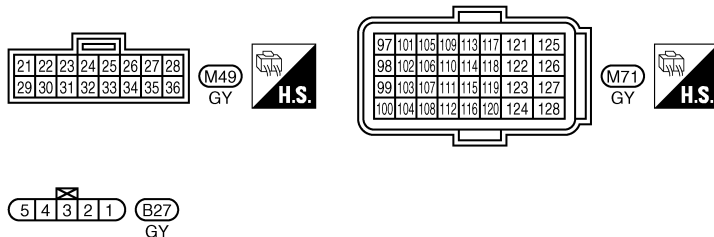
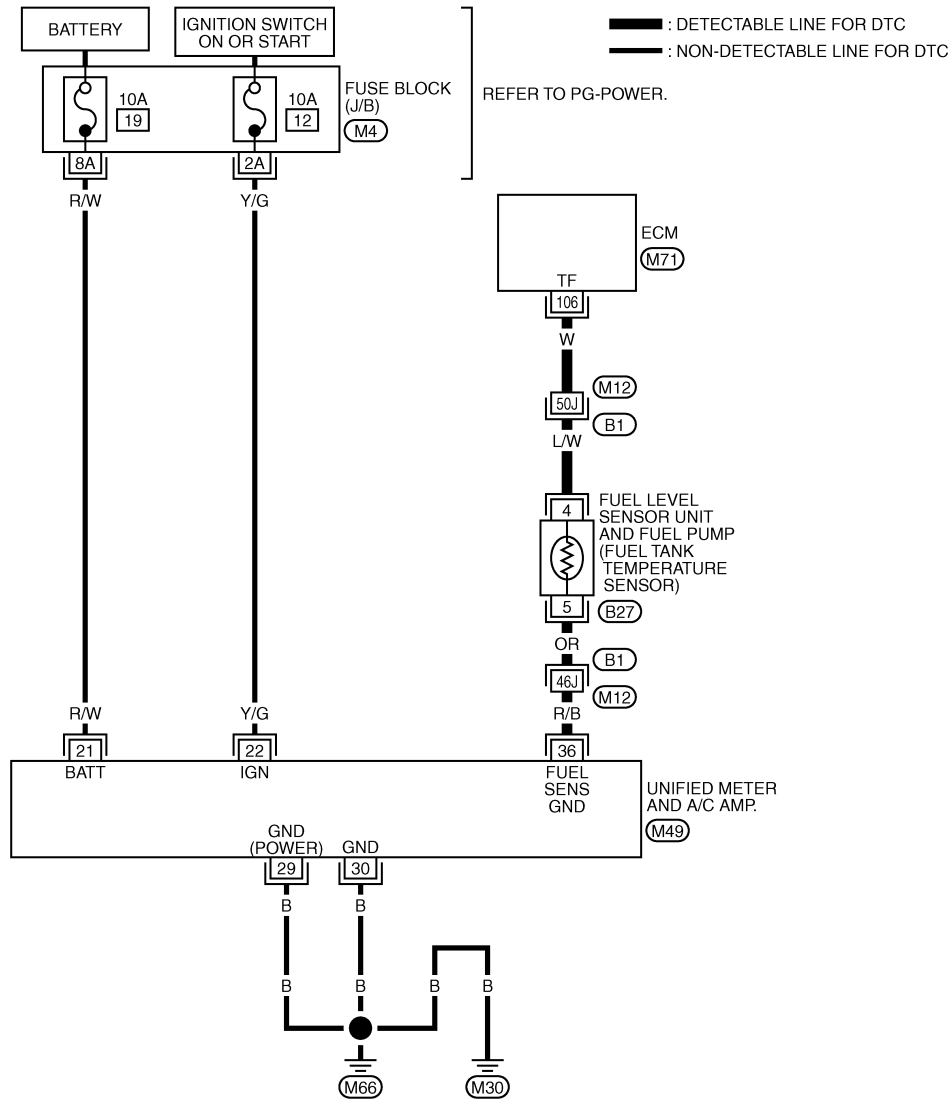
Follow the procedure "WITH CONSULT-III" above.

Wiring Diagram

INFOID:000000001645716

EC-FTTS-01

EC



REFER TO THE FOLLOWING.

- (B1) -SUPER MULTIPLE JUNCTION (SMJ)
- (M4) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1640E

Diagnosis Procedure

INFOID:000000001645717

1.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

DTC P0181 FTT SENSOR

< SERVICE INFORMATION >

Refer to [DI-44, "CONSULT-III Function \(METER/M&A\)"](#).

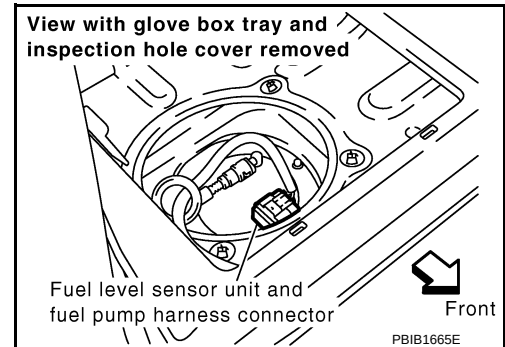
OK or NG

OK >> GO TO 2.

NG >> Go to [DI-19, "Fuel Level Sensor Signal Inspection"](#).

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Turn ignition switch ON.



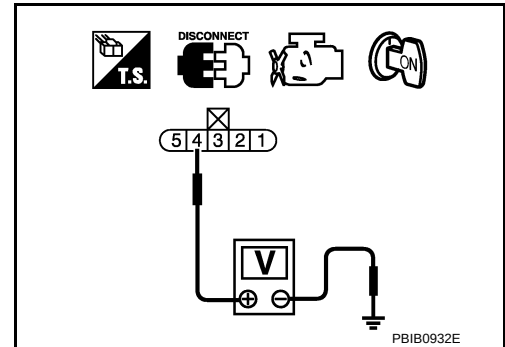
3. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M12
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

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

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect "unified meter and A/C amp." harness connector M49.
3. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 5 and "unified meter and A/C amp." terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. 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 B1, M12
- Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

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

6. CHECK FUEL TANK TEMPERATURE SENSOR

DTC P0181 FTT SENSOR

< SERVICE INFORMATION >

Refer to [EC-331](#), "Component Inspection".

OK or NG

OK >> GO TO 7.

NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

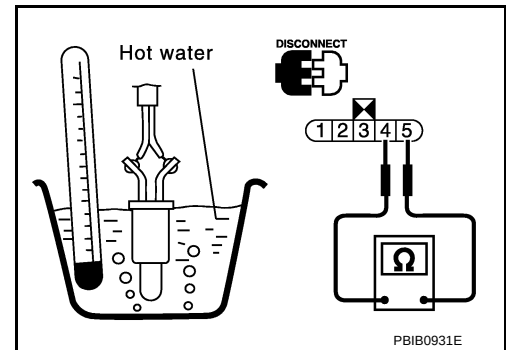
INFOID:000000001645718

FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 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

3. If NG, replace fuel level sensor unit.



INFOID:000000001645719

Removal and Installation

FUEL TANK TEMPERATURE SENSOR

Refer to [FL-4](#).

DTC P0182, P0183 FTT SENSOR

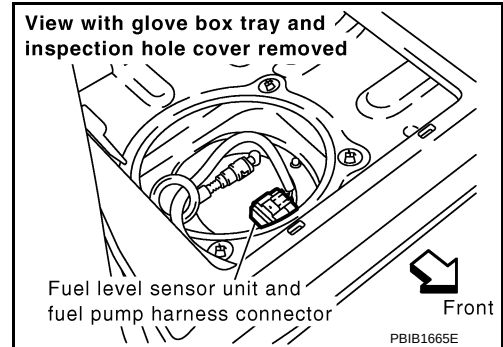
< SERVICE INFORMATION >

DTC P0182, P0183 FTT SENSOR

Component Description

INFOID:000000001645720

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.



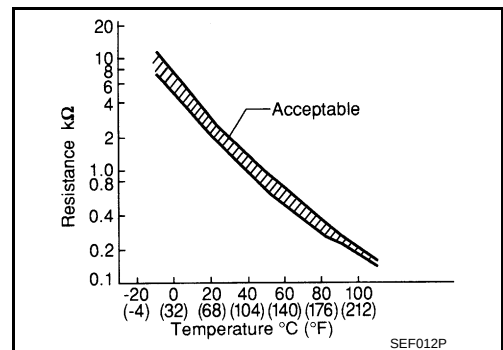
<Reference data>

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 values and is measured between ECM terminal 106 (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:000000001645721

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.	• Harness or connectors (The sensor circuit is open or shorted.)
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Fuel tank temperature sensor

DTC Confirmation Procedure

INFOID:000000001645722

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.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-333. "Diagnosis Procedure"](#).

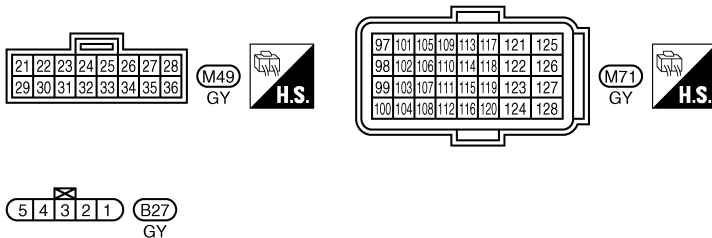
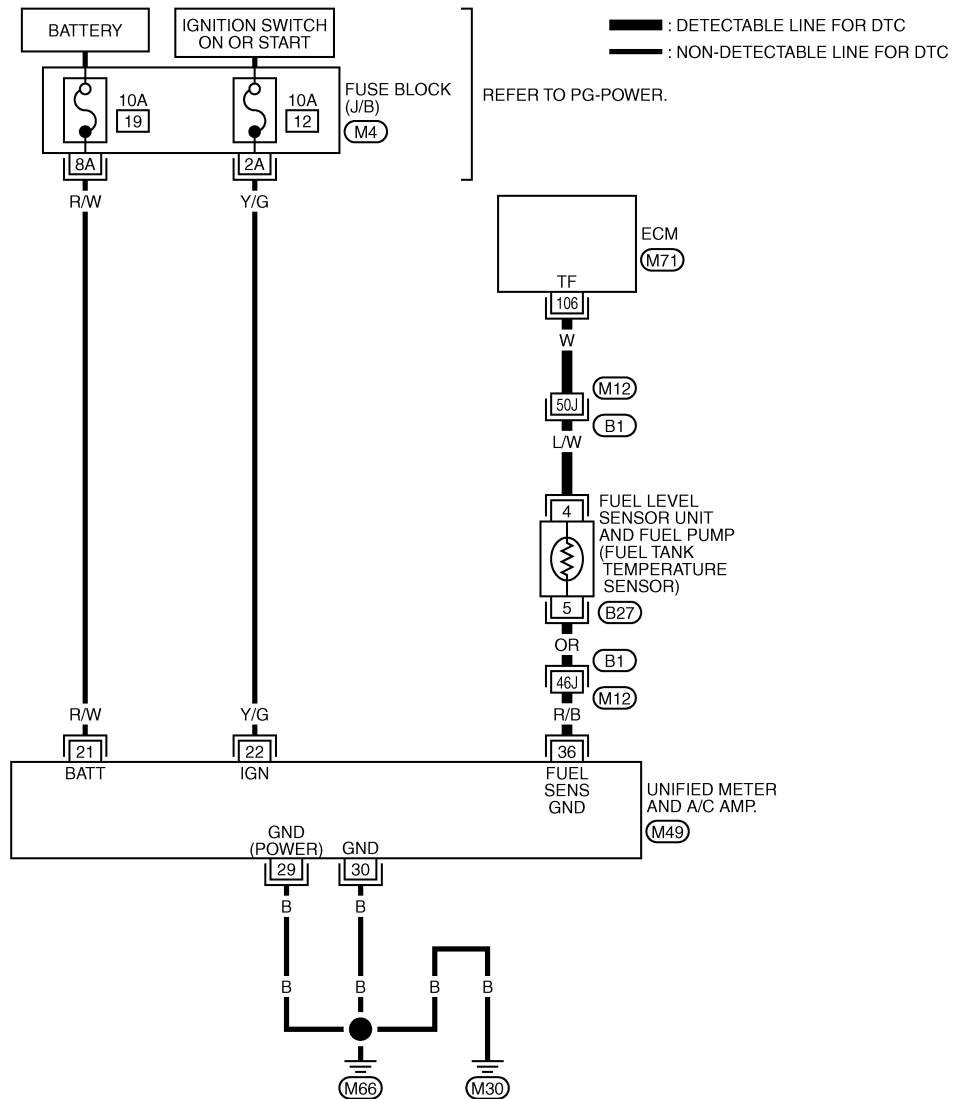
DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645723

EC-FTTS-01



REFER TO THE FOLLOWING.
 (B1) -SUPER MULTIPLE JUNCTION (SMJ)
 (M4) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1640E

Diagnosis Procedure

INFOID:000000001645724

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to [DI-44. "CONSULT-III Function \(METER/M&A\)".](#)

OK or NG

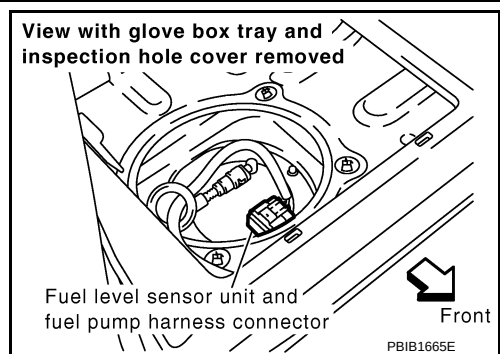
DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

- OK >> GO TO 2.
NG >> Go to [DI-19, "Fuel Level Sensor Signal Inspection"](#).

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Turn ignition switch ON.

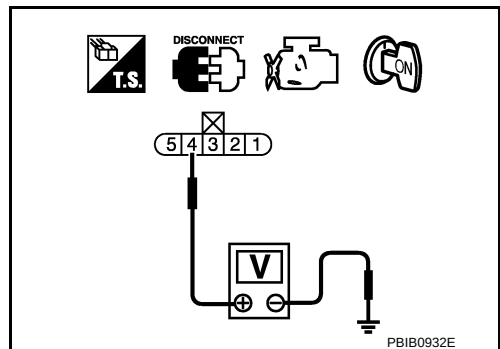


3. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M12
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

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

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect "unified meter and A/C amp." harness connector M49.
3. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 5 and "unified meter and A/C amp." terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. 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 B1, M12
- Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

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

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to [EC-331, "Component Inspection"](#).

OK or NG

DTC P0182, P0183 FTT SENSOR

< SERVICE INFORMATION >

- OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

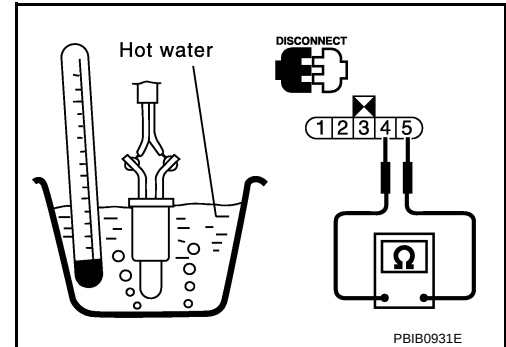
INFOID:0000000001645725

FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 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

3. If NG, replace fuel level sensor unit.



INFOID:0000000001645726

Removal and Installation

FUEL TANK TEMPERATURE SENSOR

Refer to [FL-4](#).

DTC P0196 EOT SENSOR

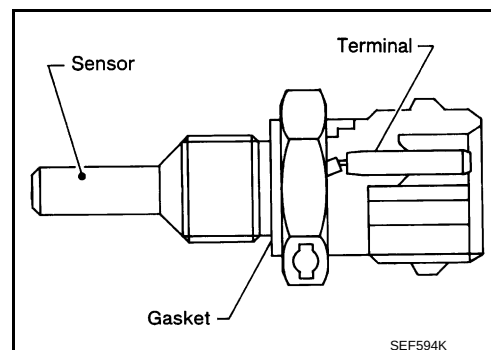
< SERVICE INFORMATION >

DTC P0196 EOT SENSOR

Component Description

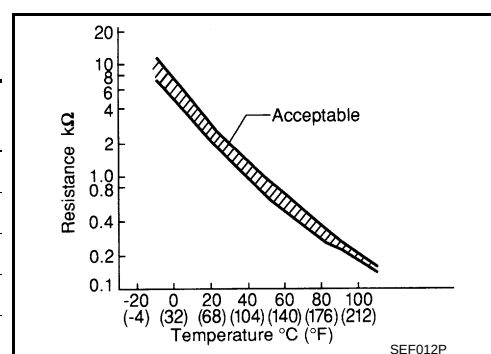
INFOID:000000001645727

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



<Reference data>

Engine 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
110 (230)	0.6	0.143 - 0.153



*: This data is reference values and is measured between ECM terminal 78 (Engine oil 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:000000001645728

NOTE:

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to [EC-340](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0196 0196	Engine oil temperature sensor 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.	• Harness or connectors (The sensor circuit is open or shorted) • Engine oil temperature sensor

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Engine oil temperature sensor	Exhaust valve timing control does not function.

DTC Confirmation Procedure

INFOID:000000001645729

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.

DTC P0196 EOT SENSOR

< SERVICE INFORMATION >

Ⓟ WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for 5 minutes and 10 seconds.
4. Check 1st trip DTC.
If 1st trip DTC is detected, go to [EC-337, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to following steps.
5. Select "DATA MONITOR" mode with CONSULT-III.
6. Check that "COOLAN TEMP/S" indicates above 80°C (176°F).
If it is above 80°C (176°F), go to the following steps.
If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F). Then go to the following steps.
7. Turn ignition switch OFF and soak the vehicle at cool place.
8. Turn ignition switch ON.
NOTE:
Do not turn ignition switch OFF until step 12
9. Select "DATA MONITOR" mode with CONSULT-III.
10. Check the following.

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

If they are within the specified range, go to following steps.

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

NOTE:

- Do not turn ignition switch OFF.
- If it is supposed to need a long period of time, do not deplete the battery.

11. Start engine and let it idle for 5 minutes.
12. Check 1st trip DTC.
13. If 1st trip DTC is detected, go to [EC-337, "Diagnosis Procedure"](#).

Ⓢ WITH GST

Follow the procedure "WITH CONSULT-III" above.

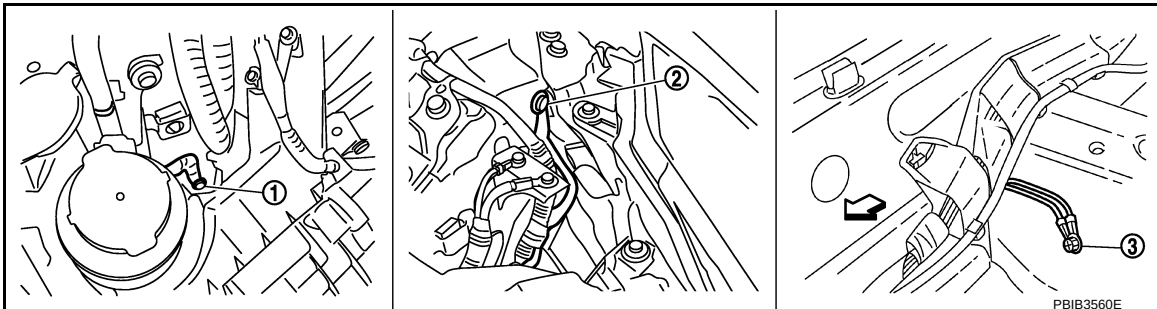
Diagnosis Procedure

INFOID:000000001645730

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



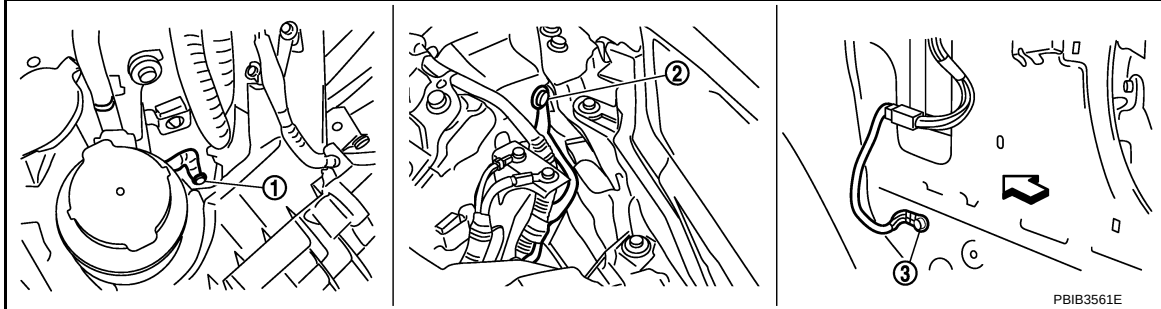
DTC P0196 EOT SENSOR

< SERVICE INFORMATION >

1. Body ground E17
↩ Vehicle front
2. Body ground E43
3. Body ground B102

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩ Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to [EC-338, "Component Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Replace engine oil temperature sensor.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

Refer to [EC-341, "Wiring Diagram"](#).

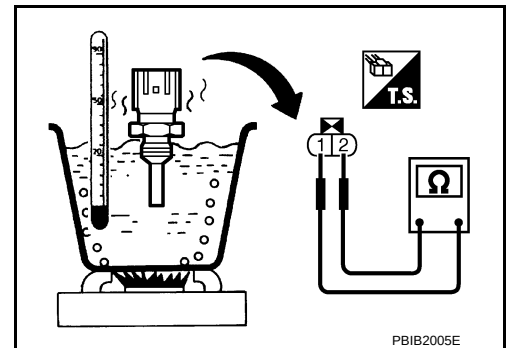
>> INSPECTION END

Component Inspection

INFOID:000000001645731

ENGINE OIL TEMPERATURE SENSOR

1. Check resistance between engine oil temperature sensor terminals 1 and 2 as shown in the figure.



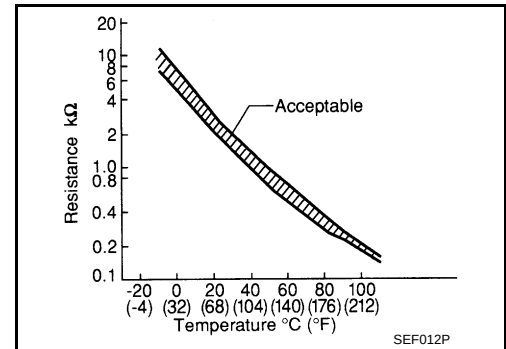
DTC P0196 EOT SENSOR

< SERVICE INFORMATION >

<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

- If NG, replace engine oil temperature sensor.



INFOID:0000000001645732

Removal and Installation

ENGINE OIL TEMPERATURE SENSOR

Refer to [EM-27](#).

DTC P0197, P0198 EOT SENSOR

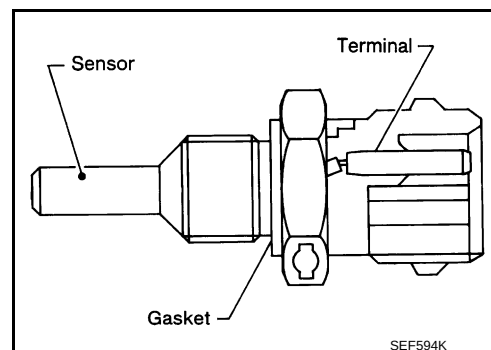
< SERVICE INFORMATION >

DTC P0197, P0198 EOT SENSOR

Component Description

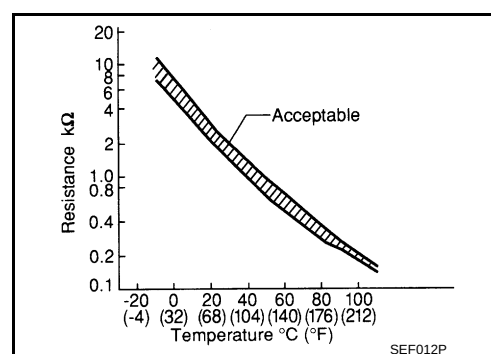
INFOID:000000001645733

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



<Reference data>

Engine 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
110 (230)	0.6	0.143 - 0.153



*: This data is reference value and is measured between ECM terminal 78 (Engine oil 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:000000001645734

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0197 0197	Engine oil temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine oil temperature sensor
P0198 0198	Engine oil 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.

Detected items	Engine operating condition in fail-safe mode
Engine oil temperature sensor	Exhaust valve timing control does not function.

DTC Confirmation Procedure

INFOID:000000001645735

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.

1. Start engine and wait at least 5 seconds.

DTC P0197, P0198 EOT SENSOR

< SERVICE INFORMATION >

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to [EC-341, "Diagnosis Procedure"](#).

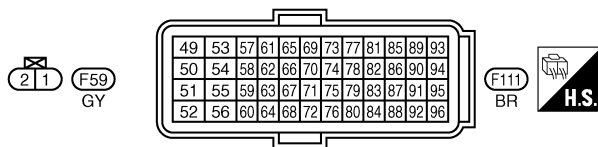
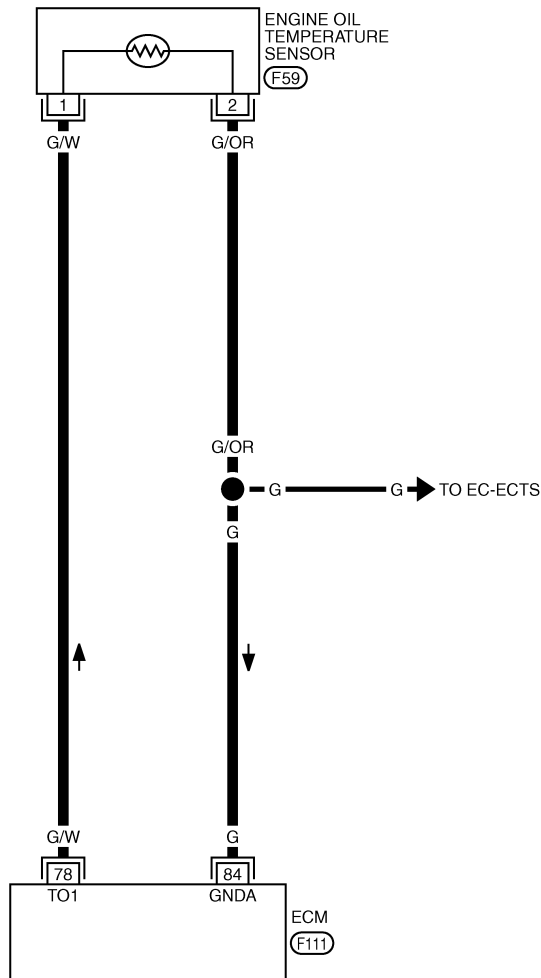
Wiring Diagram

INFOID:000000001645736

EC-EOTS-01

EC

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1684E

Diagnosis Procedure

INFOID:000000001645737

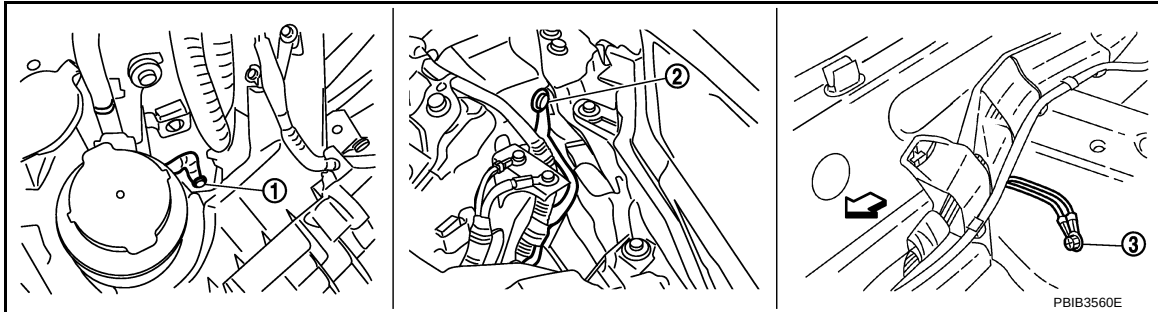
1.CHECK GROUND CONNECTIONS

DTC P0197, P0198 EOT SENSOR

< SERVICE INFORMATION >

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

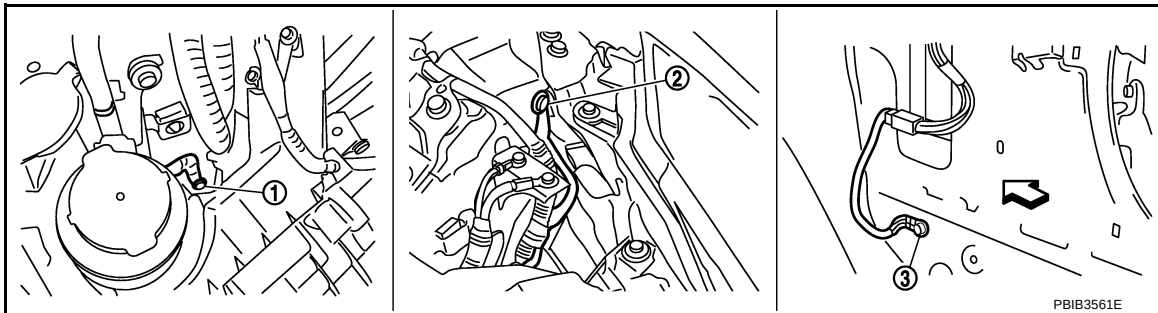
2. Body ground E43

3. Body ground B102

← : Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← : Vehicle front

OK or NG

OK >> GO TO 2.

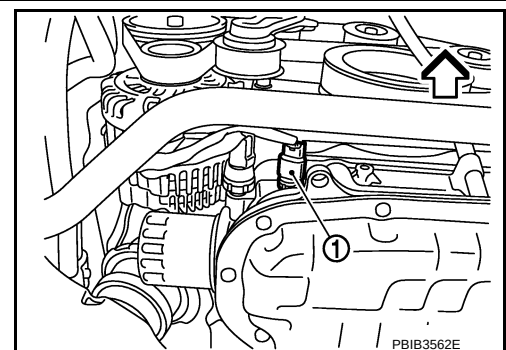
NG >> Repair or replace ground connections.

2. CHECK EOT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine oil temperature (EOT) sensor (1) harness connector.

← : Vehicle front

2. Turn ignition switch ON.



DTC P0197, P0198 EOT SENSOR

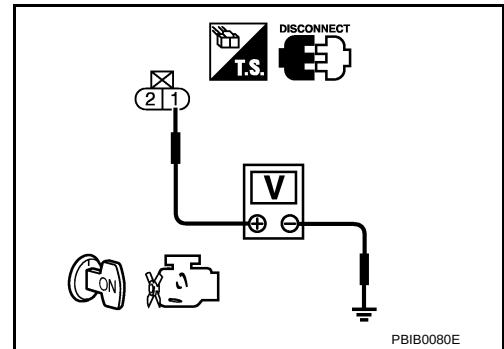
< SERVICE INFORMATION >

3. Check voltage between EOT sensor terminal 1 and ground with CONSULT-III 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 EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 84 and ECT sensor 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 ENGINE OIL TEMPERATURE SENSOR

Refer to [EC-343, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace engine oil temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

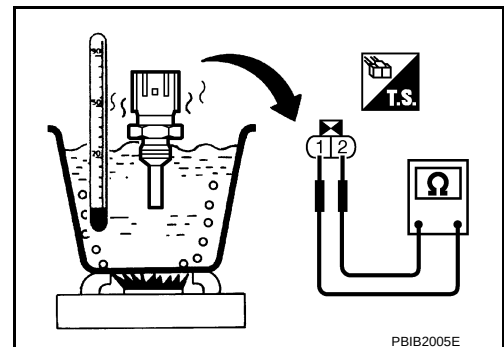
>> INSPECTION END

Component Inspection

INFOID:000000001645738

ENGINE OIL TEMPERATURE SENSOR

1. Check resistance between engine oil temperature sensor terminals 1 and 2 as shown in the figure.



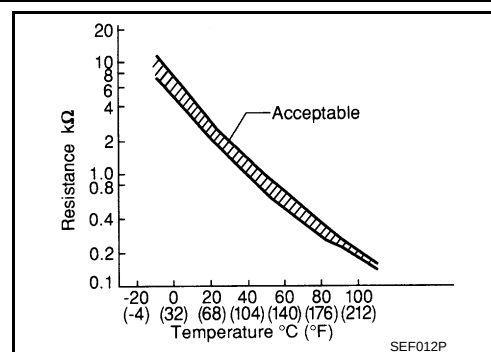
DTC P0197, P0198 EOT SENSOR

< SERVICE INFORMATION >

<Reference data>

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 oil temperature sensor.



INFOID:000000001645739

Removal and Installation

ENGINE OIL TEMPERATURE SENSOR

Refer to [EM-27](#).

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

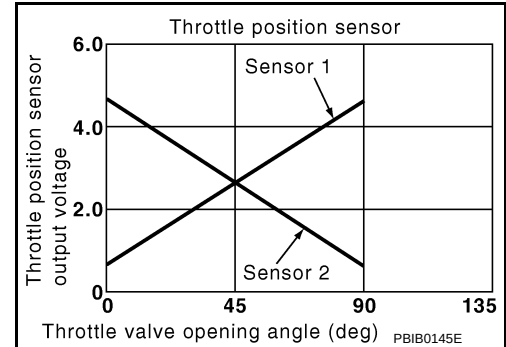
DTC P0222, P0223, P2132, P2133 TP SENSOR

Component Description

INFOID:000000001645740

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

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645741

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 1-B2 TP SEN 2-B1* TP SEN 2-B2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 1st (M/T)	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:000000001645742

These self-diagnoses have the one trip detection logic.

NOTE:

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-482](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222 (Bank 1) P2132 2133 (Bank 2)	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223 0223 (Bank 1) P2133 2133 (Bank 2)	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 P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645743

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-350, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000001645744

Bank 1

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

EC-TPS1B1-01

— : DETECTABLE LINE FOR DTC

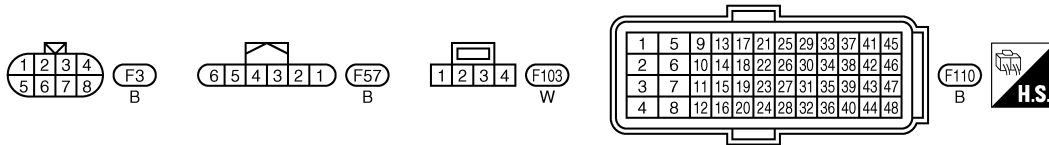
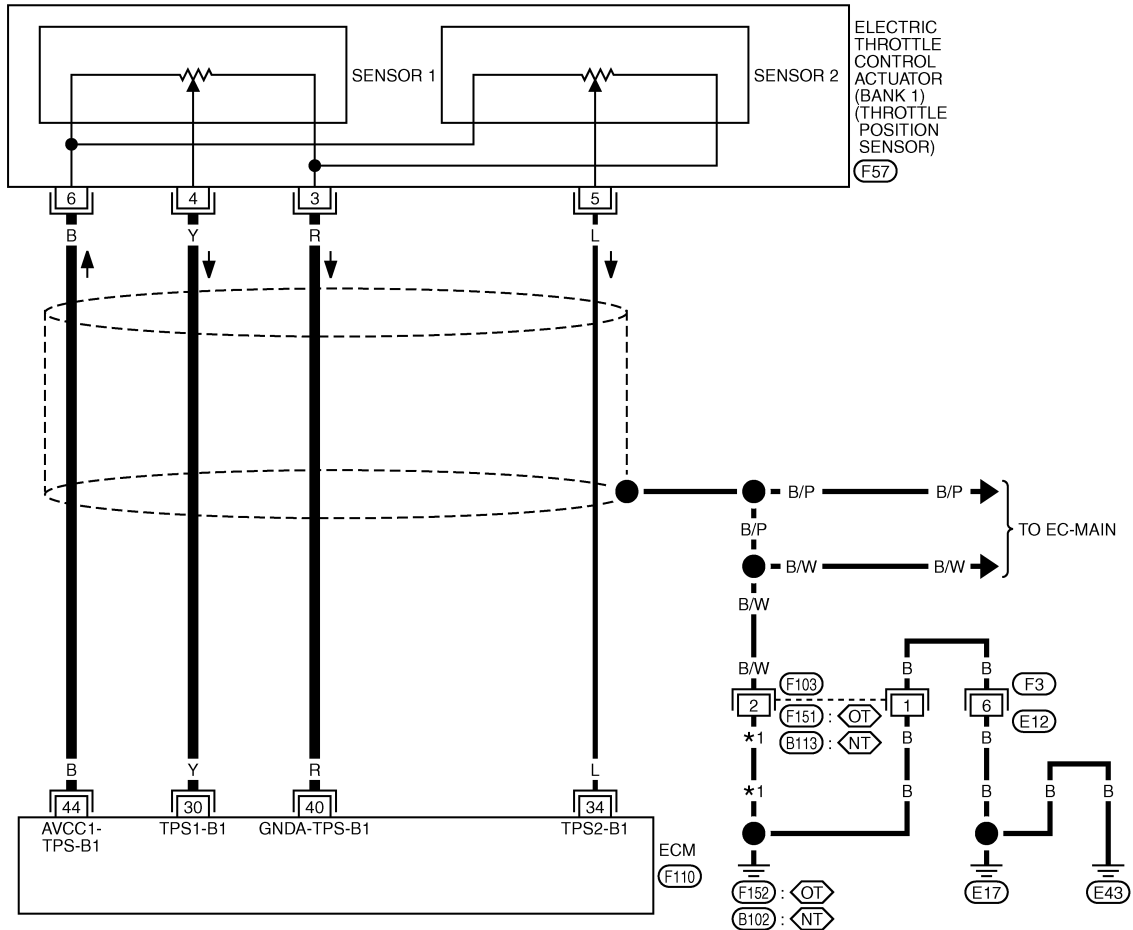
— : NON-DETECTABLE LINE FOR DTC

⬡ : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE

⬢ : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE

*1 B : ⬡

B/W : ⬢



TBWT1641E

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, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
30	Y	Throttle position sensor 1 (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	L	Throttle position sensor 2 (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
40	R	Sensor ground [Throttle position sensor (bank 1)]	[Engine is running] • Warm-up condition • Idle speed	0V
44	B	Sensor power supply [Throttle position sensor (bank 1)]	[Ignition switch: ON]	5V

Bank 2

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

EC-TPS1B2-01

— : DETECTABLE LINE FOR DTC

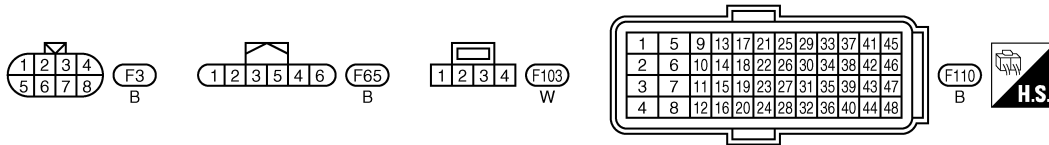
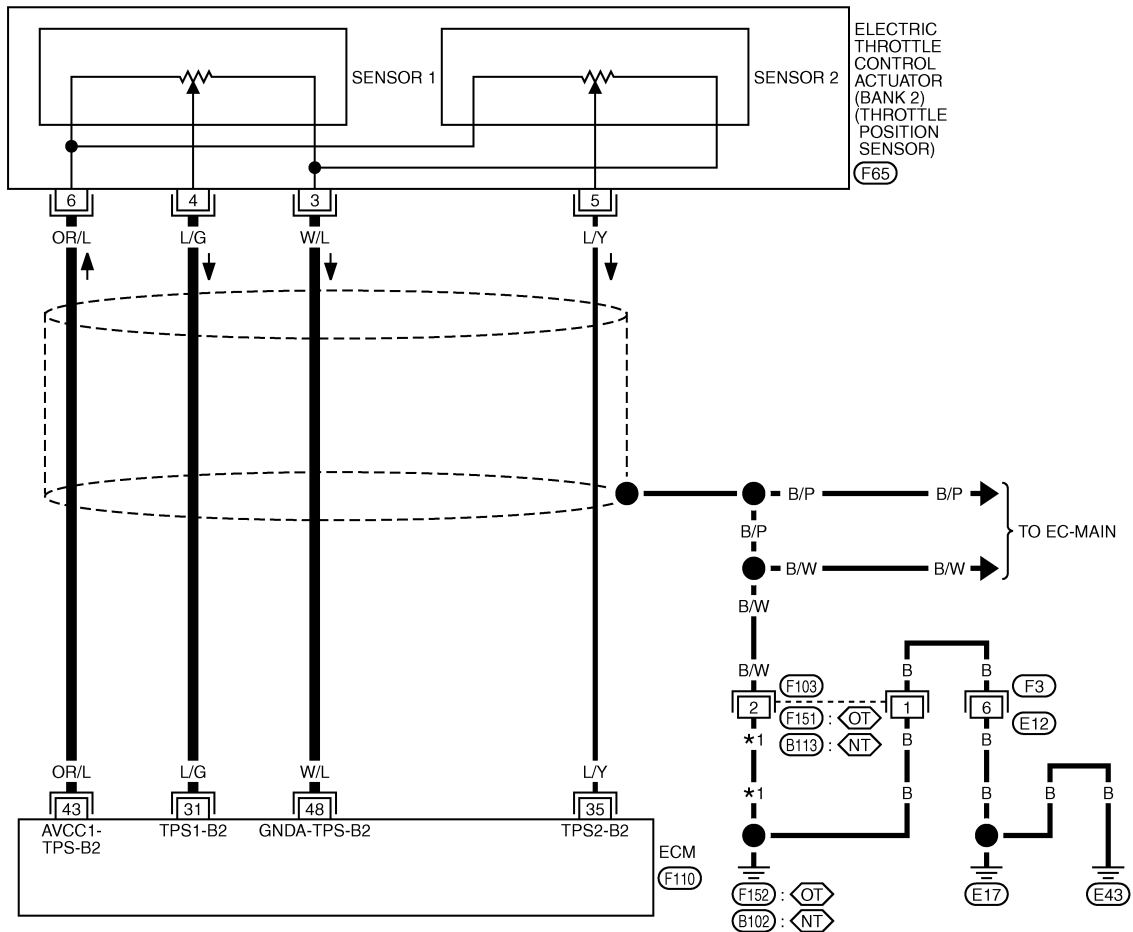
— : NON-DETECTABLE LINE FOR DTC

⬡ : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE

⬢ : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE

*1 B : ⬡

B/W : ⬢



TBWT1642E

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, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
31	L/G	Throttle position sensor 1 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	Less than 4.75V
35	L/Y	Throttle position sensor 2 (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	More than 0.36V
43	OR/L	Sensor power supply [Throttle position sensor (bank 2)]	[Ignition switch: ON]	5V
48	W/L	Sensor ground [Throttle position sensor (bank 2)]	[Engine is running] Warm-up condition - Idle speed	0V

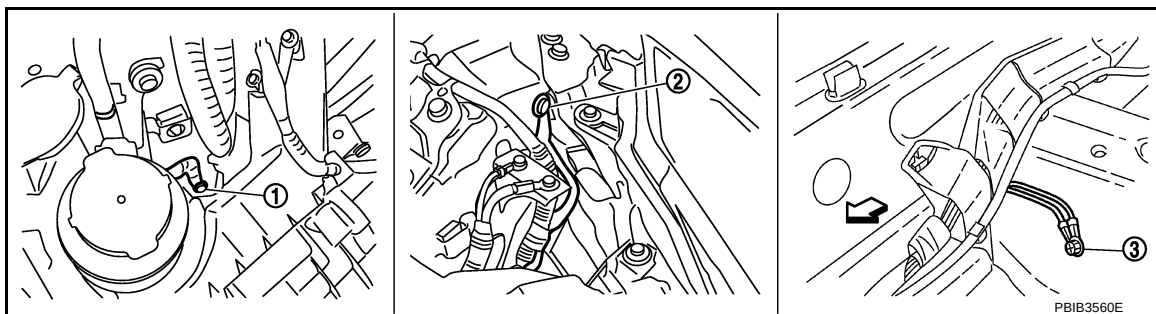
Diagnosis Procedure

INFOID:000000001645745

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .



1. Body ground E17

2. Body ground E43

3. Body ground B102

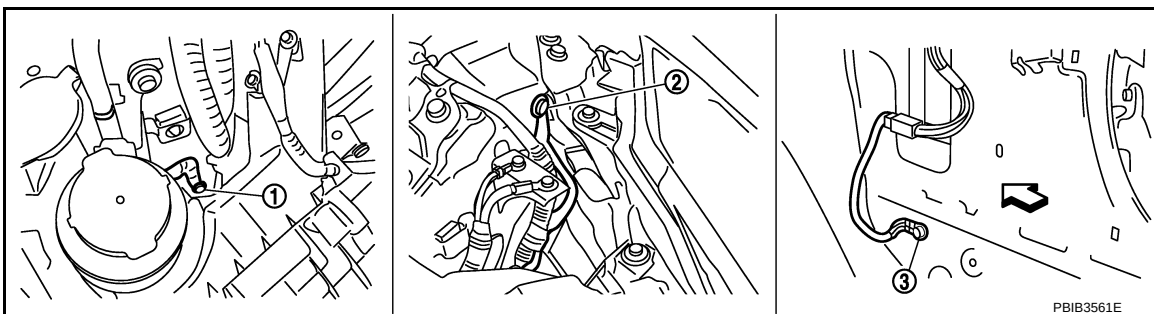
←: Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side finisher removed)

← Vehicle front

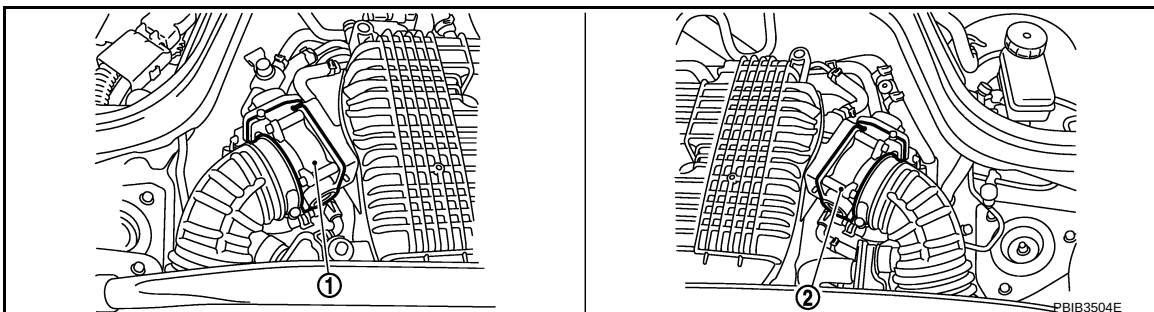
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

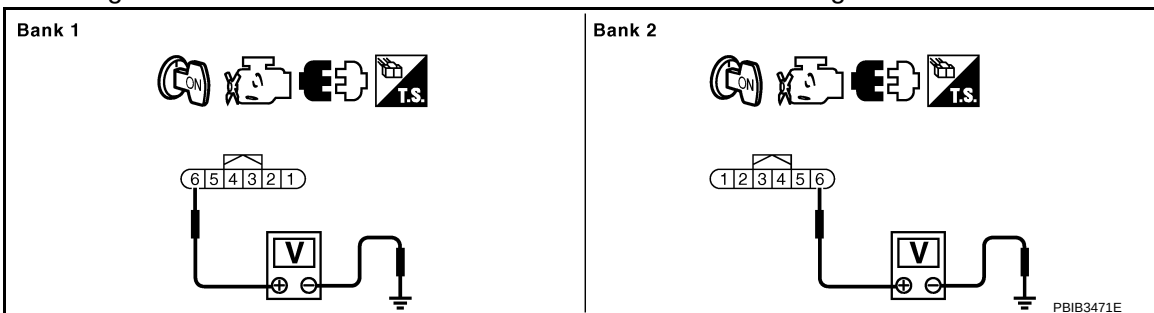


1. Electric throttle control actuator
(bank 1)

2. Electric throttle control actuator
(bank 2)

2. Turn ignition switch ON.

3. Check voltage between electric throttle control actuator terminal 6 and ground with CONSULT-III 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.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

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

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

3. Check harness continuity between electric throttle control actuator terminal 6 and ECM terminal 44 (bank 1) or 43 (bank 2).
Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4. 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 3 and ECM terminal 40 (bank 1) or 48 (bank 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 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 30 (bank 1) or 31 (bank 2) and electric throttle control actuator terminal 4. 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 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to [EC-352, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

INFOID:000000001645746

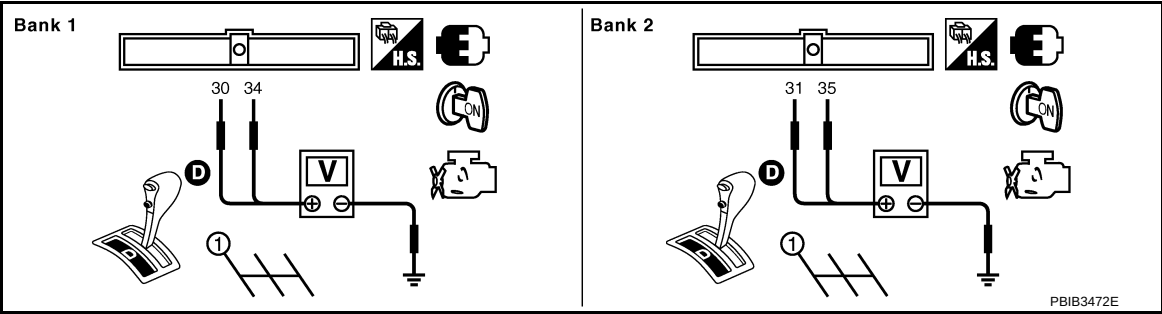
THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.

DTC P0222, P0223, P2132, P2133 TP SENSOR

< SERVICE INFORMATION >

4. Set shift lever to D (A/T) or 1st (M/T) position.
5. Check voltage between ECM terminals 30 [TP sensor 1 (bank 1) signal], 31 [TP sensor 1 (bank 2) signal], 34 [TP sensor 2 (bank 1) signal], 35 [TP sensor 2 (bank 2) signal] and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
30 [TP sensor 1 (bank 1)]	Fully released	More than 0.36V
31 [TP sensor 1 (bank 2)]	Fully depressed	Less than 4.75V
34 [TP sensor 2 (bank 1)]	Fully released	Less than 4.75V
35 [TP sensor 2 (bank 2)]	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-76, "Throttle Valve Closed Position Learning"](#) .
8. Perform [EC-77, "Idle Air Volume Learning"](#) .

Removal and Installation

INFOID:000000001645747

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#) .

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

On Board Diagnosis Logic

INFOID:000000001645748

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
If another misfire condition occurs that can damage the TWC on a 2nd 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.
2. 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 2nd 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.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • Air fuel ratio (A/F) sensor 1 • Incorrect PCV hose connection
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.	

DTC Confirmation Procedure

INFOID:000000001645749

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-III

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

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

5. If 1st trip DTC is detected, go to [EC-355, "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 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 $\pm$ 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).

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-III" above.

Diagnosis Procedure

INFOID:000000001645750

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- Listen for the sound of the intake air leak.
- 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 (With CONSULT-III)>>GO TO 3.

OK (Without CONSULT-III)>>GO TO 4.

NG >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT-III

- Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- Is there any cylinder which does not produce a momentary engine speed drop?

Yes or No

Yes >> GO TO 4.

No >> GO TO 9.

4.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

3. Make sure that each circuit produces a momentary engine speed drop.

⊗ **Without CONSULT-III**

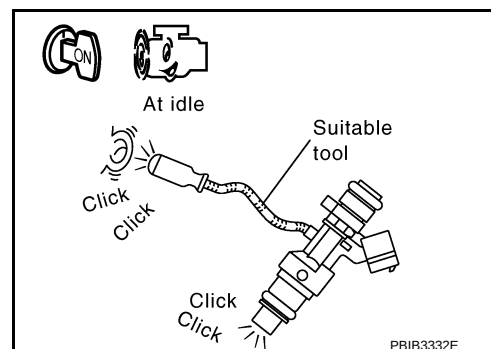
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

OK or NG

OK >> GO TO 5.

NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to [EC-634](#).



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

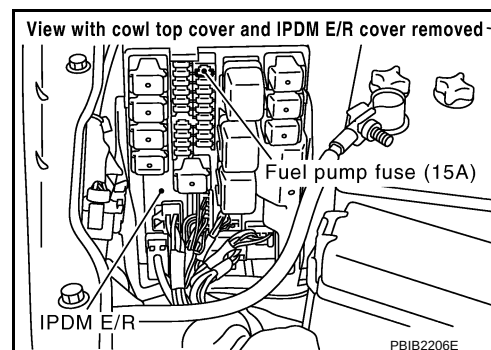
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
12. 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.

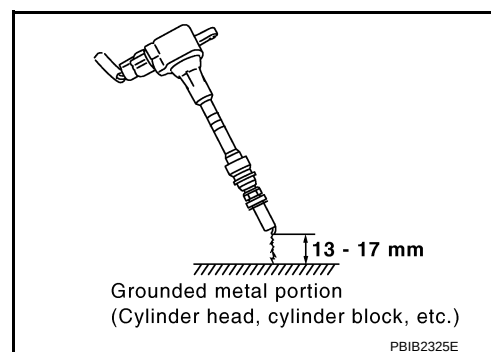
OK or NG

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.



DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

Spark should be generated.

OK or NG

OK >> GO TO 7.

NG >> Check ignition coil, power transistor and their circuits. Refer to [EC-645](#).

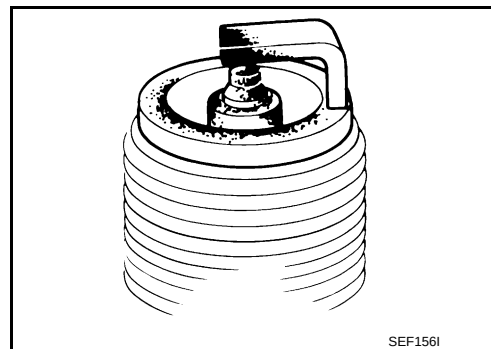
7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to [MA-17. "Changing Spark Plugs \(Iridium-Tipped Type\)"](#).

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 spark plug(s) with standard type one(s). For spark plug type, refer to [MA-17. "Changing Spark Plugs \(Iridium-Tipped Type\)"](#).

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-89. "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-78. "Fuel Pressure Check"](#).
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-78. "Fuel Pressure Check"](#).

At idle: Approximately 350 kPa (3.57 kg/cm², 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-639](#).)
- Fuel pressure regulator (Refer to [EC-78. "Fuel Pressure Check"](#).)
- Fuel lines (Refer to [FL-3. "Checking Fuel Line"](#).)
- Fuel filter for clogging

>> Repair or replace.

12.CHECK IGNITION TIMING

Check the following items. Refer to [EC-71. "Basic Inspection"](#).

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

Items	Specifications
Target idle speed	A/T: 650 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in neutral position)
Ignition timing	A/T: 16 ± 5° BTDC (in P or N position) M/T: 16 ± 5° BTDC (in neutral position)

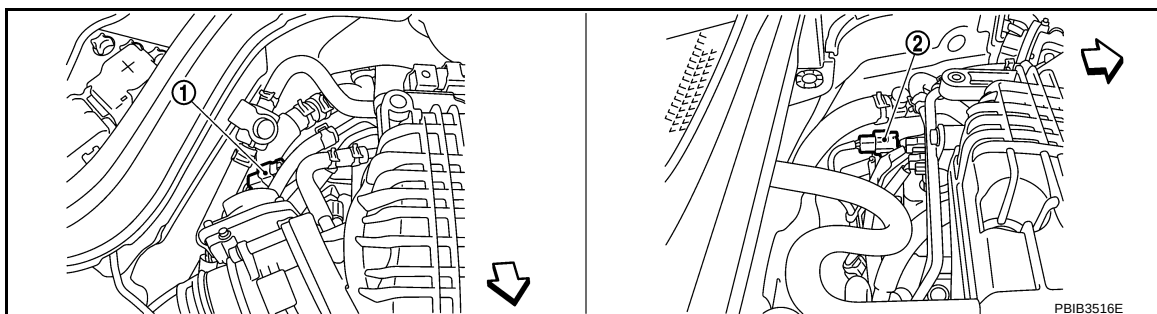
OK or NG

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.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

↶ Vehicle front

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	57
	2	61
Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

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.

DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

< SERVICE INFORMATION >

14. CHECK A/F SENSOR 1 HEATER

Refer to [EC-162, "Component Inspection"](#).

OK or NG

OK >> GO TO 15.

NG >> Replace malfunctioning A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

 **With CONSULT-III**

1. Start engine and warm it up to normal temperature.
2. Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

 **With GST**

1. Start engine and warm it up to normal temperature.
2. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 16.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to [EC-186](#).

16. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-87, "Symptom Matrix Chart"](#).

OK or NG

OK >> GO TO 17.

NG >> Repair or replace.

17. 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-46, "Emission-related Diagnostic Information"](#).

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

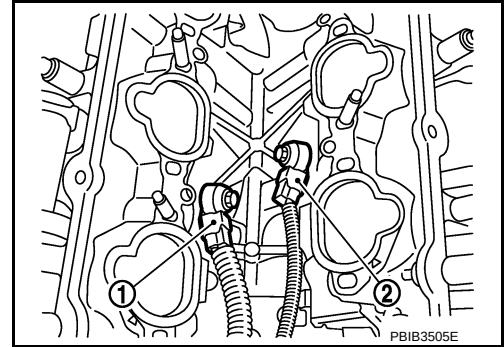
DTC P0327, P0328, P0332, P0333 KS

Component Description

INFOID:000000001645751

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.

- 1 : Knock sensor (bank 1)
- 2 : Knock sensor (bank 2)



On Board Diagnosis Logic

INFOID:000000001645752

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327 0327 (Bank 1)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
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:000000001645753

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.

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-364, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000001645754

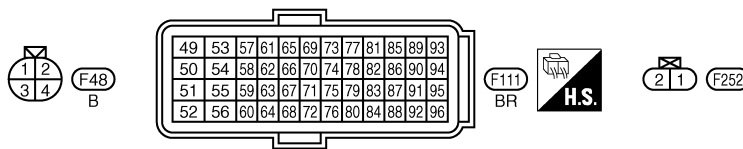
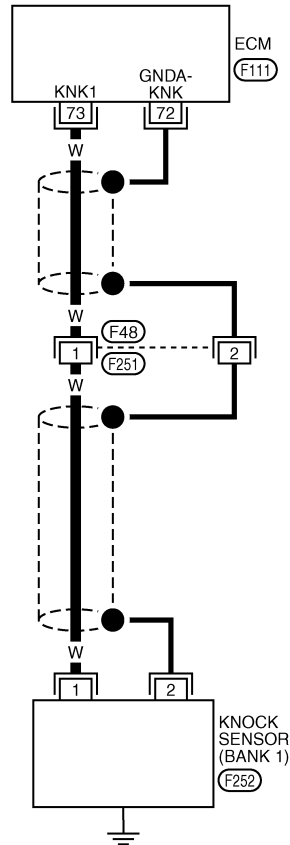
BANK 1

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

EC-KSB1-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1643E

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)
72	—	Sensor ground [Knock sensor (bank 1), Knock sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
73	W	Knock sensor (bank 1)	[Engine is running] • Idle speed	Approximately 2.5V

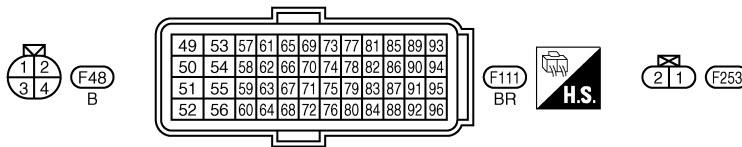
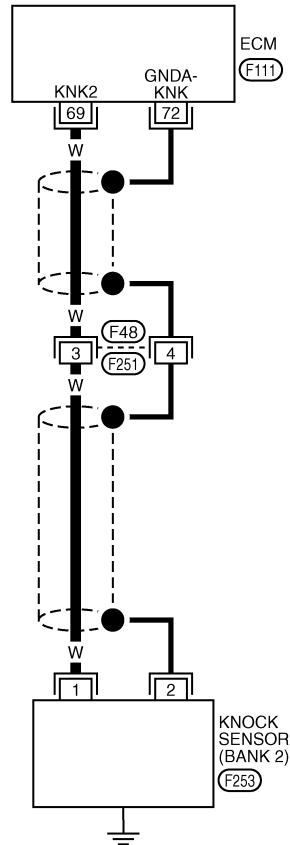
BANK 2

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

EC-KSB2-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1644E

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)
69	W	Knock sensor (bank 2)	[Engine is running] • Idle speed	Approximately 2.5V
72	—	Sensor ground [Knock sensor (bank 1), Knock sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:000000001645755

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 terminal 73 (bank 1), 69 (bank 2) and ground. Refer to Wiring Diagram.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [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.

1 : Knock sensor (bank 1)

2 : Knock sensor (bank 2)

2. Check harness continuity between ECM terminal 73 (bank 1), 69 (bank 2) and knock sensor 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 F48, F251
- 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-366. "Component Inspection"](#).

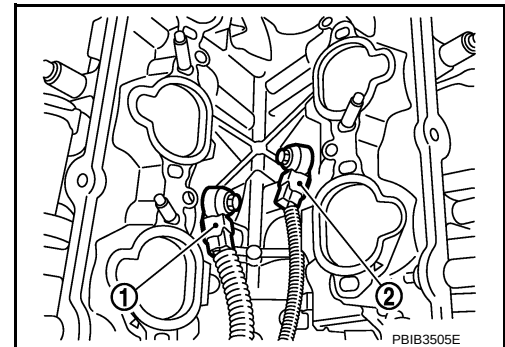
OK or NG

OK >> GO TO 5.

NG >> Replace knock sensor.

5.CHECK GROUND CONNECTIONS

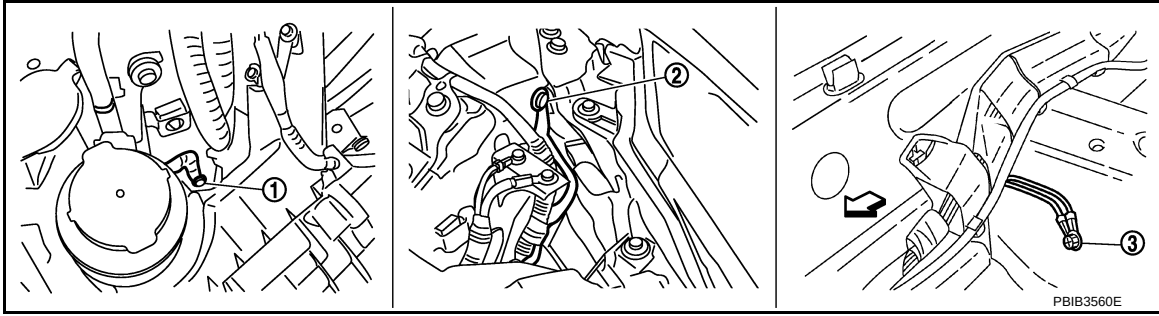
Models with VDC system, navigation system or telephone



DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

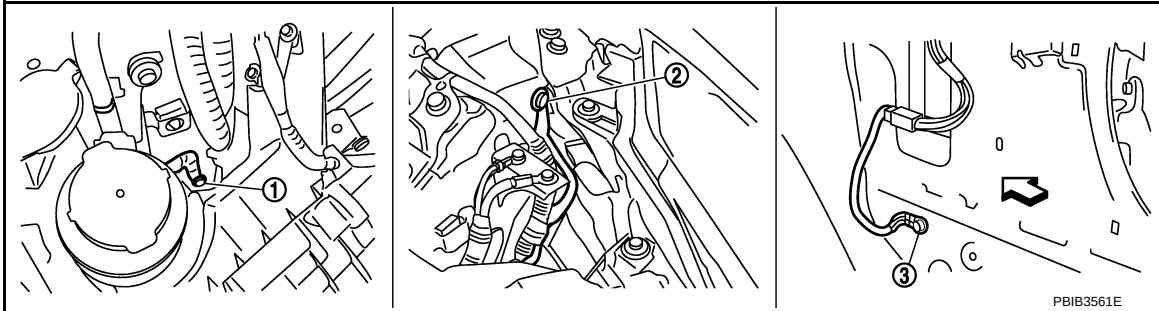
2. Body ground E43

3. Body ground B102

⇐ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

⇐ Vehicle front

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 ECM terminal 72 and knock sensor terminal 2.
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 F48, F251
- 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.

DTC P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

INFOID:000000001645756

KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

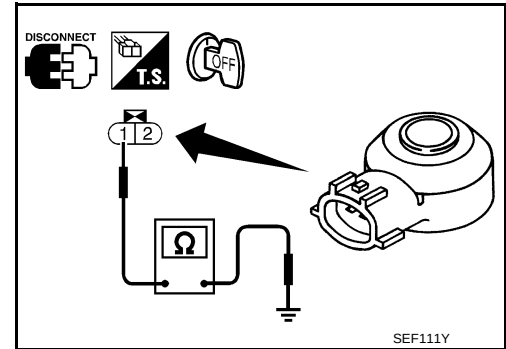
NOTE:

It is necessary to use an ohmmeter which can measure more than 10 M Ω .

Resistance: Approximately 532 - 588 k Ω [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



INFOID:000000001645757

Removal and Installation

KNOCK SENSOR

Refer to [EM-106](#).

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:000000001645758

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

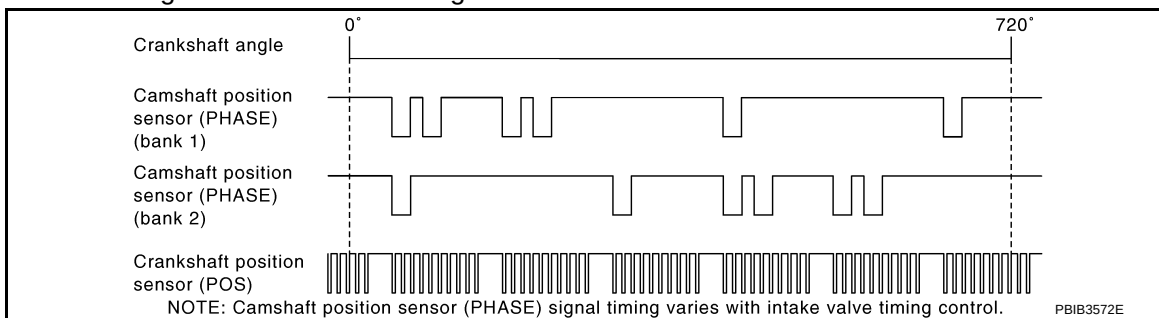
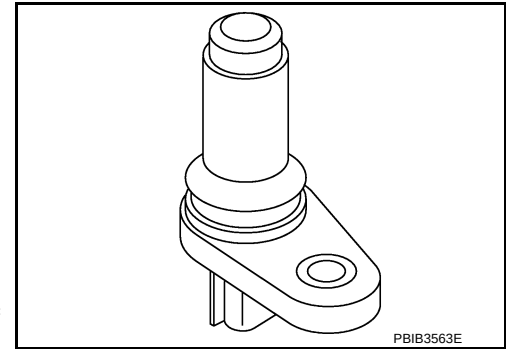
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

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

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

ECM receives the signals as shown in the figure.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645759

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:000000001645760

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [CKP sensor (POS) circuit is open or shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Accelerator pedal position sensor • EVAP control system pressure sensor • Refrigerant pressure sensor • Signal plate

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645761

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.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-370, "Diagnosis Procedure"](#).

DTC P0335 CKP SENSOR (POS)

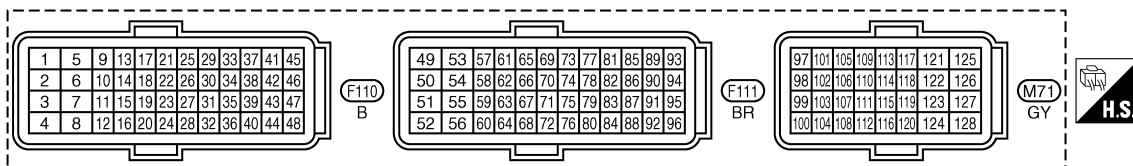
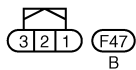
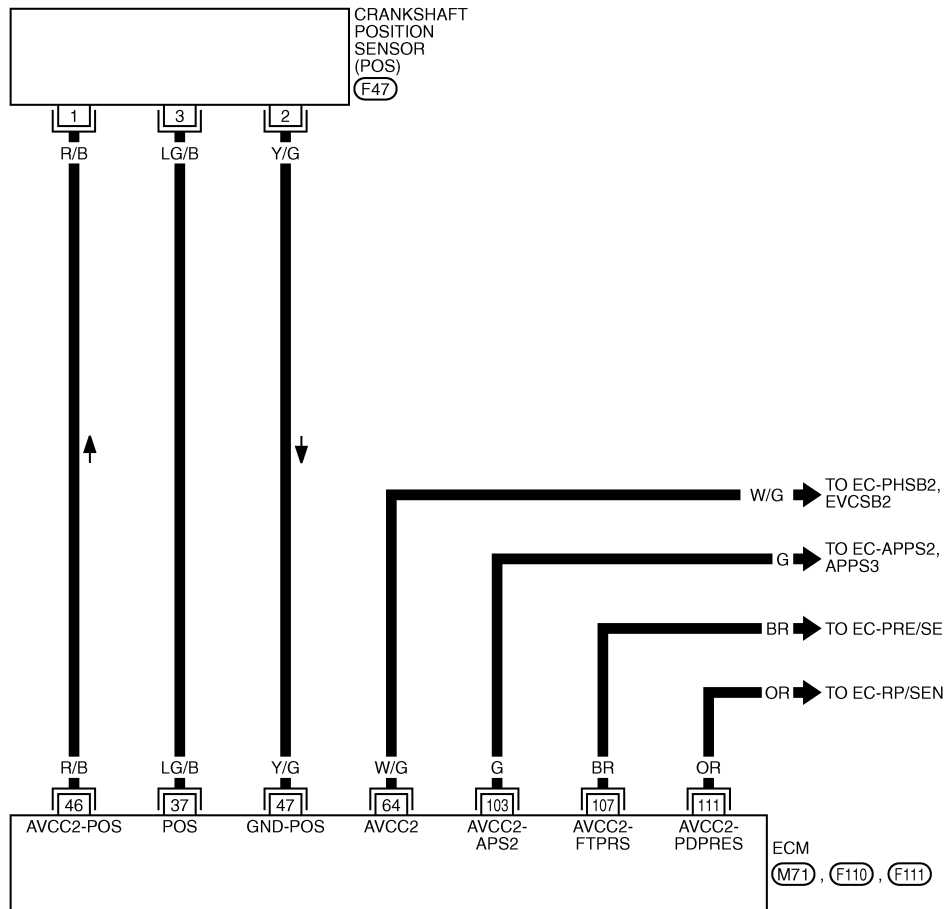
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645762

EC-POS-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1645E

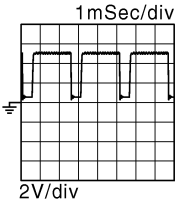
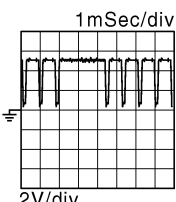
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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)
37	LG/B	Crankshaft position sensor (POS)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★ 
			[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0V★ 
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
47	Y/G	Sensor ground [Crankshaft position sensor (POS)]	[Engine is running] • Warm-up condition • Idle speed	0V
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V

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

Diagnosis Procedure

INFOID:000000001645763

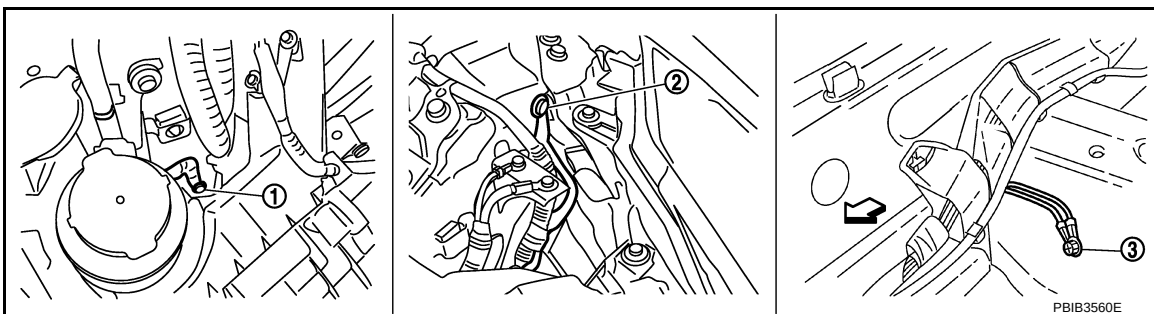
1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >



1. Body ground E17

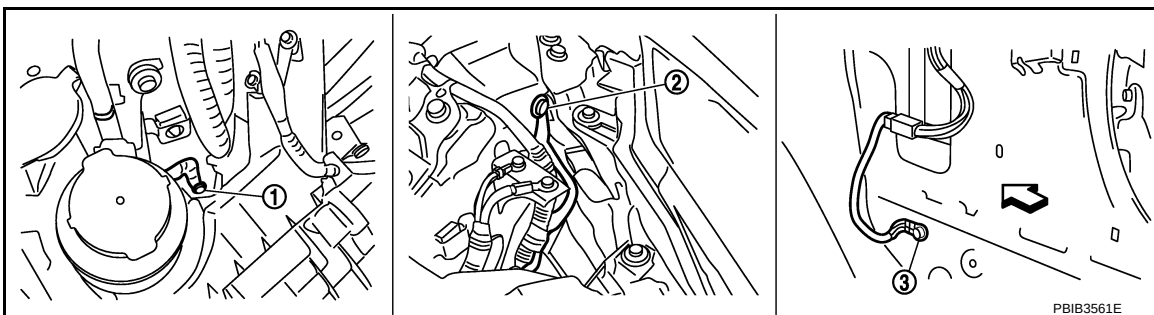
2. Body ground E43

3. Body ground B102

↩ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↩ Vehicle front

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

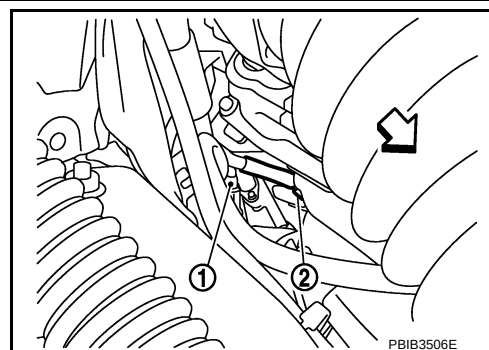
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) (2) harness connector.

1 : A/F sensor 1 (bank 1)

↩ : Vehicle front

2. Turn ignition switch ON.



DTC P0335 CKP SENSOR (POS)

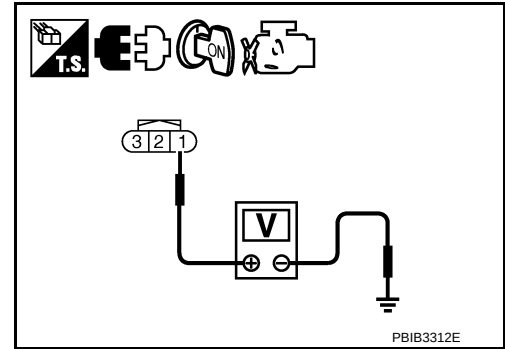
< SERVICE INFORMATION >

3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 8.
NG >> GO TO 3.



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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ECM terminal 46. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK CKP SENSOR (POS) 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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor terminal 1	EC-658

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection".](#))
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection".](#))
- EVAP control system pressure sensor (Refer to [EC-436, "Component Inspection".](#))
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit".](#))

OK or NG

- OK >> GO TO 6.
NG >> Replace malfunctioning component.

6. CHECK APP SENSOR

Refer to [EC-600, "Component Inspection".](#)

OK or NG

- OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning".](#)

DTC P0335 CKP SENSOR (POS)

< SERVICE INFORMATION >

3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77, "Idle Air Volume Learning"](#).

A

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

EC

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) terminal 2 and ECM terminal 47.
Refer to Wiring Diagram.

C

Continuity should exist.

D

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

OK or NG

E

OK >> GO TO 9.

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

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

F

1. Check the continuity between CKP sensor (POS) terminal 3 and ECM terminal 37.
Refer to Wiring Diagram.

G

Continuity should exist.

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

OK or NG

H

OK >> GO TO 10.

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

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

I

Refer to [EC-373, "Component Inspection"](#).

OK or NG

J

OK >> GO TO 11.

NG >> Replace CKP sensor (POS).

11. CHECK GEAR TOOTH

K

Visually check for chipping signal plate gear tooth.

OK or NG

L

OK >> GO TO 12.

NG >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

M

Refer to [EC-134](#).

>> INSPECTION END

N

Component Inspection

INFOID:000000001645764

CRANKSHAFT POSITION SENSOR (POS)

O

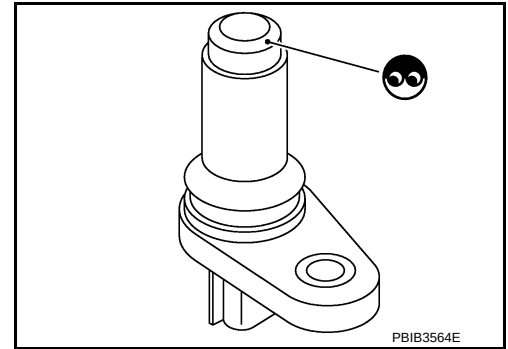
1. Loosen the fixing bolt of the sensor.
2. Disconnect CKP sensor (POS) harness connector.
3. Remove the sensor.

P

DTC P0335 CKP SENSOR (POS)

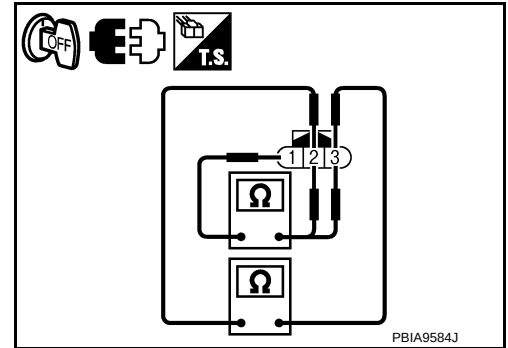
< SERVICE INFORMATION >

4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

INFOID:000000001645765

CRANKSHAFT POSITION SENSOR (POS)

Refer to [EM-27](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

DTC P0340, P0345 CMP SENSOR (PHASE)

Component Description

INFOID:0000000001645766

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

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

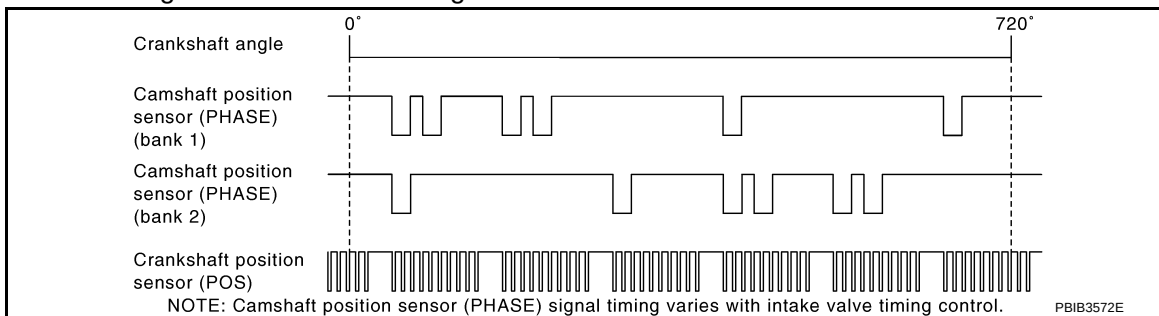
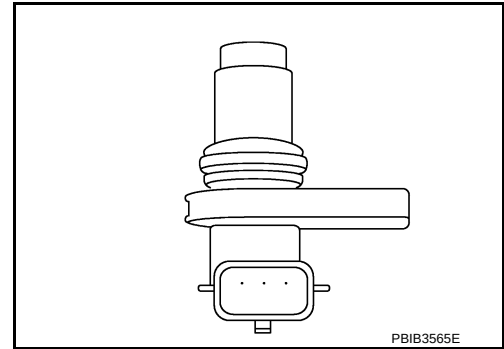
The sensor consists of a permanent magnet and Hall IC.

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

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

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

ECM receives the signals as shown in the figure.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645767

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:0000000001645768

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-482](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1)	Camshaft position sensor (PHASE) circuit	- The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. - The cylinder No. signal is not sent to ECM during engine running. - The cylinder No. signal is not in the normal pattern during engine running.	- Harness or connectors [CMP sensor (PHASE) (bank 1) circuit is open or shorted.] - Camshaft position sensor (PHASE) (bank 1) - Camshaft (INT) - Starter motor (Refer to SC-8.) - Starting system circuit (Refer to SC-8.) - Dead (Weak) battery
P0345 0345 (Bank 2)			- Harness or connectors [CMP sensor (PHASE) (bank 2) circuit is open or shorted.] [CKP sensor (POS) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) - Camshaft position sensor (PHASE) (bank 2) - Crankshaft position sensor (POS) - Exhaust valve timing control position sensor (bank 2) - Accelerator pedal position sensor - EVAP control system pressure sensor - Refrigerant pressure sensor - Camshaft (INT) - Starter motor (Refer to SC-8.) - Starting system circuit (Refer to SC-8.) - Dead (Weak) battery

DTC Confirmation Procedure

INFOID:000000001645769

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.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-380, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to next step.
4. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-380, "Diagnosis Procedure"](#).

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

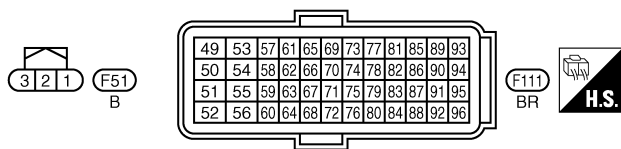
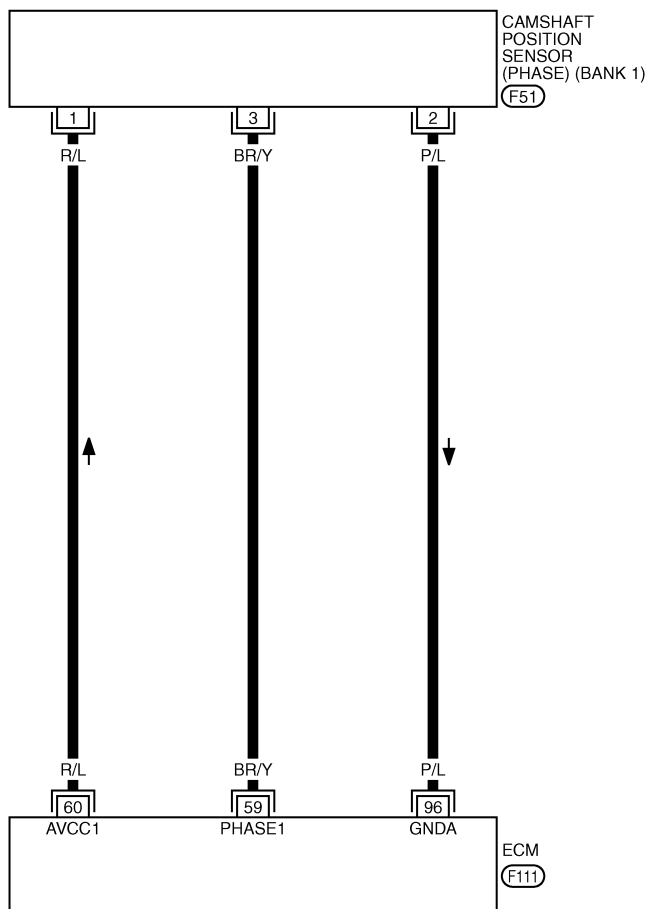
Wiring Diagram

INFOID:000000001645770

BANK 1

EC-PHSB1-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



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

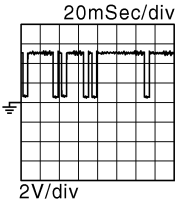
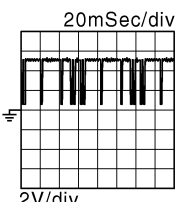
CAUTION:

TBWT1646E

DTC P0340, P0345 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)
59	BR/Y	Camshaft position sensor (PHASE) (bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	3.0 - 5.0V★  20mSec/div 2V/div PBIB3553E
			[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0V★  20mSec/div 2V/div PBIB3554E
60	R/L	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	[Ignition switch: ON]	5V
96	P/L	Sensor ground [Camshaft position sensor (PHASE) (bank 1), Power steering pressure sensor]	[Engine is running] • Warm-up condition • Idle speed	0V

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

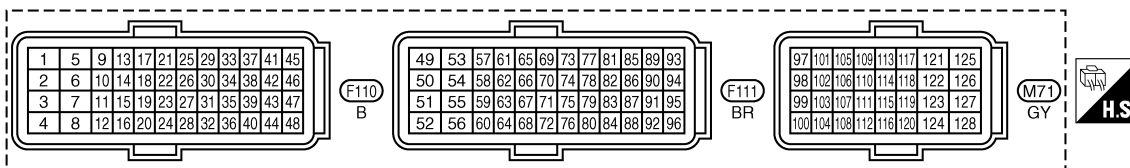
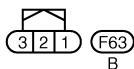
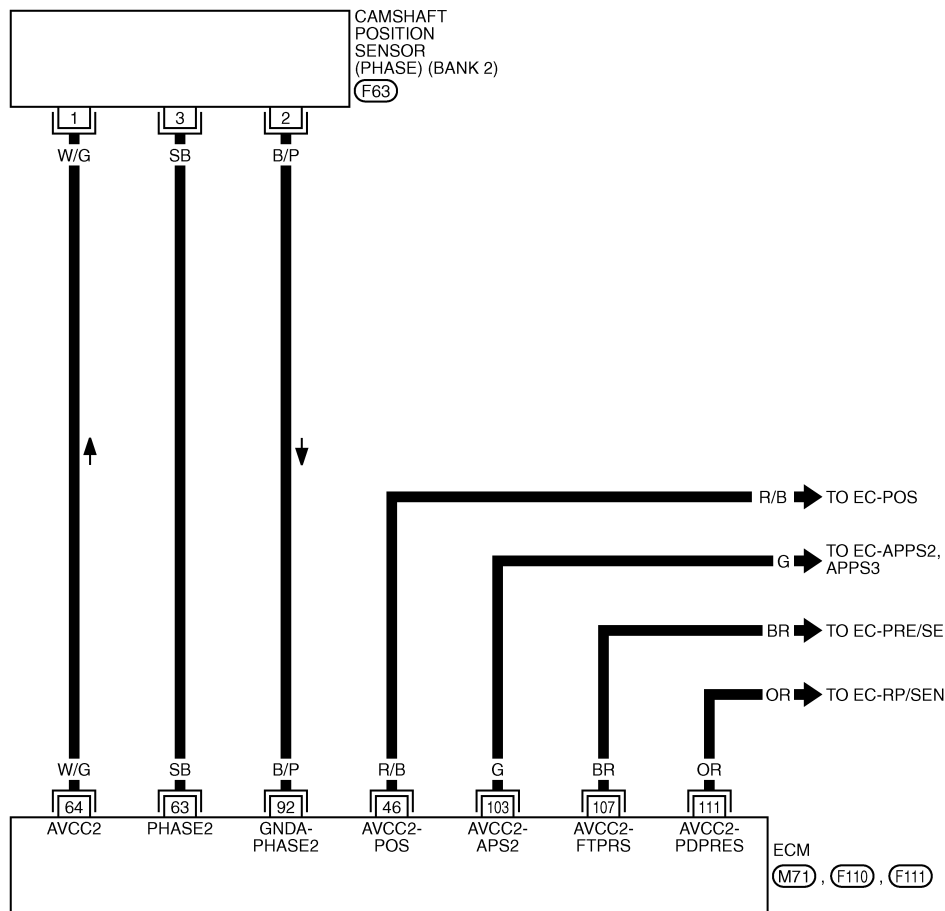
DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

BANK 2

EC-PHSB2-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1647E

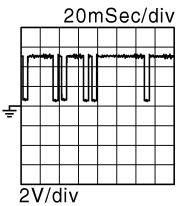
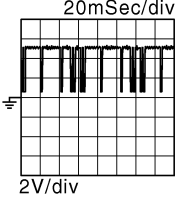
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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 P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
63	SB	Camshaft position sensor (PHASE) (bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	3.0 - 5.0V★  20mSec/div 2V/div PBIB3553E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  20mSec/div 2V/div PBIB3554E
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
92	B/P	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V

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

Diagnosis Procedure

INFOID:000000001645771

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-8](#).)

2.CHECK GROUND CONNECTIONS

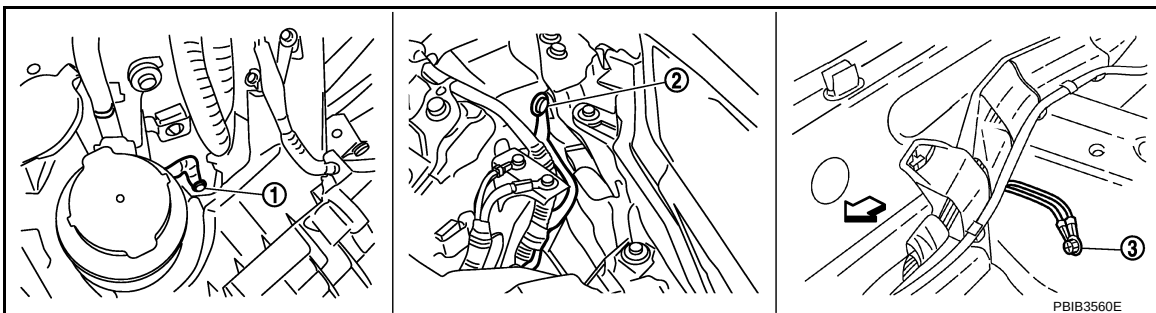
Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

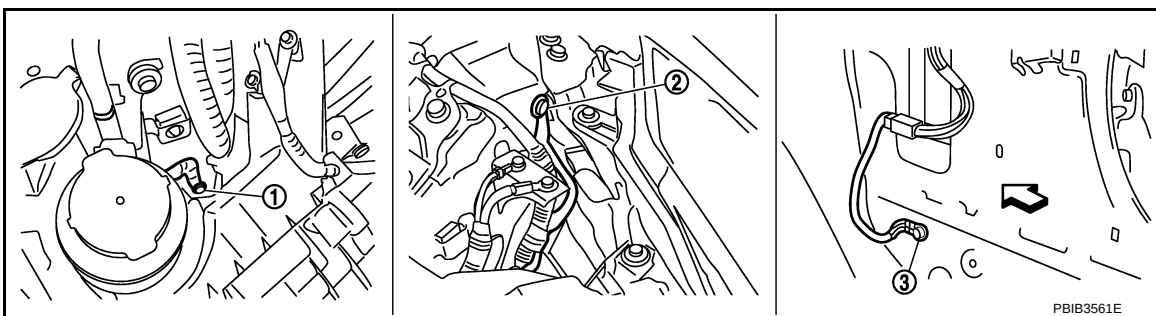
2. Body ground E43

3. Body ground B102

⇐ Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

⇐ Vehicle front

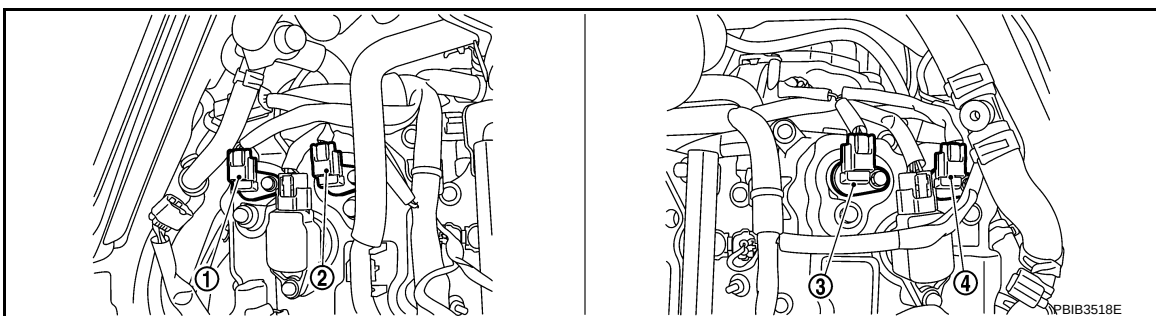
OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-I

- Disconnect camshaft position (CMP) sensor (PHASE) harness connector.



1. Exhaust valve timing control position
sensor (bank 1)

2. Camshaft position sensor (PHASE)
(bank 1)

3. Camshaft position sensor (PHASE)
(bank 2)

4. Exhaust valve timing control position
sensor (bank 2)

- Turn ignition switch ON.

DTC P0340, P0345 CMP SENSOR (PHASE)

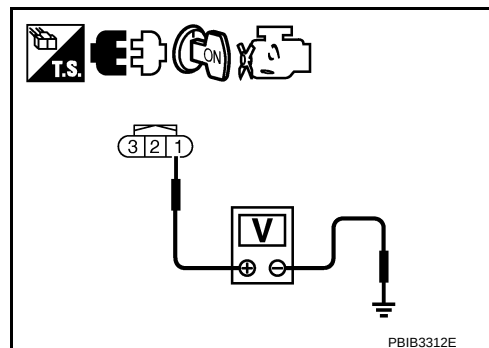
< SERVICE INFORMATION >

3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 9.
NG-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.
NG-2 >> P0345: GO TO 4.



4.CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 1 and ECM terminal 64. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 5.
NG >> Repair open circuit.

5.CHECK CMP SENSOR (PHASE) 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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor 1	EC-658

OK or NG

- OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection".](#))
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection".](#))
- EVAP control system pressure sensor (Refer to [EC-436, "Component Inspection".](#))
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit".](#))

OK or NG

- OK >> GO TO 7.
NG >> Replace malfunctioning component.

7.CHECK APP SENSOR

Refer to [EC-600, "Component Inspection".](#)

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning".](#)

DTC P0340, P0345 CMP SENSOR (PHASE)

< SERVICE INFORMATION >

3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

9. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ECM terminal 92 (bank 2) or 96 (bank 1) and CMP sensor (PHASE) terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground 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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 59 (bank 1) or 63 (bank 2) 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 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-383, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
NG >> Replace malfunctioning CMP sensor (PHASE).

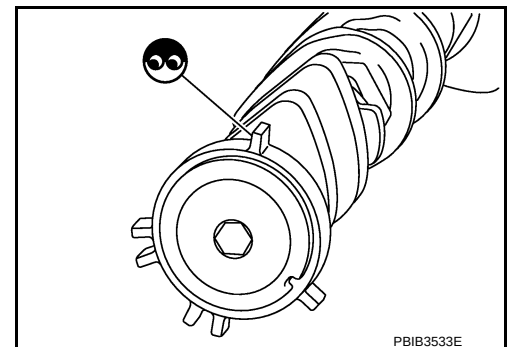
12. CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

- OK >> GO TO 13.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



13. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

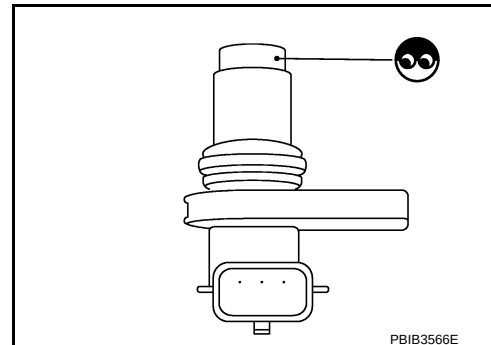
INFOID:000000001645772

CAMSHAFT POSITION SENSOR (PHASE)

DTC P0340, P0345 CMP SENSOR (PHASE)

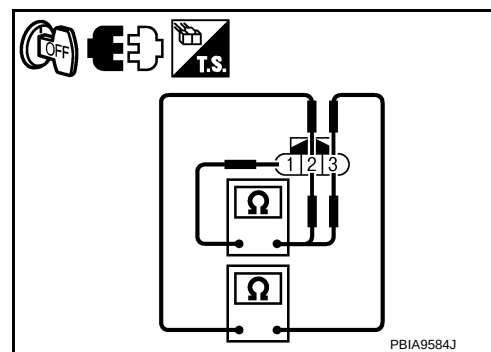
< SERVICE INFORMATION >

1. Loosen the fixing bolt of the sensor.
2. Disconnect CMP sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EM-72](#).

INFOID:000000001645773

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

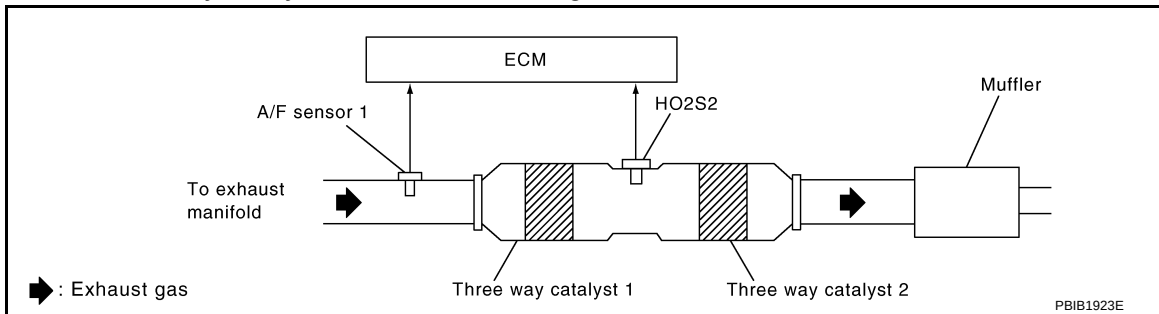
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

On Board Diagnosis Logic

INFOID:000000001645774

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 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 1 malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420 (Bank 1)	Catalyst system efficiency below threshold	- Three way catalyst 1 does not operate properly. - Three way catalyst 1 does not have enough oxygen storage capacity.	- Three way catalyst 1 - Exhaust tube - Intake air leaks - Fuel injector - Fuel injector leaks - Spark plug - Improper ignition timing
P0430 0430 (Bank 2)			

DTC Confirmation Procedure

INFOID:000000001645775

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-III

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 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.
- 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).
- Open engine hood.
- Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 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.
- Wait 5 seconds at idle.
- Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).
If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
- Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- Confirm that the 1st trip DTC is not detected.

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

If the 1st trip DTC is detected, go to [EC-386, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:000000001645776

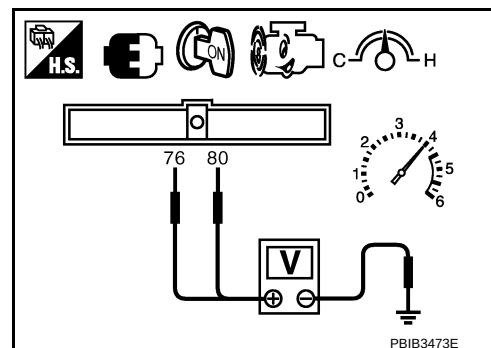
Use this procedure to check the overall function of the three way catalyst 1. During this check, a 1st trip DTC might not be confirmed.

Ⓢ 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 voltmeters probes between ECM terminal 76 [HO2S2 (bank 1) signal], 80 [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-386, "Diagnosis Procedure"](#).

- 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Diagnosis Procedure

INFOID:000000001645777

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

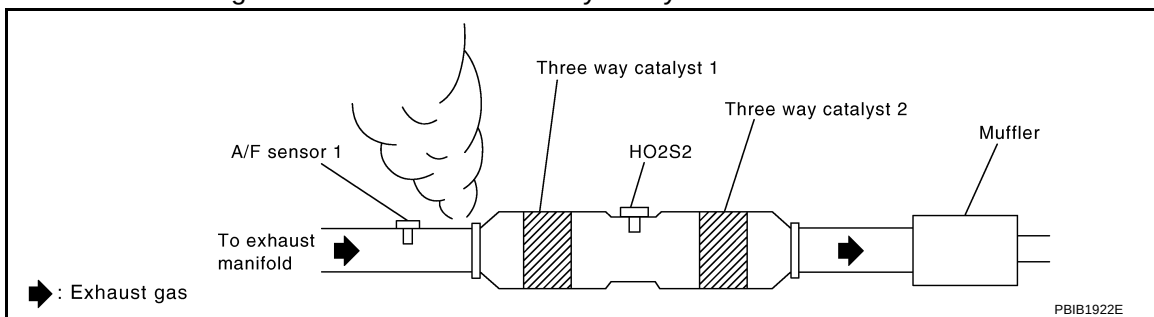
OK or NG

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 1.



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"](#).

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

Items	Specifications	
Target idle speed	A/T	650 ± 50 rpm (in P or N position)
	M/T	650 ± 50 rpm (in Neutral position)
Ignition timing	A/T	16 ± 5° BTDC (in P or N position)
	M/T	16 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.

NG >> Follow the [EC-71, "Basic Inspection"](#).

5.CHECK FUEL INJECTOR

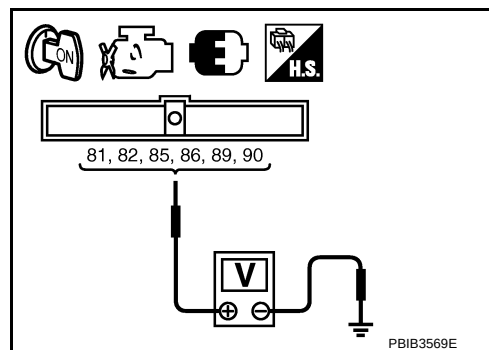
1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminals 81, 82, 85, 86, 89, 90 and ground with CONSULT-III or tester.
Refer to Wiring Diagram for fuel injectors, [EC-635, "Wiring Diagram"](#).

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.

NG >> Perform [EC-636, "Diagnosis Procedure"](#).



6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

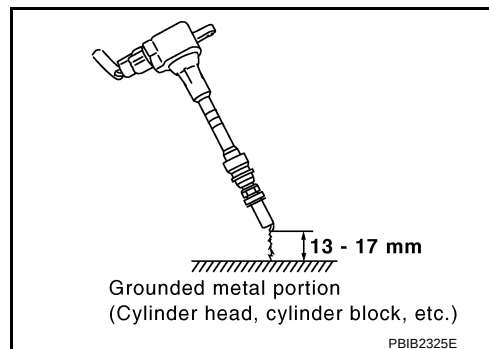
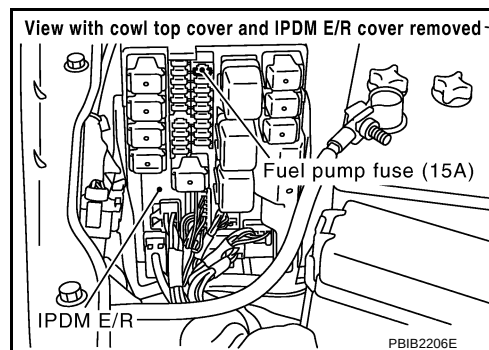
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
12. 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.



DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

- 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-645](#).

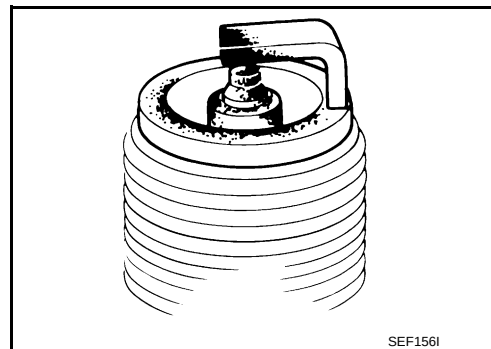
8. CHECK SPARK PLUG

1. Turn ignition switch OFF.
2. Check the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 9.

NG >> Repair or replace spark plug (s) with standard type one (s). For spark plug type ignition coil. Refer to [MA-17, "Changing Spark Plugs \(Iridium-Tipped Type\)"](#).



9. 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 spark plug(s) with standard type one(s). For spark plug type, refer to [MA-17, "Changing Spark Plugs \(Iridium-Tipped Type\)"](#).

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
Refer to [EM-35](#).
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-134](#).

DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst assembly.

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

DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

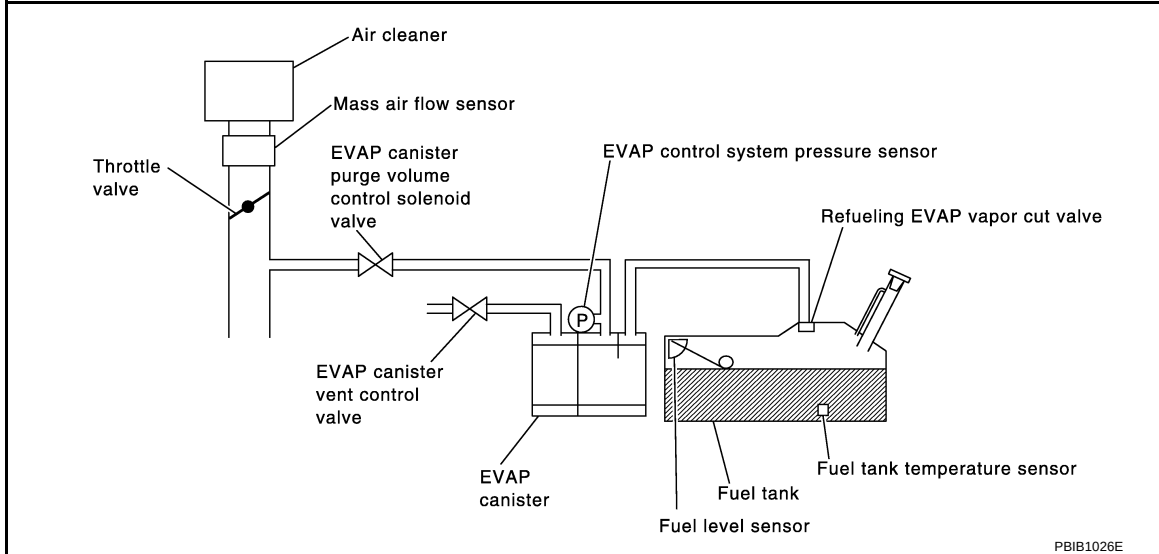
DTC P0441 EVAP CONTROL SYSTEM

System Description

INFOID:0000000001645778

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:0000000001645779

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.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve

DTC Confirmation Procedure

INFOID:0000000001645780

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-III

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

DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.
- Touch "START".
If "COMPLETED" is displayed, go to step 7.
- When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Shift lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.3 - 9.0 msec
COOLAN TEMP/S	70 - 100°C (158 - 212°F)

If "TESTING" is not changed for a long time, retry from step 2.

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-391, "Diagnosis Procedure"](#).

Overall Function Check

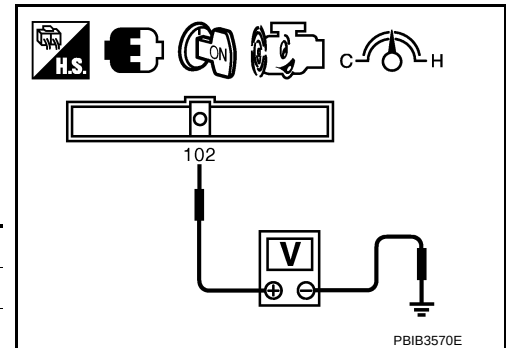
INFOID:000000001645781

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

- Lift up drive wheels.
- Start engine (VDC switch or TCS switch OFF) and warm it up to normal operating temperature.
- Turn ignition switch OFF, wait at least 10 seconds.
- Start engine and wait at least 70 seconds.
- Set voltmeter probes to ECM terminals 102 (EVAP control system pressure sensor signal) and ground.
- Check EVAP control system pressure sensor value at idle speed and note it.
- 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
Shift lever	Any position other than P, N or R



- 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.
- If NG, go to [EC-391, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645782

1.CHECK EVAP CANISTER

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

OK or NG

- OK (With CONSULT-III)>>GO TO 2.
- OK (Without CONSULT-III)>>GO TO 3.
- NG >> Replace EVAP canister.

2.CHECK PURGE FLOW

With CONSULT-III

DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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-31, "Description"](#).
2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL 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.

3.CHECK PURGE FLOW

Without CONSULT-III

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-31, "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-31, "Description"](#).

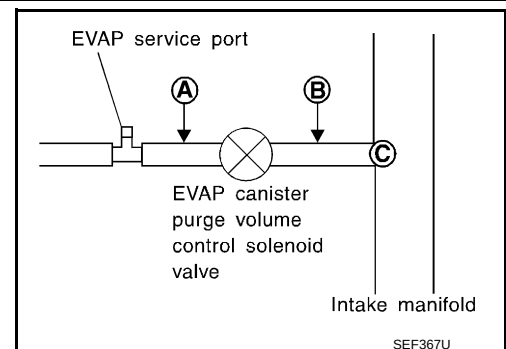
OK or NG

OK >> GO TO 5.

NG >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

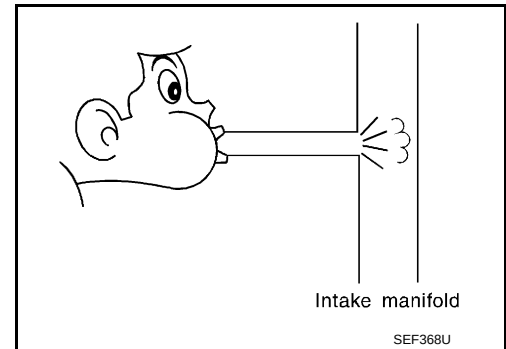
3. Check that air flows freely.

OK or NG

OK (With CONSULT-III)>>GO TO 6.

OK (Without CONSULT-III)>>GO TO 7.

NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-413. "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 [EC-431. "DTC Confirmation Procedure"](#) for DTC P0452 and [EC-439. "DTC Confirmation Procedure"](#) for P0453.

OK or NG

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-418. "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> Replace EVAP canister vent control valve.

12. CHECK EVAP PURGE LINE

DTC P0441 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to [EC-31, "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-134](#).

>> **INSPECTION END**

DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

DTC P0442 EVAP CONTROL SYSTEM

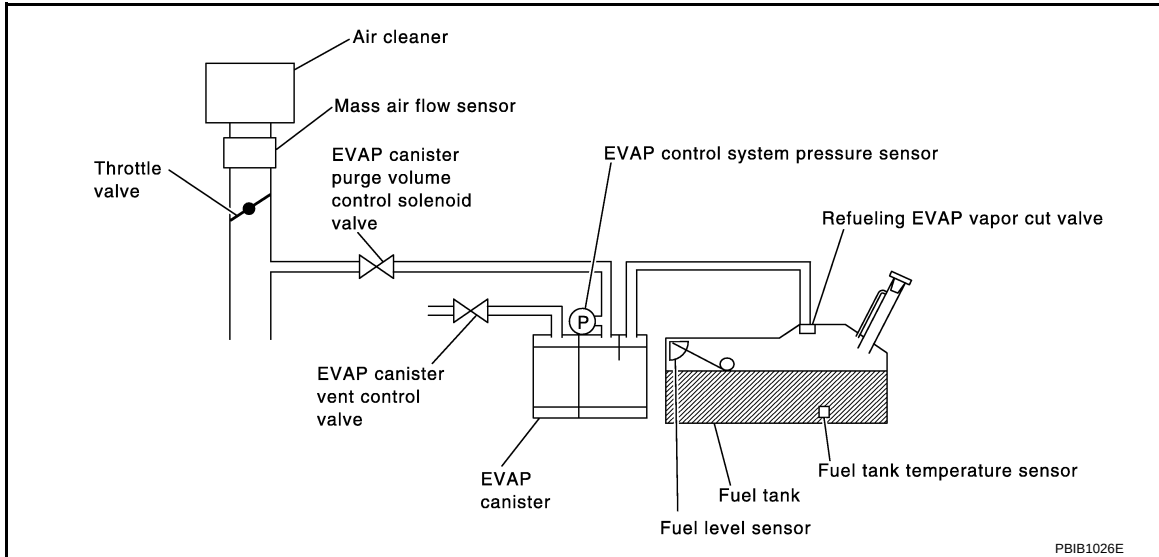
On Board Diagnosis Logic

INFOID:000000001645783

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 prop- erly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent con- trol valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks

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:000000001645784

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).

Ⓜ WITH CONSULT-III

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-III.
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 "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-71, "Basic Inspection"](#).
6. Make sure that "OK" is displayed.
If "NG" is displayed, refer to [EC-396, "Diagnosis Procedure"](#).
NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Ⓜ WITH GST

NOTE:

Be sure to read the explanation of [EC-46, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to [EC-46, "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-396, "Diagnosis Procedure"](#).
 - If P0441 is displayed on the screen, go to [EC-391, "Diagnosis Procedure"](#).

Diagnosis Procedure

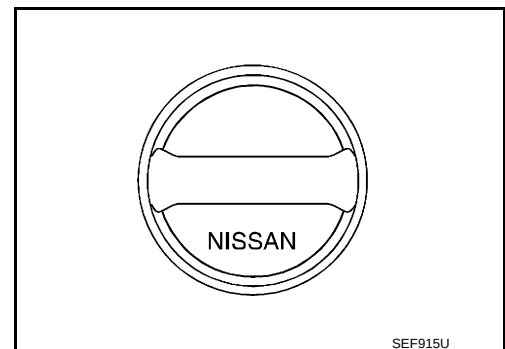
INFOID:0000000001645785

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 P0442 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-33, "Component Inspection"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

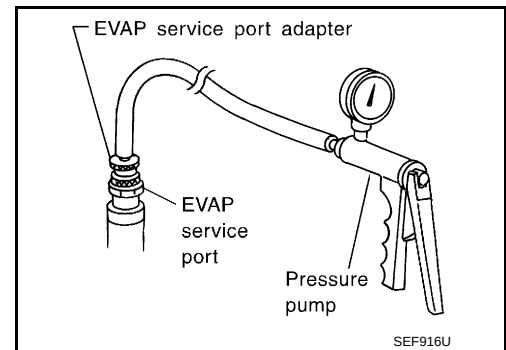
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to [EC-31, "Description"](#).

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-III>>GO TO 6.

Without CONSULT-III>>GO TO 7.



6. CHECK FOR EVAP LEAK

 **With CONSULT-III**

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
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/cm², 0.6 psi) of pressure in the system.

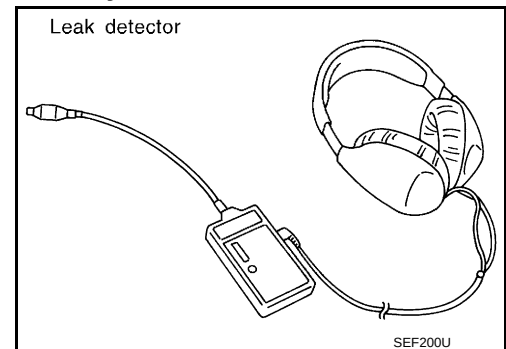
4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.

Refer to [EC-31, "Description"](#).

OK or NG

OK >> GO TO 8.

NG >> Repair or replace.



7. CHECK FOR EVAP LEAK

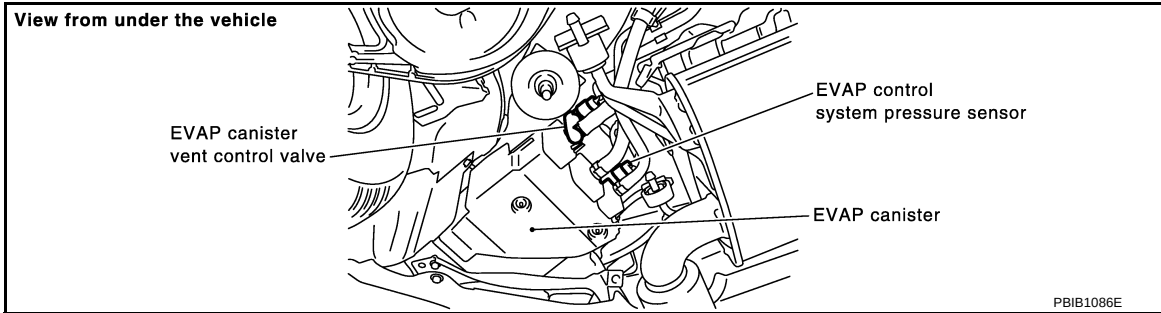
 **Without CONSULT-III**

1. Turn ignition switch OFF.

DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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.

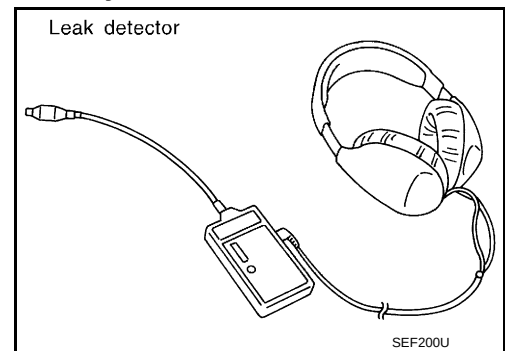
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 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-31, "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-35, "Removal and Installation"](#).
- EVAP canister vent control valve.
Refer to [EC-418, "Component Inspection"](#).

OK or NG

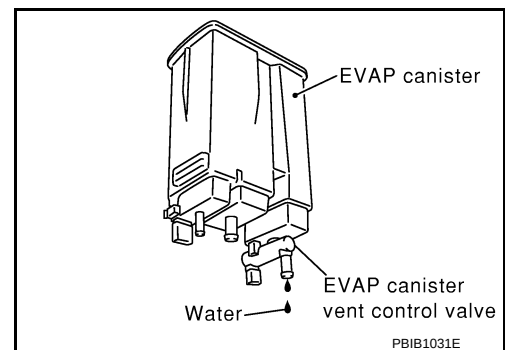
- OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

- Yes >> GO TO 10.
No (With CONSULT-III)>>GO TO 12.
No (Without CONSULT-III)>>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 2.2 kg (4.9 lb).

OK or NG

DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

- OK (With CONSULT-III)>>GO TO 12.
OK (Without CONSULT-III)>>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-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL 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.

13.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

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-97, "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-413, "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-331, "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-436, "Component Inspection"](#).

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DTC P0442 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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-31, "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-37](#).

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-39, "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-21, "Electrical Component Inspection"](#).

OK or NG

- OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

24.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:000000001645786

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	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* ¹		
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* ²		

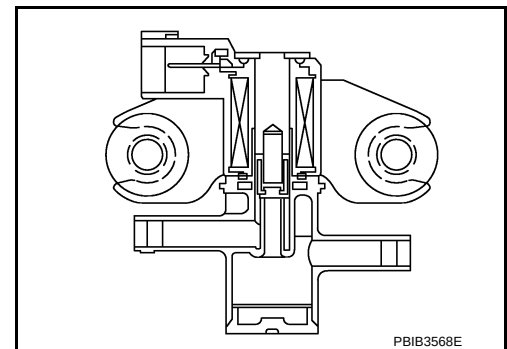
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM 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-III Reference Value in Data Monitor Mode

INFOID:000000001645787

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645788

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.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (The valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

INFOID:000000001645789

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-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
5. Touch "START".
6. Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-404, "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-404, "Diagnosis Procedure"](#).

< SERVICE INFORMATION >

Wiring Diagram

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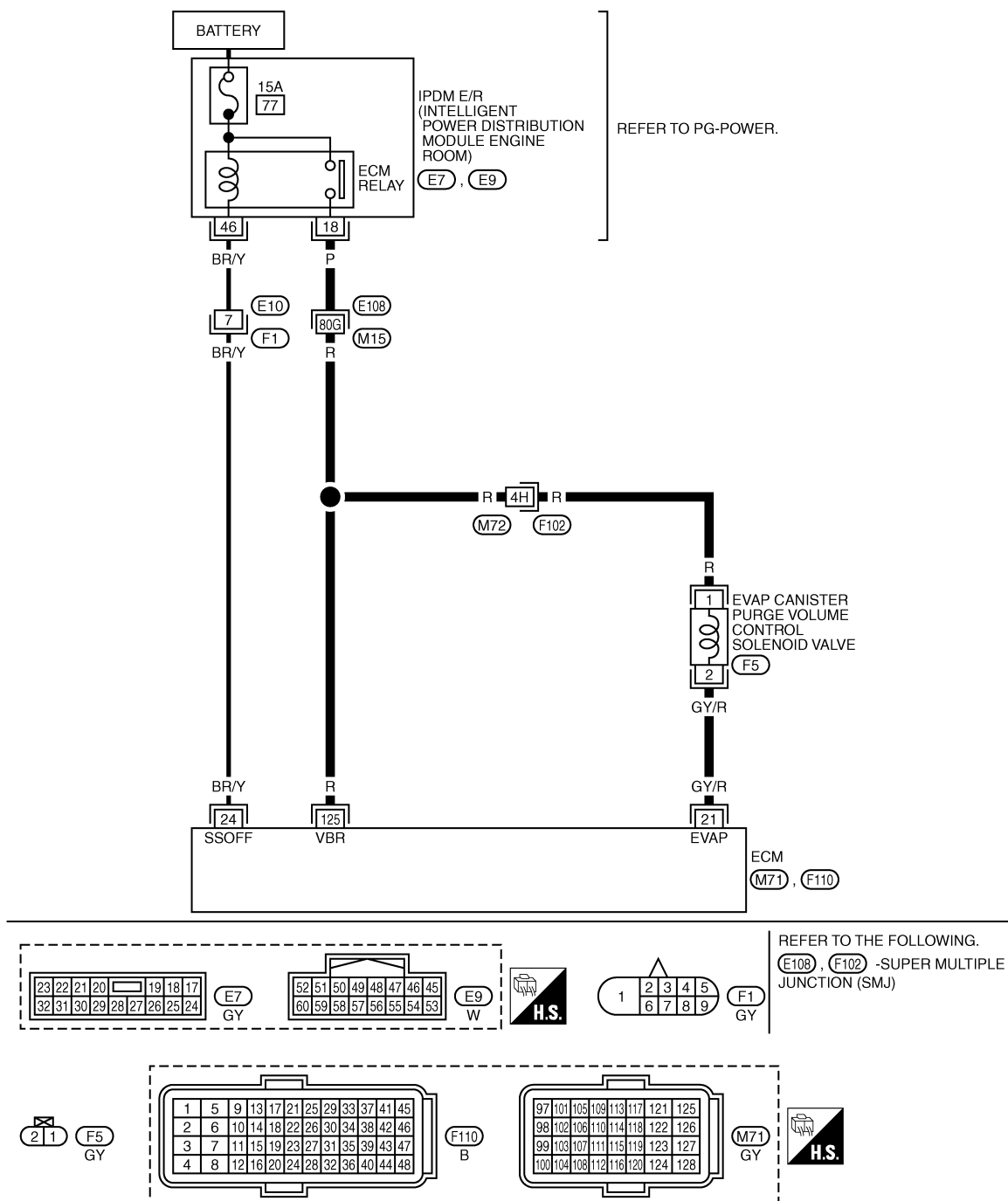
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EC-PGC/V-01

EC

■■■■■ : DETECTABLE LINE FOR DTC

— : NON-DETECTABLE LINE FOR DTC



TBWT1648E

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

CAUTION:

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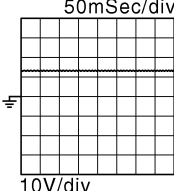
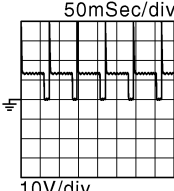
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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	GY/R	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★ 
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★ 
24	BR/Y	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)
125	R	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

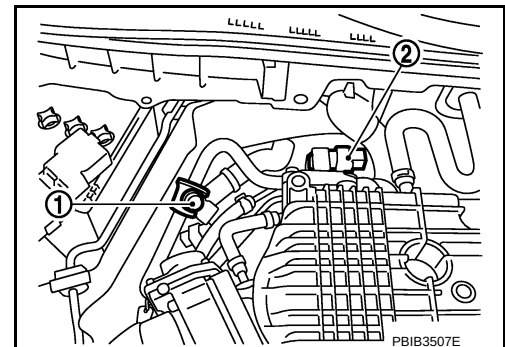
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1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve (2) harness connector.

1 : EVAP service port

- Turn ignition switch ON.



DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

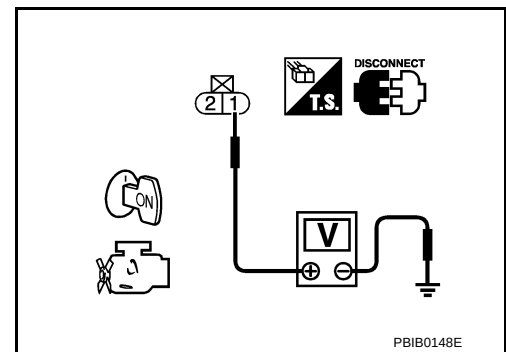
< SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III 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 E108, M15
- Harness connectors M72, F102
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 21 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-428. "Component Inspection"](#).

OK or NG

- OK (With CONSULT-III)>>GO TO 6.
OK (Without CONSULT-III)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-407, "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-418, "Component Inspection"](#).

OK or NG

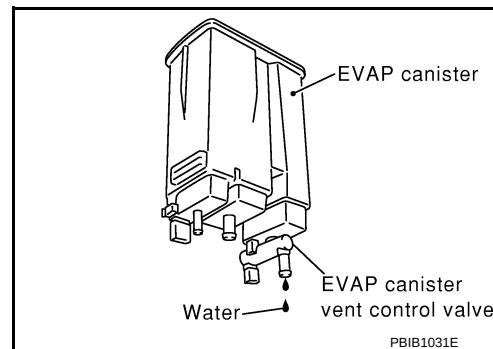
- OK >> GO TO 10.
- NG >> Replace EVAP canister vent control valve.

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. Does water drain from the EVAP canister?

OK or NG

- OK >> GO TO 11.
- NG >> 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 2.2 kg (4.9 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

>> Repair hose or replace EVAP canister.

13.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

Component Inspection

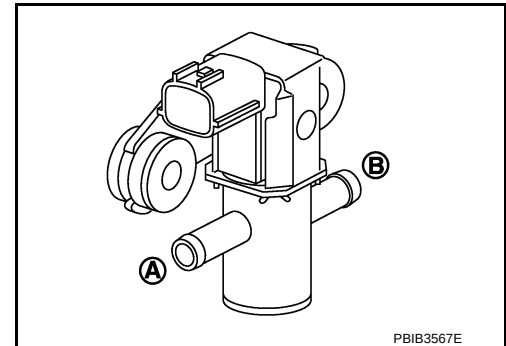
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EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

① With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

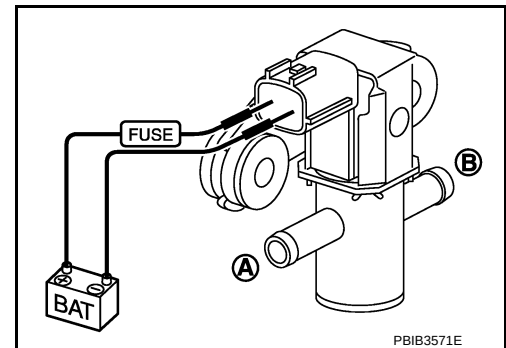
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



⊗ Without CONSULT-III

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:000000001645793

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-18](#).

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001645794

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ¹	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* ¹		
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* ²		

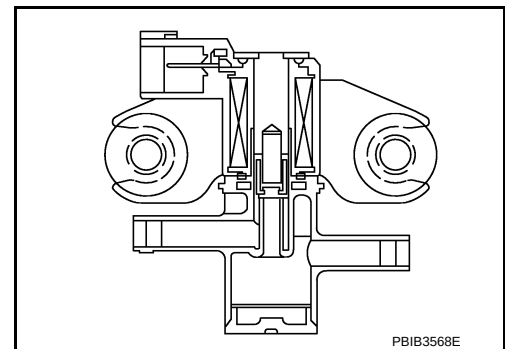
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM 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-III Reference Value in Data Monitor Mode

INFOID:0000000001645795

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645796

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	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

INFOID:000000001645797

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.

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-411, "Diagnosis Procedure"](#).

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

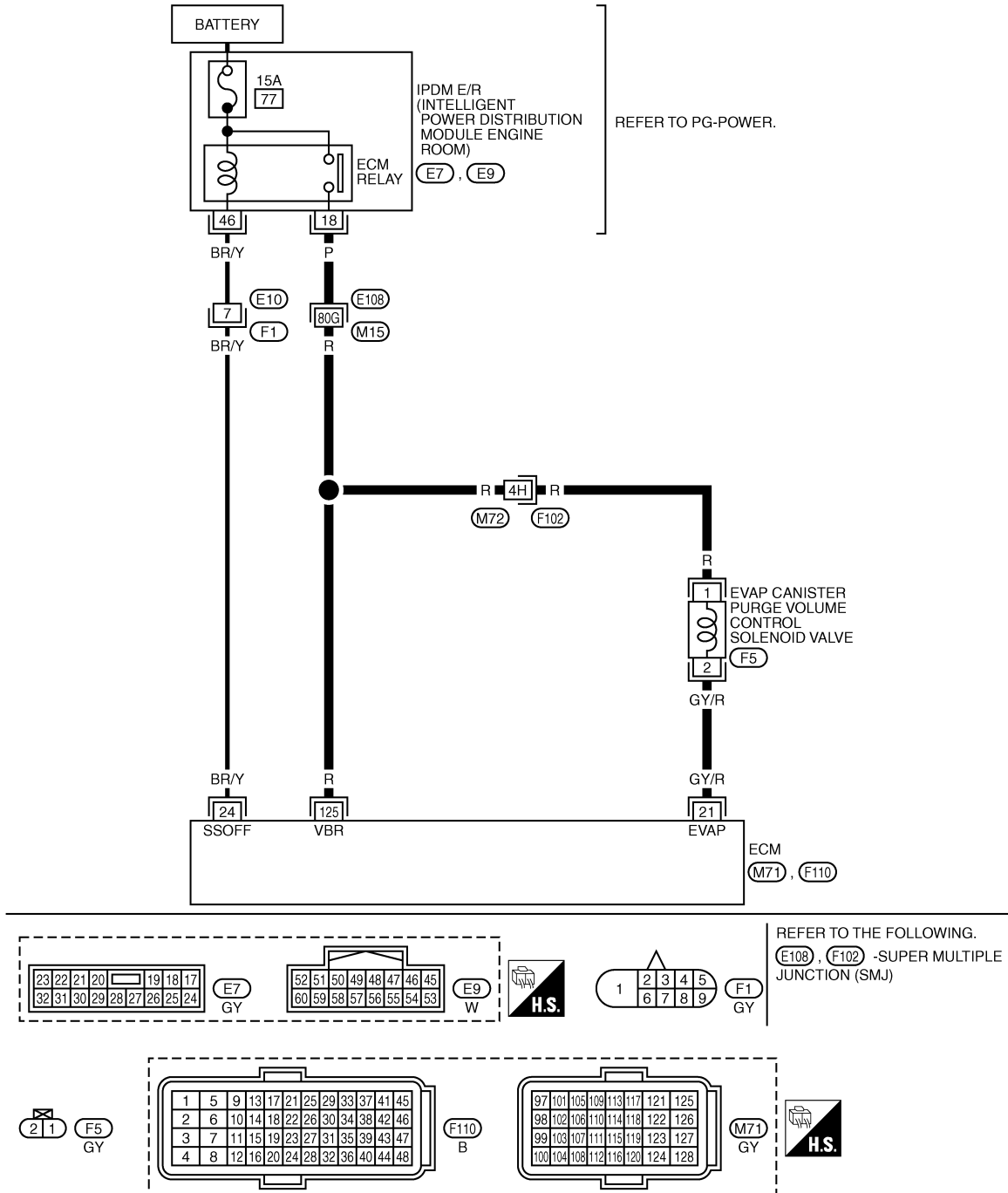
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645798

EC-PGC/V-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1648E

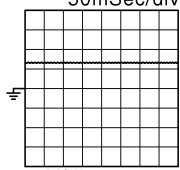
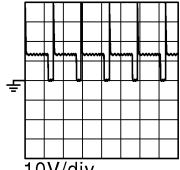
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	GY/R	EVAP canister purge volume control solenoid valve	[Engine is running] - Idle speed - Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★  50mSec/div 10V/div PBIB3547E
			[Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  50mSec/div 10V/div PBIB3548E
24	BR/Y	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)
125	R	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

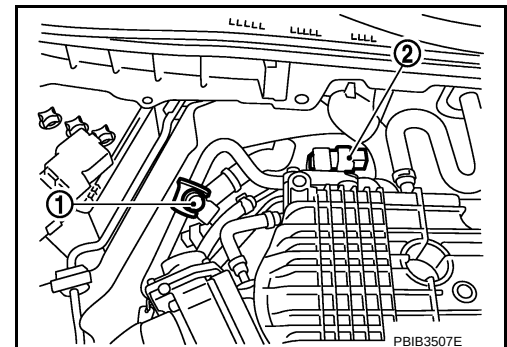
INFOID:000000001645799

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

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve (2) harness connector.

1 : EVAP service port

- Turn ignition switch ON.



DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

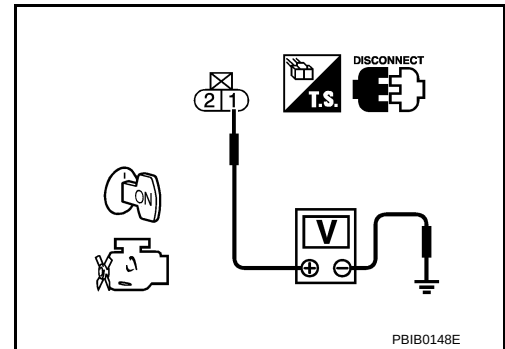
< SERVICE INFORMATION >

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III 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 E108, M15
- Harness connectors M72, F102
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 21 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 (With CONSULT-III)>>GO TO 4.
OK (Without CONSULT-III)>>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-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

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

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-413, "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-134](#).

>> **INSPECTION END**

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

Component Inspection

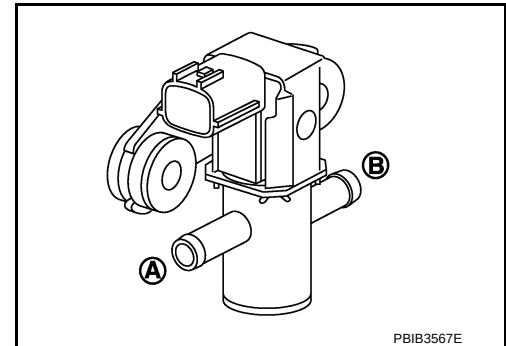
INFOID:000000001645800

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

① With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

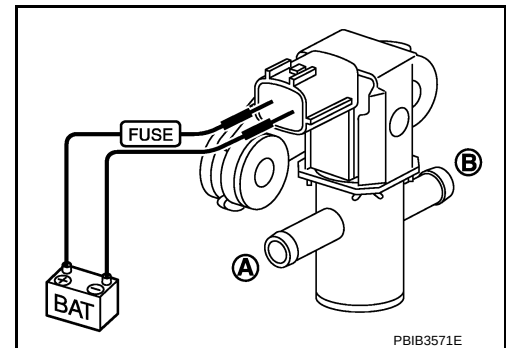
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



⊗ Without CONSULT-III

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:000000001645801

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EM-18](#).

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Component Description

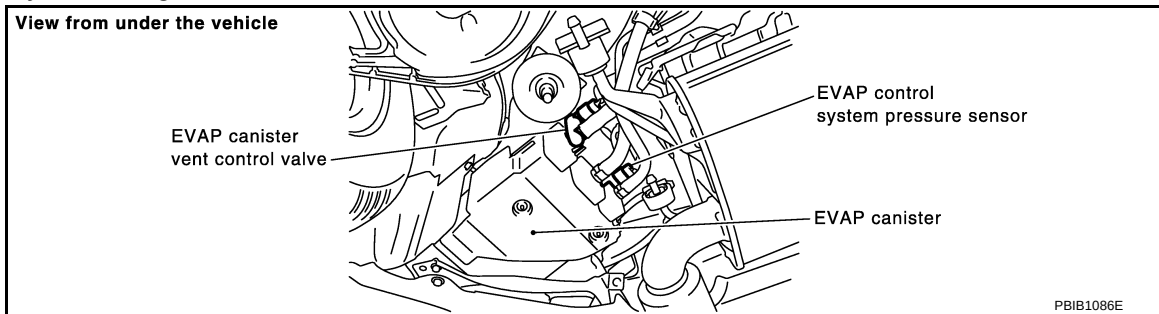
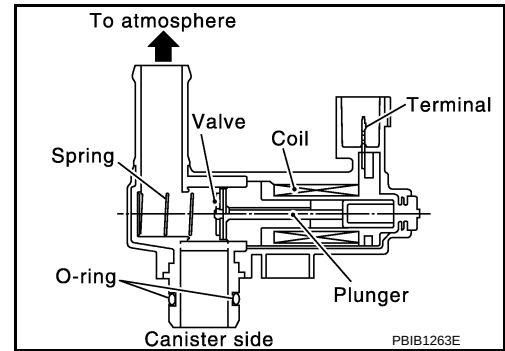
INFOID:000000001645802

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-III Reference Value in Data Monitor Mode

INFOID:000000001645803

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:000000001645804

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.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC Confirmation Procedure

INFOID:000000001645805

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.

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-416. "Diagnosis Procedure"](#).

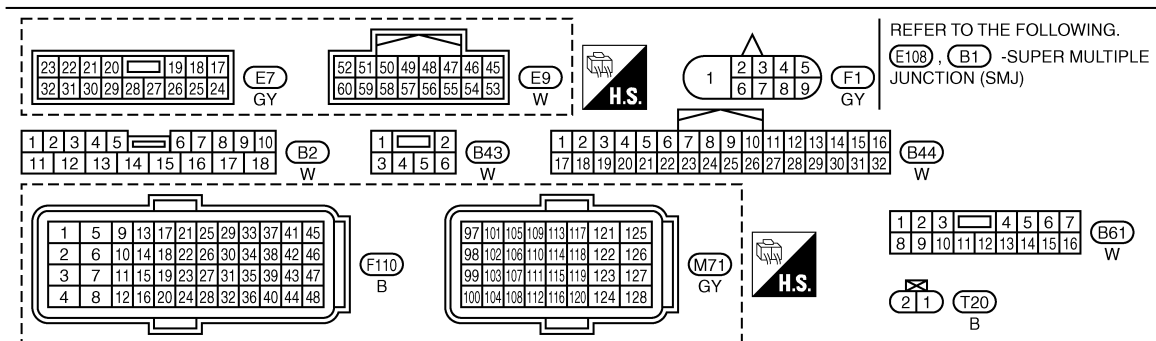
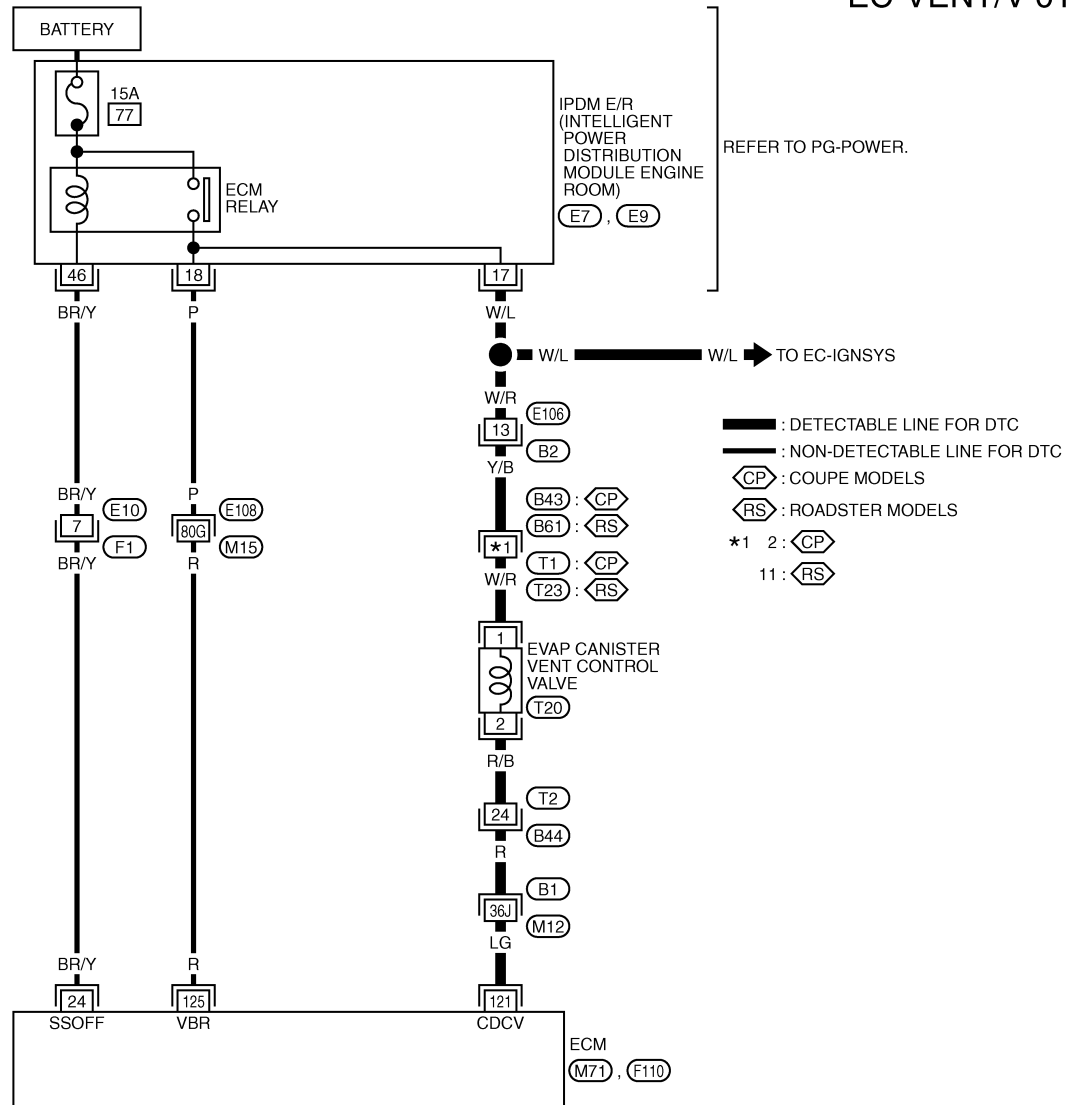
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645806

EC-VENT/V-01



TBW1649E

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)
24	BR/Y	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)
121	LG	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001645807

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

- Turn ignition switch ON.
- Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "ON/OFF" on CONSULT-III screen.
- Check for operating sound of the valve.

Clicking noise should be heard.

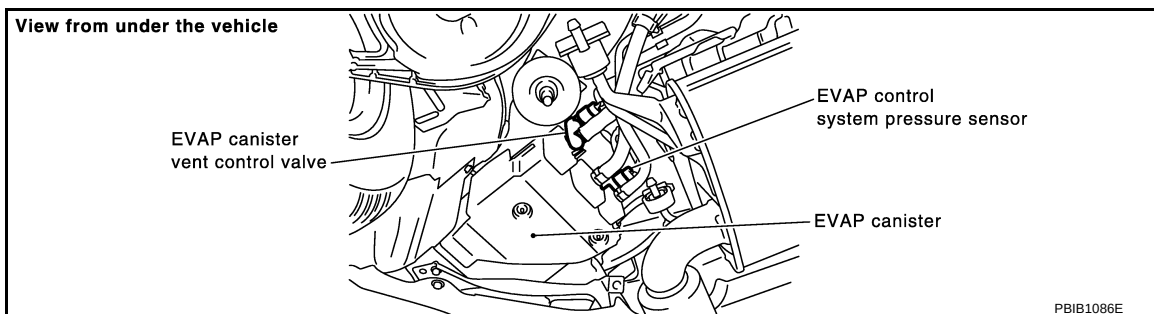
OK or NG

OK >> GO TO 7.

NG >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister vent control valve harness connector.



- Turn ignition switch ON.

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

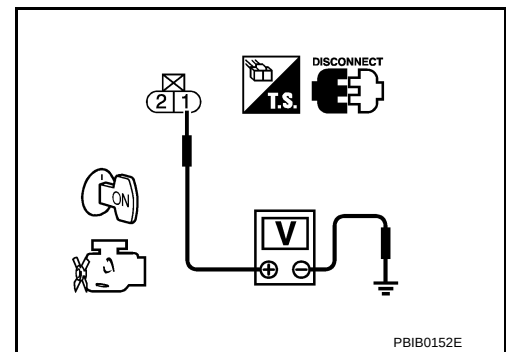
< SERVICE INFORMATION >

4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III 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 E106, B2
- Harness connectors B43, T1 (Coupe models)
- Harness connectors B61, T23 (Roadster models)
- IPDM E/R harness connector E7
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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

5.CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 121 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 T2, B44
- Harness connectors B1, M12
- 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. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. 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-418. "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

>> INSPECTION END

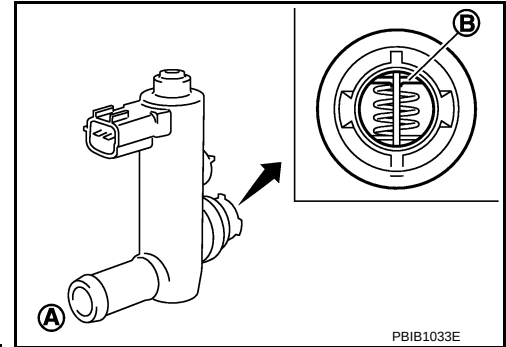
Component Inspection

INFOID:000000001645808

EVAP CANISTER VENT CONTROL VALVE

Ⓟ With CONSULT-III

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.

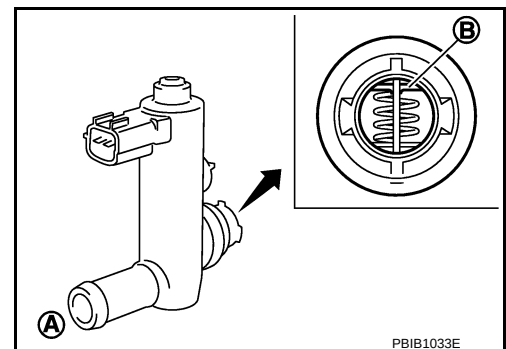
If NG, replace EVAP canister vent control valve.

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.

⊗ Without CONSULT-III

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.

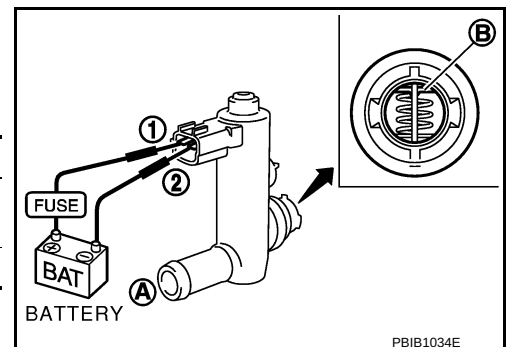
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.

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 P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

Component Description

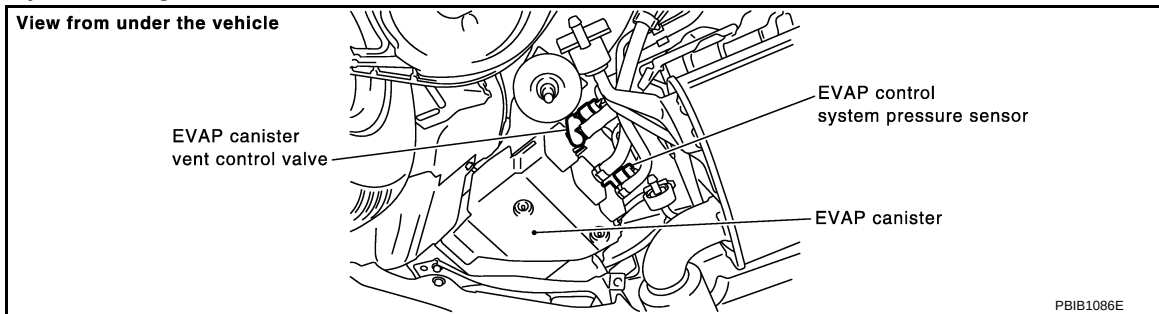
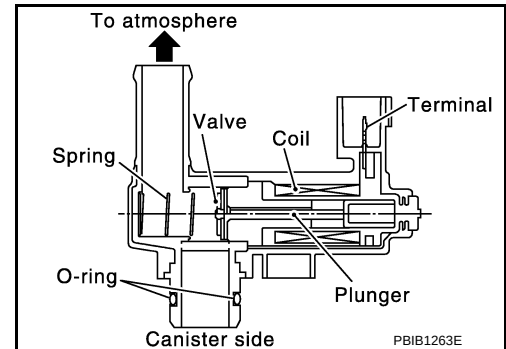
INFOID:000000001645809

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-III Reference Value in Data Monitor Mode

INFOID:000000001645810

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:000000001645811

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.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC Confirmation Procedure

INFOID:000000001645812

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-III

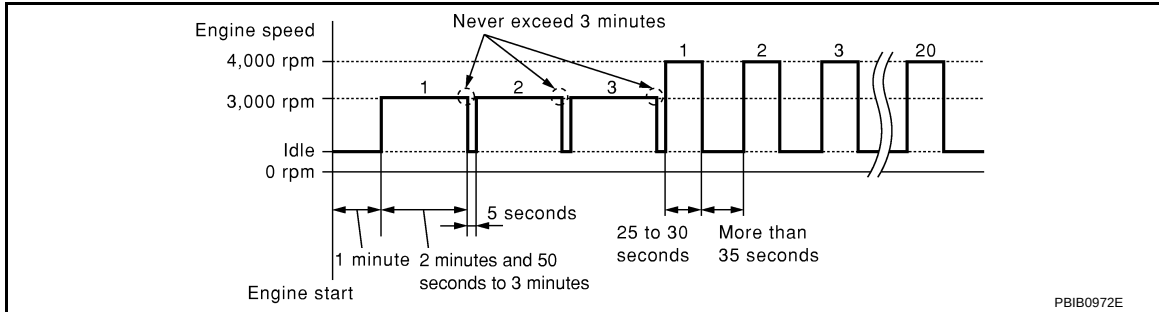
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures for three times.
 - a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

Never exceed 3 minutes.

- b. Fully released accelerator pedal and keep engine idle for about 5 seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-422. "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the next step.
8. Repeat next procedure for 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.



9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to [EC-422. "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

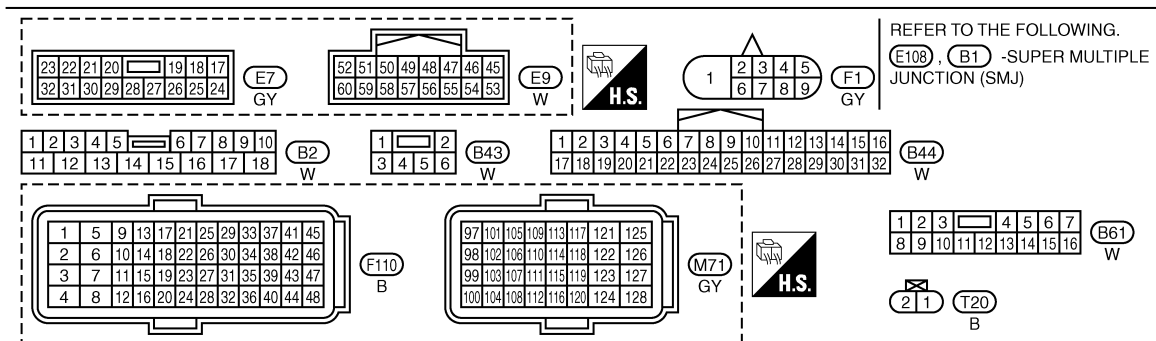
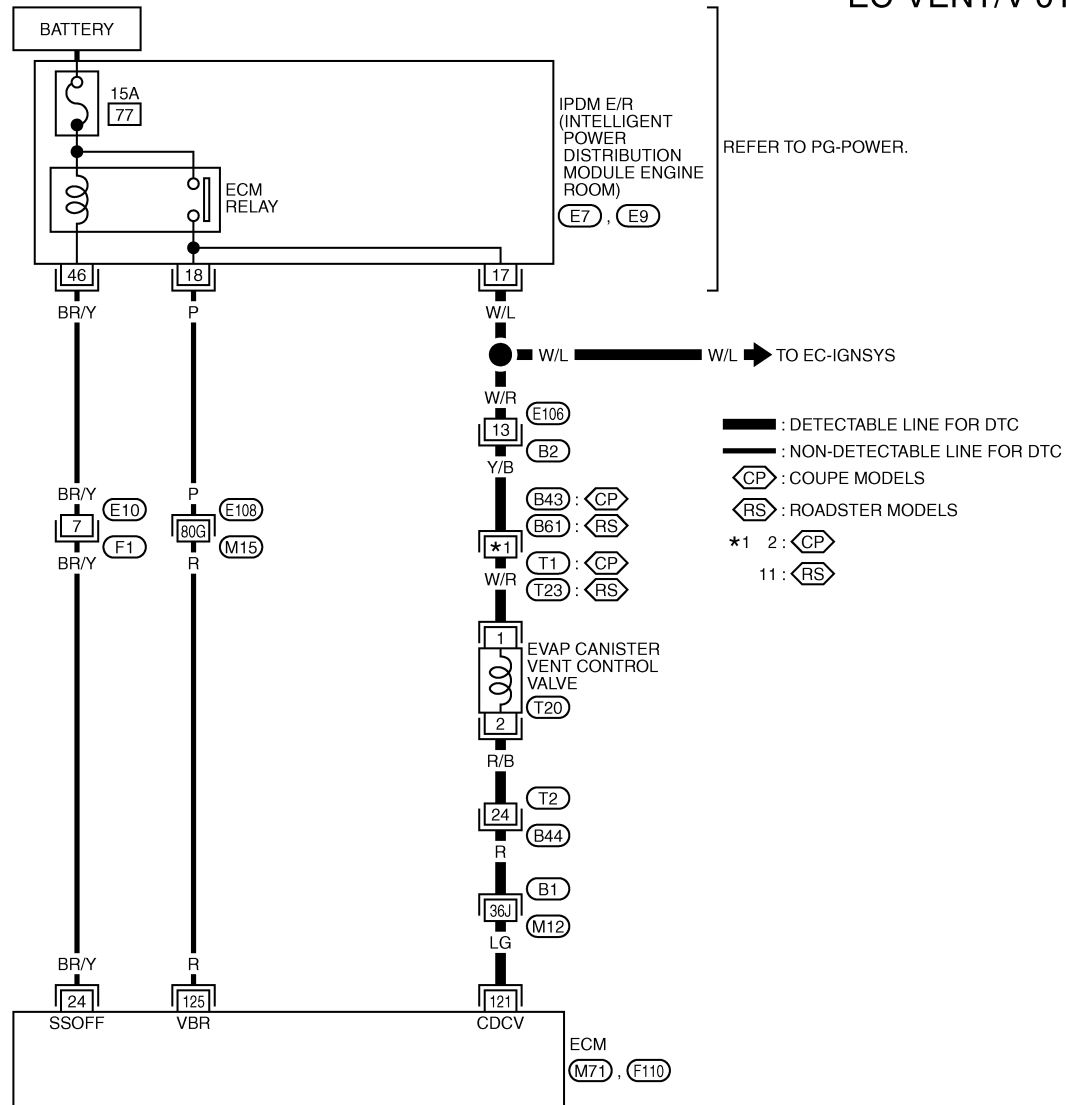
DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645813

EC-VENT/V-01



TBW1649E

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 >

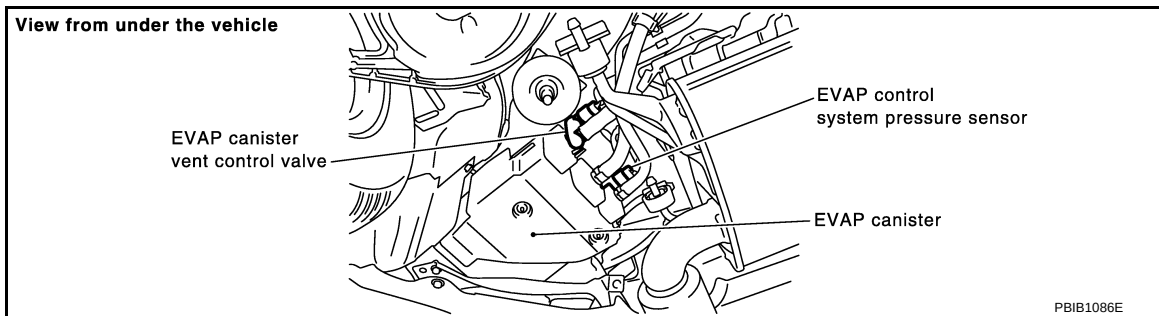
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	BR/Y	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
121	LG	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000001645814

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-423, "Component Inspection"](#).

OK or NG

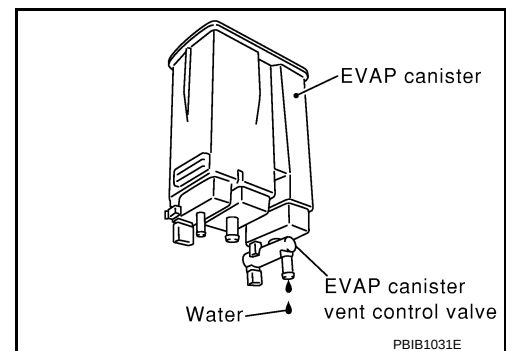
- OK >> GO TO 3.
- NG >> Replace EVAP canister vent control valve.

3.CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Does water drain from the EVAP canister?

OK or NG

- OK >> GO TO 4.
- NG >> GO TO 6.



4.CHECK EVAP CANISTER

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

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

The weight should be less than 2.2 kg (4.9 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-428, "Component Inspection"](#).

OK or NG

OK >> GO TO 8.

NG >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

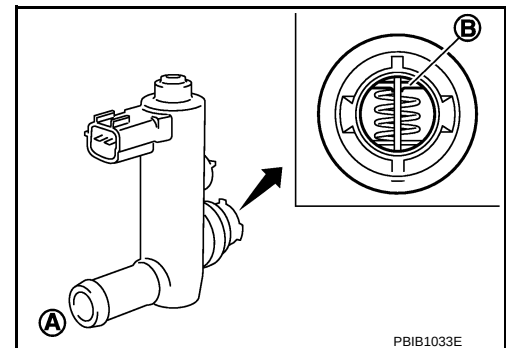
Component Inspection

INFOID:000000001645815

EVAP CANISTER VENT CONTROL VALVE

① With CONSULT-III

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.

DTC P0448 EVAP CANISTER VENT CONTROL VALVE

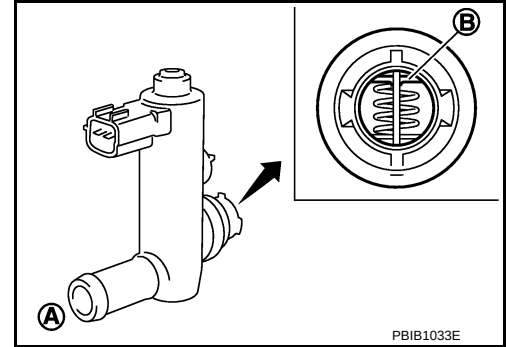
< SERVICE INFORMATION >

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-III

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.

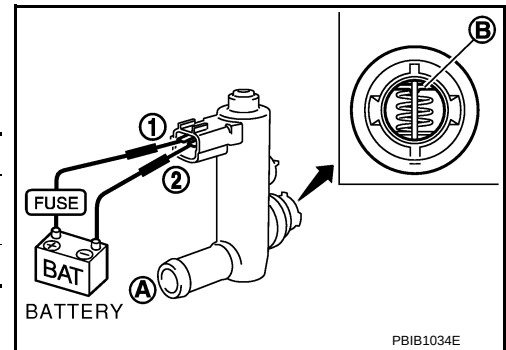
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.

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

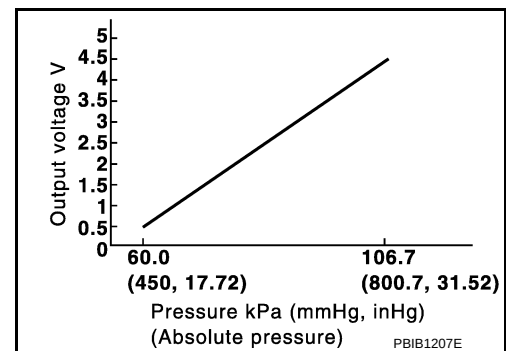
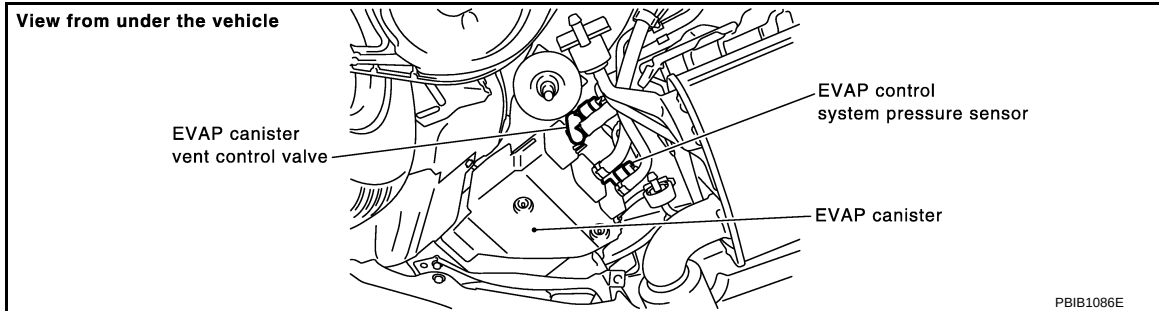
< SERVICE INFORMATION >

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000001645816

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645817

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:000000001645818

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	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645819

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.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-426, "Diagnosis Procedure"](#).

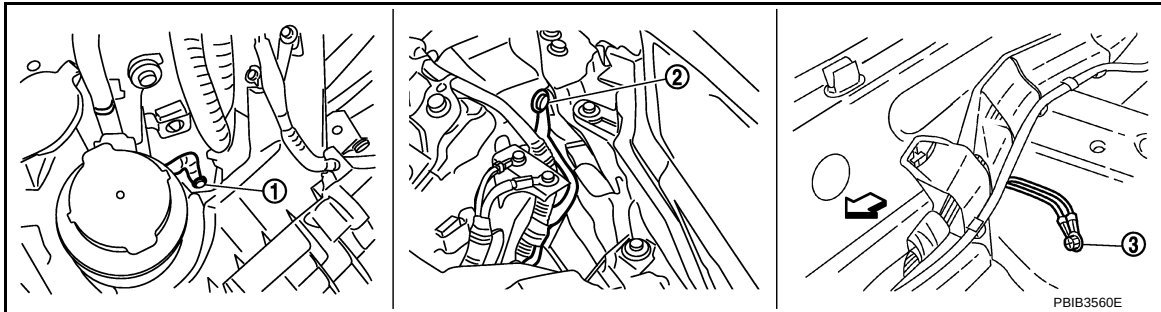
Diagnosis Procedure

INFOID:000000001645820

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

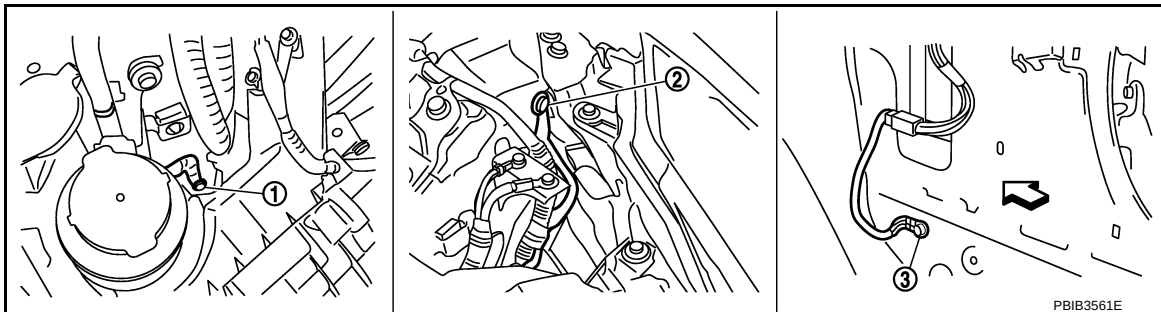
2. Body ground E43

3. Body ground B102

← Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

OK or NG

OK >> GO TO 2.

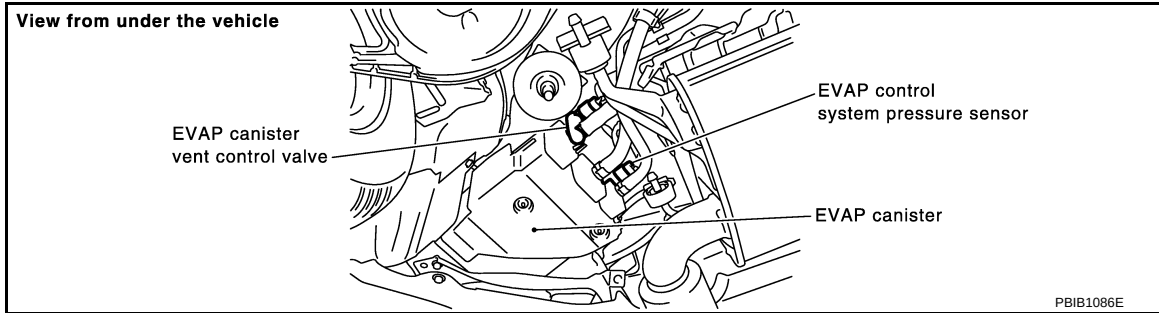
NG >> Repair or replace ground connections.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

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.

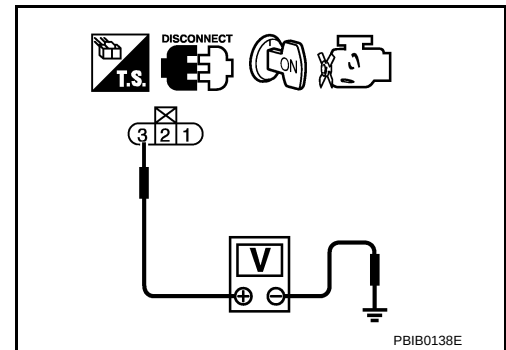
3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

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



4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 107. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

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

5.DETECT MALFUNCTIONING PART

Check the following.

1. Harness connectors T2, B44
2. Harness connectors B1, M12
3. Harness for open between ECM and EVAP control system pressure sensor.

>> Repair open circuit.

6. CHECK EVAP CONTROL SYSTEM PRESSURE 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
46	CKP sensor (POS) terminal 1	EC-369

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

ECM terminal	Sensor terminal	Reference Wiring Diagram
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor 1	EC-658

OK or NG

OK >> GO TO 7.

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

7.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection".](#))
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection" .](#))
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection" .](#))
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit" .](#))

OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to [EC-600, "Component Inspection" .](#)

OK or NG

OK >> GO TO 11.

NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning" .](#)
3. Perform [EC-76, "Throttle Valve Closed Position Learning" .](#)
4. Perform [EC-77, "Idle Air Volume Learning" .](#)

>> INSPECTION END

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-428, "Component Inspection".](#)

OK or NG

OK >> GO TO 11.

NG >> Replace EVAP control system pressure sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-134.](#)

Refer to [EC-432, "Wiring Diagram".](#)

>> INSPECTION END

Component Inspection

INFOID:000000001645821

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.

DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

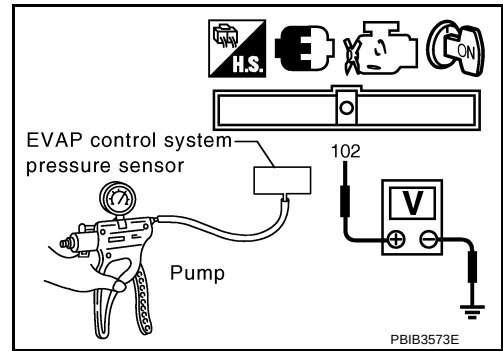
3. Turn ignition switch ON and check output voltage between ECM terminal 102 and ground under the following conditions.

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

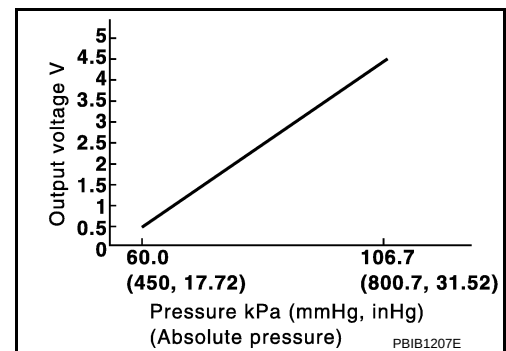
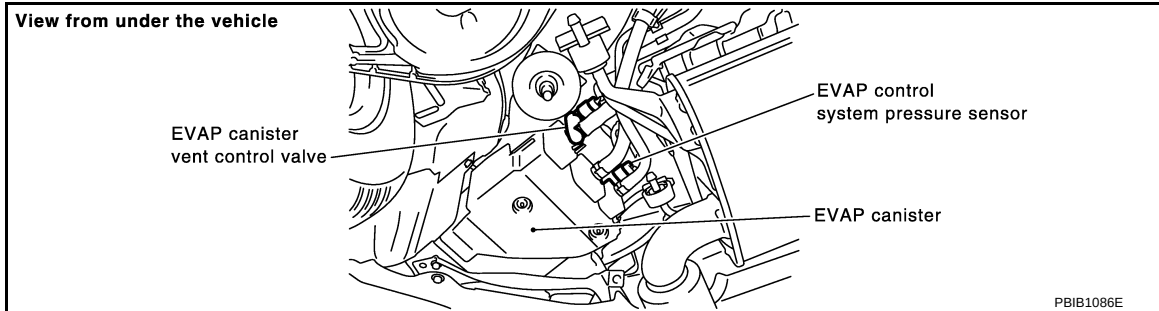
< SERVICE INFORMATION >

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000001645822

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645823

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:000000001645824

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.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645825

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:

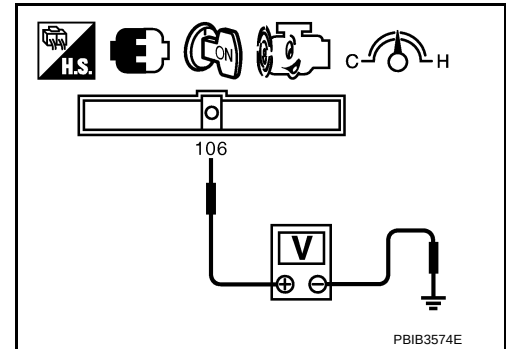
Always perform test at a temperature of 5°C (41°F) or more.

④ WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TEMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-433, "Diagnosis Procedure"](#).

④ WITH GST

1. Start engine and warm it up to normal operating temperature.
 2. Check that voltage between ECM terminal 106 (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-433, "Diagnosis Procedure"](#).



DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

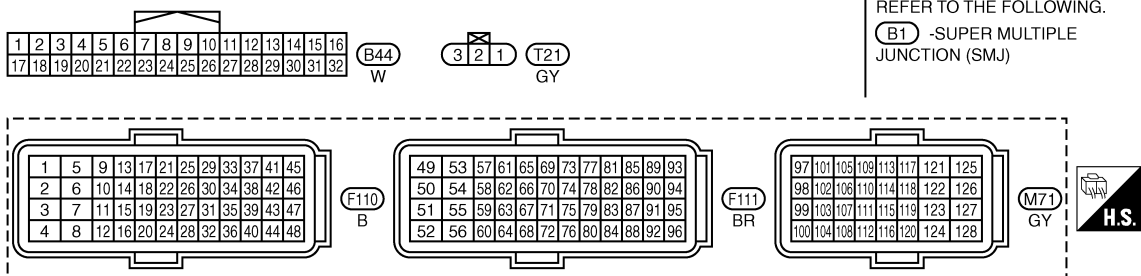
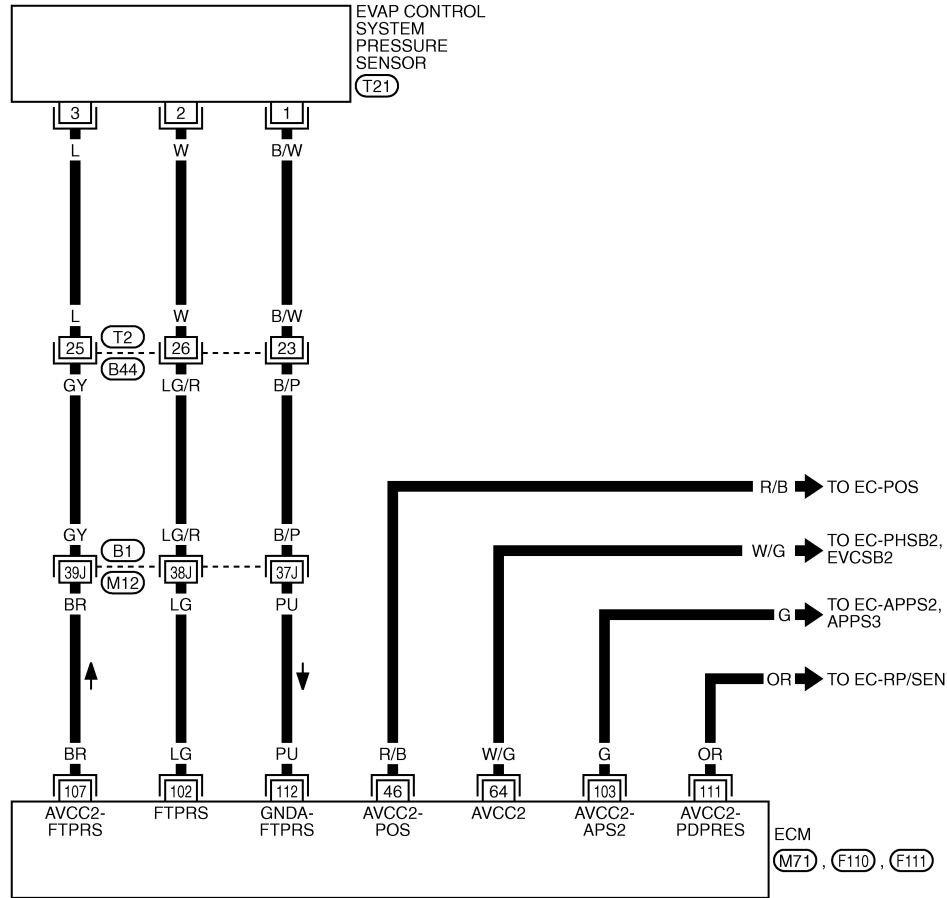
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645826

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1650E

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)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
102	LG	EVAP control system pressure sensor	[Ignition switch: ON]	1.8 - 4.8V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V
112	PU	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	0V

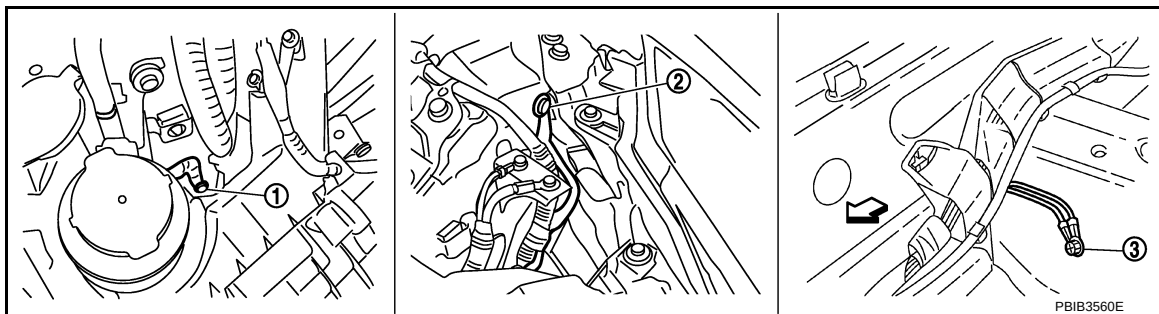
Diagnosis Procedure

INFOID:0000000001645827

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17

2. Body ground E43

3. Body ground B102

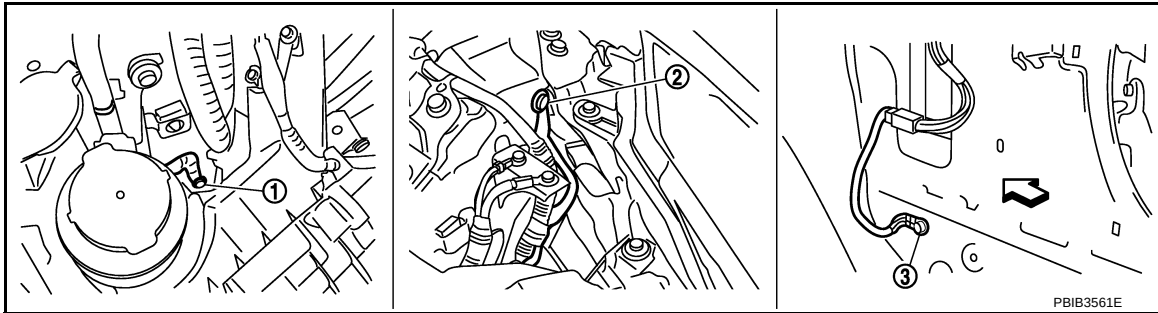
↶ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

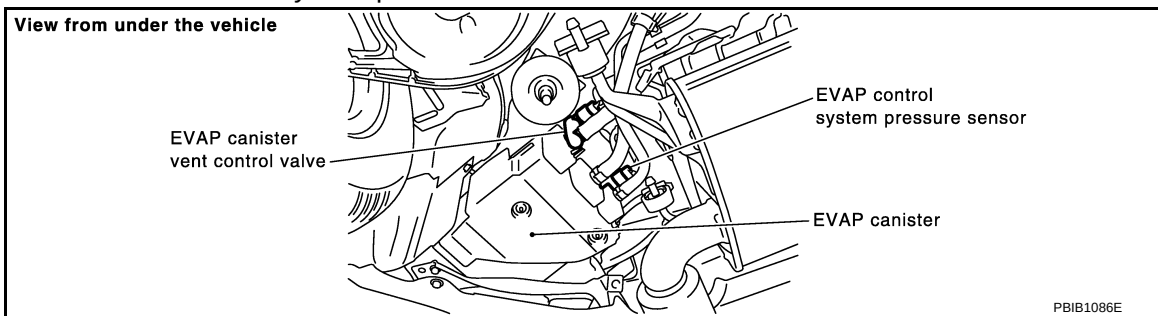
OK or NG

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-I

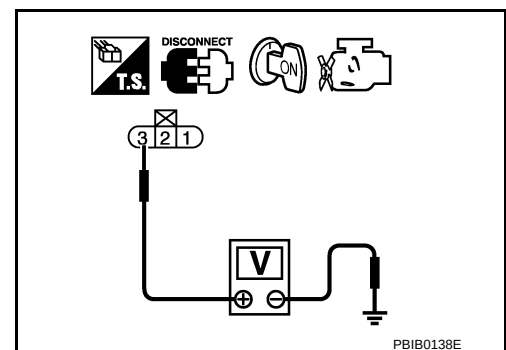
1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 10.

NG >> GO TO 4.



4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 107. Refer to Wiring Diagram.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

Continuity should exist.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

1. Harness connectors T2, B44
2. Harness connectors B1, M12
3. Harness for open between ECM and EVAP control system pressure sensor.

>> Repair open circuit.

6. CHECK EVAP CONTROL SYSTEM PRESSURE 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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor 1	EC-658

OK or NG

OK >> GO TO 7.

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

7.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373. "Component Inspection"](#) .)
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383. "Component Inspection"](#) .)
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505. "Component Inspection"](#) .)
- Refrigerant pressure sensor (Refer to [ATC-63. "Magnet Clutch Circuit"](#) .)

OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to [EC-600. "Component Inspection"](#) .

OK or NG

OK >> GO TO 15.

NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76. "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-76. "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-77. "Idle Air Volume Learning"](#) .

>> INSPECTION END

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 112. 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 >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors T2, B44
- Harness connectors B1, M12
- Harness for open or short between EVAP control system pressure sensor and ECM

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

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 102 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 14.
NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors T2, B44
- Harness connectors B1, M12
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-436, "Component Inspection"](#).

OK or NG

- OK >> GO TO 15.
NG >> Replace EVAP control system pressure sensor.

15.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645828

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.

DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

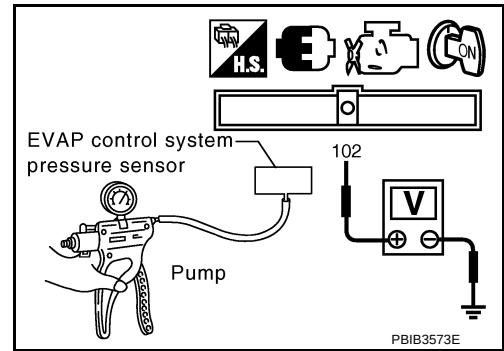
- Turn ignition switch ON and check output voltage between ECM terminal 102 and ground under the following conditions.

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).

- If NG, replace EVAP control system pressure sensor.



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DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

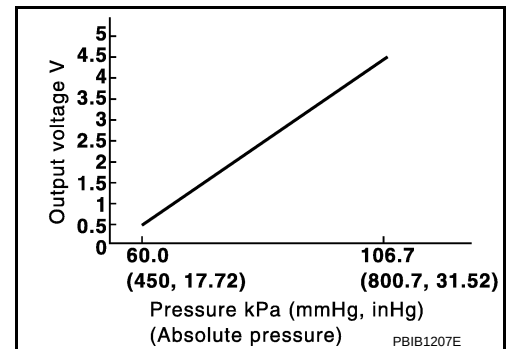
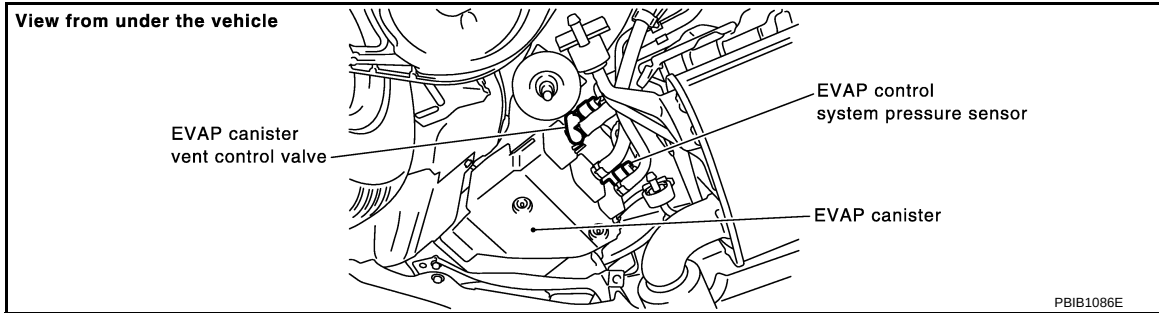
< SERVICE INFORMATION >

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:000000001645829

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645830

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

On Board Diagnosis Logic

INFOID:000000001645831

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.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • [CKP sensor (POS) circuit is shorted.] • [CMP sensor (PHASE) (bank 2) circuit is shorted.] • [EVT control position sensor (bank 2) circuit is shorted.] • (APP sensor 2 circuit is shorted.) • (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Rubber hose from EVAP canister vent control valve to vehicle frame

DTC Confirmation Procedure

INFOID:000000001645832

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:

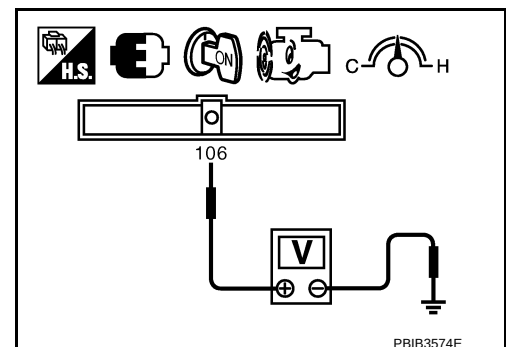
Always perform test at a temperature of 5°C (41°F) or more.

Ⓐ With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that "FUEL T/TEMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to [EC-441, "Diagnosis Procedure"](#).

Ⓑ With GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 106 (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-441, "Diagnosis Procedure"](#).



DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

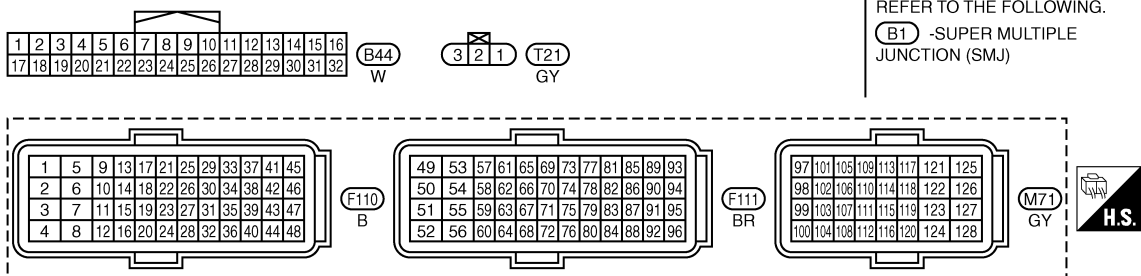
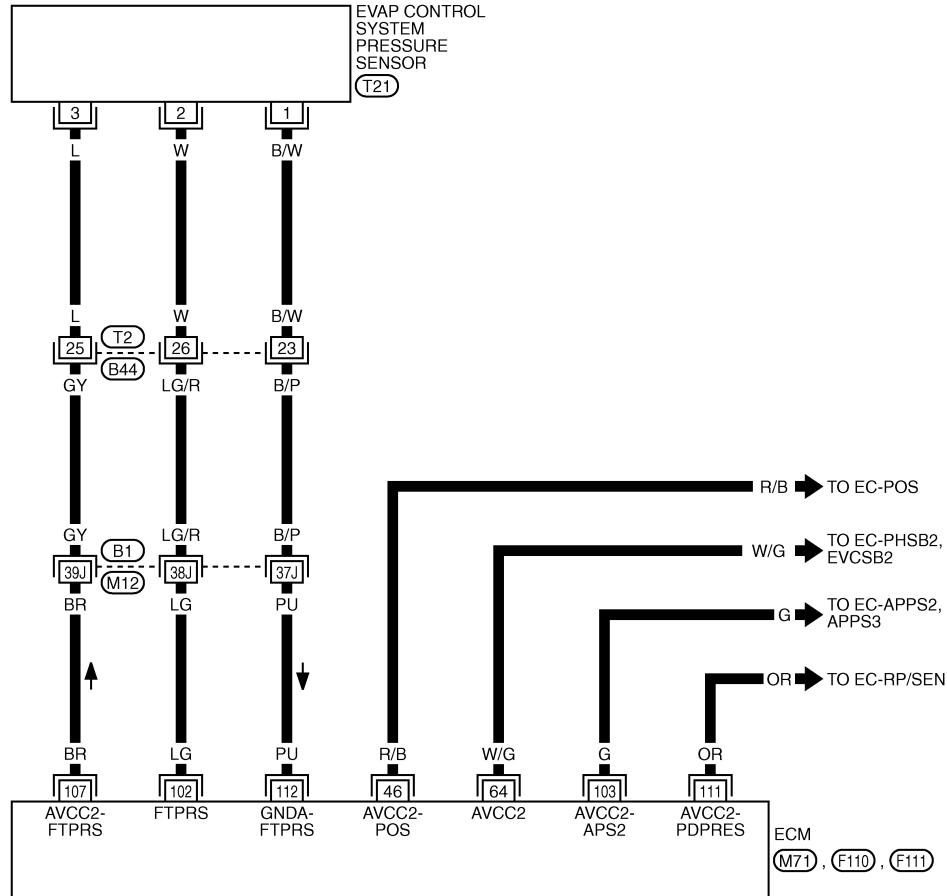
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645833

EC-PRE/SE-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1650E

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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
102	LG	EVAP control system pressure sensor	[Ignition switch: ON]	1.8 - 4.8V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V
112	PU	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	0V

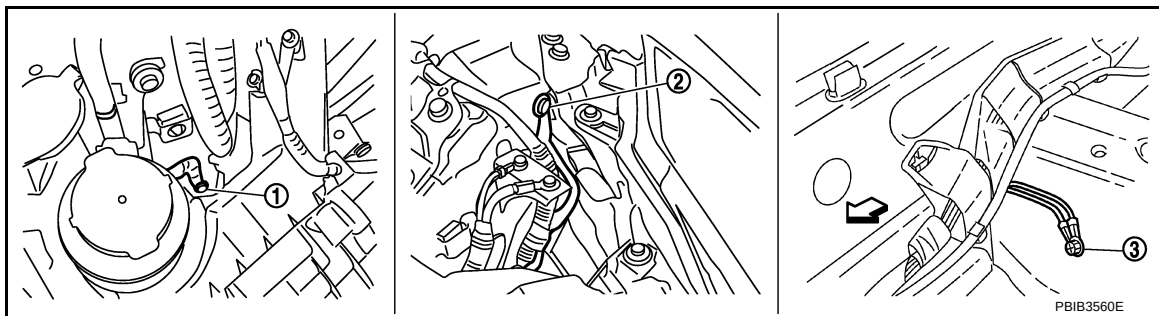
Diagnosis Procedure

INFOID:0000000001645834

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

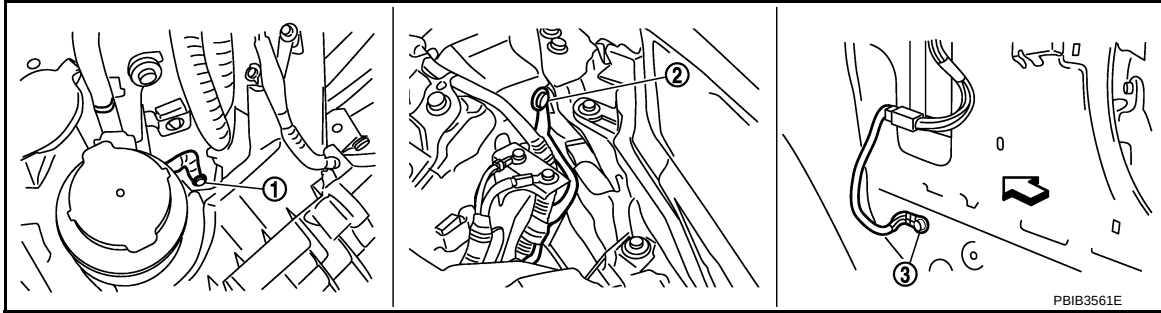
⇐: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

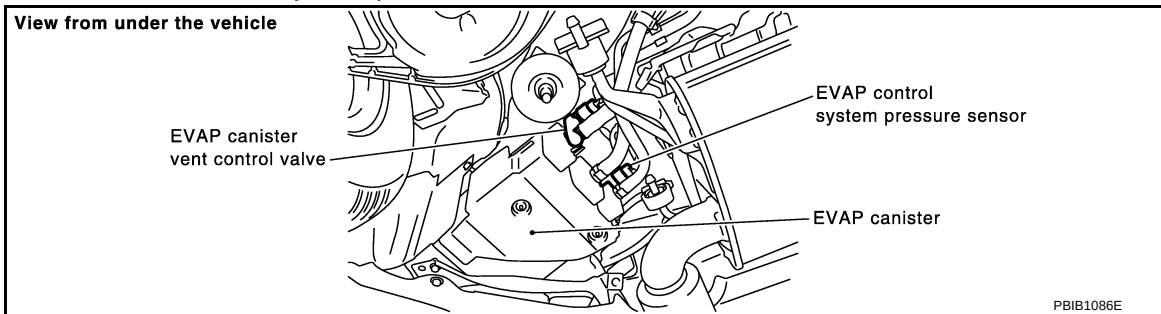
OK or NG

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-I

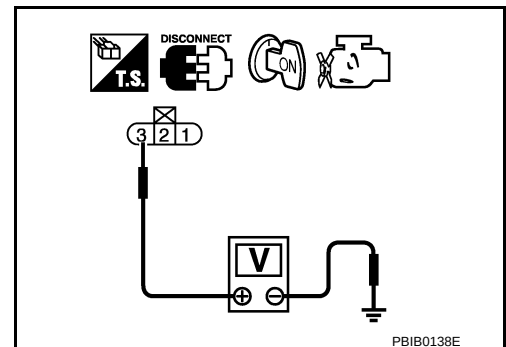
1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 10.

NG >> GO TO 4.



4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 107. Refer to Wiring Diagram.

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

Continuity should exist.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

1. Harness connectors T2, B44
2. Harness connectors B1, M12
3. Harness for open between ECM and EVAP control system pressure sensor.

>> Repair open circuit.

6. CHECK EVAP CONTROL SYSTEM PRESSURE 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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor 1	EC-658

OK or NG

OK >> GO TO 7.

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

7.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection".](#))
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection".](#))
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection".](#))
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit".](#))

OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to [EC-600, "Component Inspection".](#)

OK or NG

OK >> GO TO 20.

NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning".](#)
3. Perform [EC-76, "Throttle Valve Closed Position Learning".](#)
4. Perform [EC-77, "Idle Air Volume Learning".](#)

>> INSPECTION END

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

< SERVICE INFORMATION >

2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 112. 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 >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors T2, B44
- Harness connectors B1, M12
- Harness for open or short between EVAP control system pressure sensor and ECM

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

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 102 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 14.
NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors T2, B44
- Harness connectors B1, M12
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14.CHECK RUBBER TUBE

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

OK or NG

- OK >> GO TO 15.
NG >> Clean the rubber tube using an air blower.

15.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to [EC-418, "Component Inspection"](#).

OK or NG

- OK >> GO TO 16.
NG >> Replace EVAP canister vent control valve.

16.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to [EC-445, "Component Inspection"](#).

OK or NG

- OK >> GO TO 17.
NG >> Replace EVAP control system pressure sensor.

DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

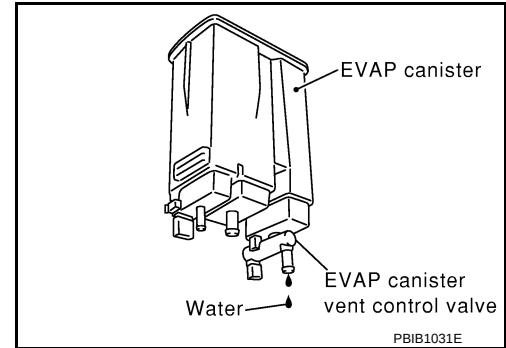
< SERVICE INFORMATION >

17.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. Does water drain from the EVAP canister?

Yes or No

- Yes >> GO TO 18.
No >> GO TO 20.



18.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 2.2 kg (4.9 lb).

OK or NG

- OK >> GO TO 20.
NG >> GO TO 19.

19.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.

20.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001645835

EVAP CONTROL SYSTEM PRESSURE SENSOR

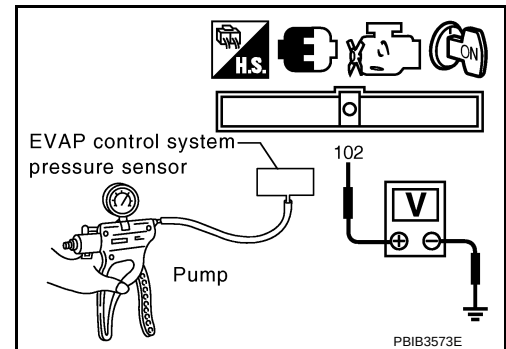
1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
Always replace O-ring with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 102 and ground under the 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

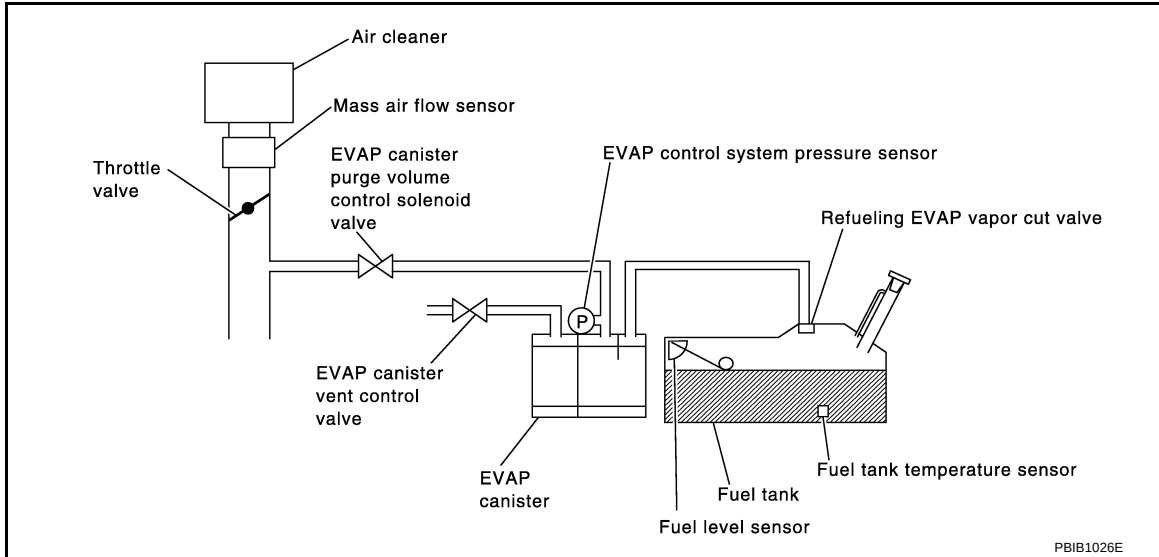
< SERVICE INFORMATION >

DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:000000001645836

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.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks

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:000000001645837

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-III

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-III.
5. Make sure that the following conditions are met.
COOLANT TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to [EC-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-447, "Diagnosis Procedure"](#).
If P0442 is displayed, perform [EC-396, "Diagnosis Procedure"](#) for DTC P0442.

Ⓜ WITH GST

NOTE:

Be sure to read the explanation of [EC-46, "Emission-related Diagnostic Information"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to [EC-46, "Emission-related Diagnostic Information"](#).
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Select Service \$07 with GST.
 - If P0441 is displayed on the screen, go to [EC-391, "Diagnosis Procedure"](#), for DTC P0441.
 - If P0442 is displayed on the screen, go to [EC-396, "Diagnosis Procedure"](#), for DTC P0442.
 - If P0455 is displayed on the screen, go to [EC-447, "Diagnosis Procedure"](#).

Diagnosis Procedure

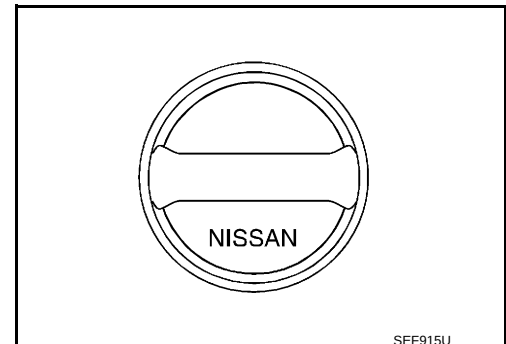
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1.CHECK FUEL FILLER CAP DESIGN

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.



SEF915U

2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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-33, "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-31, "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-35, "Removal and Installation"](#).
- EVAP canister vent control valve.
Refer to [EC-418, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

8.INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to [EC-31, "Description"](#).

NOTE:

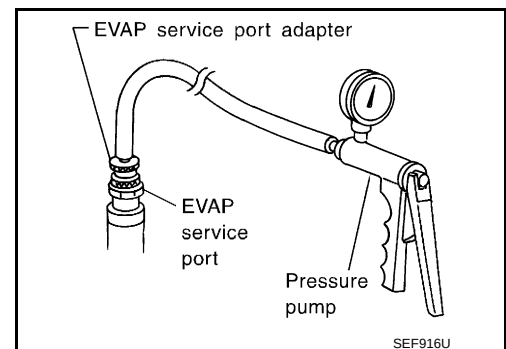
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

- With CONSULT-III>>GO TO 9.
Without CONSULT-III>>GO TO 10.

9.CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.



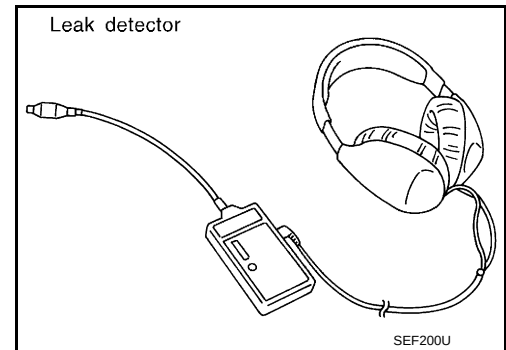
DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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/cm², 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-31. "Description"](#).

OK or NG

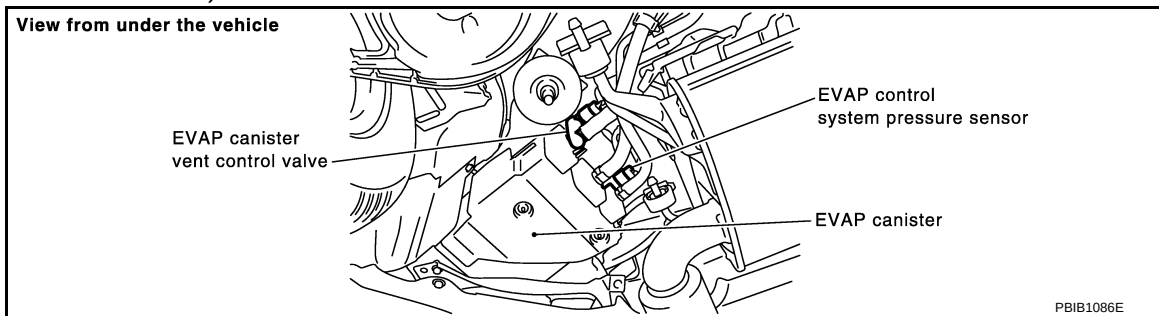
- OK >> GO TO 11.
NG >> Repair or replace.



10. CHECK FOR EVAP LEAK

⊗ Without CONSULT-III

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.)



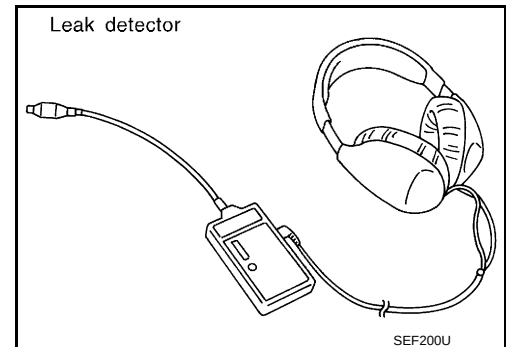
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:

- Never use compressed air or a high pressure pump.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 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-31. "Description"](#).

OK or NG

- OK >> GO TO 12.
NG >> Repair or replace.



11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

- OK >> GO TO 14.
NG >> GO TO 13.

12.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

⊗ Without CONSULT-III

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.

13.CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to [EC-97, "Vacuum Hose Drawing"](#).

OK or NG

- OK (With CONSULT-III)>>GO TO 14.
OK (Without CONSULT-III)>>GO TO 15.
NG >> Repair or reconnect the hose.

14.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-III

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

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

15.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to [EC-413, "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-331, "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-436, "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-37](#).

OK or NG

- OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

DTC P0455 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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-39. "Component Inspection"](#).

OK or NG

OK >> GO TO 21.

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

21.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

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DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

DTC P0456 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

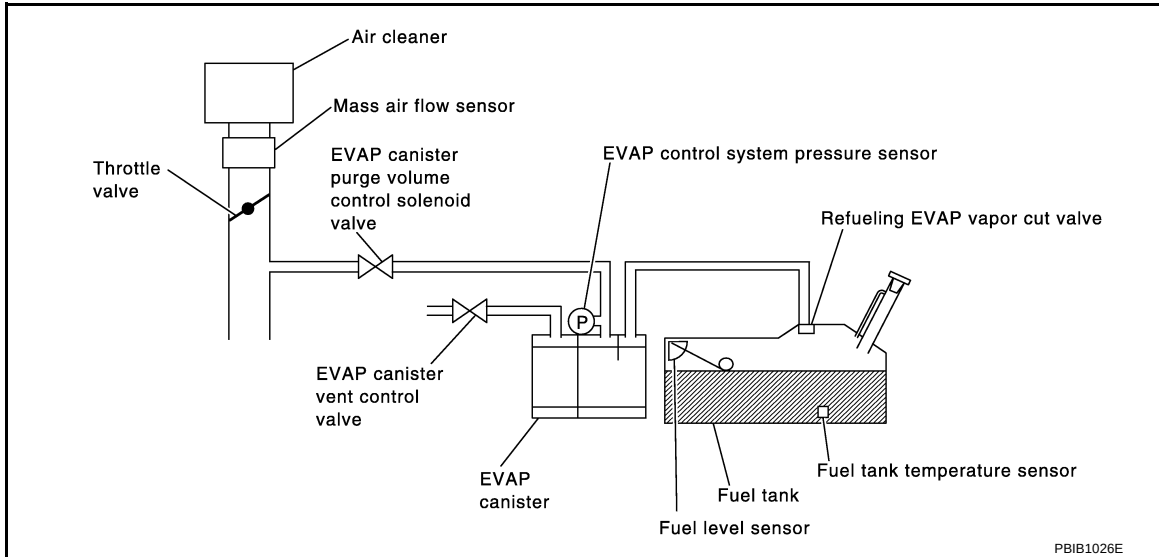
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This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

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)	- EVAP system has a very small leak. - EVAP system does not operate properly.	- Incorrect fuel tank vacuum relief valve - Incorrect fuel filler cap used - Fuel filler cap remains open or fails to close. - Foreign matter caught in fuel filler cap. - Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. - Foreign matter caught in EVAP canister vent control valve. - EVAP canister or fuel tank leaks - EVAP purge line (pipe and rubber tube) leaks - EVAP purge line rubber tube bent - Loose or disconnected rubber tube - EVAP canister vent control valve and the circuit - EVAP canister purge volume control solenoid valve and the circuit - Fuel tank temperature sensor - O-ring of EVAP canister vent control valve is missing or damaged - EVAP canister is saturated with water - EVAP control system pressure sensor - Refueling EVAP vapor cut valve - ORVR system leaks - Fuel level sensor and the circuit - Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645840

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.
 - Refilled or drained the fuel.
 - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ WITH CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
 2. Make sure the following conditions are met.
 - FUEL LEVEL SE: 0.25 - 1.4V**
 - 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 and wait at least 10 seconds.
 4. Turn ignition switch ON.
 5. Select "EVAP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
Follow the instruction displayed.
 6. Make sure that "OK" is displayed.
If "NG" is displayed, refer to [EC-454, "Diagnosis Procedure"](#).
- NOTE:**
- If the engine speed cannot be maintained within the range displayed on CONSULT-III 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:000000001645841

Ⓜ 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:

- Never use compressed air, doing so may damage the EVAP system.
 - Do not start engine.
 - Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).
1. Attach the EVAP service port adapter securely to the EVAP service port. For the location of EVAP service port, refer to [EC-31, "Description"](#).

DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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).

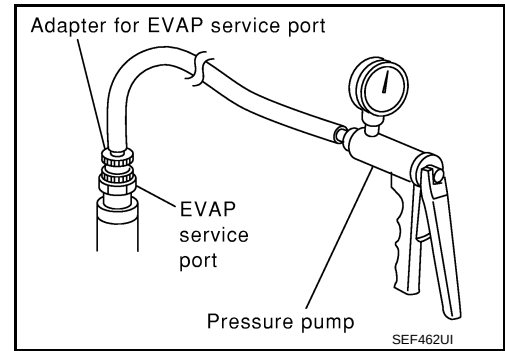
If NG, go to [EC-454, "Diagnosis Procedure"](#).

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

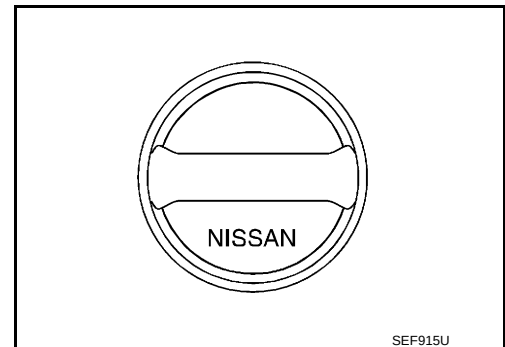
INFOID:000000001645842

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-33, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

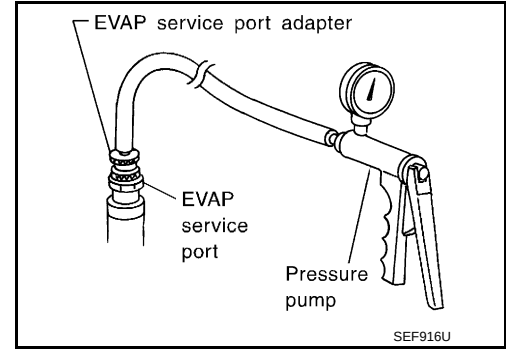
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to [EC-31, "Description"](#).

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.



6. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

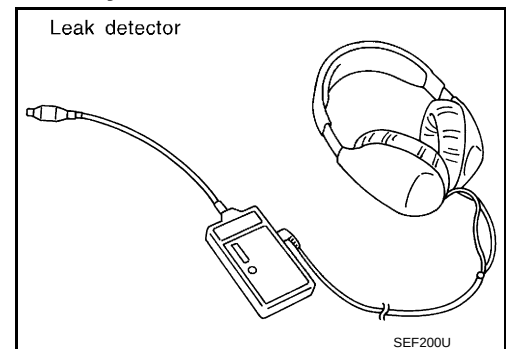
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 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-31, "Description"](#).

OK or NG

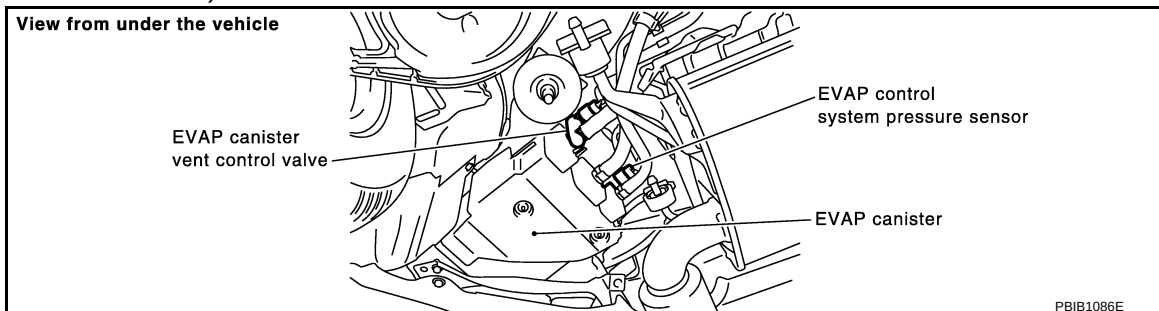
- OK >> GO TO 8.
NG >> Repair or replace.



7. CHECK FOR EVAP LEAK

Without CONSULT-III

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/cm², 0.6 psi) of pressure in the system.

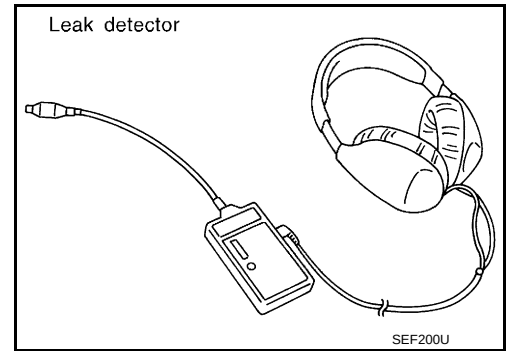
DTC P0456 EVAP CONTROL SYSTEM

< 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-31, "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-35, "Removal and Installation"](#).
- EVAP canister vent control valve.
Refer to [EC-418, "Component Inspection"](#).

OK or NG

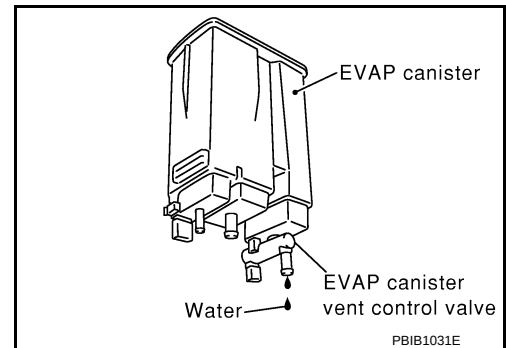
- OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

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-III) >> GO TO 12.
No (Without CONSULT-III) >> 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 2.2 kg (4.9 lb).

OK or NG

- OK (With CONSULT-III) >> GO TO 12.
OK (Without CONSULT-III) >> 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-III

- Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.

DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

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-97. "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-413. "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-331. "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-436. "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-31. "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.

A

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DTC P0456 EVAP CONTROL SYSTEM

< SERVICE INFORMATION >

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-37](#).

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-39, "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-21, "Electrical Component Inspection"](#).

OK or NG

OK >> GO TO 24.

NG >> Replace fuel level sensor unit.

24.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

DTC P0460 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

DTC P0460 FUEL LEVEL SENSOR

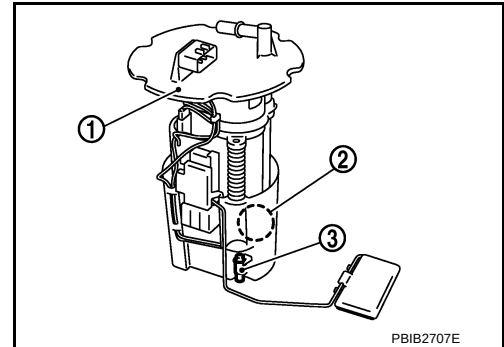
Component Description

INFOID:000000001645843

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 “unified meter and A/C amp.”. The “unified meter and A/C amp.” sends the fuel level sensor signal to the ECM through CAN communication line.

- 1 : Fuel level sensor unit and fuel pump
- 2 : Fuel pressure regulator
- 3 : Fuel tank temperature sensor

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:000000001645844

NOTE:

- If DTC P0460 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P0460 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

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.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Unified meter and A/C amp. • Fuel level sensor

DTC Confirmation Procedure

INFOID:000000001645845

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-III

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-459, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:000000001645846

1.CHECK FUEL GAUGE OPERATION

Refer to [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Follow the instruction of [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

DTC P0460 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

Refer to [DI-19, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000001645847

FUEL LEVEL SENSOR

Refer to [FL-4](#).

DTC P0461 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

DTC P0461 FUEL LEVEL SENSOR

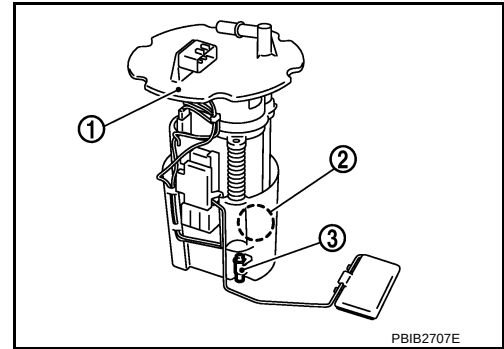
Component Description

INFOID:000000001645848

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 “unified meter and A/C amp.”. The “unified meter and A/C amp.” sends the fuel level sensor signal to the ECM through CAN communication line.

- 1 : Fuel level sensor unit and fuel pump
- 2 : Fuel pressure regulator
- 3 : Fuel tank temperature sensor

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:000000001645849

NOTE:

- If DTC P0461 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P0461 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

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.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Unified meter and A/C amp. • Fuel level sensor

Overall Function Check

INFOID:000000001645850

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-III

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to [EC-78, "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.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-III.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-III.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.

DTC P0461 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

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-462, "Diagnosis Procedure"](#).

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-78, "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-462, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000001645851

1.CHECK FUEL GAUGE OPERATION

Refer to [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

- OK >> GO TO 2.
NG >> Follow the instruction of [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to [DI-19, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

- OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Removal and Installation

INFOID:0000000001645852

FUEL LEVEL SENSOR

Refer to [FL-4](#)

DTC P0462, P0463 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

DTC P0462, P0463 FUEL LEVEL SENSOR

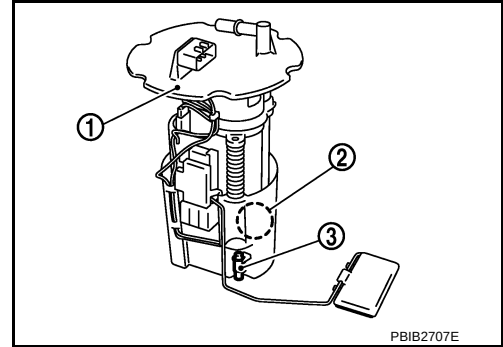
Component Description

INFOID:000000001645853

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 “unified meter and A/C amp.”. The “unified meter and A/C amp.” sends the fuel level sensor signal to the ECM through CAN communication line.

- 1 : Fuel level sensor unit and fuel pump
- 2 : Fuel pressure regulator
- 3 : Fuel tank temperature sensor

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:000000001645854

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-144](#).
- If DTC P0462 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

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 is sent from the sensor is sent to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Unified meter and A/C amp. • Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:000000001645855

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-III

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-463, "Diagnosis Procedure"](#).

Ⓢ WITH GST

Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:000000001645856

1.CHECK FUEL GAUGE OPERATION

Refer to [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Follow the instruction of [DI-14, "Self-Diagnosis Mode of Combination Meter"](#).

DTC P0462, P0463 FUEL LEVEL SENSOR

< SERVICE INFORMATION >

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to [DI-19, "Fuel Level Sensor Signal Inspection"](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning parts.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000001645857

FUEL LEVEL SENSOR

Refer to [FL-4](#).

DTC P0500 VSS

< SERVICE INFORMATION >

DTC P0500 VSS

Description

INFOID:000000001645858

NOTE:

- If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

The vehicle speed signal is sent to the "unified meter and A/C amp". from the VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models) by CAN communication line. The unified meter and A/C amp. then sends the signal to the ECM by CAN communication line.

On Board Diagnosis Logic

INFOID:000000001645859

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.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Unified meter and A/C amp. • VDC/TCS/ABS control unit (with VDC models) • ABS actuator and electric unit (control unit) (without VDC models)

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:000000001645860

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.

① WITH CONSULT-III

1. Start engine (VDC switch or TCS switch OFF).
2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to [EC-466, "Diagnosis Procedure"](#).
If OK, go to following step.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,800 - 6,000 rpm (A/T) 1,800 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)

DTC P0500 VSS

< SERVICE INFORMATION >

B/FUEL SCHDL	5.0 - 31.8 msec (A/T) 5.0 - 31.8 msec (M/T)
Shift lever	Except P or N position (A/T) Neutral position (M/T)
PW/ST SIGNAL	OFF

6. Check 1st trip DTC.

7. If 1st trip DTC is detected, go to [EC-466, "Diagnosis Procedure"](#).

Overall Function Check

INFOID:0000000001645861

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-466, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000001645862

1.CHECK DTC WITH "VDC/TCS/ABS CONTROL UNIT (WITH VDC MODELS)" OR "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITHOUT VDC MODELS)"

Refer to [BRC-81](#) (with VDC models) or refer to [BRC-43](#) (without VDC models).

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK DTC WITH UNIFIED METER AND A/C AMP.

Refer to [DI-5](#).

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

< SERVICE INFORMATION >

DTC P0506 ISC SYSTEM

Description

INFOID:000000001645863

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:000000001645864

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.	• Electric throttle control actuator • Intake air leak

DTC Confirmation Procedure

INFOID:000000001645865

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-77, "Idle Air Volume Learning"](#), before conducting DTC Confirmation Procedure. For the target idle speed, refer to [EC-664](#).**

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).**

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. Restart engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-467, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645866

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.
- NG >> Discover air leak location and repair.

2.REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to [BL-135, "ECM Re-communicating Function"](#).
4. Perform [EC-75, "VIN Registration"](#).
5. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
6. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).

DTC P0506 ISC SYSTEM

< SERVICE INFORMATION >

7. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P0507 ISC SYSTEM

< SERVICE INFORMATION >

DTC P0507 ISC SYSTEM

Description

INFOID:000000001645867

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:000000001645868

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.	• Electric throttle control actuator • Intake air leak • PCV system

DTC Confirmation Procedure

INFOID:000000001645869

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-77, "Idle Air Volume Learning"](#), before conducting DTC Confirmation Procedure. For the target idle speed, refer to [EC-664](#).**

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).**

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. Restart engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-469, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645870

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

- OK >> GO TO 2.
- 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.

DTC P0507 ISC SYSTEM

< SERVICE INFORMATION >

2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-135, "ECM Re-communicating Function"](#).
4. Perform [EC-75, "VIN Registration"](#).
5. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
6. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
7. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

DTC P0550 PSP SENSOR

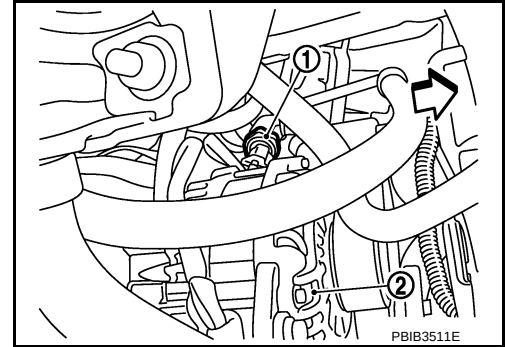
Component Description

INFOID:000000001645871

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.

2 : Alternator

↶ : Vehicle front



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645872

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON

On Board Diagnosis Logic

INFOID:000000001645873

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-482](#).

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.	• Harness or connectors (The sensor circuit is open or shorted) • Power steering pressure sensor

DTC Confirmation Procedure

INFOID:000000001645874

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.

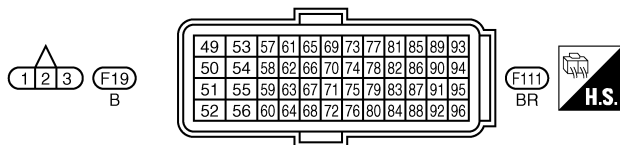
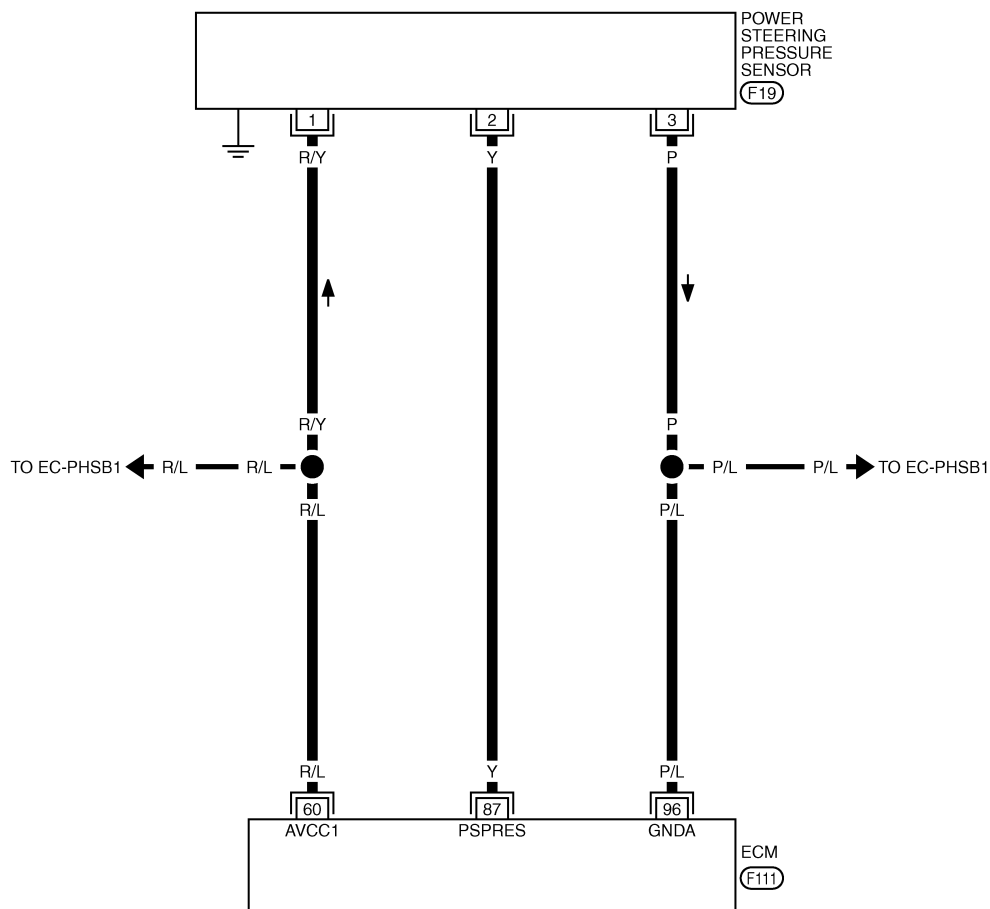
1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-473, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:0000000001645875

EC-PS/SEN-01

 : DETECTABLE LINE FOR DTC
 : NON-DETECTABLE LINE FOR DTC



TBWT1651E

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)
60	R/L	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	[Ignition switch: ON]	5V
87	Y	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
96	P/L	Sensor ground [Camshaft position sensor (PHASE) (bank 1), Power steering pressure sensor]	[Engine is running] • Warm-up condition • Idle speed	0V

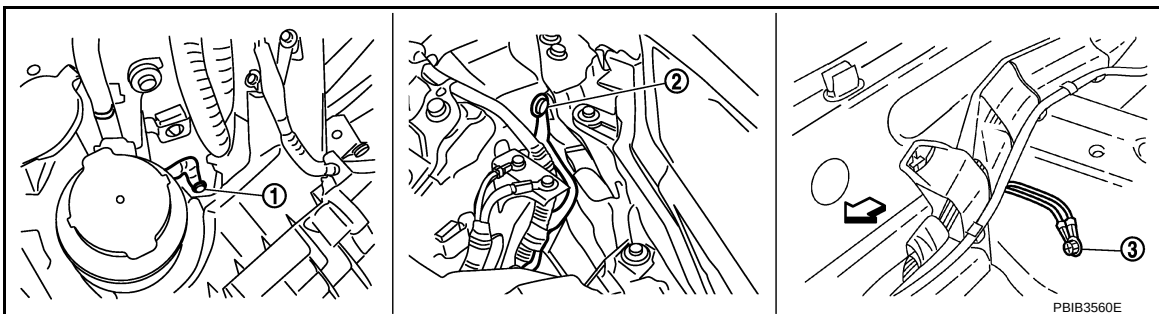
Diagnosis Procedure

INFOID:000000001645876

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

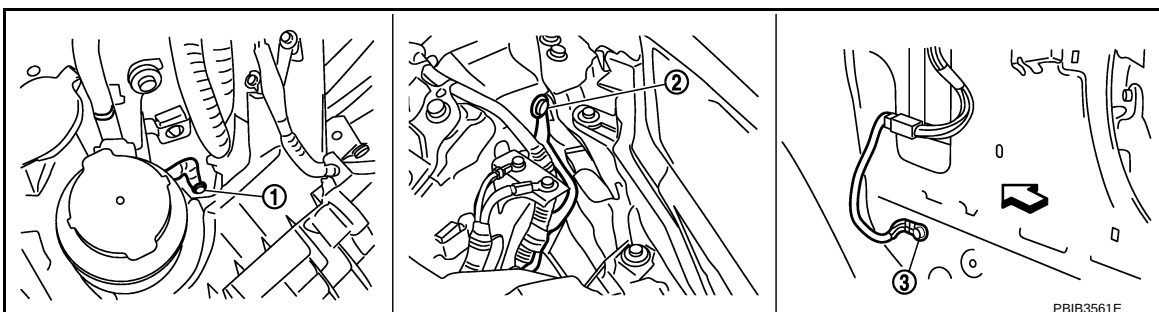
2. Body ground E43

3. Body ground B102

Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩: Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

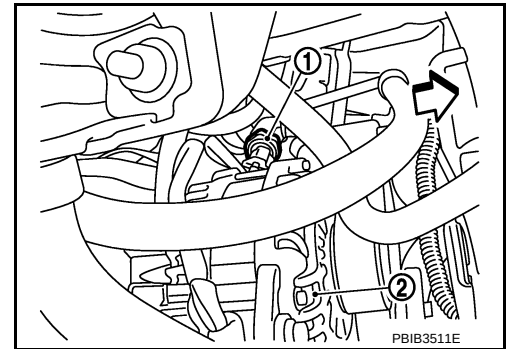
2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PNP) sensor (1) harness connector.

1 : Alternator

↩: Vehicle front

2. Turn ignition switch ON.

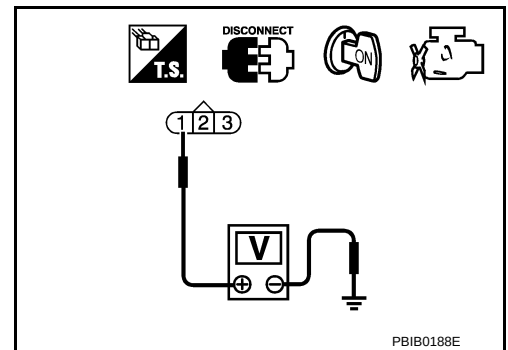


3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-III or tester.

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 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 96.
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 87 and PSP 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 PSP SENSOR

DTC P0550 PSP SENSOR

< SERVICE INFORMATION >

Refer to [EC-475, "Component Inspection"](#).

OK or NG

OK >> GO TO 6.

NG >> Replace PNP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

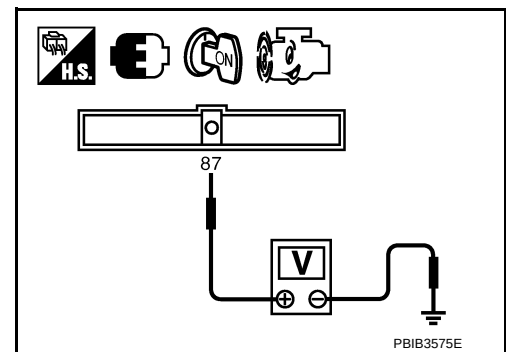
Component Inspection

INFOID:000000001645877

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 87 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:000000001645878

Removal and Installation

POWER STEERING PRESSURE SENSOR

Refer to [PS-33](#).

DTC P0603 ECM POWER SUPPLY

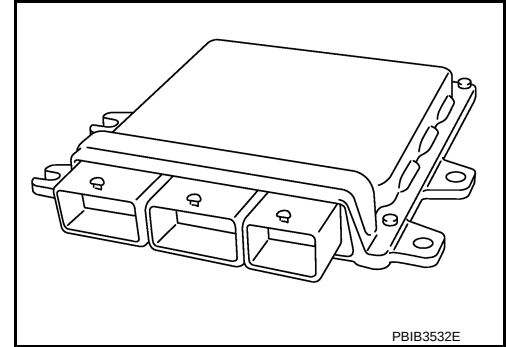
< SERVICE INFORMATION >

DTC P0603 ECM POWER SUPPLY

Component Description

INFOID:000000001645879

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:000000001645880

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.	• Harness or connectors [The ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

INFOID:000000001645881

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.

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat steps 3 and 4 for four times.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-478, "Diagnosis Procedure"](#).

DTC P0603 ECM POWER SUPPLY

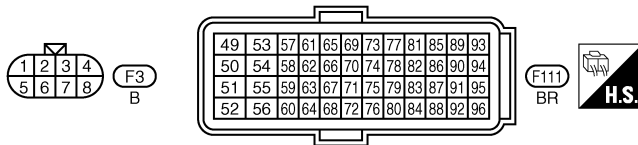
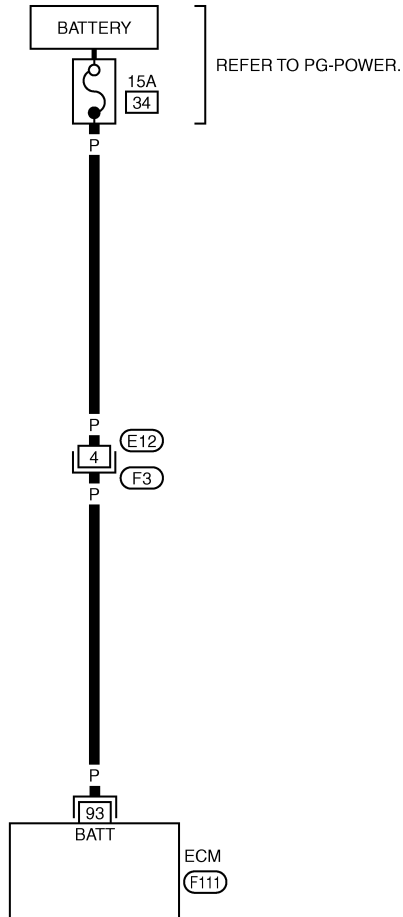
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645882

EC-ECM/PW-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1652E

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)
93	P	Power supply for ECM (Back-up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001645883

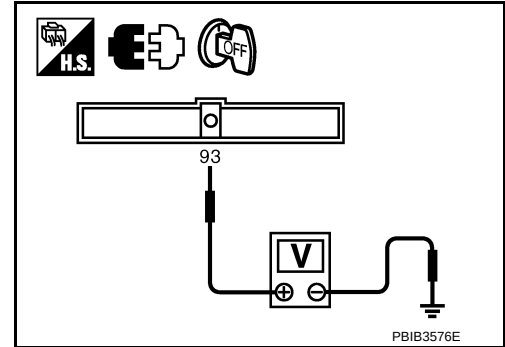
1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 93 and ground with CONSULT-III 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 E12, F3
- 15A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

- OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-476. "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-476. "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

1. Replace ECM.

DTC P0603 ECM POWER SUPPLY

< SERVICE INFORMATION >

2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-135, "ECM Re-communicating Function"](#).
3. Perform [EC-75, "VIN Registration"](#).
4. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

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DTC P0605 ECM

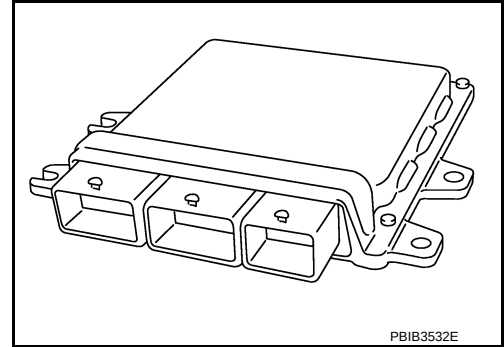
< SERVICE INFORMATION >

DTC P0605 ECM

Component Description

INFOID:000000001645884

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:000000001645885

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 EEP-ROM 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	• ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ECM deactivates ASCD operation.

DTC Confirmation Procedure

INFOID:000000001645886

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. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-481. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to [EC-481. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 3 for 32 times.

DTC P0605 ECM

< SERVICE INFORMATION >

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-481, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645887

1. INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-480, "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-480, "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.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-135, "ECM Re-communicating Function"](#).
3. Perform [EC-75, "VIN Registration"](#).
4. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

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DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

DTC P0643 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:000000001645888

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.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [CMP sensor (PHASE) (bank 1) circuit is shorted.] [EVT control position sensor (bank 1) circuit is shorted.] (PSP sensor circuit is shorted.) • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE) (bank 1) • Exhaust valve timing control position sensor (bank 1) • Power steering pressure sensor

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:000000001645889

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-484, "Diagnosis Procedure"](#).

DTC P0643 SENSOR POWER SUPPLY

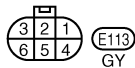
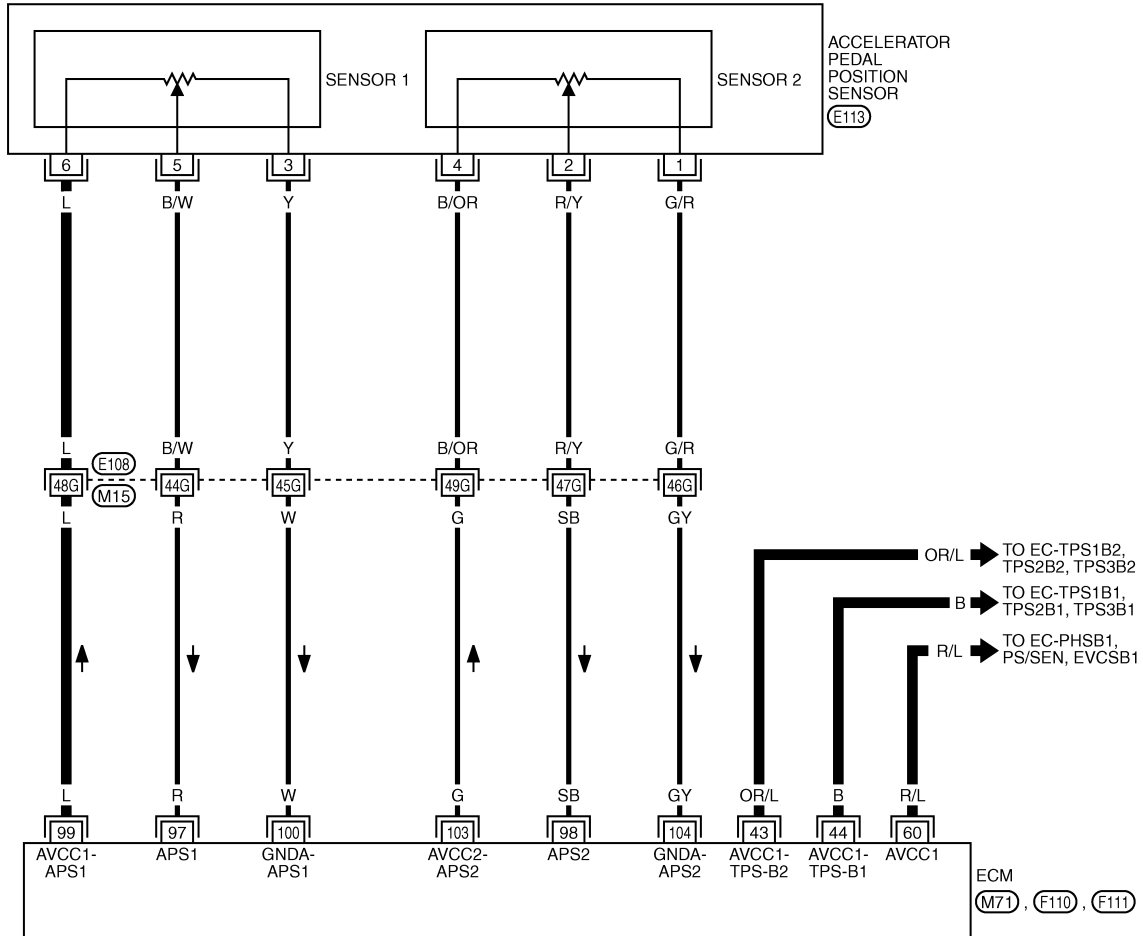
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645890

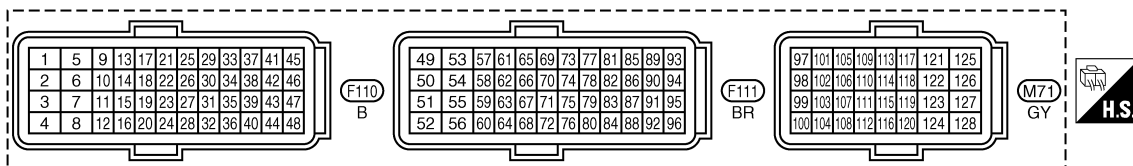
EC-SEN/PW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE JUNCTION (SMJ)



TBWT1653E

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)
43	OR/L	Sensor power supply [Throttle position sensor (bank 2)]	[Ignition switch: ON]	5V
44	B	Sensor power supply [Throttle position sensor (bank 1)]	[Ignition switch: ON]	5V
60	R/L	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	[Ignition switch: ON]	5V
97	R	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	3.9 - 4.7V
98	SB	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.15 - 0.60V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.40V
99	L	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	5V
100	W	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
104	GY	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	0V

Diagnosis Procedure

INFOID:0000000001645891

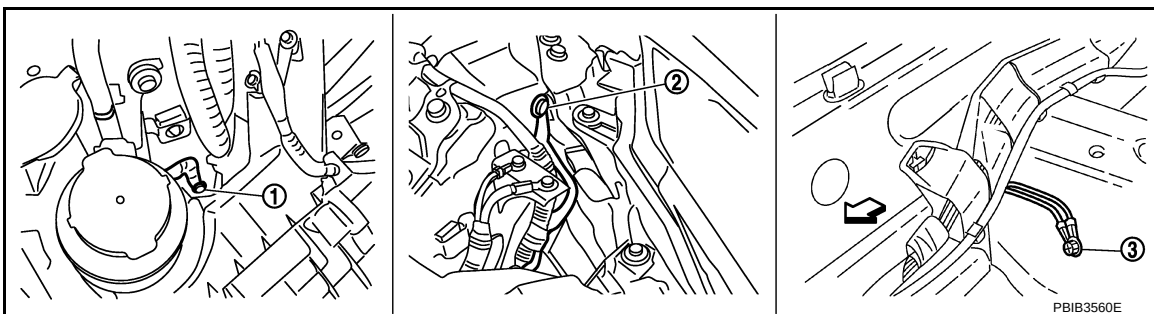
1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .

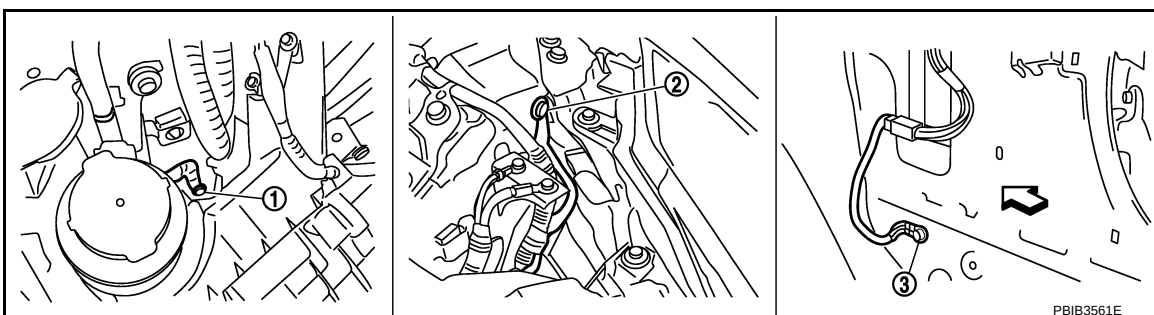
DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >



Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

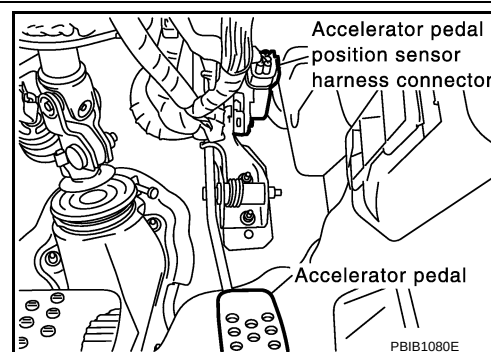


OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



DTC P0643 SENSOR POWER SUPPLY

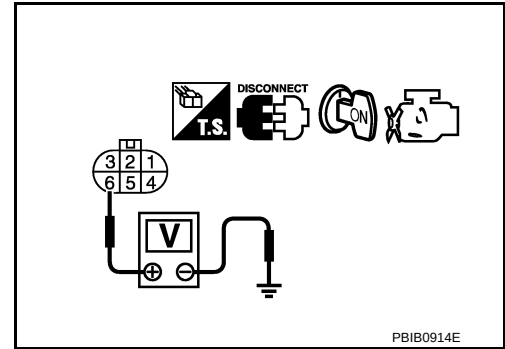
< SERVICE INFORMATION >

3. Check voltage between APP sensor terminal 6 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 7.
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
43	Electric throttle control actuator (bank 2) terminal 6	EC-346
44	Electric throttle control actuator (bank 1) terminal 6	EC-346
60	CMP sensor (PHASE) (bank 1) terminal 1	EC-377
	EVT control position sensor (bank 1) terminal 1	EC-498
	PSP sensor terminal 1	EC-472
99	APP sensor terminal 6	EC-483

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.

- Camshaft position sensor (PHASE) (bank 1) (Refer to [EC-383, "Component Inspection"](#).)
- Exhaust valve timing control position sensor (bank 1) (Refer to [EC-505, "Component Inspection"](#).)
- Power steering pressure sensor (Refer to [EC-475, "Component Inspection"](#).)

OK or NG

- OK >> GO TO 5.
NG >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to [EC-352, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

7.CHECK APP SENSOR

Refer to [EC-591, "Component Inspection"](#).

OK or NG

- OK >> GO TO 9.
NG >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

DTC P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

2. Perform [EC-76. "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-76. "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77. "Idle Air Volume Learning"](#).

A

>> INSPECTION END

EC

9. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

C

>> INSPECTION END

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DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

DTC P0850 PNP SWITCH

Component Description

INFOID:0000000001645892

When the shift position is P or N TCM is ON.(A/T models)

When the shift position is Neutral, park/neutral position (PNP) switch is ON. (M/T models)

ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645893

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T) position	ON
		Shift lever: Except above position	OFF

On Board Diagnosis Logic

INFOID:0000000001645894

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	TCM (A/T models) Park/neutral position switch (M/T models)	The signal of the TCM (A/T models) or park/ neutral position (PNP) switch (M/T models) is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch • TCM (A/T models)

DTC Confirmation Procedure

INFOID:0000000001645895

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-III

1. Turn ignition switch ON.
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" signal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

If NG, go to [EC-493. "Diagnosis Procedure"](#).

If OK, go to following steps.

3. Select "DATA MONITOR" mode with CONSULT-III.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 6375 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)
Shift lever	Suitable position

6. Check 1st trip DTC.

7. If 1st trip DTC is detected, go to [EC-493. "Diagnosis Procedure"](#).

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

Overall Function Check

INFOID:000000001645896

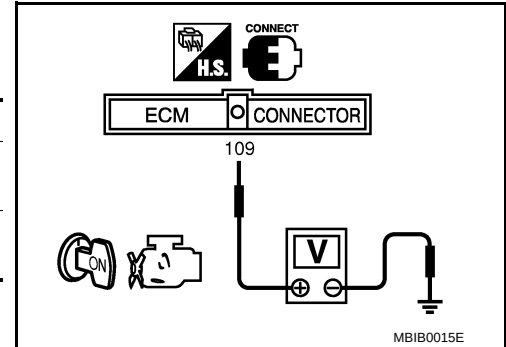
Use this procedure to check the overall function of the TCM (A/T models) or park/neutral position (PNP) switch (M/T models) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 109 (PNP switch signal) and ground under the following conditions.

Condition (Shift lever)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to [EC-493, "Diagnosis Procedure"](#).



DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

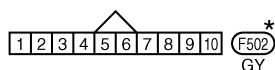
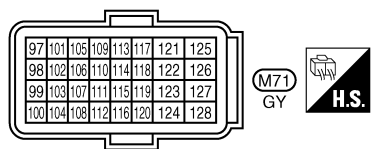
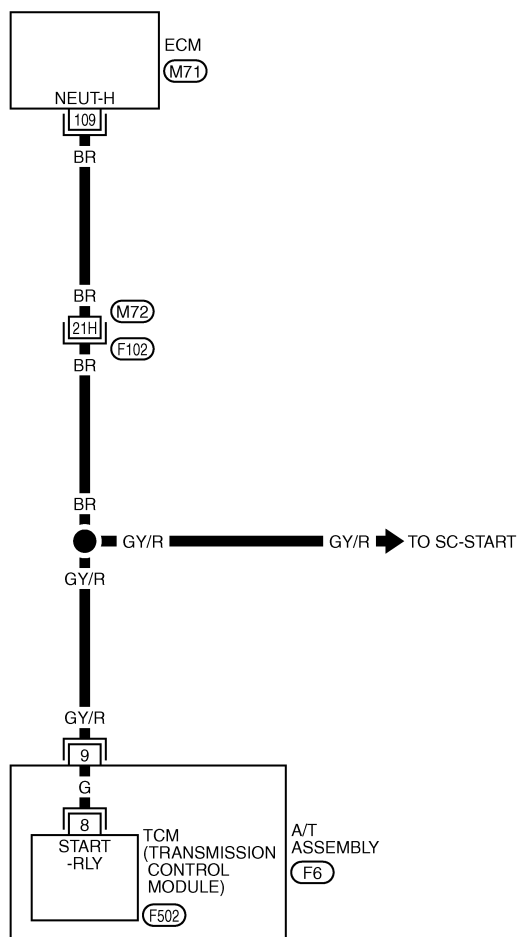
Wiring Diagram

INFOID:000000001645897

A/T MODELS

EC-PNP/SW-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG. SECTION.

REFER TO THE FOLLOWING.

(F102) -SUPER MULTIPLE JUNCTION (SMJ)

TBWT1654E

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)
109	BR	PNP switch	[Ignition switch: ON] • Shift lever: P or N position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Shift lever: Except above position	0V

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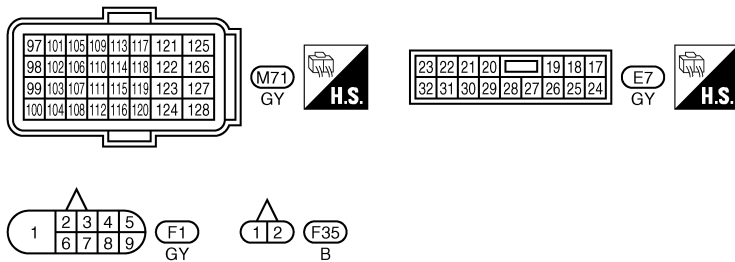
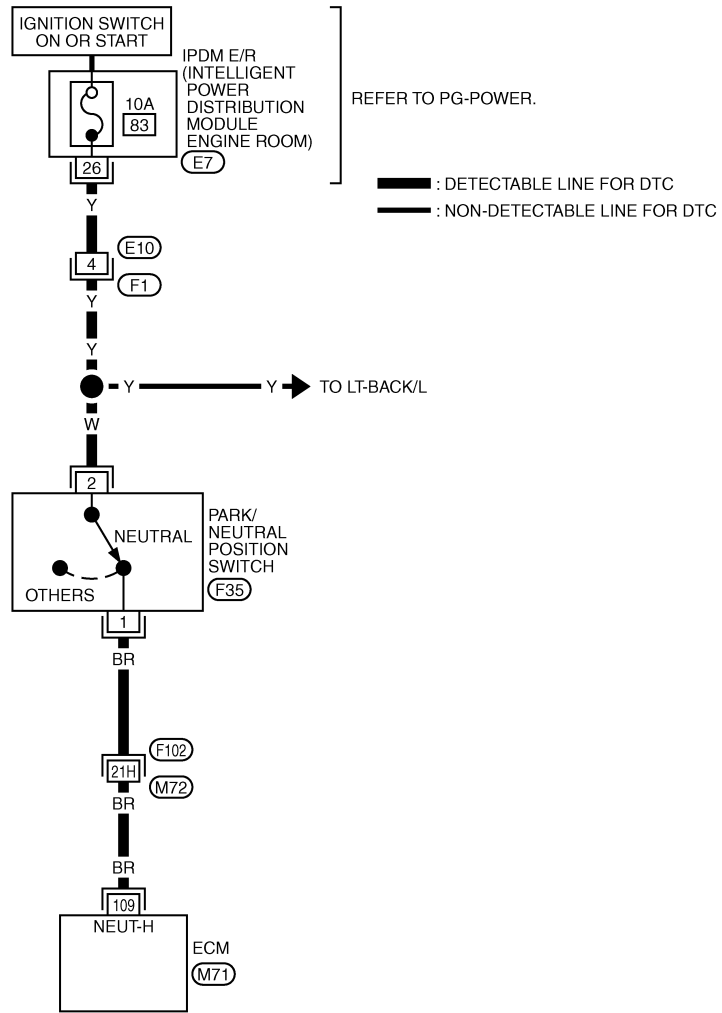
P

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

M/T MODELS

EC-PNP/SW-02



REFER TO THE FOLLOWING.

(F102) -SUPER MULTIPLE
JUNCTION (SMJ)

TBWT1655E

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)
109	BR	PNP switch	[Ignition switch: ON] • Shift lever: Neutral position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Shift lever: Except above position	0V

Diagnosis Procedure

INFOID:000000001645898

A/T MODELS

1.CHECK DTC WITH TCM

Refer to [AT-37. "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-8](#).

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between A/T assembly terminal 9 and ECM terminal 109.
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 F102, M72
- Harness for open or short between A/T assembly and ECM.

>> 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. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8.
Refer to [AT-93](#).

Continuity should exist.

2. 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 connectors.

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

M/T MODELS

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect TCM (A/T models) or park/neutral position (PNP) switch (M/T models) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E10, F1
- 10A fuse
- IPDM harness connector E7
- Harness for open or short between ECM and fuse

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

3.CHECK PNP 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 109 and PNP 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 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F102, M72
- Harness for open or short between PNP switch and ECM

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

5.CHECK PNP SWITCH

Refer to [MT-12, "Checking"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace PNP switch.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

- OK >> Replace IPDM E/R.

DTC P0850 PNP SWITCH

< SERVICE INFORMATION >

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

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DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

Component Description

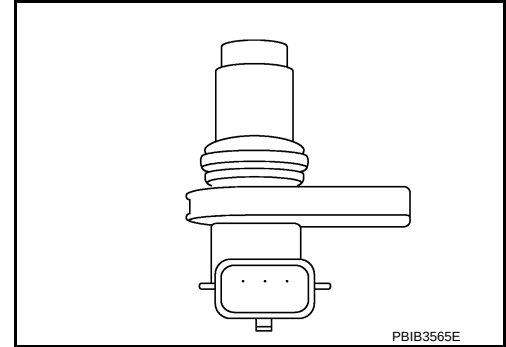
INFOID:0000000001645899

Exhaust valve timing control position sensor detects the concave groove of the exhaust camshaft rear end.

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

This sensor uses a Hall IC.

Based on the position of the exhaust camshaft, ECM controls exhaust valve timing control magnet retarder to optimize the shut/open timing of exhaust valve for the driving condition.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645900

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EXH/V TIM B1 EXH/V TIM B2	- Engine: After warming up - Shift lever: P or N (A/T), Neutral (M/T) position - Air conditioner switch: OFF - No load	Idle	-5° - 5°CA
		Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA

On Board Diagnosis Logic

INFOID:0000000001645901

NOTE:

If DTC P1078 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.

Refer to [EC-482](#).

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1078 1078 (Bank 1)	Exhaust valve timing control position sensor circuit	An excessively high or low voltage from the sensor is sent to ECM.	• Harness or connectors [Exhaust valve timing control position sensor (bank 1) circuit is open or shorted] • Exhaust valve timing control position sensor (bank 1) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 1) • Accumulation of debris to the signal pick-up portion of the camshaft
P1084 1084 (Bank 2)			• Harness or connectors [EVT control position sensor (bank 2) circuit is shorted.] [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is open or shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Exhaust valve timing control position sensor (bank 2) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Accelerator pedal position sensor • EVAP control system pressure sensor • Refrigerant pressure sensor • Accumulation of debris to the signal pick-up portion of the camshaft

DTC Confirmation Procedure

INFOID:000000001645902

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.

1. Start engine and let it idle for 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-501. "Diagnosis Procedure"](#).

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

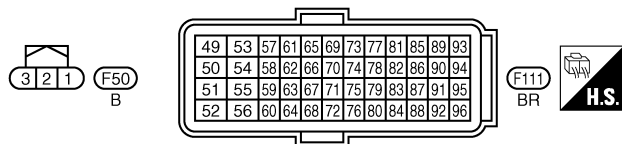
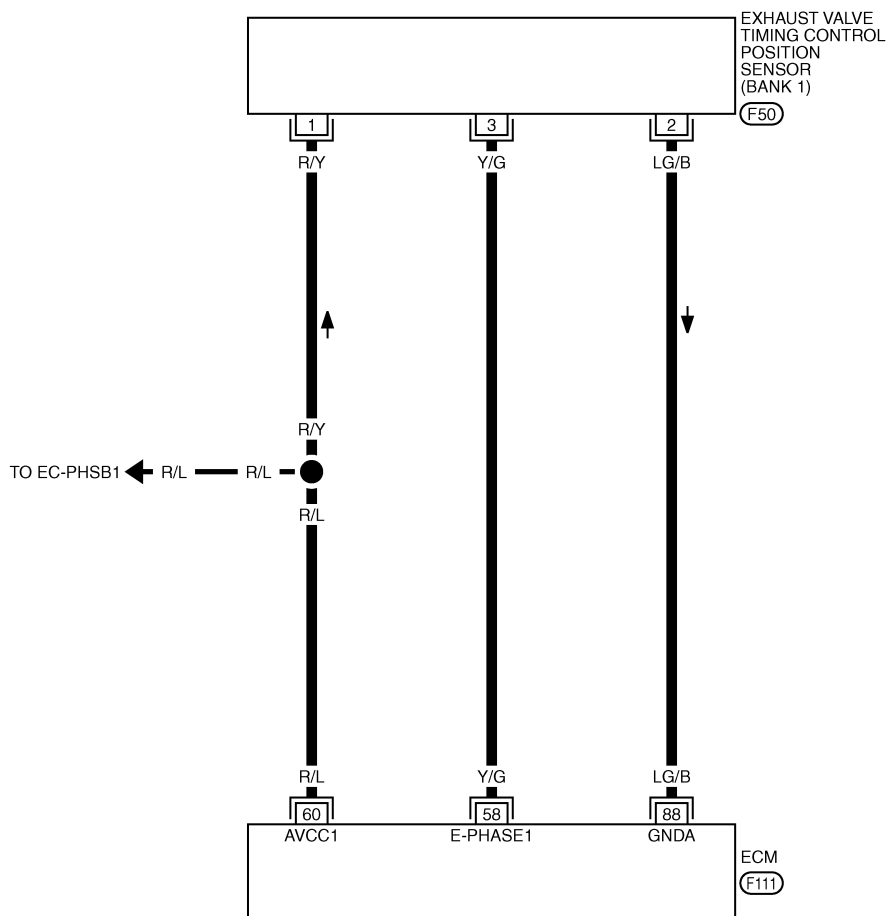
Wiring Diagram

INFOID:000000001645903

BANK 1

EC-EVCSB1-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1656E

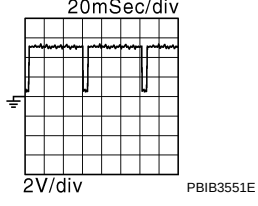
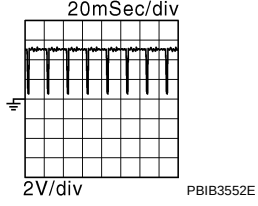
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< 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)
58	Y/G	Exhaust valve timing control position sensor (bank 1)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 - 5.0V★ 
60	R/L	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	[Ignition switch: ON]	5V
88	LG/B	Sensor ground [Exhaust valve timing control position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V

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

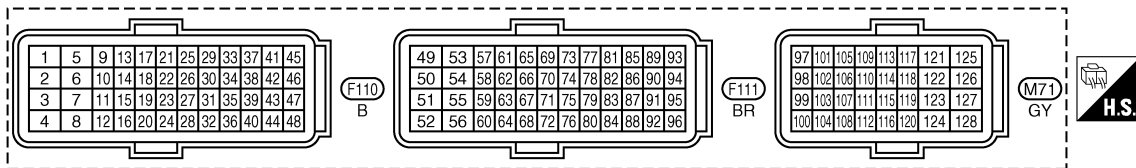
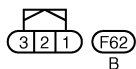
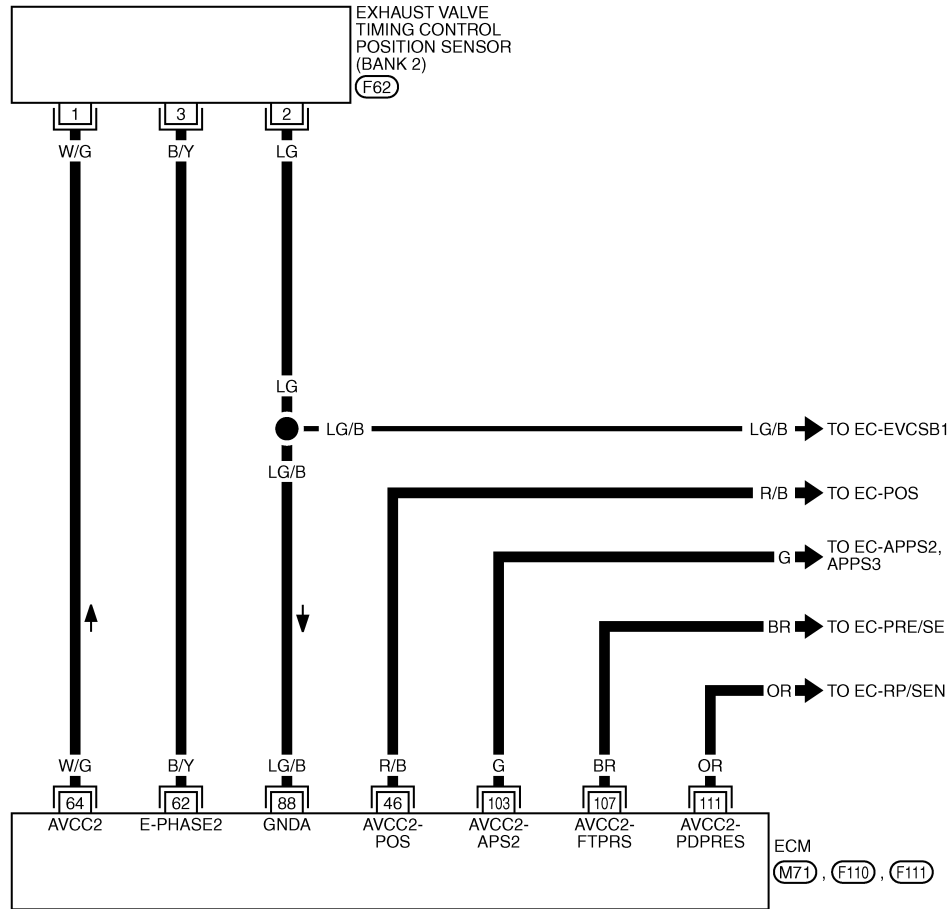
DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

BANK 2

EC-EVCSB2-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



TBWT1657E

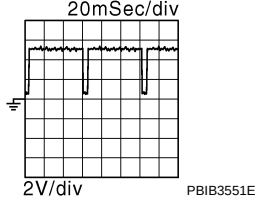
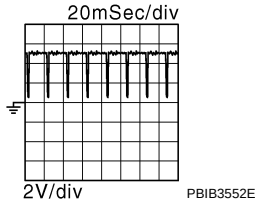
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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 P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
62	B/Y	Exhaust valve timing control position sensor (bank 2)	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	4.0 - 5.0V★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 - 5.0V★ 
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
88	LG/B	Sensor ground [Exhaust valve timing control position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V

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

Diagnosis Procedure

INFOID:000000001645904

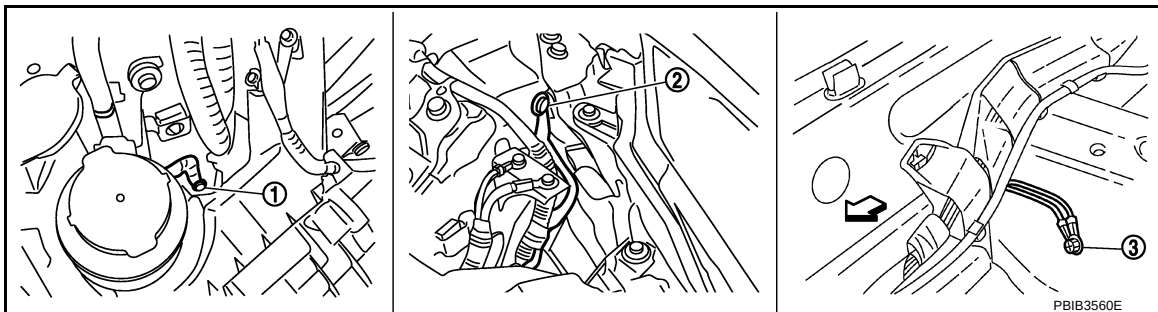
1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#) .

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >



1. Body ground E17

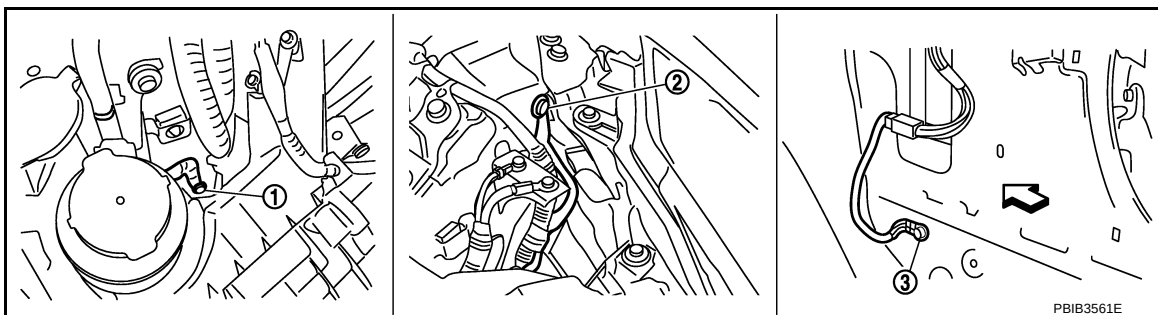
2. Body ground E43

3. Body ground B102

← Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

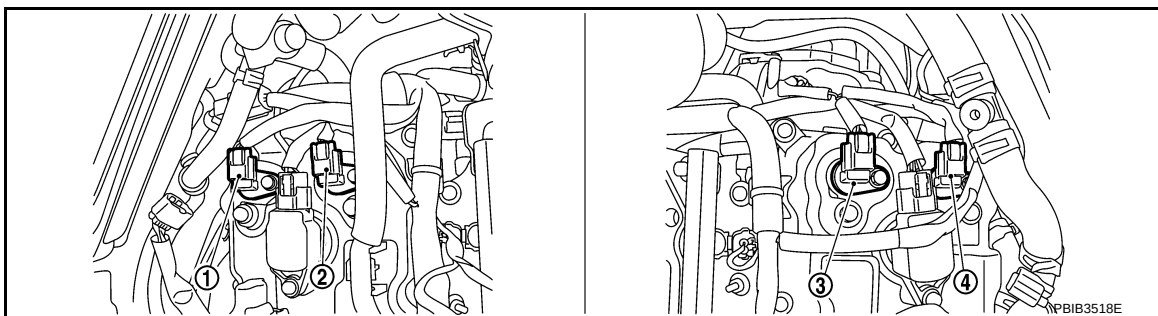
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-I

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



1. Exhaust valve timing control position
sensor (bank 1)

2. Camshaft position sensor (PHASE)
(bank 1)

3. Camshaft position sensor (PHASE)
(bank 2)

4. Exhaust valve timing control position
sensor (bank 2)

2. Turn ignition switch ON.

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

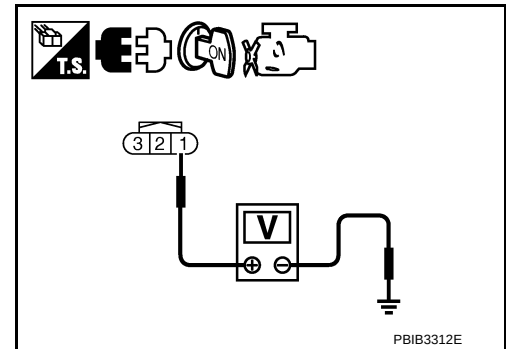
< SERVICE INFORMATION >

3. Check voltage between exhaust valve timing control position sensor terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 8.
NG-1 >> P1078: Repair open circuit or short to ground or short to power in harness connector.
NG-2 >> P1084: GO TO 3.



3.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between exhaust valve timing control position sensor terminal 1 and ECM terminal 64.
Refer to Wiring Diagram.

Continuity should exist.

OK or NG

- OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK EXHAUST VALVE TIMING CONTROL 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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor terminal 1	EC-658

OK or NG

- OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection"](#) .)
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection"](#) .)
- EVAP control system pressure sensor (Refer to [EC-436, "Component Inspection"](#) .)
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit"](#) .)

OK or NG

- OK >> GO TO 6.
NG >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to [EC-600, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 14.
NG >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

2. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#) .
3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#) .
4. Perform [EC-77, "Idle Air Volume Learning"](#) .

>> INSPECTION END

8.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between exhaust valve timing control position sensor terminal 2 and ECM terminal 88. 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 EXHAUST VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 58 (bank 1) or 62 (bank 2) and exhaust valve timing control position sensor 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 10.

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

10.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to [EC-505, "Component Inspection"](#).

OK or NG

OK >> GO TO 11.

NG >> Replace exhaust valve timing control position sensor.

11.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to [EC-373, "Component Inspection"](#).

OK or NG

OK >> GO TO 12.

NG >> Replace crankshaft position sensor (POS).

12.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to [EC-383, "Component Inspection"](#).

OK or NG

OK >> GO TO 13.

NG >> Replace malfunctioning camshaft position sensor (PHASE).

13.CHECK CAMSHAFT (EXH)

Check the following;

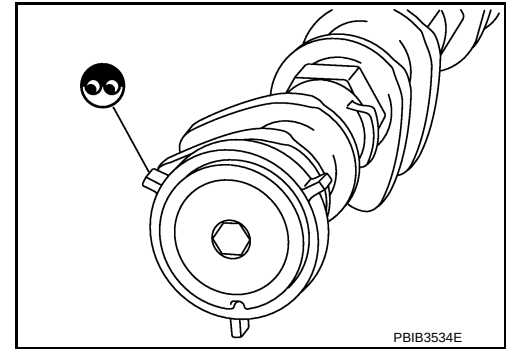
DTC P1078 P1084 EVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

- OK >> GO TO 14.
- NG >> Remove debris and clean the signal plate of camshaft rear end or replace malfunctioning camshaft.



14.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

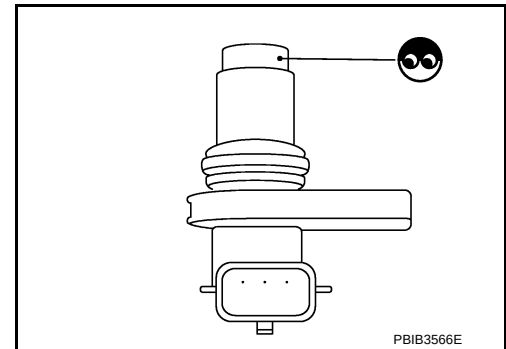
>> INSPECTION END

Component Inspection

INFOID:000000001645905

EXHAUST VALVE TIMING CONTROL POSITION SENSOR

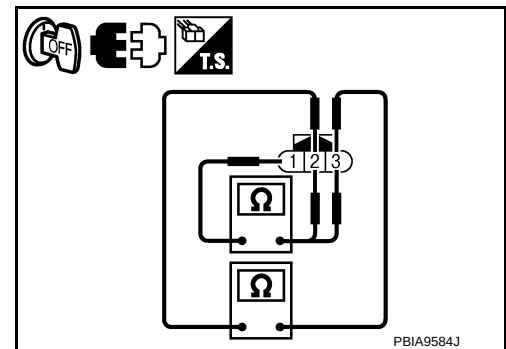
1. Disconnect exhaust valve timing control position sensor harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown below.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace exhaust valve timing control position sensor.



INFOID:000000001645906

Removal and Installation

EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to [EM-72](#).

DTC P1148, P1168 CLOSED LOOP CONTROL

< SERVICE INFORMATION >

DTC P1148, P1168 CLOSED LOOP CONTROL

On Board Diagnosis Logic

INFOID:000000001645907

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.	• Harness or connectors [The air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater
P1168 1168 (Bank 2)		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

NOTE:

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:0000000001645908

The malfunction information related to TCS is transferred through the CAN communication line from VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models) to ECM.

Be sure to erase the malfunction information such as DTC not only for VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models) but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:0000000001645909

- 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 VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models).	• VDC/TCS/ABS control unit (with VDC models) • ABS actuator and electric unit (control unit) (without VDC models) • TCS related parts

DTC Confirmation Procedure

INFOID:0000000001645910

TESTING CONDITION:

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

WITH CONSULT-III

1. Start engine and let it idle for at least 60 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-507, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:0000000001645911

Go to [BRC-81](#) (With VDC models) or [BRC-43](#) (Without VDC models).

DTC P1212 TCS COMMUNICATION LINE

< SERVICE INFORMATION >

DTC P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001645912

NOTE:

- If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models).

Be sure to erase the malfunction information such as DTC not only for VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models) but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:0000000001645913

- 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 VDC/TCS/ABS control unit (with VDC models) or "ABS actuator and electric unit (control unit)" (without VDC models) continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • VDC/TCS/ABS control unit (with VDC models) • ABS actuator and electric unit (control unit) (without VDC models) • Dead (Weak) battery

DTC Confirmation Procedure

INFOID:0000000001645914

TESTING CONDITION:

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

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to [EC-508, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000001645915

Go to [BRC-81](#) (With VDC models) or [BRC-43](#) (Without VDC models).

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

DTC P1217 ENGINE OVER TEMPERATURE

Description

INFOID:000000001645916

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-144](#).
- If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).

Cooling Fan Control

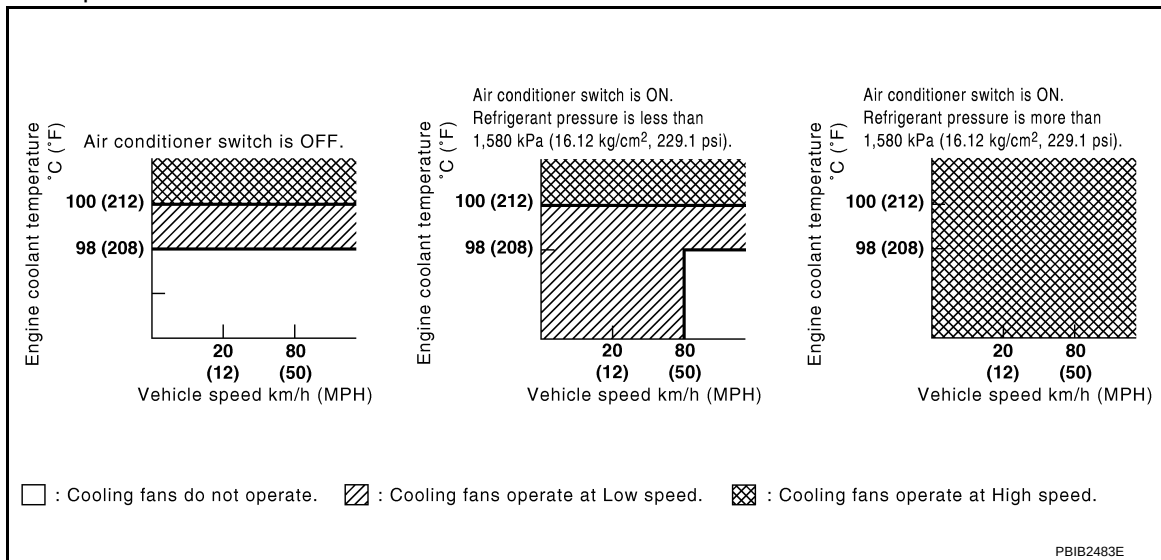
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage*1		
Wheel sensor	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
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 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop	OFF	OFF	OFF
Low	ON	OFF	OFF
High	ON	ON	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Low	1	4
	2	3
High	1 and 2	3 and 4

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001645917

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
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 97°C (206°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HI

On Board Diagnosis Logic

INFOID:0000000001645918

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)	- Cooling fan does not operate properly (Overheat). - Cooling fan system does not operate properly (Overheat). - Engine coolant was not added to the system using the proper filling method. - Engine coolant is not within the specified range.	- Harness or connectors (The cooling fan circuit is open or shorted.) - Cooling fan - IPDM E/R (Cooling fan relays) - Radiator hose - Radiator - Radiator cap - Water pump - Thermostat For more information, refer to EC-518, "Main 12 Causes of Overheating".

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-6, "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, "Engine Oil Recommendation"](#).
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

INFOID:0000000001645919

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

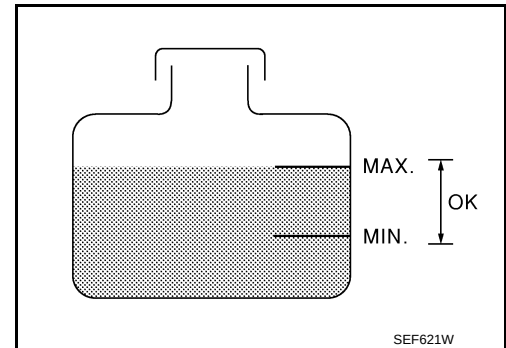
DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

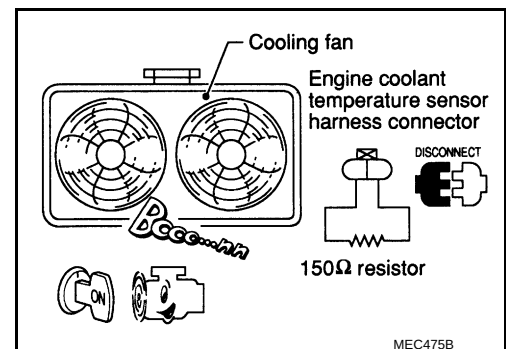
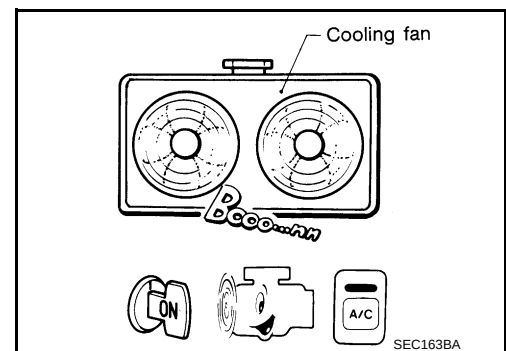
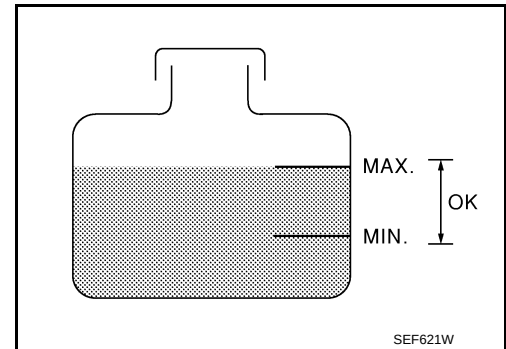
WITH CONSULT-III

1. Check the coolant level in the reservoir tank and radiator.
NOTE:
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-513, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-513, "Diagnosis Procedure"](#).
3. Turn ignition switch ON.
4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
5. If the results are NG, go to [EC-513, "Diagnosis Procedure"](#).



WITH GST

1. Check the coolant level in the reservoir tank and radiator.
NOTE:
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-513, "Diagnosis Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-513, "Diagnosis Procedure"](#).
3. Start engine.
CAUTION:
Be careful not to overheat engine.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.
6. Make sure that cooling fans operates at low speed.
If NG, go to [EC-513, "Diagnosis Procedure"](#).
If OK, go to the following steps.
7. Turn ignition switch OFF.
8. Turn air conditioner switch and blower fan switch OFF.
9. Disconnect engine coolant temperature sensor harness connector.
10. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
11. Restart engine and make sure that cooling fans operates at higher speed than low speed.
CAUTION:
Be careful not to overheat engine.
12. If NG, go to [EC-513, "Diagnosis Procedure"](#).



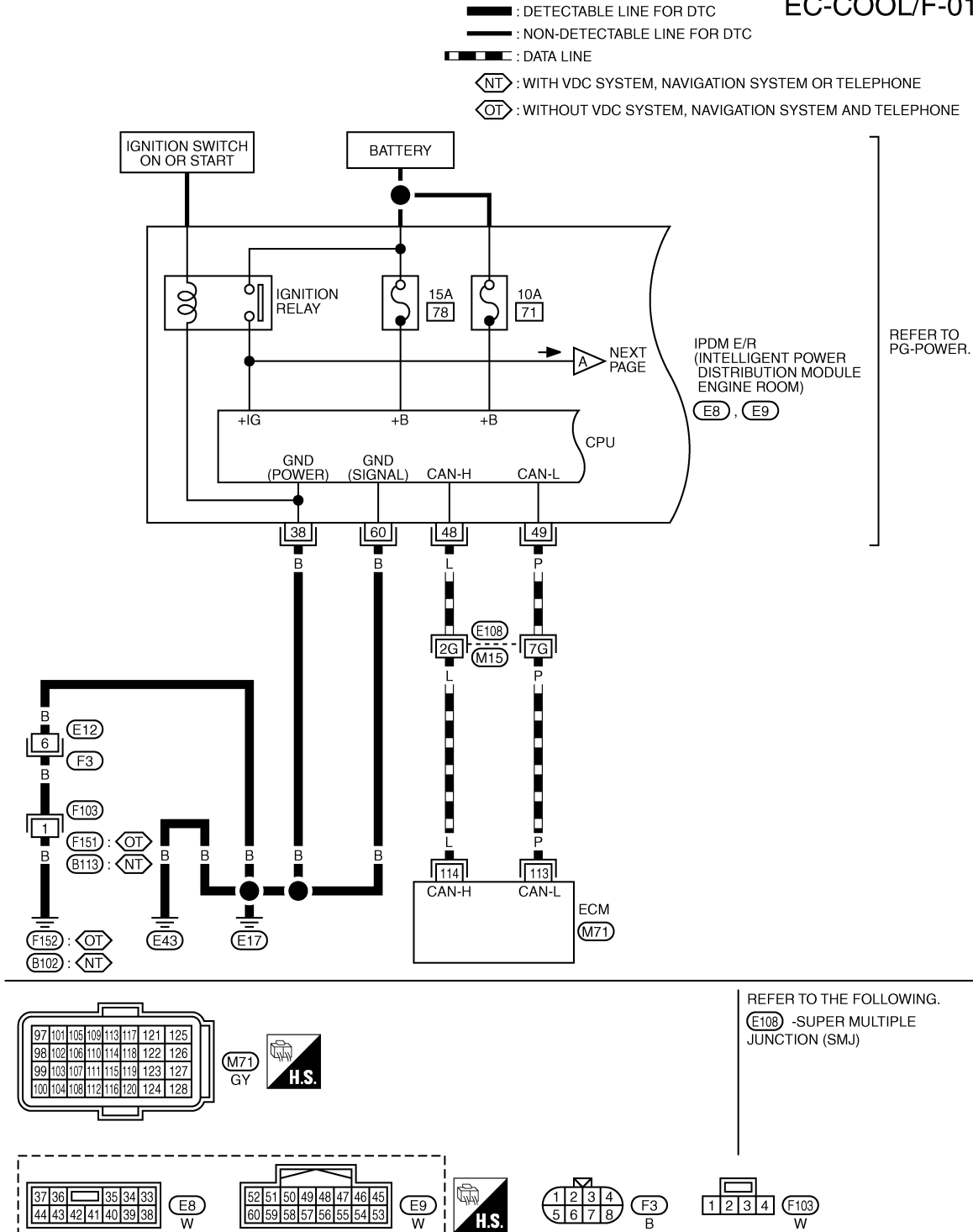
DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

Wiring Diagram

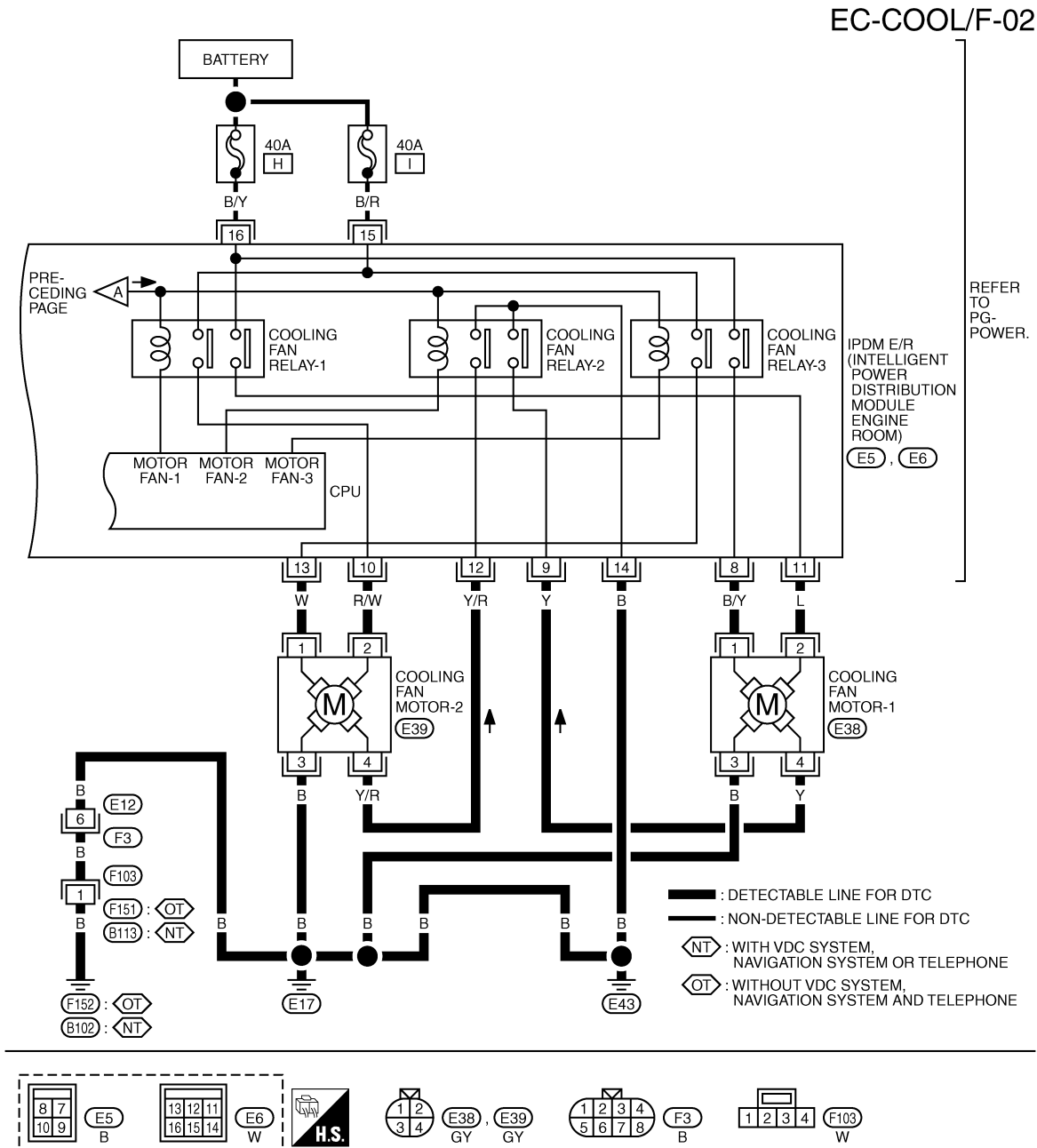
INFOID:000000001645920

EC-COOL/F-01



TBWT1658E

< SERVICE INFORMATION >



Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.

No >> GO TO 4.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-III

1. Start engine and let it idle.
2. Select "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III and touch "LOW" on the CONSULT-III screen.
3. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 3.

NG >> Check cooling fan low speed control circuit. (Go to "PROCEDURE A".)

3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III

1. Touch "HIGH" on the CONSULT-III screen.
2. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to "PROCEDURE B".)

4. CHECK COOLING FAN LOW SPEED OPERATION

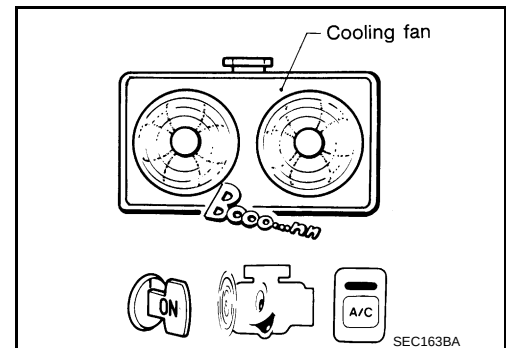
Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 5.

NG >> Check cooling fan low speed control circuit. (Go to "PROCEDURE A".)



5. CHECK COOLING FAN HIGH SPEED OPERATION

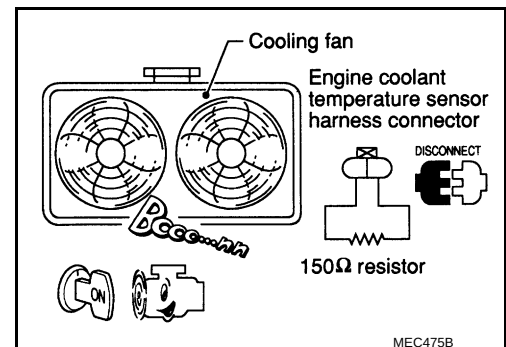
Without CONSULT-III

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fans-1 and -2 operate at higher speed than low speed.

OK or NG

OK >> GO TO 6.

NG >> Check cooling fan high speed control circuit. (Go to "PROCEDURE B".)



6. CHECK COOLING SYSTEM FOR LEAK

Refer to [CO-9. "Inspection"](#).

OK or NG

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

- OK >> GO TO 7.
NG >> Check the following for leak.
- Hose
 - Radiator
 - Water pump

7.CHECK RADIATOR CAP

Refer to [CO-14. "Checking Radiator Cap"](#).

OK or NG

- OK >> GO TO 8.
NG >> Replace radiator cap.

8.CHECK THERMOSTAT

Refer to [CO-25](#).

OK or NG

- OK >> GO TO 9.
NG >> Replace thermostat

9.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-220. "Component Inspection"](#).

OK or NG

- OK >> GO TO 10.
NG >> Replace engine coolant temperature sensor.

10.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-518. "Main 12 Causes of Overheating"](#).

>> **INSPECTION END**

PROCEDURE A

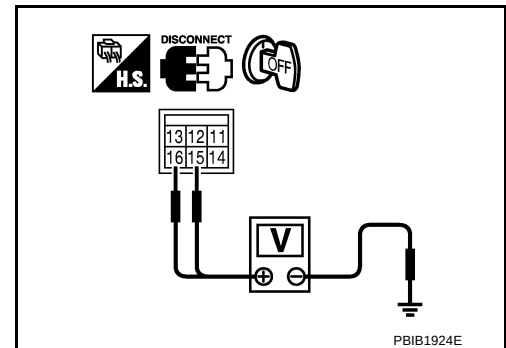
1.CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E6.
3. Check voltage between IPDM E/R terminals 15, 16 and ground with CONSULT-III 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 links
- Harness for open or short between IPDM E/R and battery

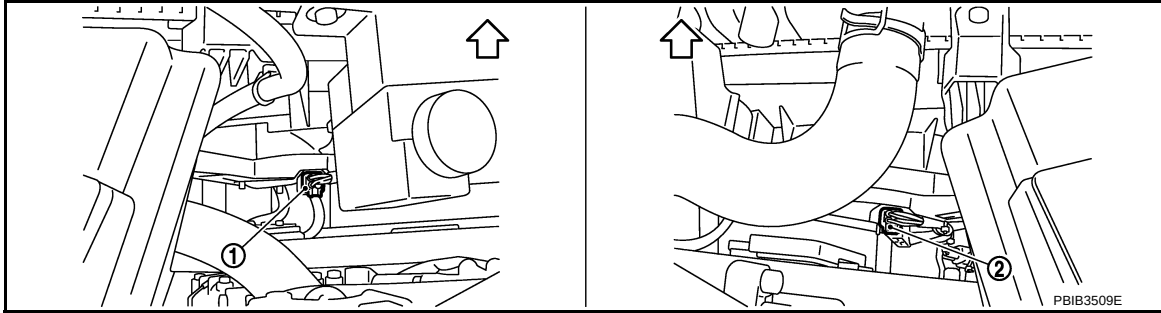
>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK COOLING FAN MOTORS CIRCUIT

1. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >



1. Cooling fan motor-1 2. Cooling fan motor-2

↶ Vehicle front

2. Disconnect all IPDM E/R harness connectors.
3. Check harness continuity between the following;
cooling fan motor-1 terminal 2 and IPDM E/R terminal 11,
cooling fan motor-1 terminal 3 and ground,
IPDM E/R terminal 38, 60 and ground,
Refer to wiring diagram.

Continuity should exist.

4. Check harness continuity between the following;
cooling fan motor-2 terminal 2 and IPDM E/R terminal 10,
cooling fan motor-2 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 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E12, F3
- Harness connectors F103, B113 (Models with VDC system, navigation system or telephone) or F151 (Models without VDC system, navigation system and telephone)
- Harness for open or short between cooling fan motors-1, 2 and IPDM E/R
- Harness for open or short between cooling fan motors-1, 2 and ground
- Harness for open or short between IPDM E/R and ground

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

5.CHECK COOLING FAN MOTORS

Refer to [EC-518, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
NG >> Replace malfunctioning cooling fan motors.

6.CHECK INTERMITTENT INCIDENT

Perform [EC-134](#).

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-16](#).
NG >> Repair or replace harness or connector.

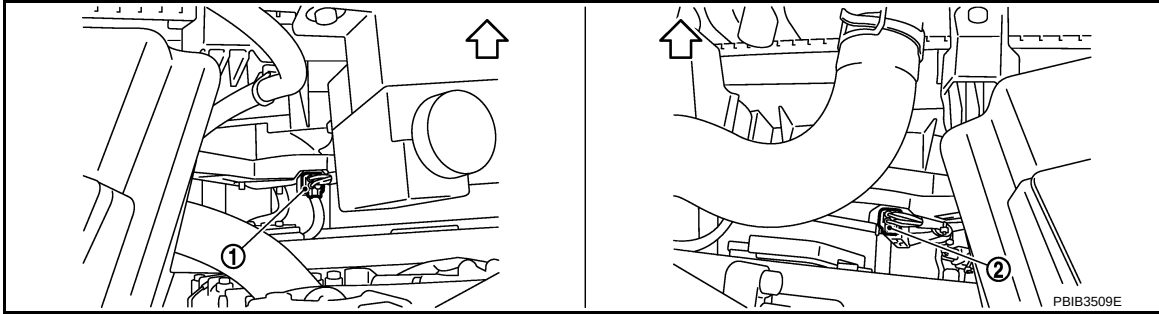
PROCEDURE B

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

1.CHECK COOLING FAN MOTORS CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



1. Cooling fan motor-1 2. Cooling fan motor-2

↔ Vehicle front

3. Disconnect all IPDM E/R harness connectors.
4. Check harness continuity between the following;
cooling fan motor-1 terminal 1 and IPDM E/R terminal 8,
cooling fan motor-1 terminal 4 and IPDM E/R terminal 9,
IPDM E/R terminal 14 and ground,
Refer to wiring diagram.

Continuity should exist.

5. Also check harness connector for short to ground or short to power.
6. Check harness continuity between the following;
cooling fan motor-2 terminal 1 and IPDM E/R terminal 13,
cooling fan motor-2 terminal 4 and IPDM E/R terminal 12,
Refer to wiring diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 3.

NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motors-1, 2 and IPDM E/R
- Harness for open or short between IPDM E/R and ground

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

3.CHECK COOLING FAN MOTORS

Refer to [EC-518. "Component Inspection"](#).

OK or NG

OK >> GO TO 4.

NG >> Replace malfunctioning cooling fan motors.

4.CHECK INTERMITTENT INCIDENT

Perform [EC-134](#).

OK or NG

OK >> Replace IPDM E/R. Refer to [PG-16](#).

NG >> Repair or replace harness or connectors.

DTC P1217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

Main 12 Causes of Overheating

INFOID:000000001645922

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	- Blocked radiator - Blocked condenser - Blocked radiator grille - Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-10
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9
	4	• Radiator cap	• Pressure tester	88 - 127 kPa (0.90 - 1.30 kg/cm ² , 12.8 - 18.4 psi) (Limit)	CO-14
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-9
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-25
ON*1	7	• Cooling fan	• CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-509).
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	CO-9
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-9
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-89
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-106

*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](#).

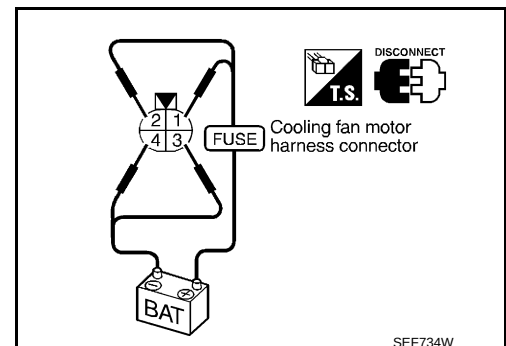
Component Inspection

INFOID:000000001645923

COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4



Cooling fan motor should operate.

If NG, replace cooling fan motors.

DTC P1225, P1234 TP SENSOR

< SERVICE INFORMATION >

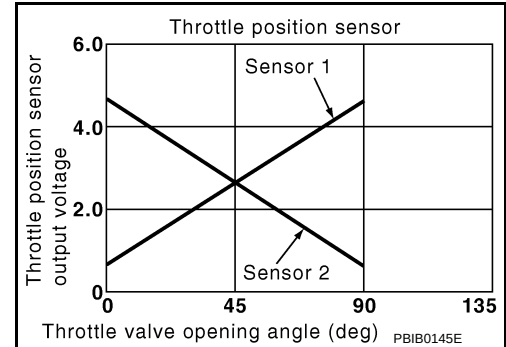
DTC P1225, P1234 TP SENSOR

Component Description

INFOID:0000000001645924

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

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



On Board Diagnosis Logic

INFOID:0000000001645925

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225 (Bank 1)	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)
P1234 1234 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000001645926

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.

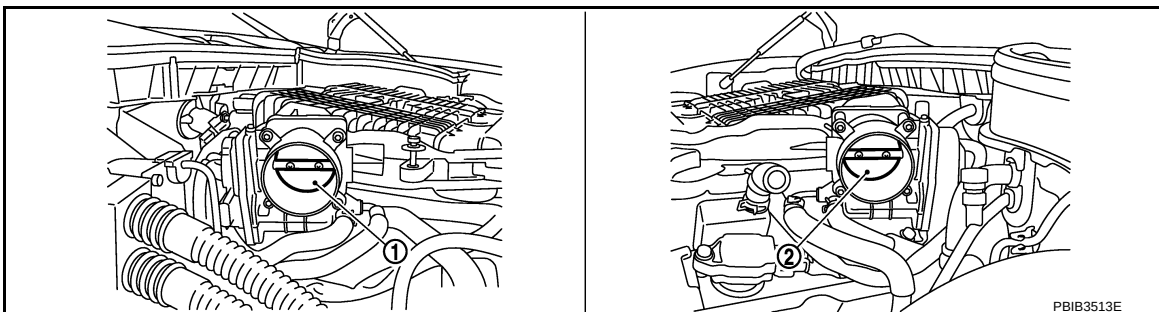
1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-519, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000001645927

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



PBIB3513E

DTC P1225, P1234 TP SENSOR

< SERVICE INFORMATION >

1. Throttle valve (bank 1)
2. Throttle valve (bank 2)

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-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

Removal and Installation

INFOID:0000000001645928

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1226, P1235 TP SENSOR

< SERVICE INFORMATION >

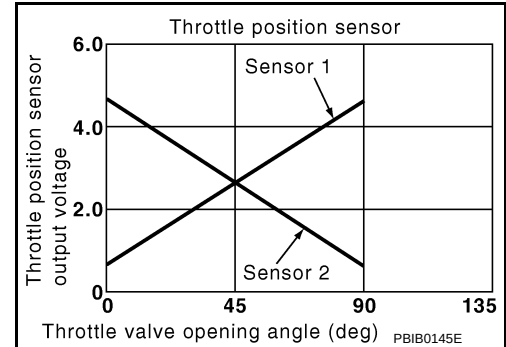
DTC P1226, P1235 TP SENSOR

Component Description

INFOID:0000000001645929

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

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



On Board Diagnosis Logic

INFOID:0000000001645930

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226 (Bank 1)	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)
P1235 1235 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000001645931

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.

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 3 and 4 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-521, "Diagnosis Procedure"](#).

Diagnosis Procedure

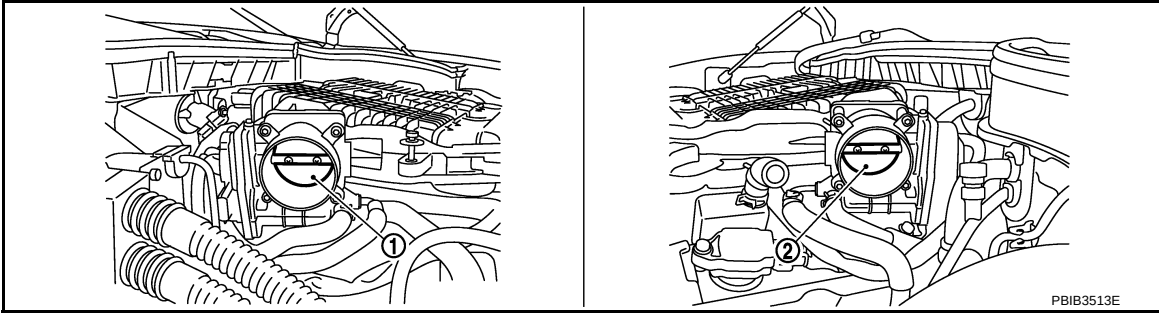
INFOID:0000000001645932

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

DTC P1226, P1235 TP SENSOR

< SERVICE INFORMATION >



1. Throttle valve (bank 1)

2. Throttle valve (bank 2)

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-76. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77. "Idle Air Volume Learning"](#).

>> **INSPECTION END**

Removal and Installation

INFOID:000000001645933

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000001645934

NOTE:

If DTC P1233 or P2101 is displayed with DTC P1238, P1290, P2100, P2119 first perform the trouble diagnosis for DTC P1238, P2119 or P1290, P2100. Refer to [EC-539](#) or [EC-549](#).

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:000000001645935

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1233 1233 (Bank 2)	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (The throttle control motor circuit is open or shorted) • Electric throttle control actuator
P2101 2101 (Bank 1)			

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:000000001645936

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.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-527. "Diagnosis Procedure"](#).

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

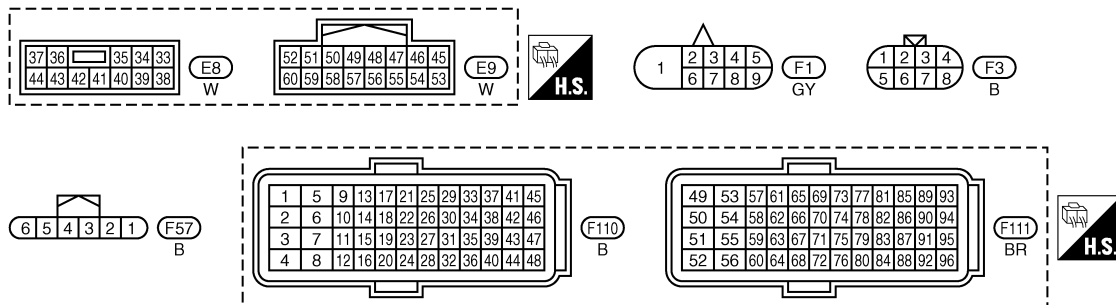
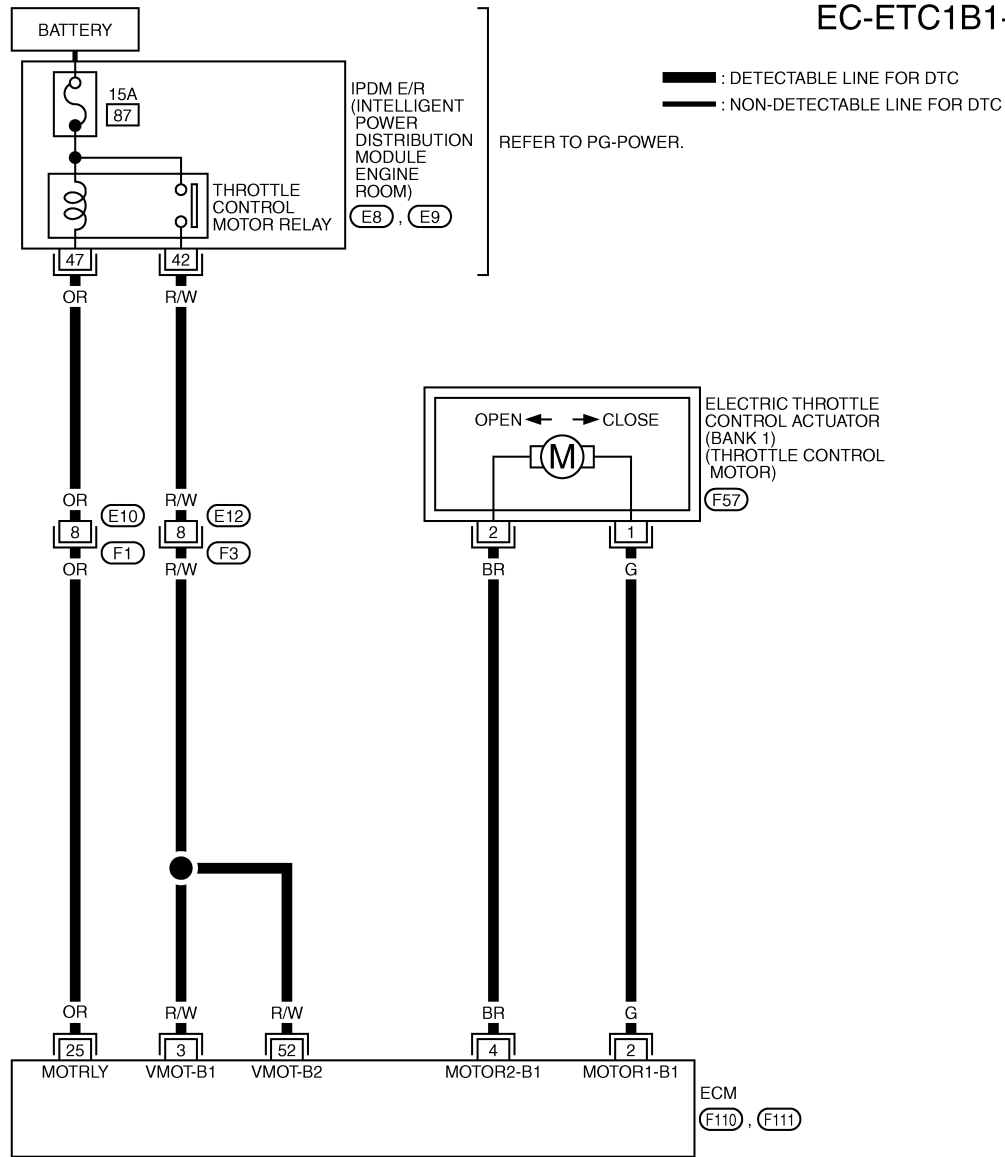
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645937

BANK 1

EC-ETC1B1-01



TBWT1666E

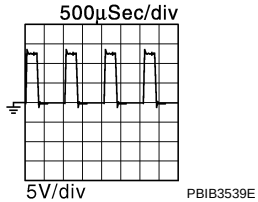
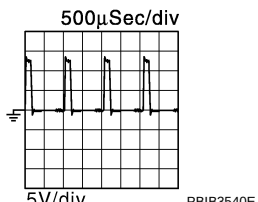
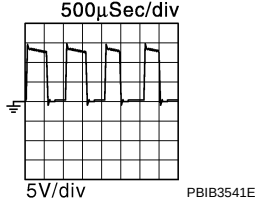
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P1233, 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)
2	G	Throttle control motor (Open) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	BR	Throttle control motor (Close) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

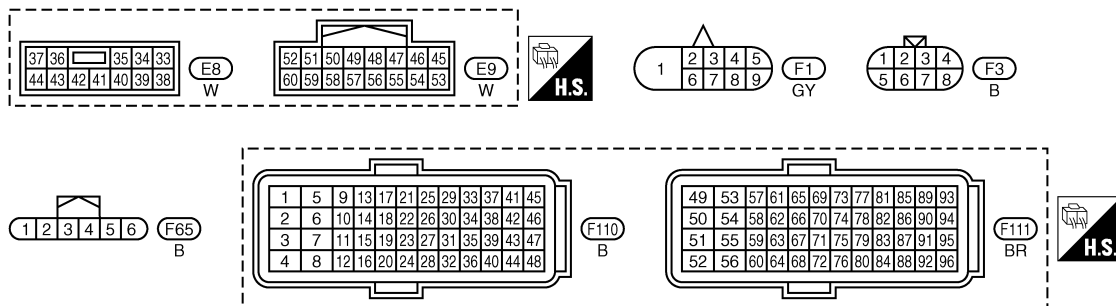
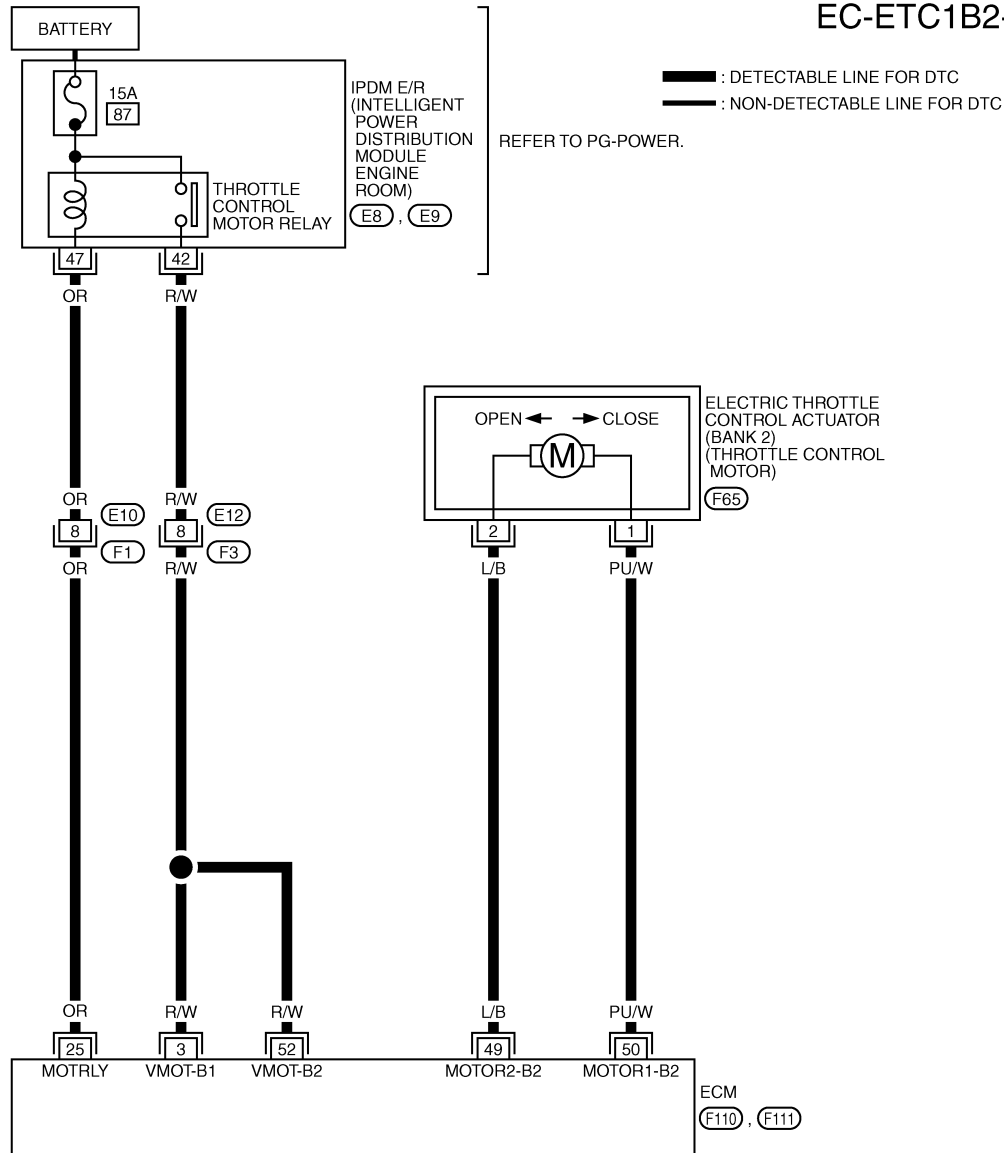
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

BANK 2

EC-ETC1B2-01



TBWT1667E

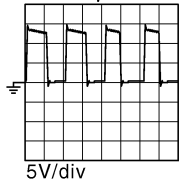
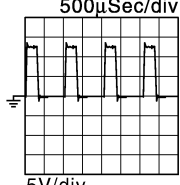
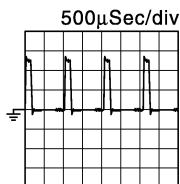
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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 P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
49	L/B	Throttle control motor (Close) (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: In the middle of releasing operation	0 - 14V★ 500μSec/div  5V/div PBIB3541E
50	PU/W	Throttle control motor (Open) (bank 2)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	0 - 14V★ 500μSec/div  5V/div PBIB3539E
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	0 - 14V★ 500μSec/div  5V/div PBIB3540E
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

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

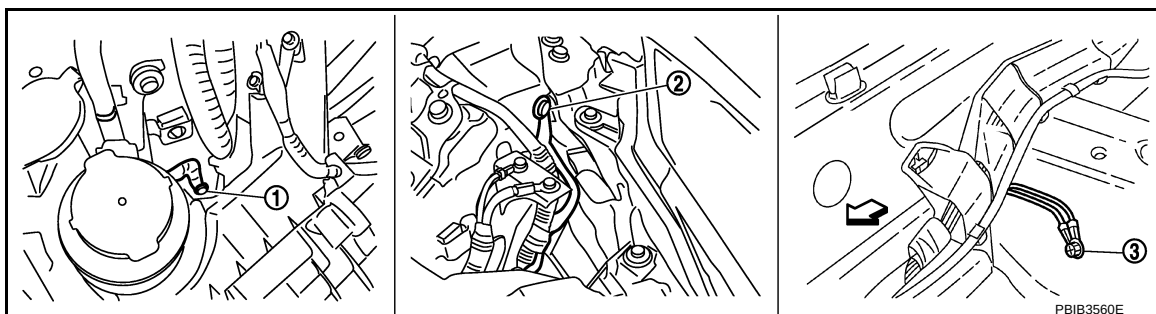
Diagnosis Procedure

INFOID:000000001645938

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



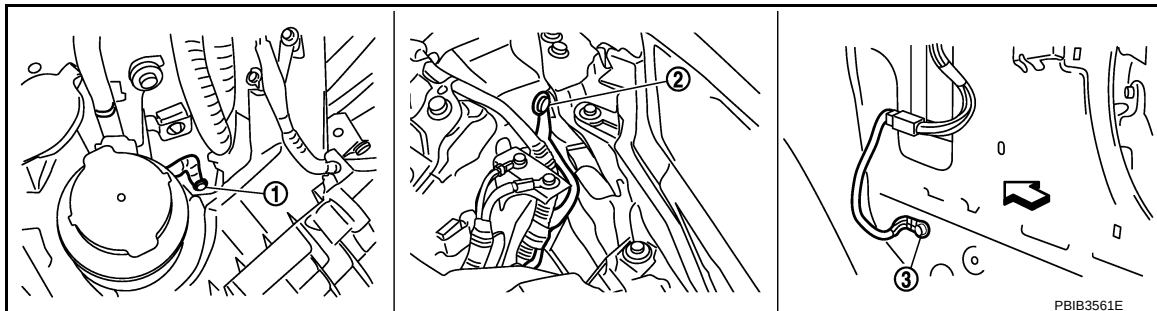
DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

1. Body ground E17
↩ Vehicle front
2. Body ground E43
3. Body ground B102

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

↩ Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

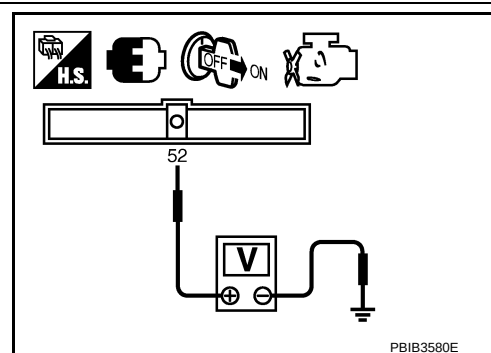
2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 (bank 1), 52 (bank 2) and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 10.
NG >> GO TO 3.



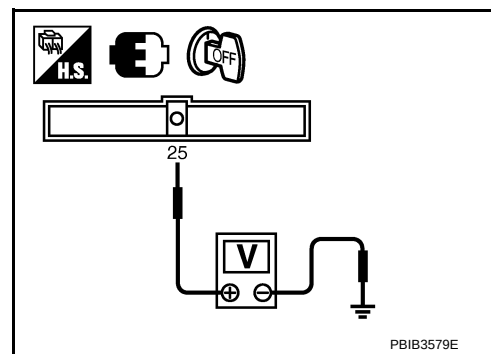
3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 25 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 7.
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 E9.
3. Check continuity between ECM terminal 25 and IPDM E/R terminal 47.
Refer to Wiring Diagram.

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

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 E10, F1
- Harness for open or short between ECM and IPDM E/R

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

6.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

OK or NG

OK >> GO TO 9.

NG >> Replace 15A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E8.
3. Check continuity between ECM terminal 3 (bank 1), 52 (bank 2) and IPDM E/R terminal 42. 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 >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- 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.

9.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

OK >> Replace IPDM E/R. Refer to [PG-16](#).

NG >> Repair or replace harness or connectors.

10.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.

A

EC

C

D

E

F

G

H

I

J

K

L

M

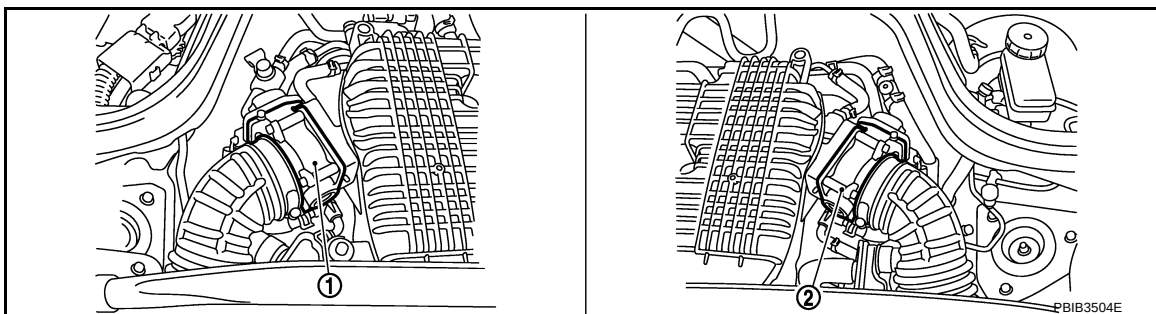
N

O

P

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >



1. Electric throttle control actuator (bank 1)
2. Electric throttle control actuator (bank 2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Bank	Electric throttle control actuator terminal	ECM terminal	Continuity
1	1	2	Should exist
		4	Should not exist
	2	2	Should not exist
		4	Should exist
2	1	49	Should not exist
		50	Should exist
	2	49	Should exist
		50	Should not exist

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

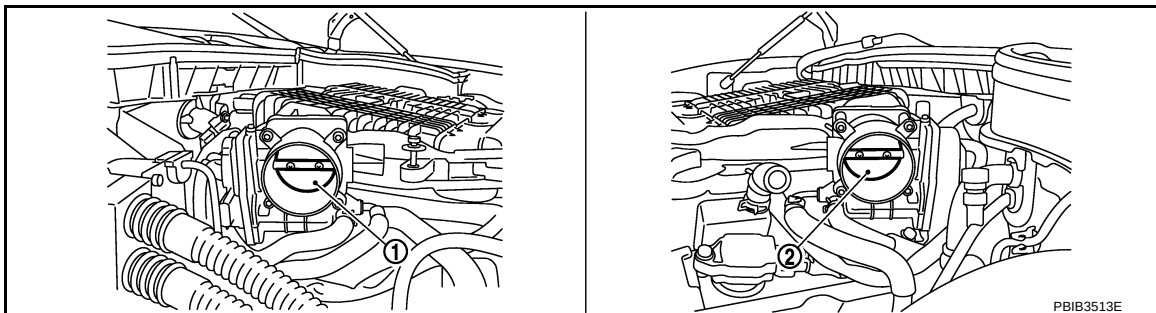
OK or NG

OK >> GO TO 11.

NG >> Repair or replace.

11.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.



1. Throttle valve (bank 1)
2. Throttle valve (bank 2)

OK or NG

OK >> GO TO 12.

NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

12.CHECK THROTTLE CONTROL MOTOR

Refer to [EC-531. "Component Inspection"](#).

DTC P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 13.
- NG >> GO TO 14.

13.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

- OK >> GO TO 14.
- NG >> Repair or replace harness or connectors.

14.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

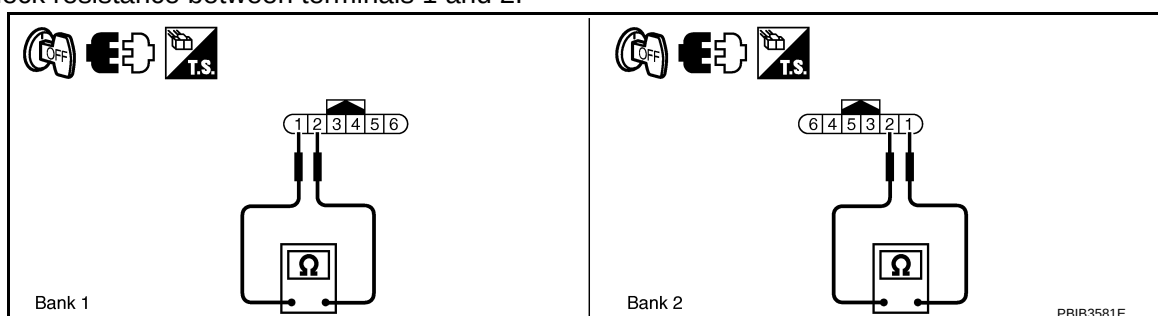
>> INSPECTION END

Component Inspection

INFOID:0000000001645939

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 1 and 2.



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-76, "Throttle Valve Closed Position Learning"](#).
5. Perform [EC-77, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:0000000001645940

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1236, P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

DTC P1236, P2118 THROTTLE CONTROL MOTOR

Component Description

INFOID:0000000001645941

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:0000000001645942

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1236 1236 (Bank 2)	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (The throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)
P2118 2118 (Bank 1)			

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:0000000001645943

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.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-536, "Diagnosis Procedure"](#).

DTC P1236, P2118 THROTTLE CONTROL MOTOR

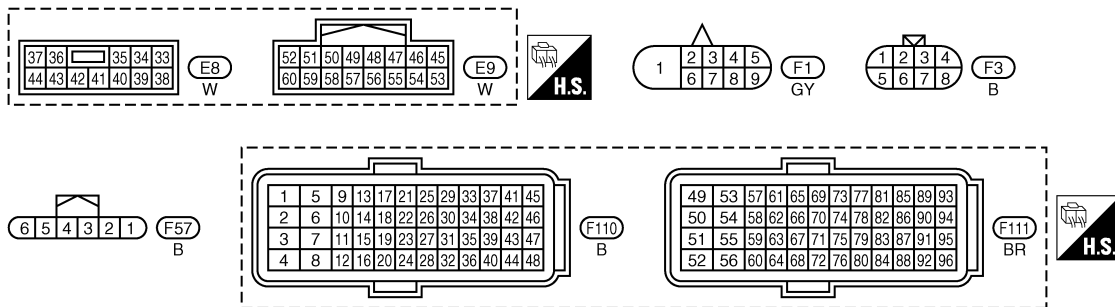
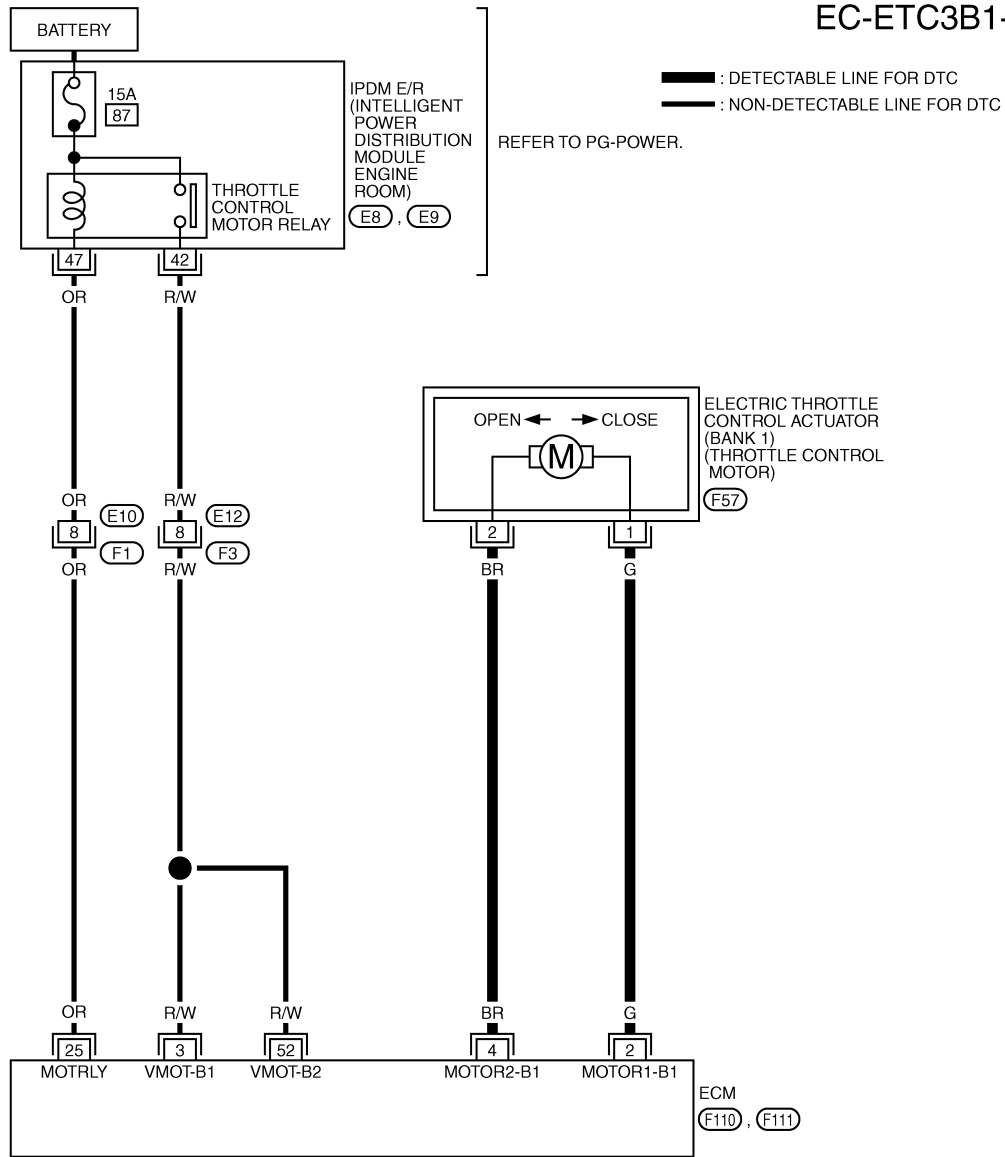
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645944

BANK 1

EC-ETC3B1-01



TBWT1668E

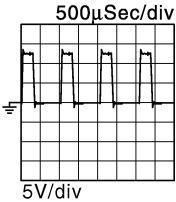
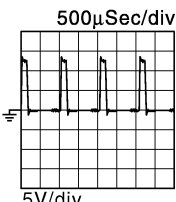
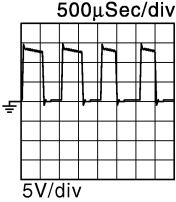
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P1236, 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)
2	G	Throttle control motor (Open) (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully depressed	0 - 14V★ 
			[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: Fully released	0 - 14V★ 
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	BR	Throttle control motor (Close) (bank 1)	[Ignition switch: ON] - Engine stopped - Shift lever: D (A/T) or 1st (M/T) - Accelerator pedal: In the middle of releasing operation	0 - 14V★ 
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

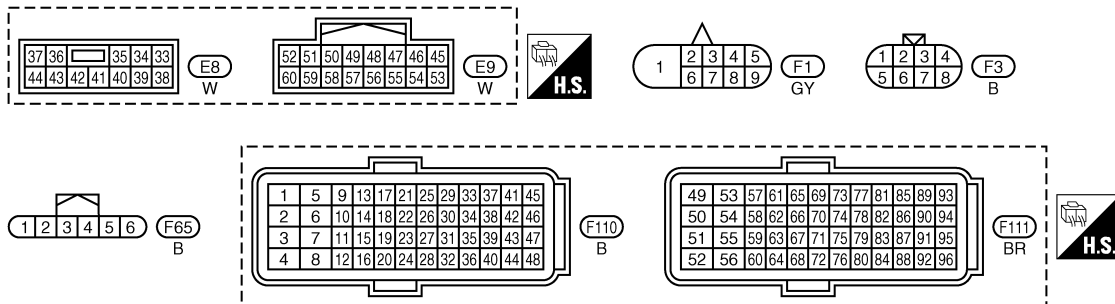
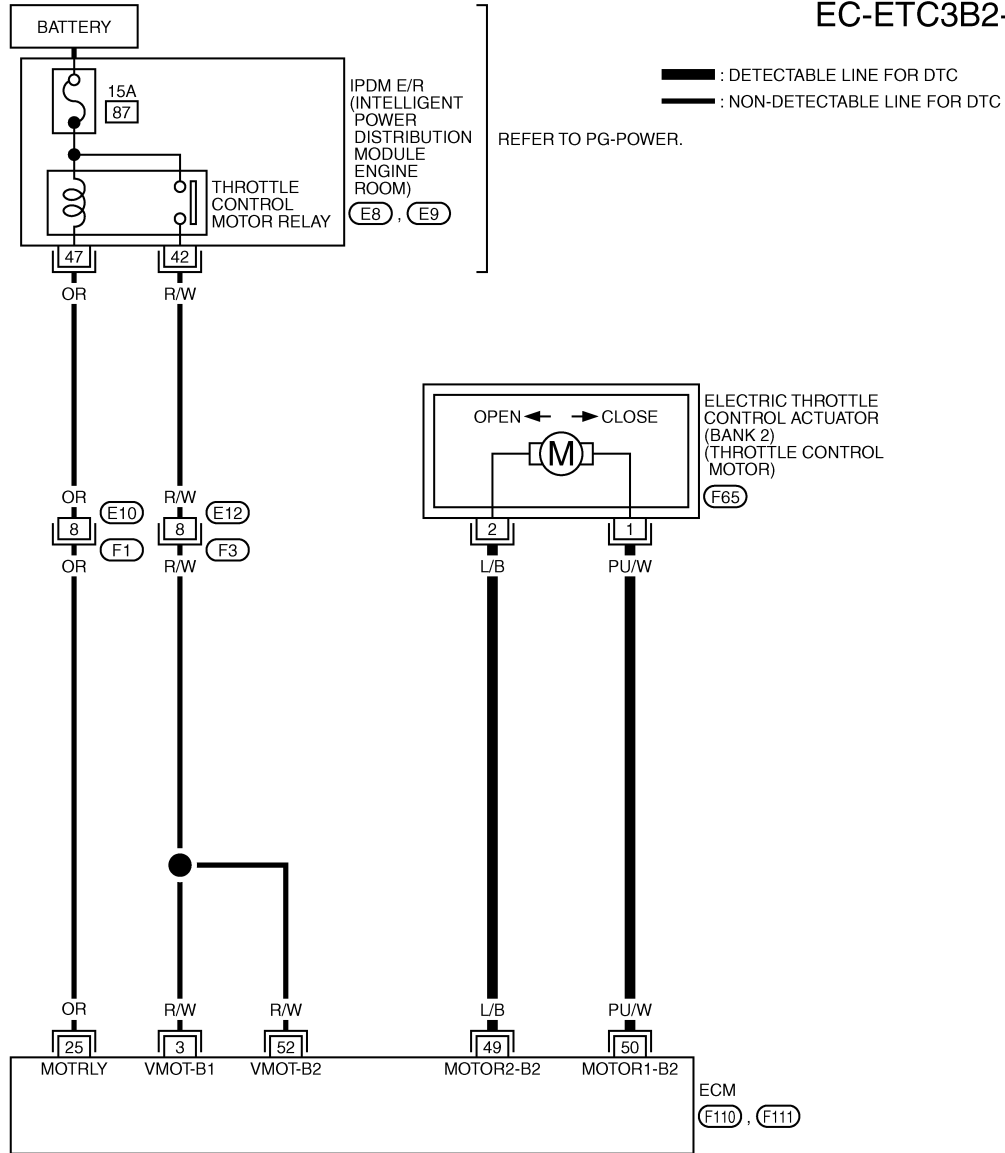
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P1236, P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

BANK 2

EC-ETC3B2-01



TBWT1669E

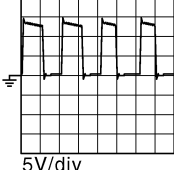
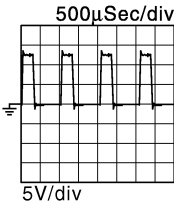
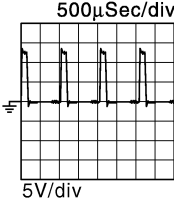
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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 P1236, P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
49	L/B	Throttle control motor (Close) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 500μSec/div 
50	PU/W	Throttle control motor (Open) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 500μSec/div 
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 500μSec/div 
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

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

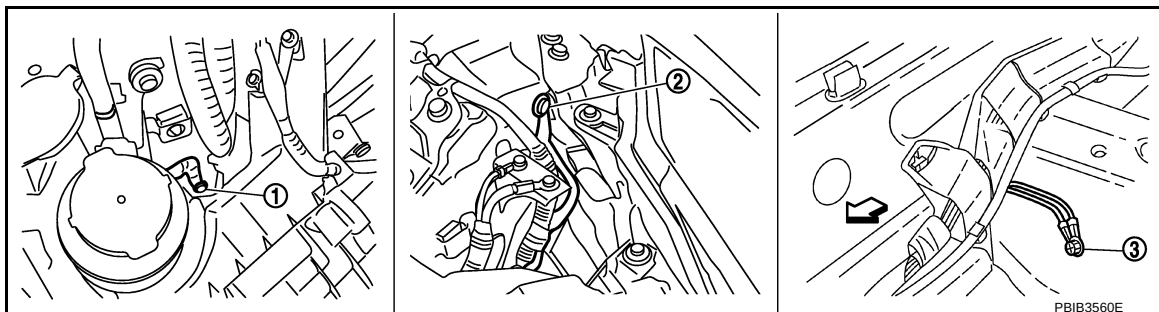
Diagnosis Procedure

INFOID:0000000001645945

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



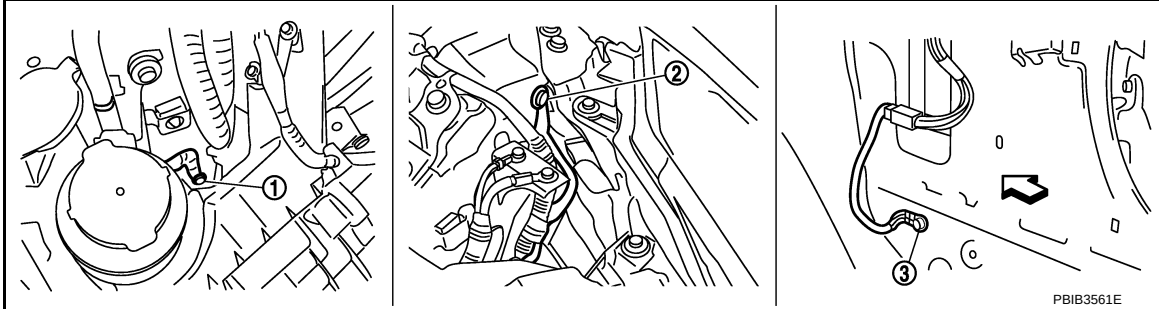
DTC P1236, P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

1. Body ground E17
↩ Vehicle front
2. Body ground E43
3. Body ground B102

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

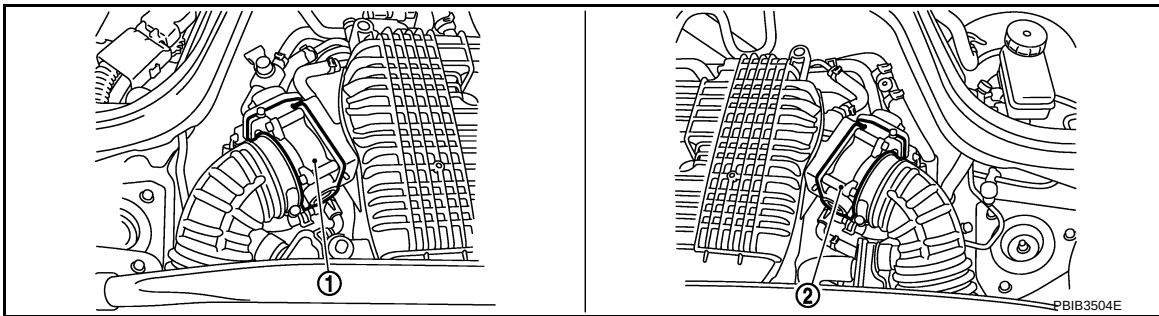
↩ Vehicle front

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

1. Disconnect electric throttle control actuator harness connector.



1. Electric throttle control acutator (bank 1)
2. Electric throttle control acutator (bank 2)

2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
Refer to Wiring Diagram.

Bank	Electric throttle control ac- tuator terminal	ECM terminal	Continuity
1	1	2	Should exist
		4	Should not exist
	2	2	Should not exist
		4	Should exist

DTC P1236, P2118 THROTTLE CONTROL MOTOR

< SERVICE INFORMATION >

Bank	Electric throttle control actuator terminal	ECM terminal	Continuity
2	1	49	Should not exist
		50	Should exist
	2	49	Should exist
		50	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-538, "Component Inspection"](#).

OK or NG

OK >> GO TO 4.

NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

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-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

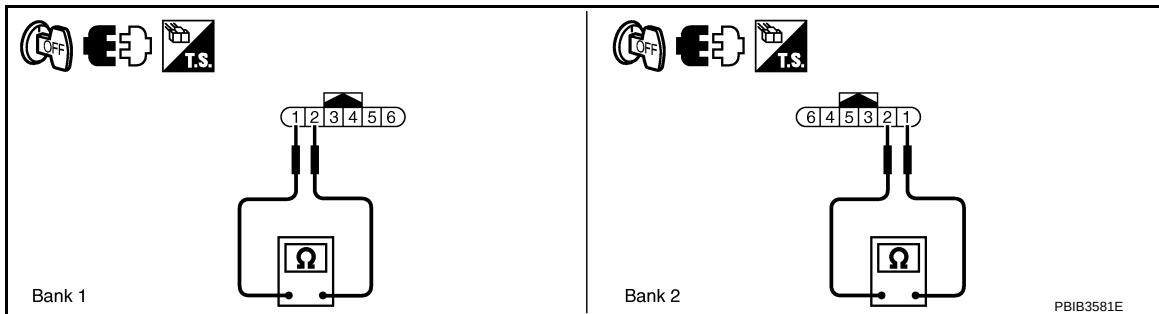
>> **INSPECTION END**

Component Inspection

INFOID:0000000001645946

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 1 and 2.



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-76, "Throttle Valve Closed Position Learning"](#) .
5. Perform [EC-77, "Idle Air Volume Learning"](#) .

Removal and Installation

INFOID:0000000001645947

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#) .

DTC P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

DTC P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:000000001645948

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:000000001645949

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1238 1238 (Bank 2)	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
P2119 2119 (Bank 1)		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detects 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	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 (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:000000001645950

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. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
3. Set shift lever to P position (A/T) or Neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
7. Set shift lever to P position (A/T) or Neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to [EC-540. "Diagnosis Procedure"](#).

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.

DTC P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

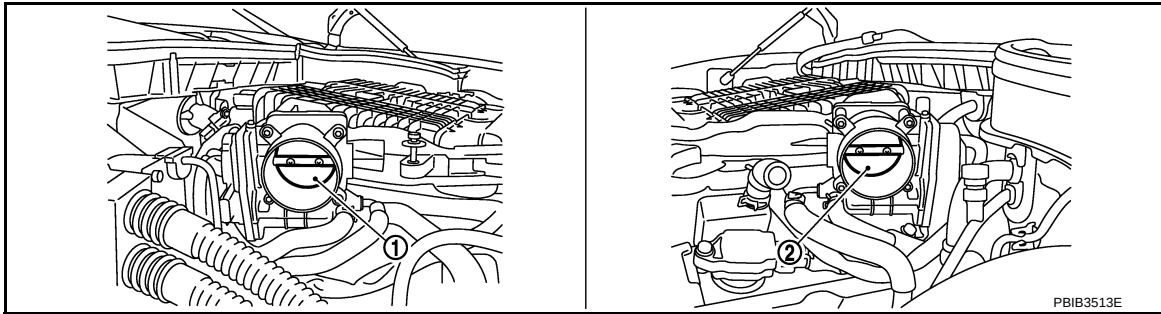
3. Set shift lever to N, P position (A/T) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to [EC-540. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000001645951

1. 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.



1. Throttle valve (bank 1)

2. Throttle valve (bank 2)

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-76. "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77. "Idle Air Volume Learning"](#).

>> INSPECTION END

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

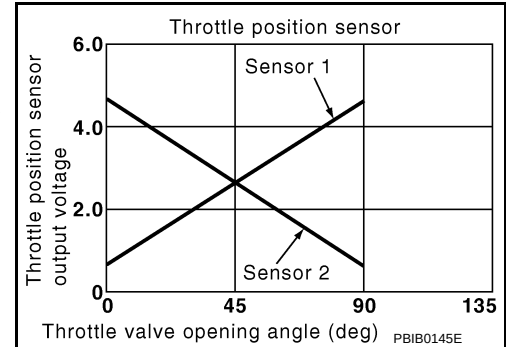
DTC P1239, P2135 TP SENSOR

Component Description

INFOID:000000001645952

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

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



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645953

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T) or 1st (M/T) position	Accelerator pedal: Fully released	More than 0.36V
TP SEN 2-B1*1		Accelerator pedal: Fully depressed	Less than 4.75V
TP SEN 1-B2	- Ignition switch: ON (Engine stopped) - Shift lever: D (A/T) or 1st (M/T) position	Accelerator pedal: Fully released	More than 0.36V
TP SEN 2-B2*1		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:000000001645954

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to [EC-482](#).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135 (Bank 1)	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.	- Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) - Electric throttle control actuator (TP sensor 1 and 2)
P1239 1239 (Bank 2)			

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:000000001645955

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.

1. Start engine and let it idle for 1 second.

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

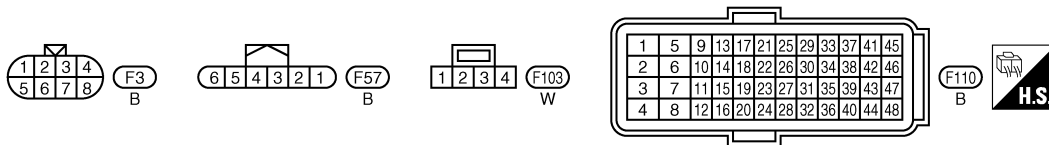
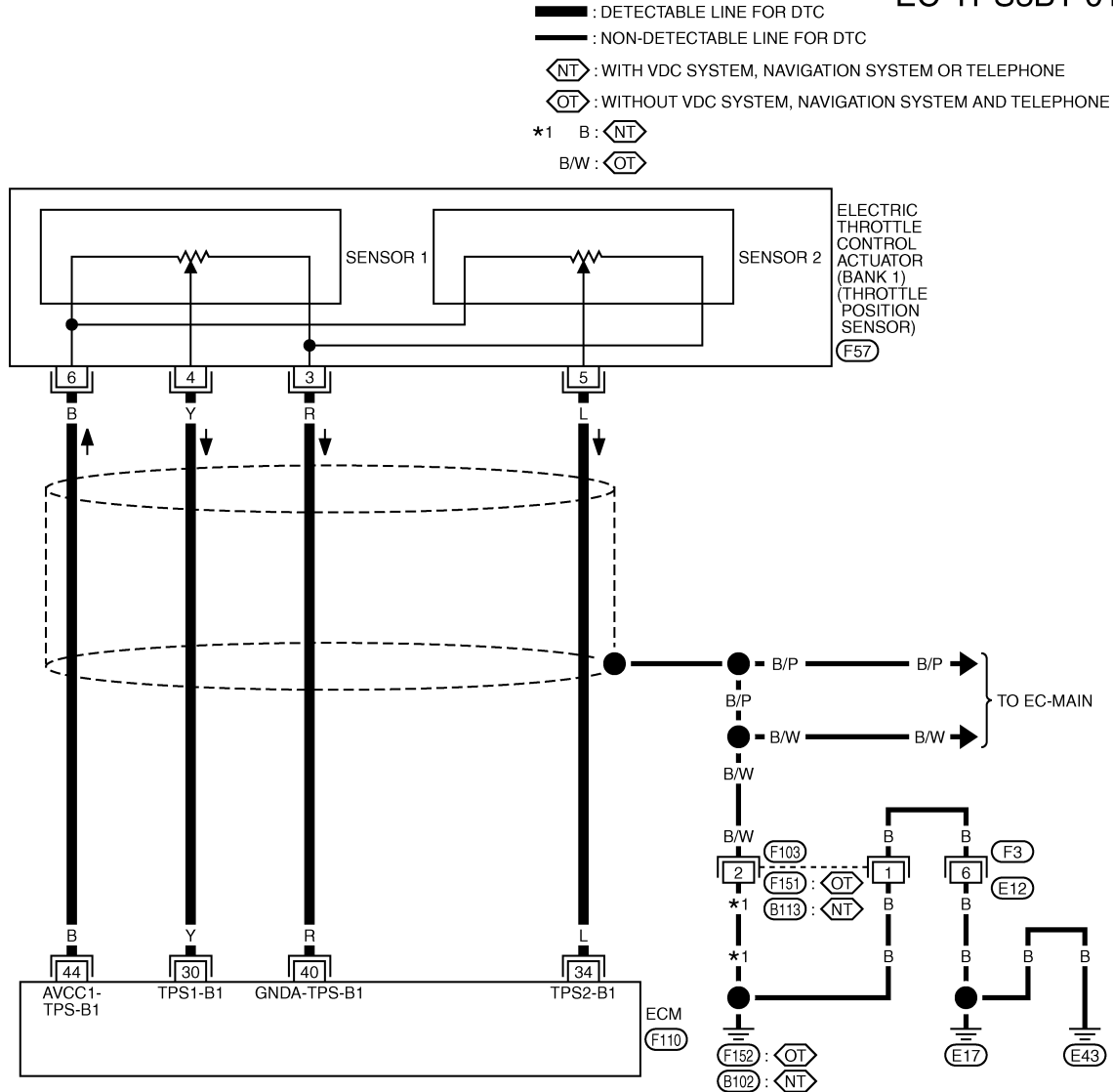
- Check DTC.
- If DTC is detected, go to [EC-545, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000001645956

BANK 1

EC-TPS3B1-01



TBWT1672E

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

DTC P1239, P2135 TP 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)
30	Y	Throttle position sensor 1 (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	L	Throttle position sensor 2 (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
40	R	Sensor ground [Throttle position sensor (bank 1)]	[Engine is running] • Warm-up condition • Idle speed	0V
44	B	Sensor power supply [Throttle position sensor (bank 1)]	[Ignition switch: ON]	5V

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

BANK 2

EC-TPS3B2-01

— : DETECTABLE LINE FOR DTC

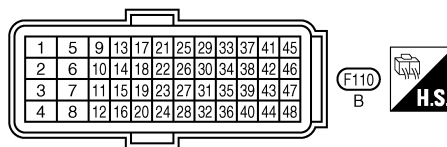
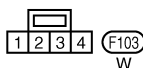
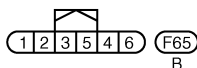
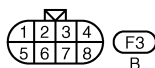
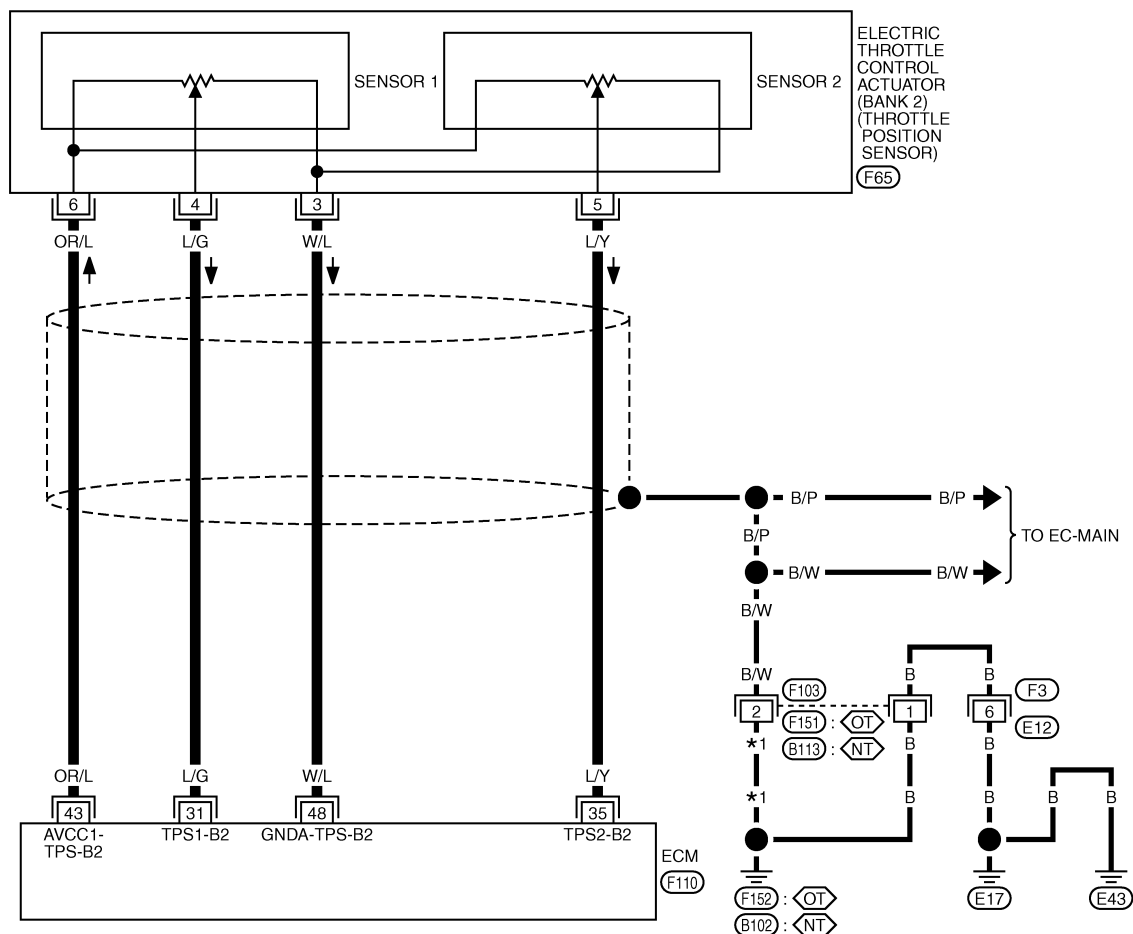
— : NON-DETECTABLE LINE FOR DTC

⬡ : WITH VDC SYSTEM, NAVIGATION SYSTEM OR TELEPHONE

⬢ : WITHOUT VDC SYSTEM, NAVIGATION SYSTEM AND TELEPHONE

*1 B : ⬡

B/W : ⬢



TBWT1673E

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

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 P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
31	L/G	Throttle position sensor 1 (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
35	L/Y	Throttle position sensor 2 (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
43	OR/L	Sensor power supply [Throttle position sensor (bank 2)]	[Ignition switch: ON]	5V
48	W/L	Sensor ground [Throttle position sensor (bank 2)]	[Engine is running] • Warm-up condition • Idle speed	0V

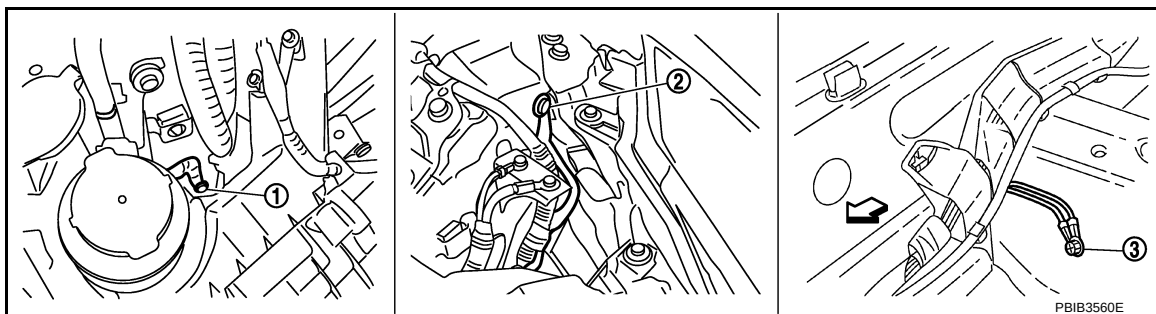
Diagnosis Procedure

INFOID:000000001645957

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

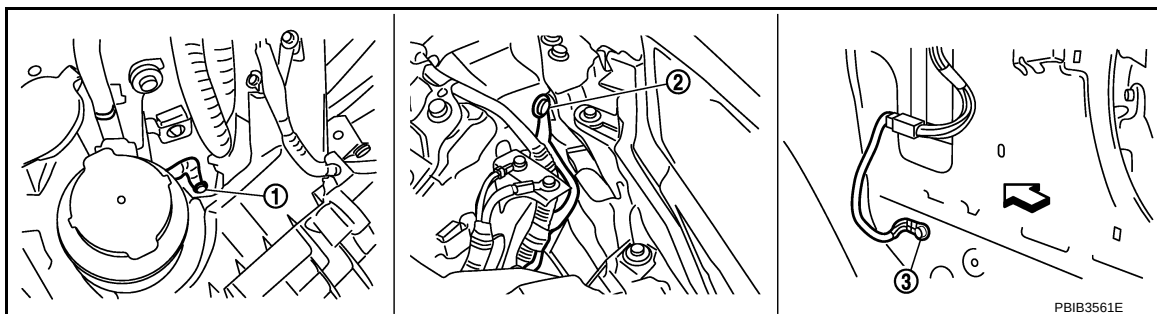
⇐ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142. "Ground Inspection"](#).

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

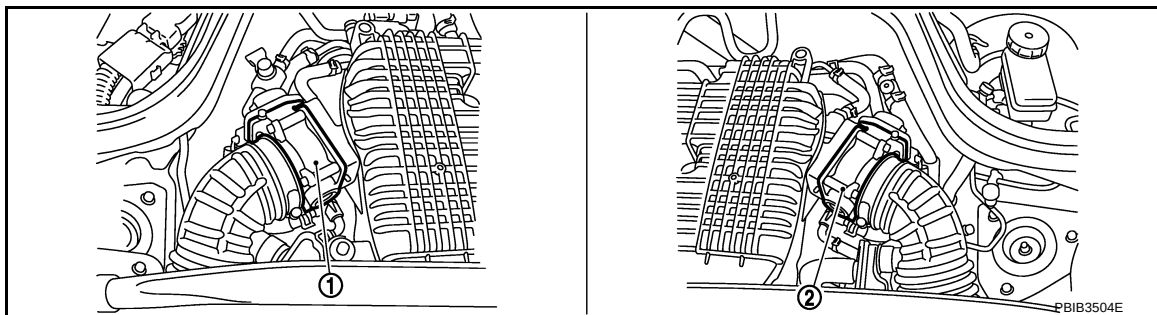
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

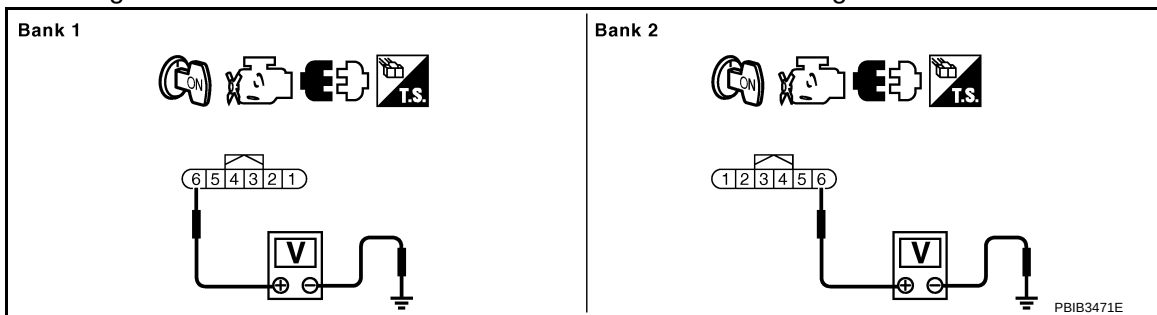
1. Disconnect electric throttle control actuator harness connector.



1. Electric throttle control actuator
(bank 1)

2. Electric throttle control actuator
(bank 2)

2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 6 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.

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

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

3. Check harness continuity between electric throttle control actuator terminal 3 and ECM terminal 40 (bank 1) or 48 (bank 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
ECM terminal 30 (bank 1) or 31 (bank 2) and electric throttle control actuator terminal 4,
ECM terminal 34 (bank 1) or 35 (bank 2) and electric throttle control actuator 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 5.

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

5.CHECK THROTTLE POSITION SENSOR

Refer to [EC-547, "Component Inspection"](#).

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Perform [EC-77, "Idle Air Volume Learning"](#).

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

INFOID:0000000001645958

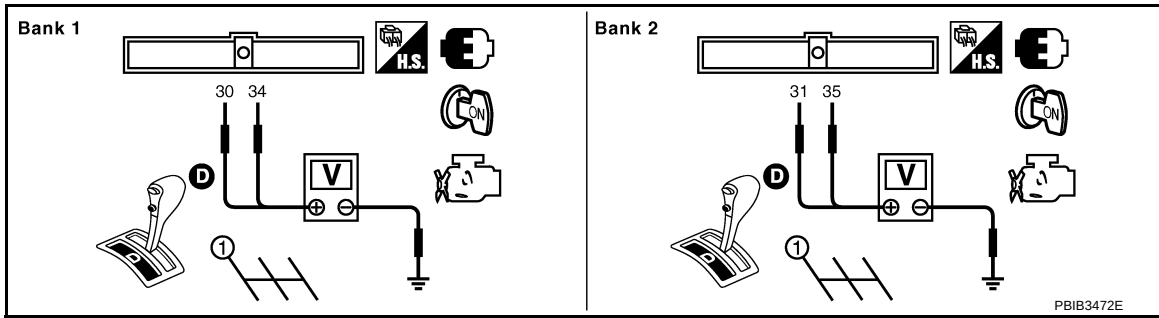
THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
3. Turn ignition switch ON.
4. Set shift lever to D (A/T) or 1st (M/T) position.

DTC P1239, P2135 TP SENSOR

< SERVICE INFORMATION >

5. Check voltage between ECM terminals 30 [TP sensor 1 (bank 1) signal], 31 [TP sensor 1 (bank 2) signal], 34 [TP sensor 2 (bank 1) signal]. 35 [TP sensor 2 (bank 2) signal] and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
30 [TP sensor 1 (bank 1)]	Fully released	More than 0.36V
31 [TP sensor 1 (bank 2)]	Fully depressed	Less than 4.75V
34 [TP sensor 2 (bank 1)]	Fully released	Less than 4.75V
35 [TP sensor 2 (bank 2)]	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform [EC-76. "Throttle Valve Closed Position Learning"](#).
8. Perform [EC-77. "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:0000000001645959

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to [EM-18](#).

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:000000001645960

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-III Reference Value in Data Monitor Mode

INFOID:000000001645961

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:000000001645962

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1290 1290 (Bank 2)	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (The throttle control motor relay circuit is open) • Throttle control motor relay
P2100 2100 (Bank 1)			
P2103 2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (The throttle control motor relay circuit is shorted) • Throttle control motor relay

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:000000001645963

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 P1290, P2100

TESTING CONDITION:

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

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to [EC-553. "Diagnosis Procedure"](#).

PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

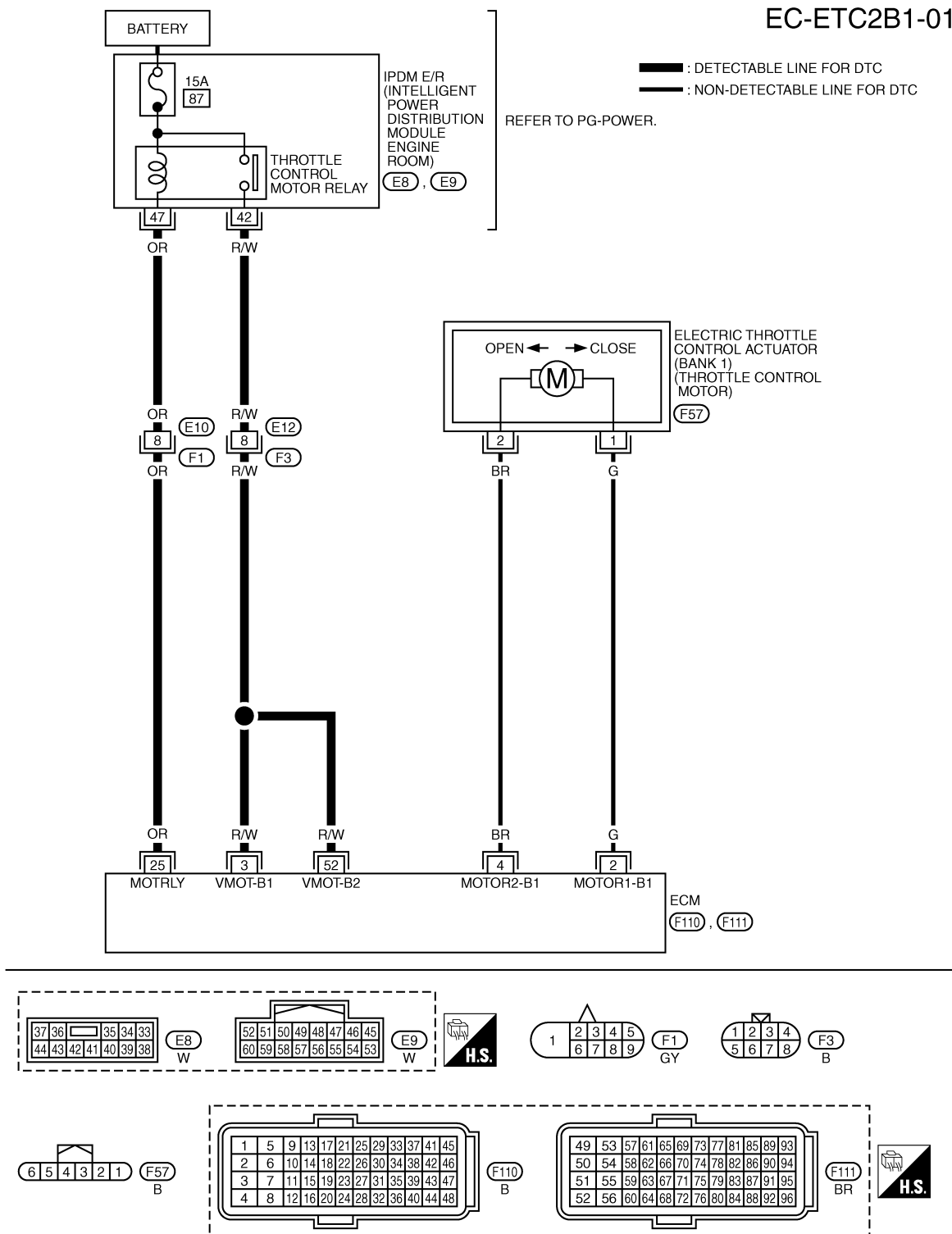
< SERVICE INFORMATION >

4. If DTC is detected, go to [EC-553, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000001645964

BANK 1



TBWT1664E

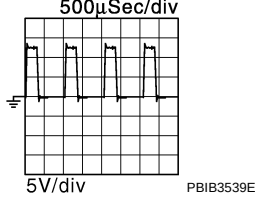
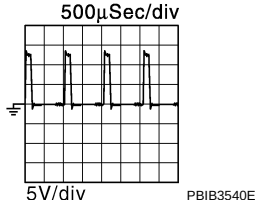
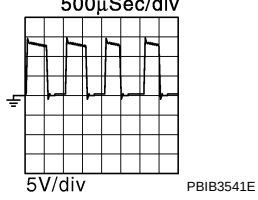
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

CAUTION:

DTC P1290, 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)
2	G	Throttle control motor (Open) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	BR	Throttle control motor (Close) (bank 1)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

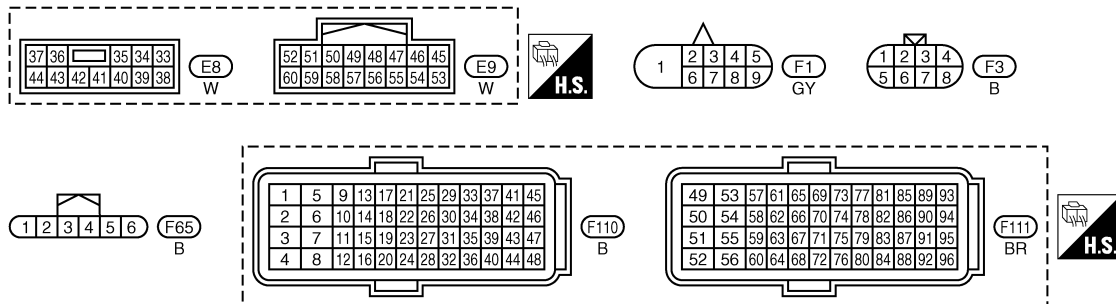
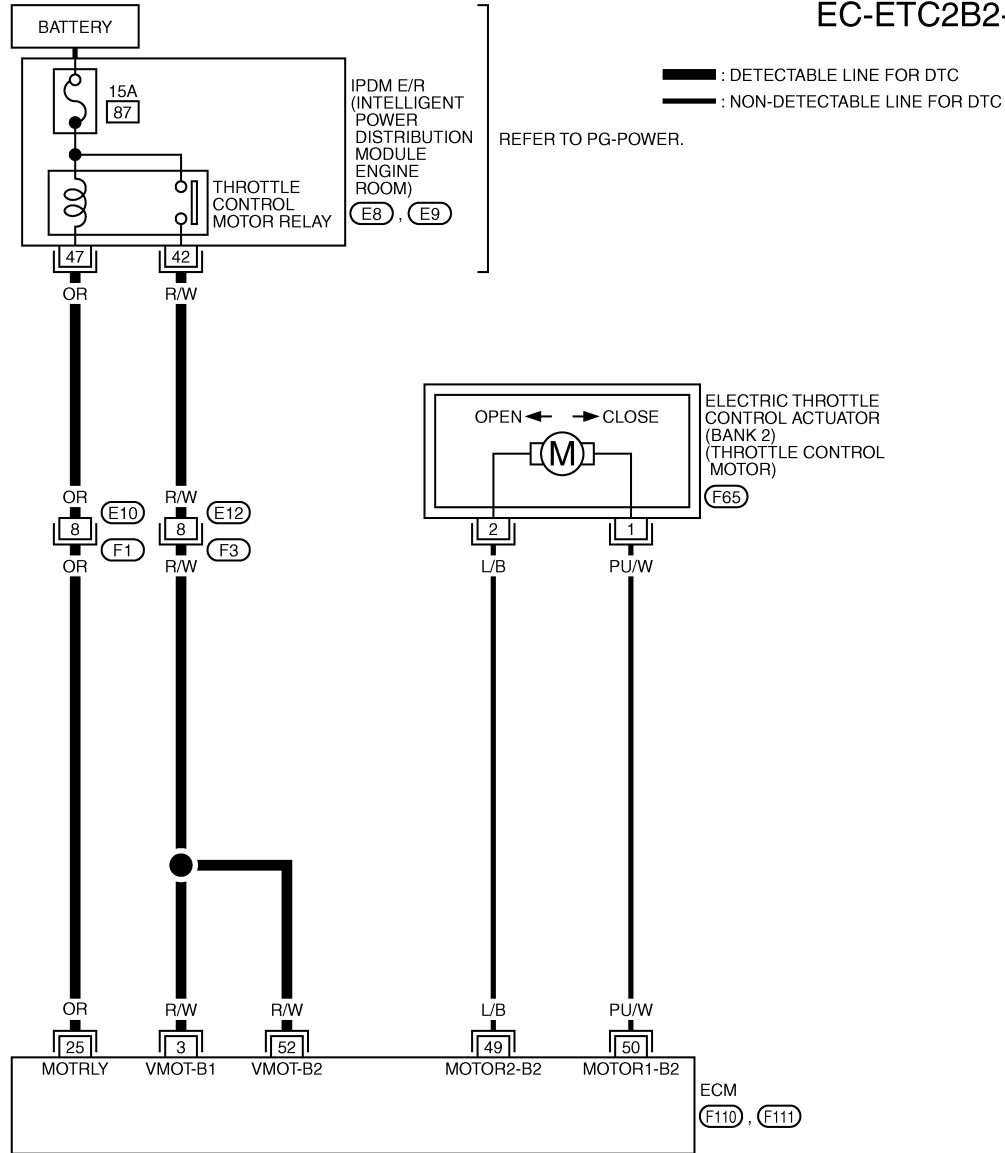
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

BANK 2

EC-ETC2B2-01



TBWT1665E

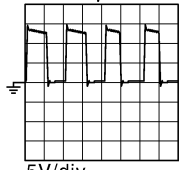
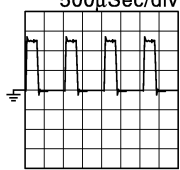
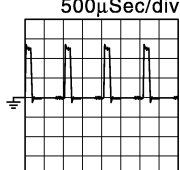
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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 P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor relay power supply (bank 1)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	OR	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
49	L/B	Throttle control motor (Close) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: In the middle of releasing operation	0 - 14V★ 500μSec/div  5V/div PBIB3541E
50	PU/W	Throttle control motor (Open) (bank 2)	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 500μSec/div  5V/div PBIB3539E
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 500μSec/div  5V/div PBIB3540E
52	R/W	Throttle control motor relay power supply (bank 2)	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

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

Diagnosis Procedure

INFOID:000000001645965

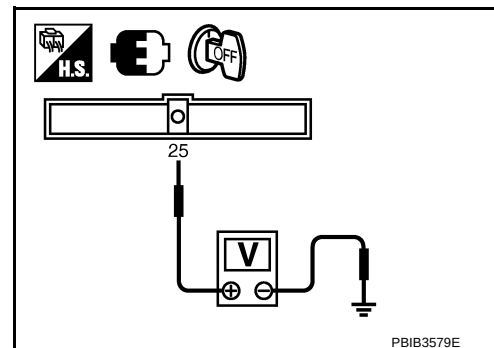
1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 25 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 2.



2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E9.

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

3. Check continuity between ECM terminal 25 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 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and IPDM E/R

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

4.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

OK or NG

- OK >> GO TO 8.
NG >> Replace 15A fuse.

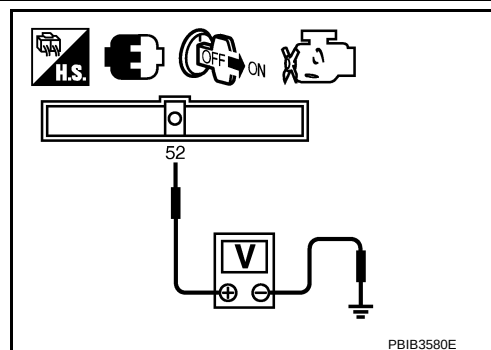
5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 (bank 1), 52 (bank 2) and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E8.
3. Check continuity between ECM terminal 3 (bank 1), 52 (bank 2) and IPDM E/R terminal 42.
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.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- 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-134](#).

DTC P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

OK or NG

- OK >> Replace IPDM E/R. Refer to [PG-16](#).
- NG >> Repair or replace harness or connectors.

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DTC P1421 COLD START CONTROL

< SERVICE INFORMATION >

DTC P1421 COLD START CONTROL

Description

INFOID:000000001645966

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:000000001645967

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.	• Lack of intake air volume • Fuel injection system • ECM

DTC Confirmation Procedure

INFOID:000000001645968

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-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-III.
4. Check that the "COOLAN TEMP/S" indication is between 4°C (39°F) and 36°C (97°F).
If "COOLAN TEMP/S" indication is within the specified value, go to the following step.
If "COOLAN TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to [EC-556, "Diagnosis Procedure"](#).

Ⓖ WITH GST

Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:000000001645969

1.PERFORM IDLE AIR VOLUME LEARNING

Perform [EC-77, "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

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform [EC-306, "DTC Confirmation Procedure"](#) for DTC P0171.

DTC P1421 COLD START CONTROL

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 4.
- NG >> Go to [EC-313, "Diagnosis Procedure"](#) for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON.
2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
4. **Perform DTC Confirmation Procedure.**
See [EC-556, "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-556, "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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
Refer to [BL-135, "ECM Re-communicating Function"](#).
3. Perform [EC-75, "VIN Registration"](#).
4. Perform [EC-76, "Exhaust Valve Timing Control Learning"](#).
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

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DTC P1564 ASCD STEERING SWITCH

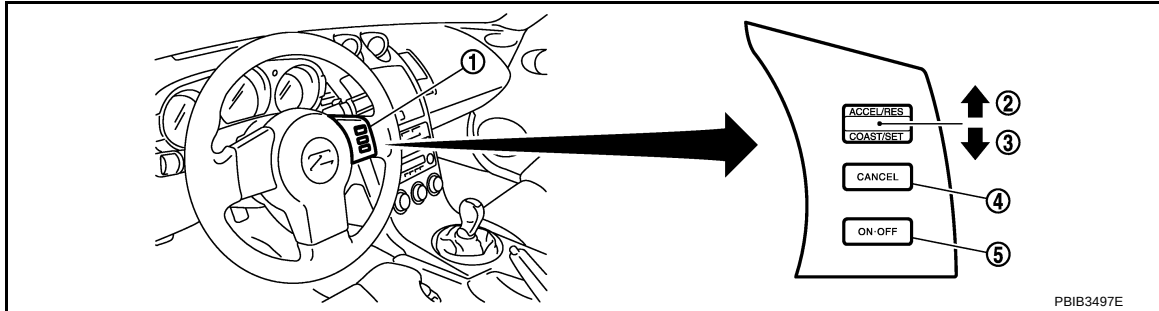
< SERVICE INFORMATION >

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:000000001645970

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



1. ASCD steering switch	2. RESUME/ACCELERATE switch	3. SET/COAST switch
4. CANCEL switch	5. MAIN switch	

Refer to [EC-28](#) for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645971

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:000000001645972

- 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-480](#).

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

INFOID:000000001645973

NOTE:

DTC P1564 ASCD STEERING SWITCH

< 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.

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.
7. If DTC is detected, go to [EC-561. "Diagnosis Procedure"](#).

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DTC P1564 ASCD STEERING SWITCH

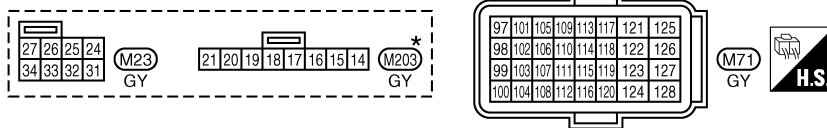
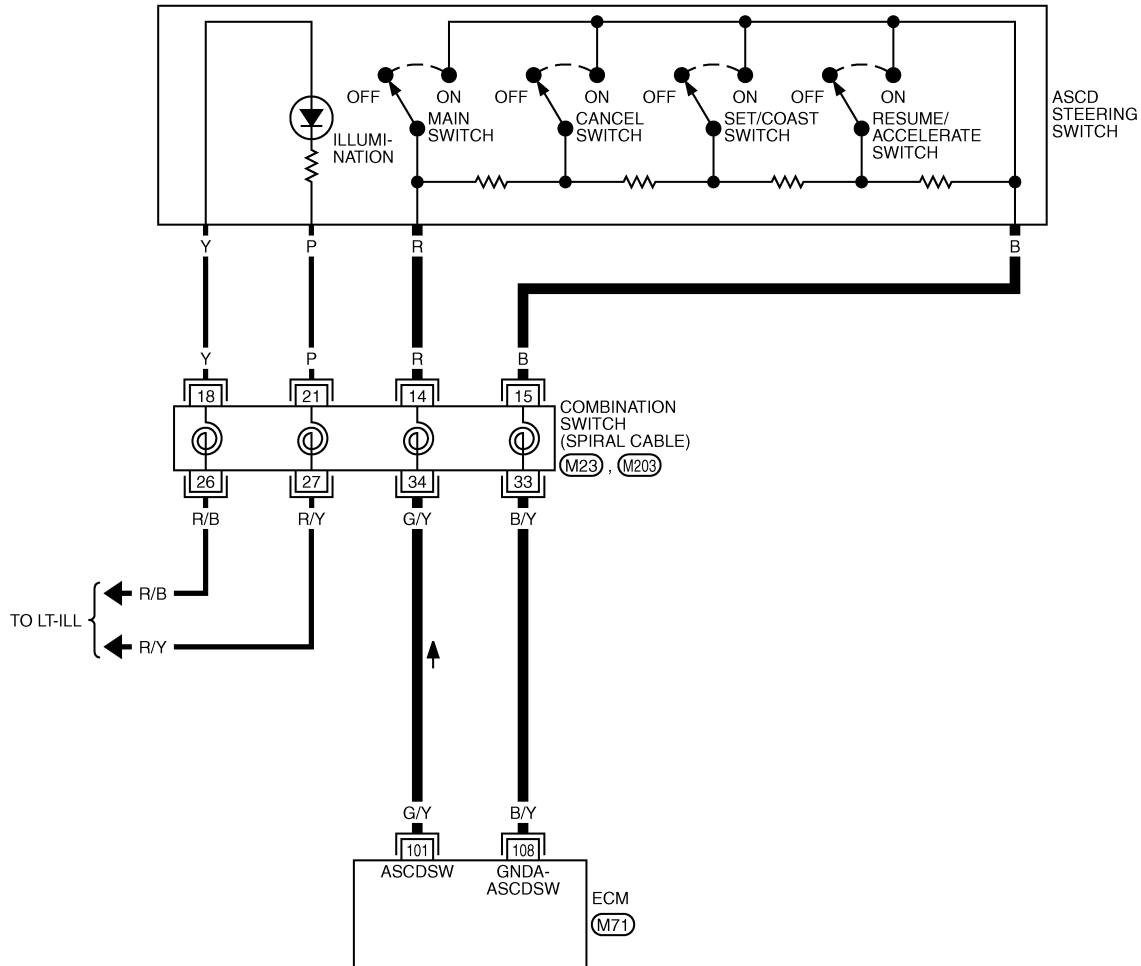
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645974

EC-ASC/SW-01

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG. SECTION.

TBWT1660E

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)
101	G/Y	ASCD steering switch	[Ignition switch: ON] • ASCD steering switch: OFF	4V
			[Ignition switch: ON] • MAIN switch: Pressed	0V
			[Ignition switch: ON] • CANCEL switch: Pressed	1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	2V
108	B/Y	Sensor ground (ASCD steering switch)	[Engine is running] • Warm-up condition • Idle speed	0V

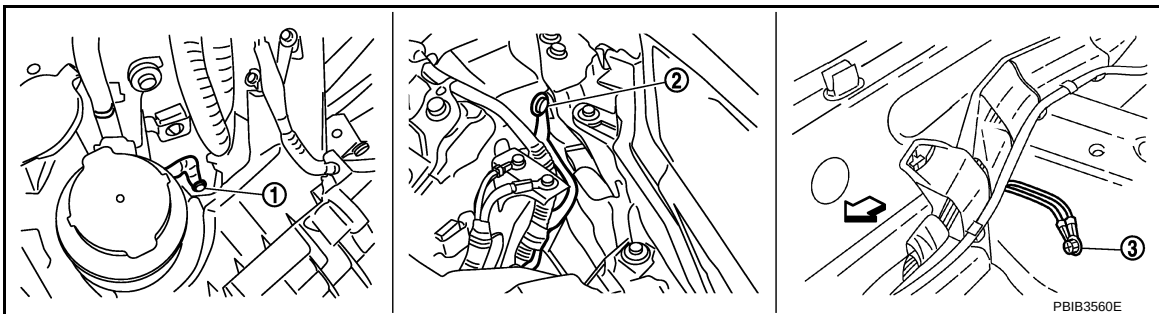
Diagnosis Procedure

INFOID:000000001645975

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

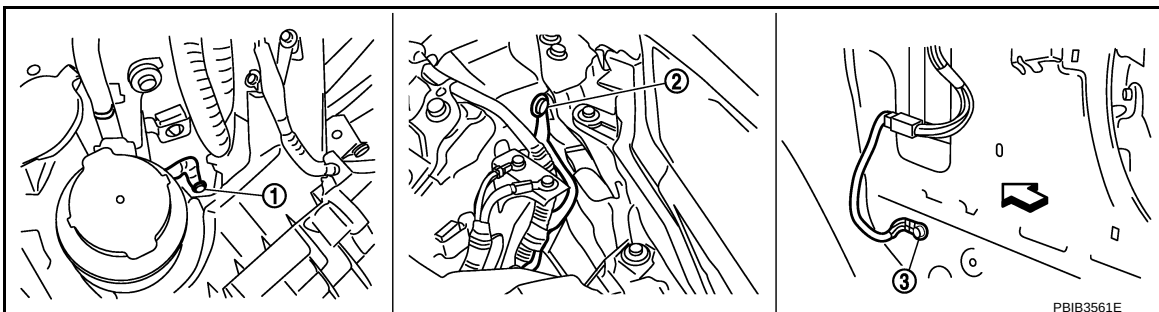
2. Body ground E43

3. Body ground B102

← Vehicle front

Models without VDC system, navigation system and telephone

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

←: Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ASCD STEERING SWITCH CIRCUIT

④ With CONSULT-III

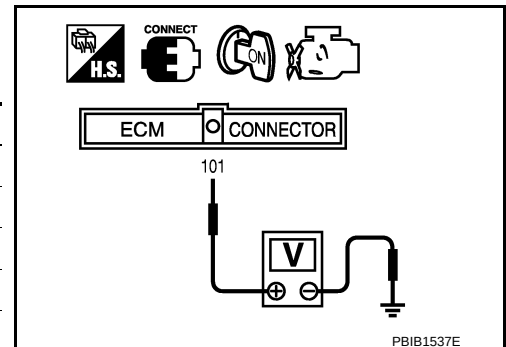
1. Turn ignition switch ON.
2. Select "MAIN SW", "RESUME/ACC SW", "SET SW" and "CANCEL SW" in "DATA MONITOR" mode with CONSULT-III.
3. Check each item indication under the following conditions.

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
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

⊗ Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 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 ECM harness connector.
3. Disconnect combination switch harness connector M203.
4. Check harness continuity between combination switch terminal 15 and ECM terminal 108.
Refer to Wiring Diagram.

Continuity should exist.

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

DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

OK or NG

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

4.DETECT MALFUNCTIONING PART

Check the following.

- 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 101 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.

- 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-563, "Component Inspection"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Replace steering wheel.

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

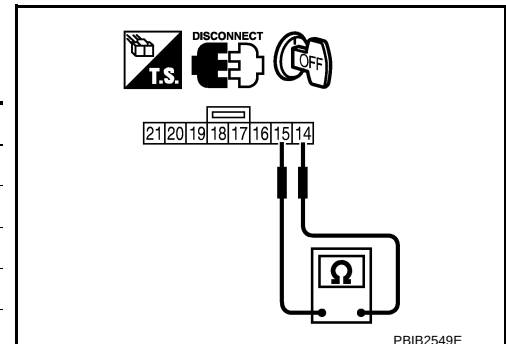
Component Inspection

INFOID:0000000001645976

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M203.
2. Check continuity between combination switch harness connector terminals 14 and 15 with pushing each switch.

Switch	Condition	Resistance [Ω]
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



DTC P1564 ASCD STEERING SWITCH

< SERVICE INFORMATION >

Switch	Condition	Resistance [Ω]
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

3. If NG, replace ASCD steering switch.

DTC P1572 ASCD BRAKE SWITCH

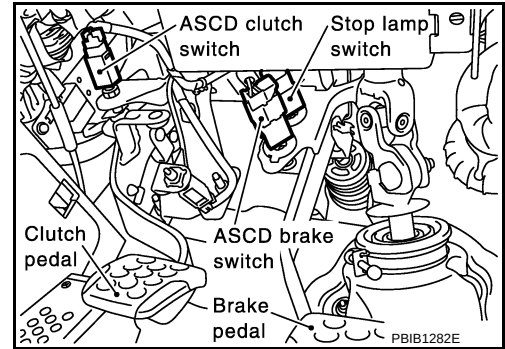
< SERVICE INFORMATION >

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:000000001645977

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-28](#) for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645978

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCd brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:000000001645979

- This self-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-480](#).
- 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.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCd brake switch circuit is shorted.) • Harness or connectors (The ASCd clutch switch circuit is shorted.) (M/T models) • Stop lamp switch • ASCd brake switch • ASCd clutch switch (M/T models) • Incorrect stop lamp switch installation • Incorrect ASCd brake switch installation • Incorrect ASCd clutch switch installation (M/T models) • ECM
		B)	ASCd brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001645980

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.

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-III

1. Start engine (VDC switch or TCS switch OFF).
2. Select "DATA MONITOR" mode with CONSULT-III.
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)
Shift lever	Suitable position

5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to [EC-570, "Diagnosis Procedure"](#).
If 1st trip DTC is not detected, go to the following step.
7. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift 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.

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to [EC-570, "Diagnosis Procedure"](#).

Ⓕ WITH GST

Follow the procedure "WITH CONSULT-III" above.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

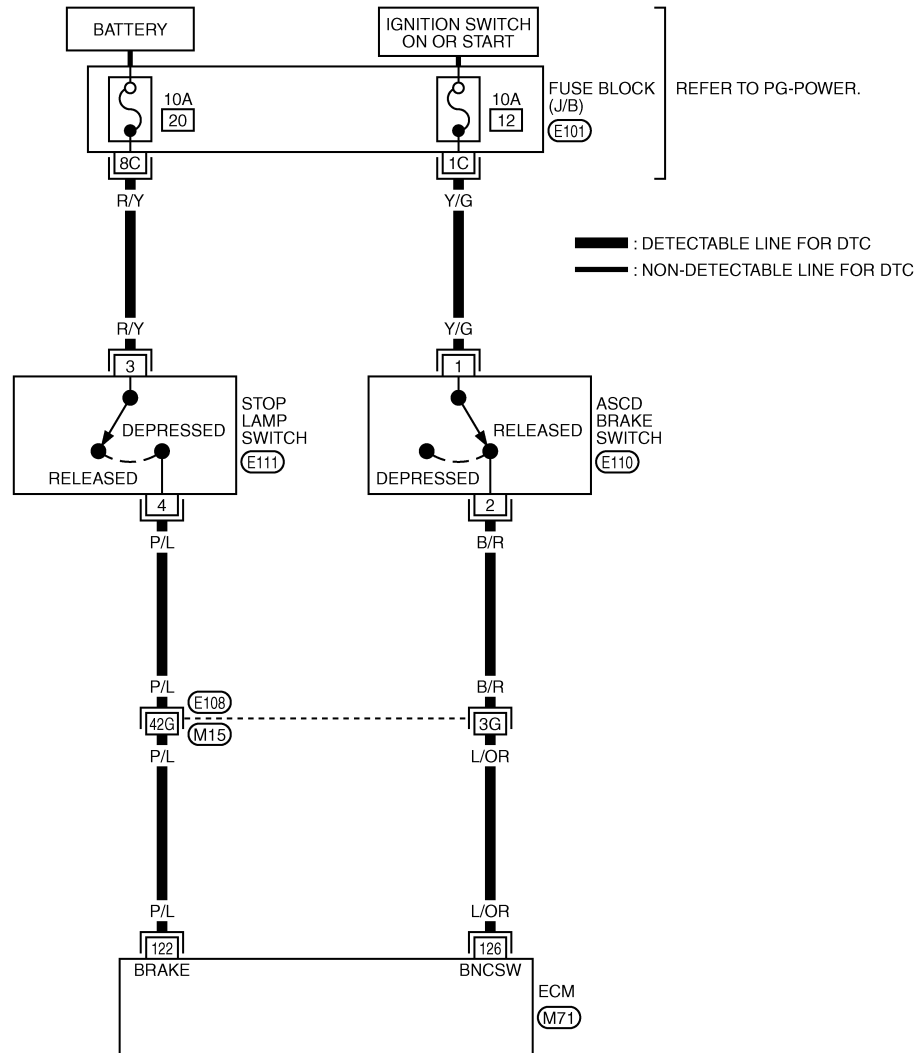
Wiring Diagram

INFOID:000000001645981

A/T MODELS

EC-ASC/BS-01

EC



97	101	105	109	113	117	121	125
98	102	106	110	114	118	122	126
99	103	107	111	115	119	123	127
100	104	108	112	116	120	124	128



REFER TO THE FOLLOWING.

- (E108) -SUPER MULTIPLE JUNCTION (SMJ)
- (E101) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1661E

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 >

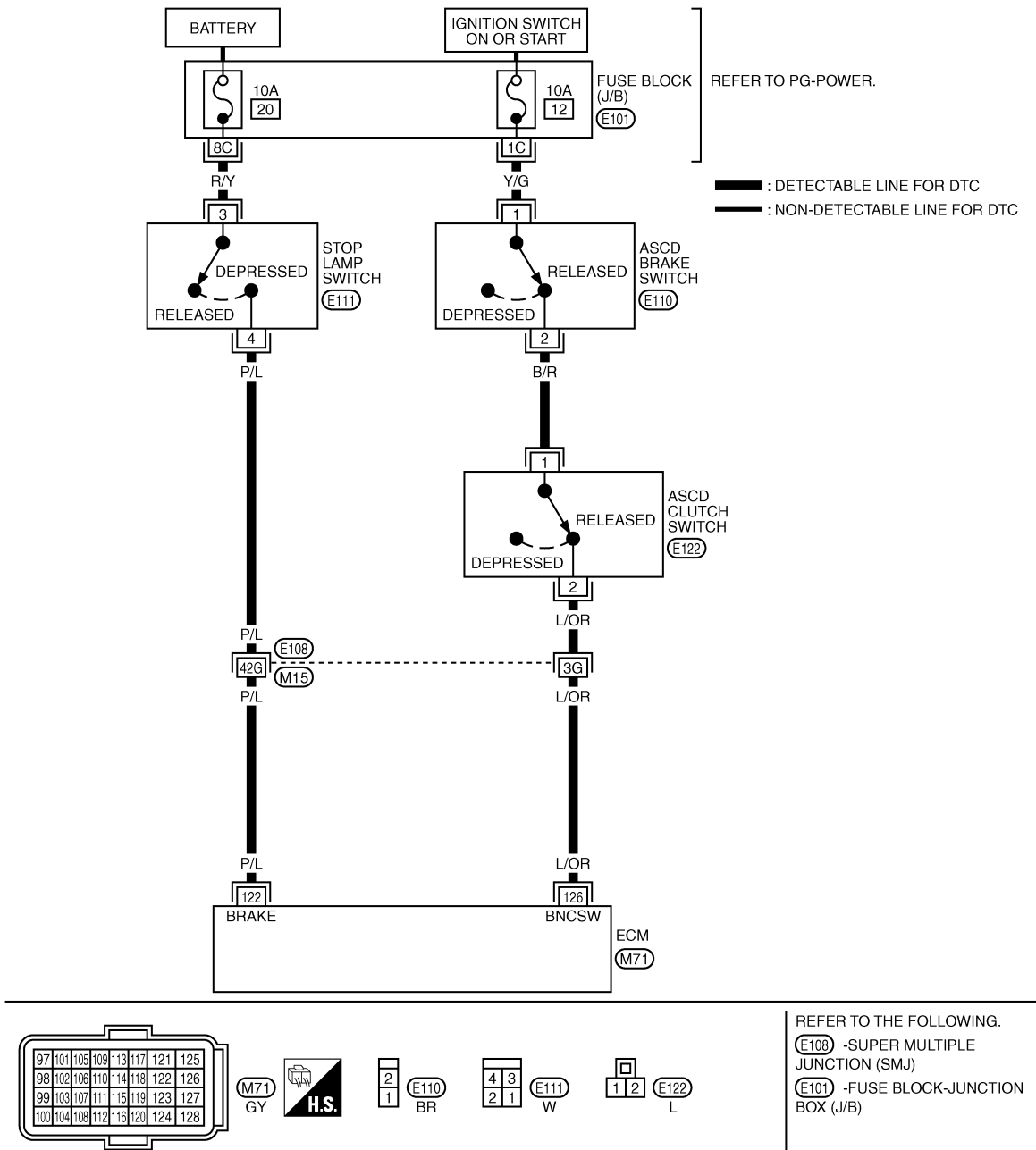
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
126	L/OR	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

M/T MODELS

EC-ASC/BS-02



TBWT1662E

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)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
126	L/OR	ASCD brake switch	[Ignition switch: ON] • Brake pedal and/or clutch pedal: Slightly depressed	0V
			[Ignition switch: ON] • Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001645982

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

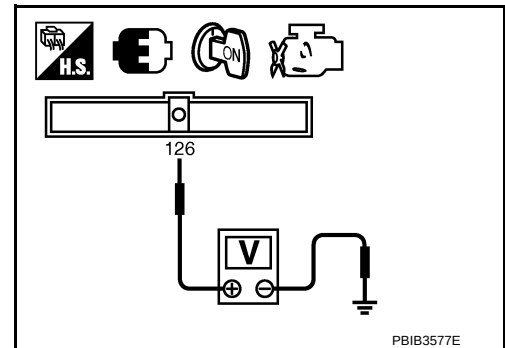
Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 126 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-III

1. Select "BRAKE SW2" in "DATA MONITOR" mode with CONSULT-III.
2. Check "BRAKE SW2" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

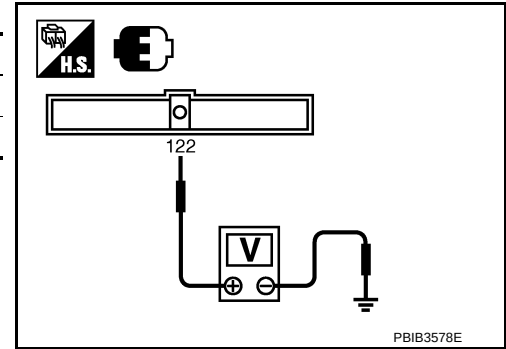
Without CONSULT-III

Check voltage between ECM terminal 122 and ground under the following conditions.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



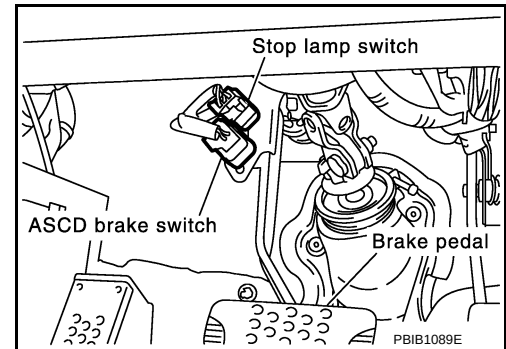
OK or NG

OK >> GO TO 13.

NG >> GO TO 8.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



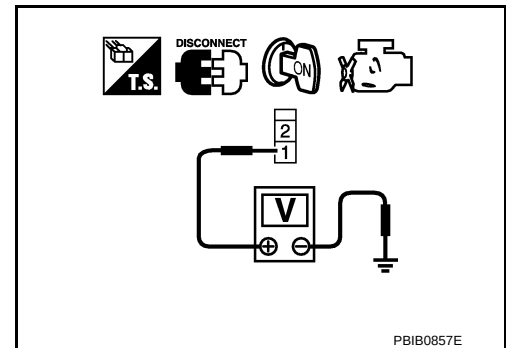
4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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 126 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.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

OK or NG

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD brake switch

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

7.CHECK ASCD BRAKE SWITCH

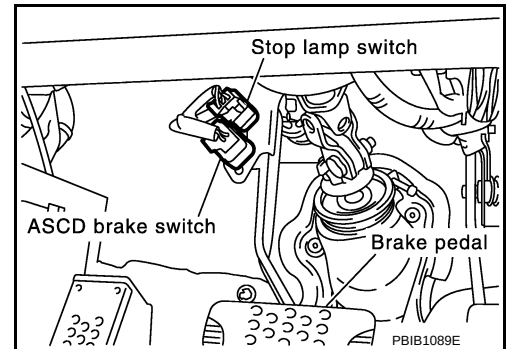
Refer to [EC-577, "Component Inspection"](#)

OK or NG

- OK >> GO TO 13.
- NG >> Replace ASCD brake switch.

8.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

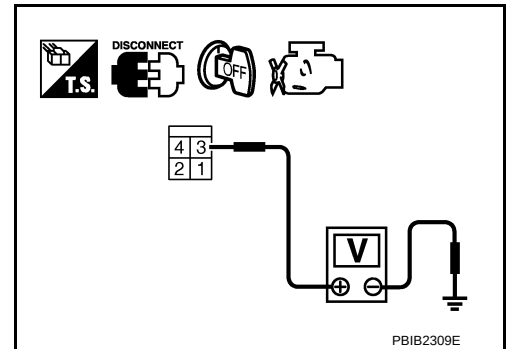


3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 10.
- NG >> GO TO 9.



9.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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.

10.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 122 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.

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

OK or NG

- OK >> GO TO 12.
- NG >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch

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

12.CHECK STOP LAMP SWITCH

Refer to [EC-577. "Component Inspection"](#)

OK or NG

- OK >> GO TO 13.
- NG >> Replace stop lamp switch.

13.CHECK INTERMITTENT INCIDENT

Refer to [EC-134.](#)

>> **INSPECTION END**

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal and/or clutch pedal: Slightly depressed	OFF
Brake pedal and clutch pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 126 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V
Brake pedal and clutch pedal: Fully released	Battery voltage

OK or NG

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

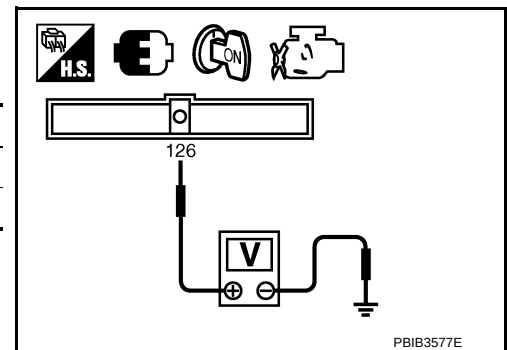
2.CHECK OVERALL FUNCTION-II

With CONSULT-III

1. Select "BRAKE SW2" in "DATA MONITOR" mode with CONSULT-III.
2. Check "BRAKE SW2" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III



DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

Check voltage between ECM terminal 122 and ground under the following conditions.

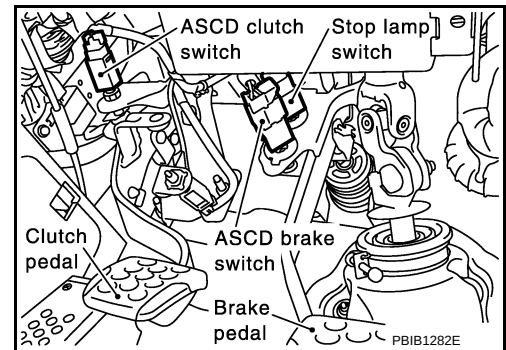
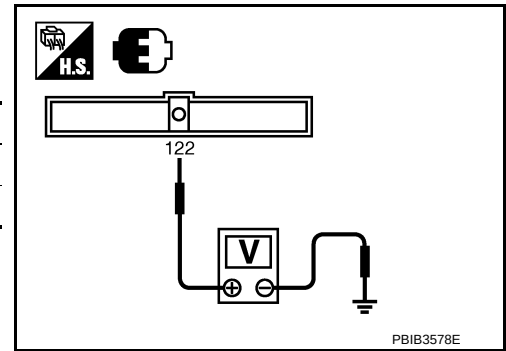
CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

OK or NG

- OK >> GO TO 16.
NG >> GO TO 11.

3. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

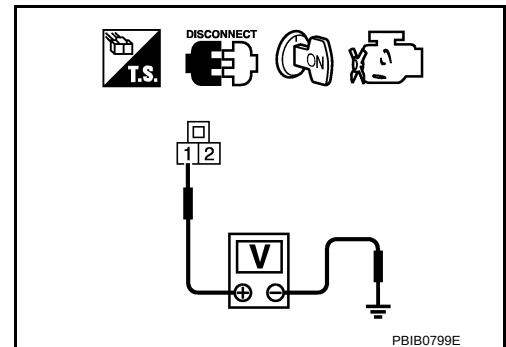


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

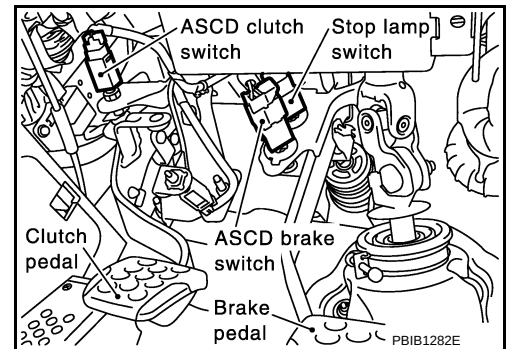
OK or NG

- OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



DTC P1572 ASCD BRAKE SWITCH

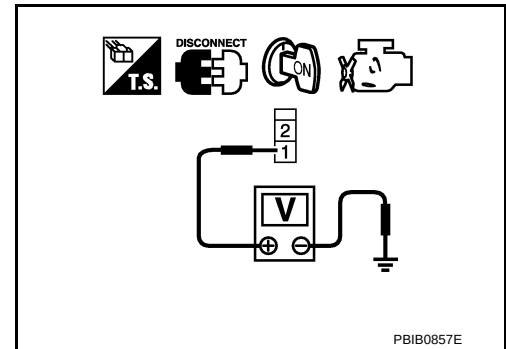
< SERVICE INFORMATION >

4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

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



5.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch 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 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH

Refer to [EC-577, "Component Inspection"](#)

OK or NG

- OK >> GO TO 16.
NG >> Replace ASCD brake switch.

8.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD clutch switch terminal 2 and ECM terminal 126. 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 10.
NG >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD clutch switch

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

10.CHECK ASCD CLUTCH SWITCH

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

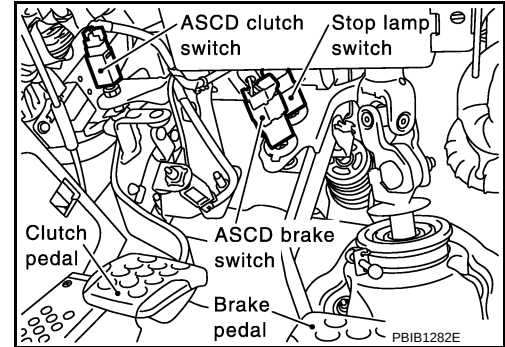
Refer to [EC-577, "Component Inspection"](#).

OK or NG

- OK >> GO TO 16.
NG >> Replace ASCD clutch switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

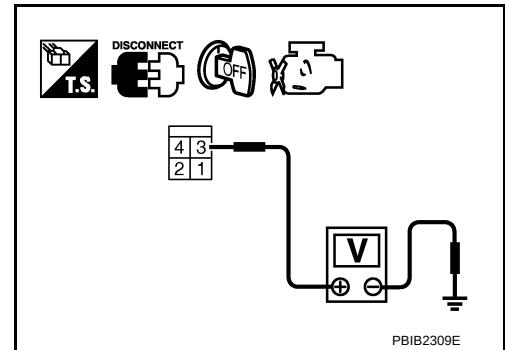


3. Check voltage between stop lamp switch terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 13.
NG >> GO TO 12.



12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 122 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 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch

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

DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

15.CHECK STOP LAMP SWITCH

Refer to [EC-577](#). "Component Inspection"

OK or NG

OK >> GO TO 16.

NG >> Replace stop lamp switch.

16.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

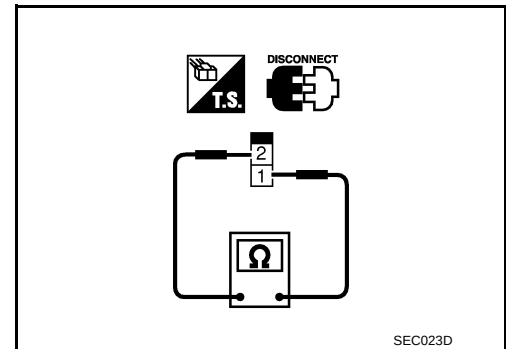
INFOID:0000000001645983

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check 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-7](#), and perform step 3 again.

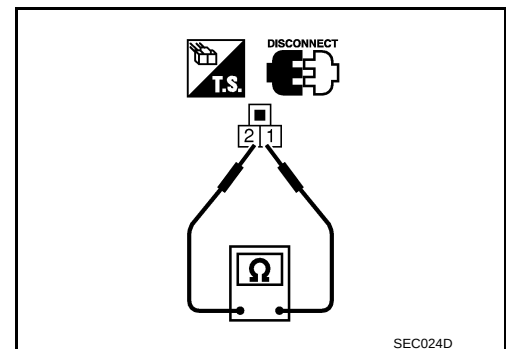


ASCD CLUTCH SWITCH (M/T MODELS)

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to [CL-5](#), and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

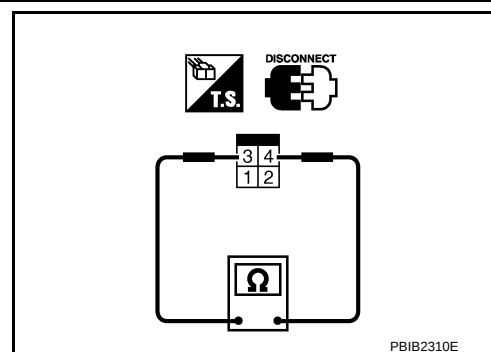
DTC P1572 ASCD BRAKE SWITCH

< SERVICE INFORMATION >

3. 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-7](#), and perform step 3 again.



DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

DTC P1574 ASCD VEHICLE SPEED SENSOR

Component Description

INFOID:000000001645984

The ECM receives two vehicle speed sensor 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 ASCD control. Refer to [EC-28](#) for ASCD functions.

On Board Diagnosis Logic

INFOID:000000001645985

- 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 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to [EC-465](#)
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-480](#)

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.	• Harness or connectors (The CAN communication line is open or shorted.) • Unified meter and A/C amp. • VDC/TCS/ABS control unit (with VDC models) • ABS actuator and electric unit (control unit) (without VDC models) • Wheel sensor • TCM(A/T models) • ECM

DTC Confirmation Procedure

INFOID:000000001645986

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-III

1. Start engine (VDC switch or TCS switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. Check DTC.
5. If DTC is detected, go to [EC-579, "Diagnosis Procedure"](#).

WITH GST

Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:000000001645987

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-37](#).

DTC P1574 ASCD VEHICLE SPEED SENSOR

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH "VDC/TSC/ABS CONTROL UNIT (WITH VDC MODELS)" OR "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITHOUT VDC MODELS)"

Refer to [BRC-81](#) or refer to [BRC-43](#).

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to [DI-5](#).

>> INSPECTION END

DTC P1715 INPUT SPEED SENSOR

< SERVICE INFORMATION >

DTC P1715 INPUT SPEED SENSOR

Description

INFOID:000000001645988

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001645989

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:000000001645990

NOTE:

- If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to [EC-144](#).
- If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to [EC-146](#).
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to [EC-480](#).
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to [EC-367](#).
- If DTC P1715 is displayed with DTC P0340 or P0345 first perform the trouble diagnosis for DTC P0340 or P0345. Refer to [EC-375](#).

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from revolution sensor signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:000000001645991

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to [AT-37](#).

OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to [AT-40](#).

>> INSPECTION END

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

DTC P1805 BRAKE SWITCH

Description

INFOID:0000000001645992

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-III Reference Value in Data Monitor Mode

INFOID:0000000001645993

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:0000000001645994

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.	• Harness or connectors (The stop lamp switch circuit is open or shorted.) • Stop lamp switch

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:0000000001645995

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to [EC-584, "Diagnosis Procedure"](#).

DTC P1805 BRAKE SWITCH

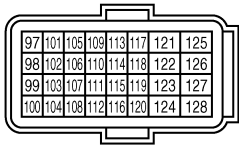
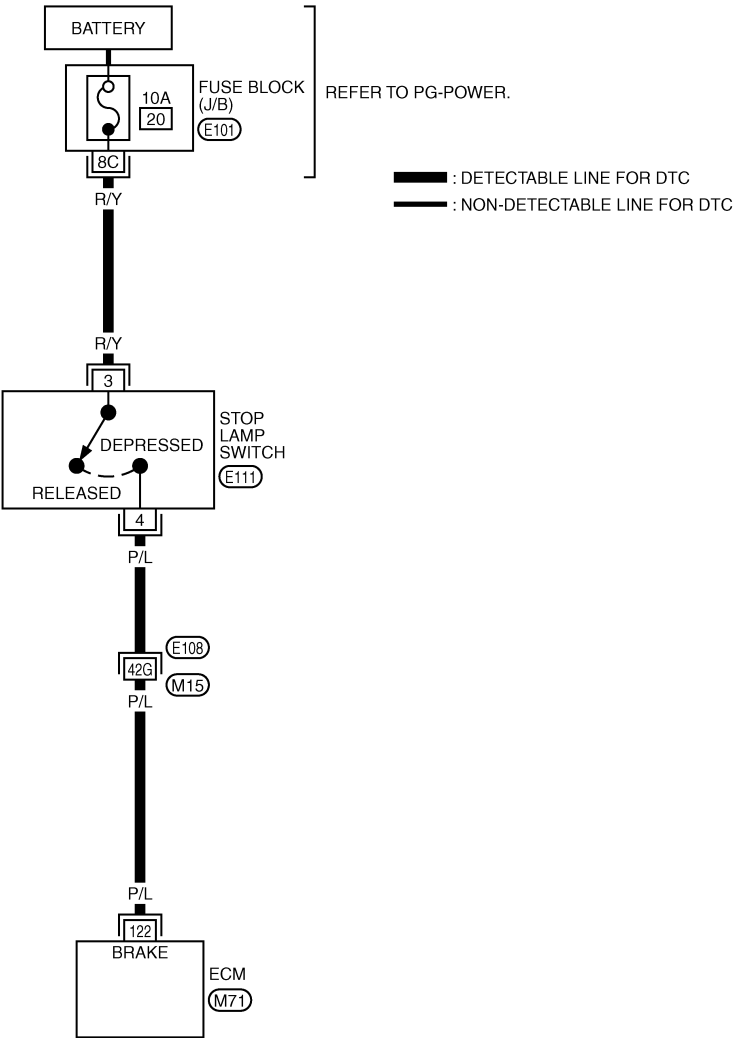
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001645996

EC-BRK/SW-01

EC



M71
GY



4 3
2 1

E111
W

REFER TO THE FOLLOWING.
(E108) -SUPER MULTIPLE JUNCTION (SMJ)
(E101) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1663E

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)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001645997

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

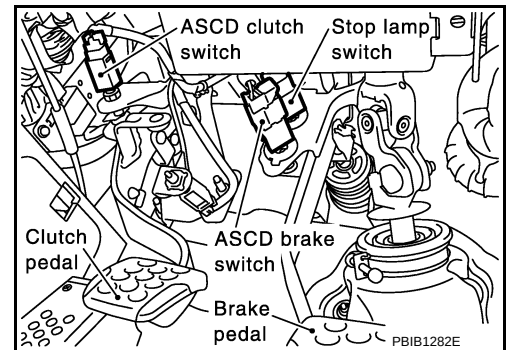
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

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.

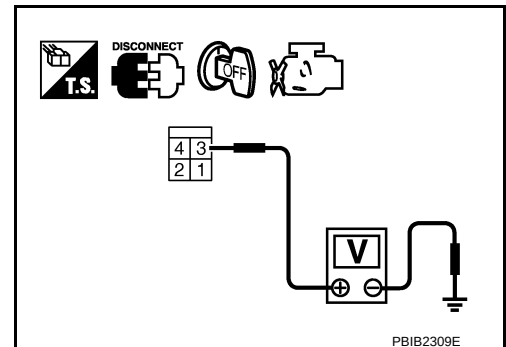


2. Check voltage between stop lamp switch terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E101
- Harness for open and short between stop lamp switch and fuse

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

DTC P1805 BRAKE SWITCH

< SERVICE INFORMATION >

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between ECM terminal 122 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 6.
NG >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch

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

6.CHECK STOP LAMP SWITCH

Refer to [EC-585, "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
NG >> Replace stop lamp switch.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

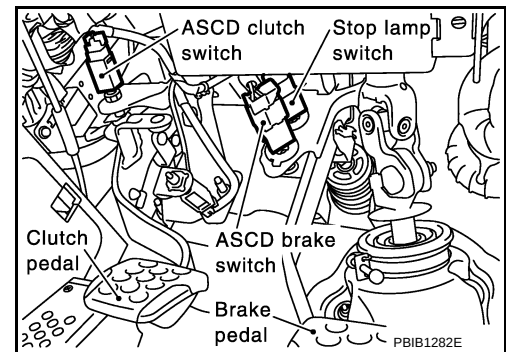
>> **INSPECTION END**

Component Inspection

INFOID:000000001645998

STOP LAMP SWITCH

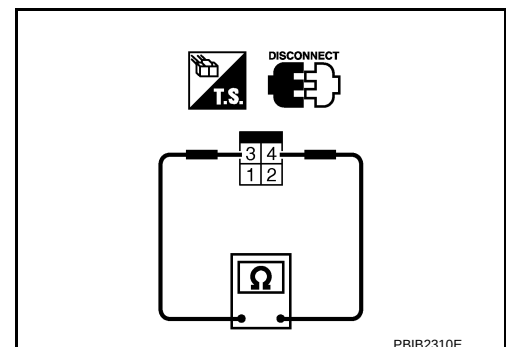
1. Disconnect stop lamp switch harness connector.



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-7](#), and perform step 2 again.



DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

DTC P2122, P2123 APP SENSOR

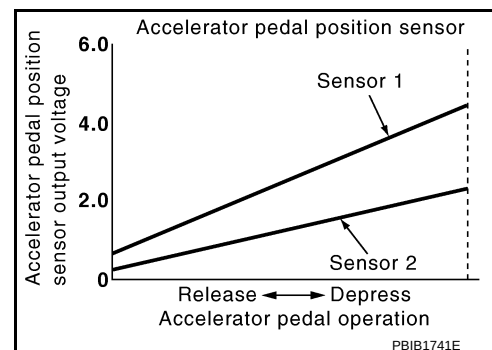
Component Description

INFOID:000000001645999

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-III Reference Value in Data Monitor Mode

INFOID:000000001646000

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	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 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 differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000001646001

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-482](#).

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.	• Harness or connectors (The APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
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 P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

DTC Confirmation Procedure

INFOID:000000001646002

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-589, "Diagnosis Procedure"](#).

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DTC P2122, P2123 APP SENSOR

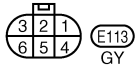
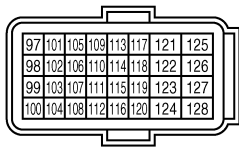
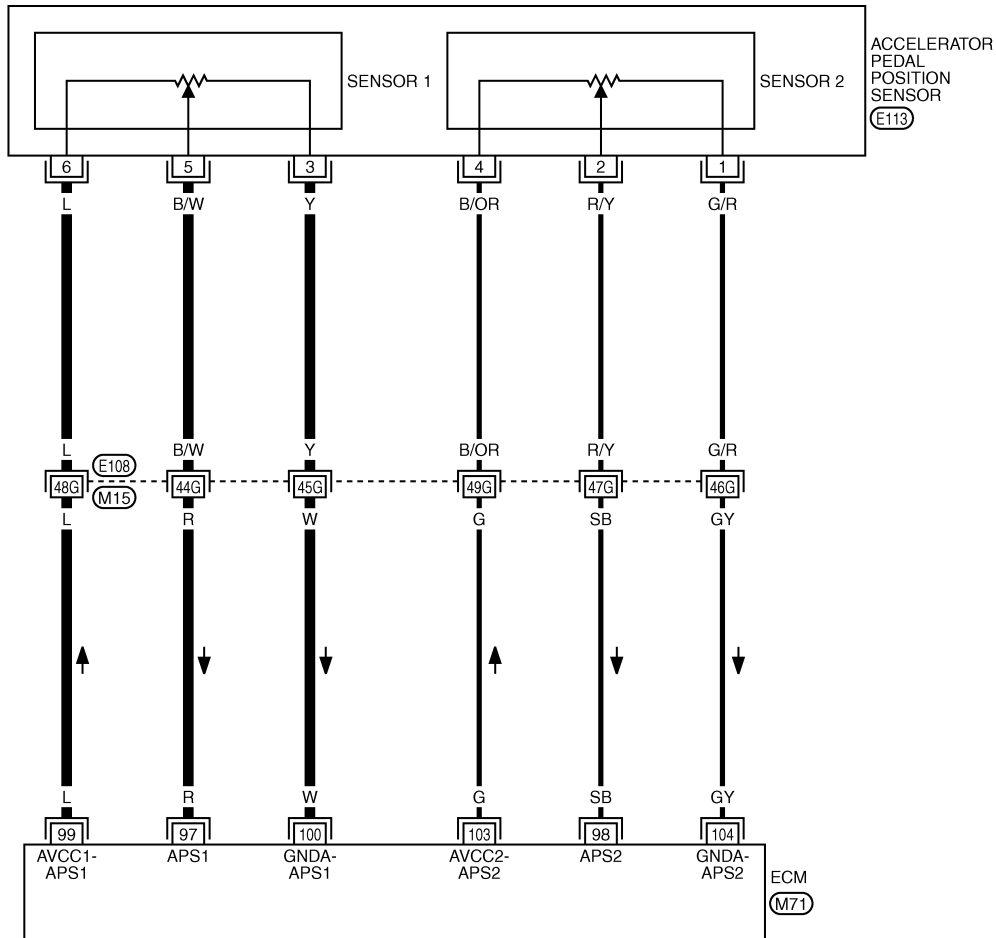
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646003

EC-APPS1-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE JUNCTION (SMJ)

TBWT1670E

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)
97	R	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	3.9 - 4.7V
98	SB	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.15 - 0.60V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.40V
99	L	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	5V
100	W	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
104	GY	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	0V

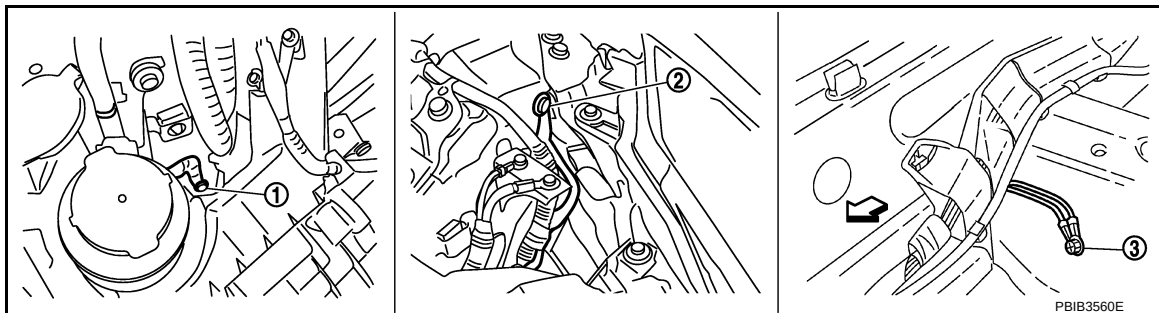
Diagnosis Procedure

INFOID:000000001646004

1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).



1. Body ground E17

2. Body ground E43

3. Body ground B102

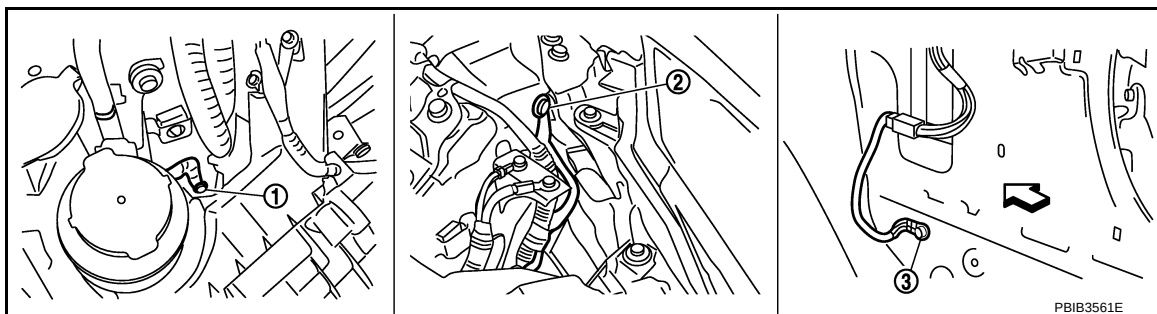
← Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

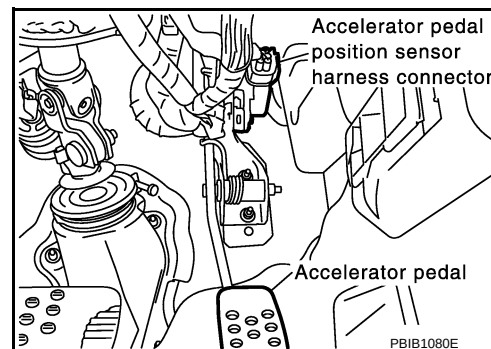
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



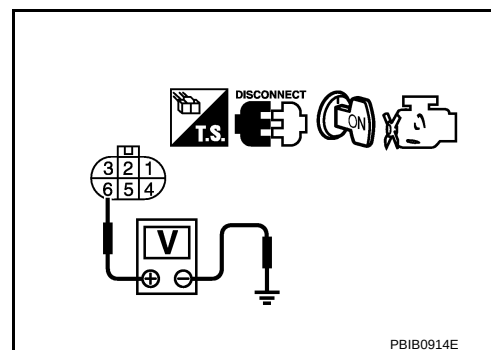
3. Check voltage between APP sensor terminal 6 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

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

4. 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 APP sensor terminal 3 and ECM terminal 100.
Refer to Wiring Diagram.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

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 E108, M15
- Harness for open or short between ECM and APP sensor

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

6.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 97 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 8.

NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

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

8.CHECK APP SENSOR

Refer to [EC-608, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

10.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

Component Inspection

INFOID:000000001646005

ACCELERATOR PEDAL POSITION SENSOR

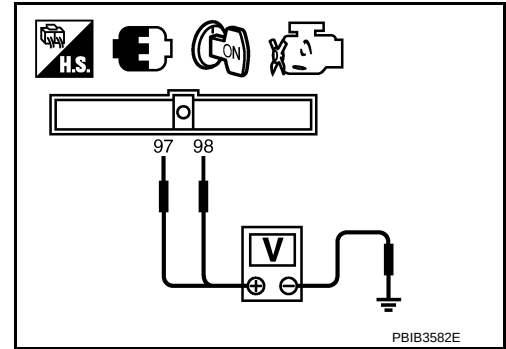
1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

DTC P2122, P2123 APP SENSOR

< SERVICE INFORMATION >

3. Check voltage between ECM terminals 97 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
97 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.60V
	Fully depressed	1.95 - 2.40V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000001646006

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

DTC P2127, P2128 APP SENSOR

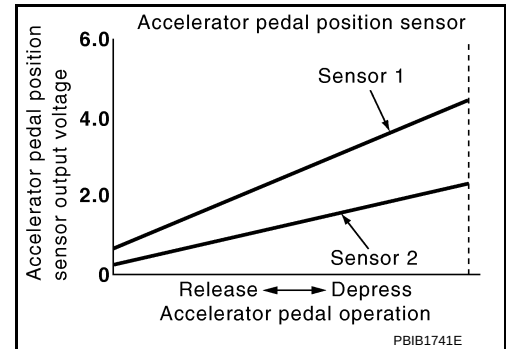
Component Description

INFOID:000000001646007

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-III Reference Value in Data Monitor Mode

INFOID:000000001646008

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	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 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 differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:000000001646009

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.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is open or shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • EVAP control system pressure sensor • Refrigerant pressure sensor
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.

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

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:0000000001646010

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-596, "Diagnosis Procedure"](#).

DTC P2127, P2128 APP SENSOR

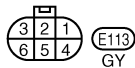
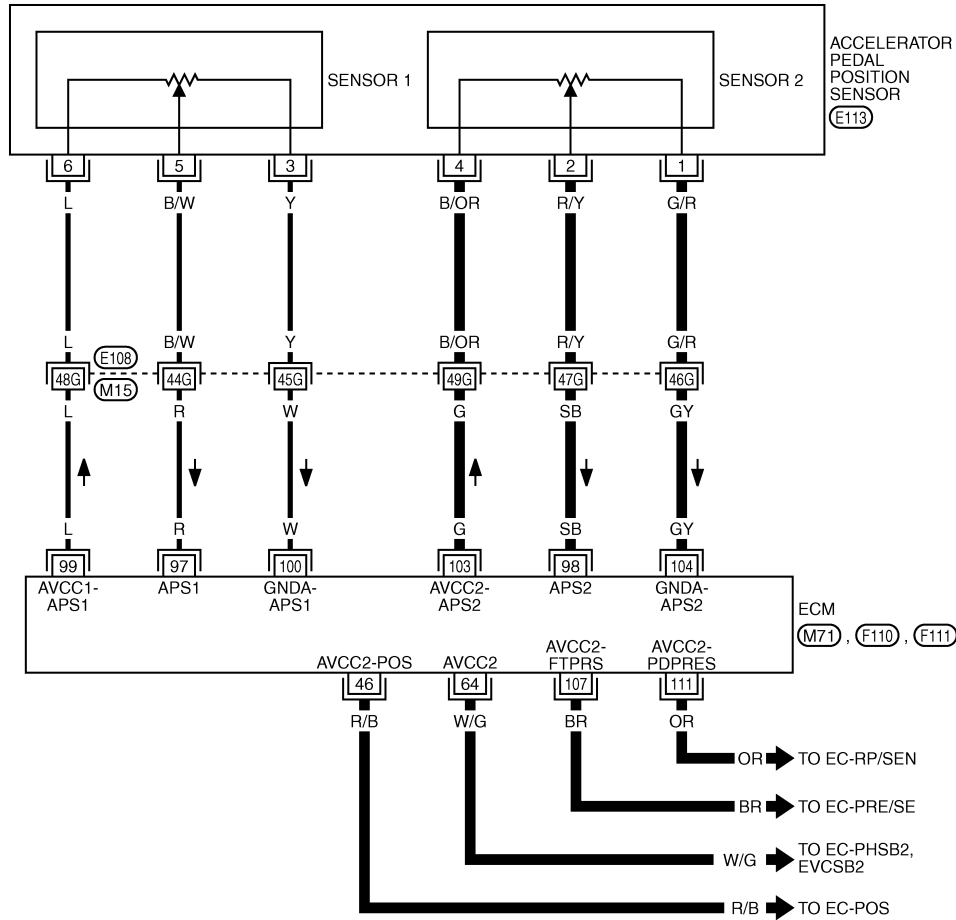
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646011

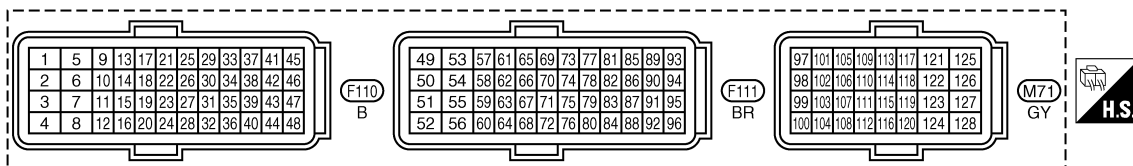
EC-APPS2-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE JUNCTION (SMJ)



TBWT1671E

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)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
97	R	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	3.9 - 4.7V
98	SB	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.15 - 0.60V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.40V
99	L	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	5V
100	W	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
104	GY	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	0V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V

Diagnosis Procedure

INFOID:0000000001646012

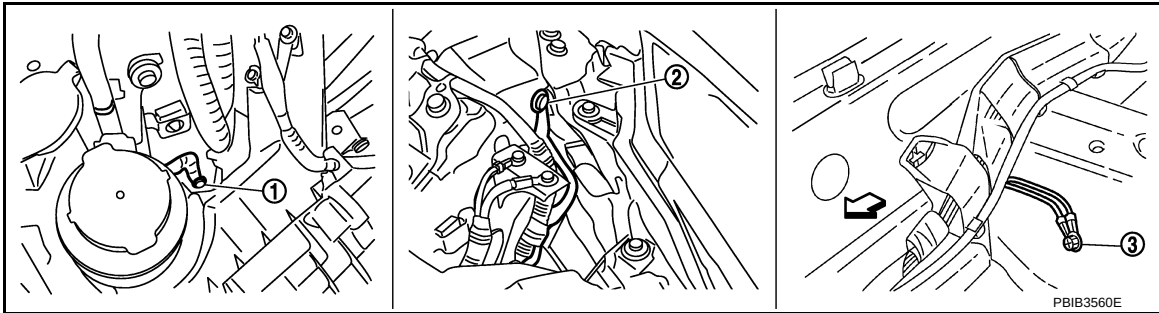
1. CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .

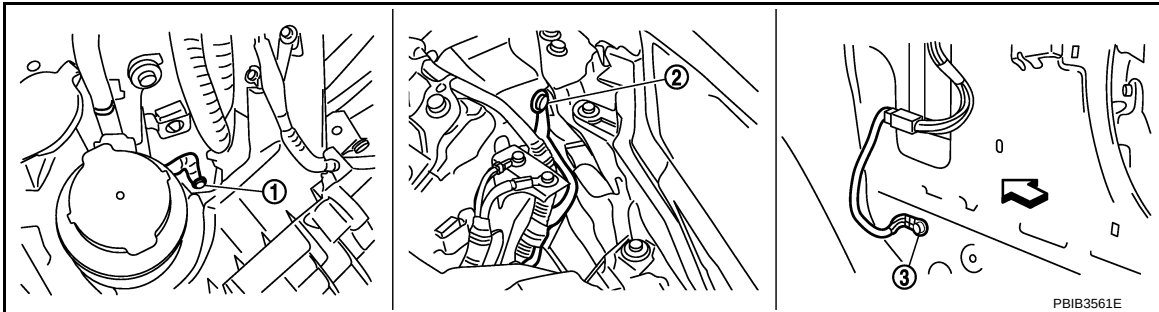
DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >



Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#).

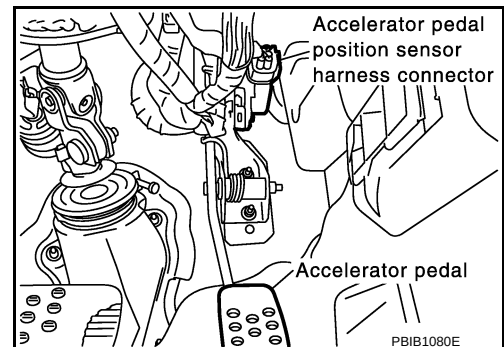


OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT- I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



DTC P2127, P2128 APP SENSOR

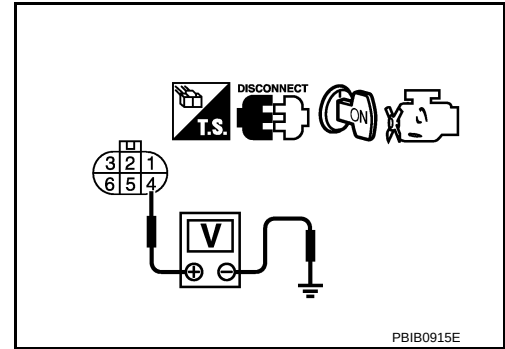
< SERVICE INFORMATION >

3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III 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 4 and ECM terminal 103.
Refer to Wiring Diagram.

Continuity should exist.

OK or NG

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

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open between ECM and APP sensor

>> Repair open circuit.

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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor terminal 1	EC-658

OK or NG

- OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection"](#) .)
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection"](#) .)
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection"](#) .)
- EVAP control system pressure sensor (Refer to [EC-436, "Component Inspection"](#) .)
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit"](#) .)

OK or NG

- OK >> GO TO 13.
NG >> Replace malfunctioning component.

7.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

DTC P2127, P2128 APP SENSOR

< SERVICE INFORMATION >

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 104.
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 >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

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

9.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 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 11.

NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

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

11.CHECK APP SENSOR

Refer to [EC-608, "Component Inspection"](#).

OK or NG

OK >> GO TO 13.

NG >> GO TO 12.

12.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

13.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

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DTC P2127, P2128 APP SENSOR

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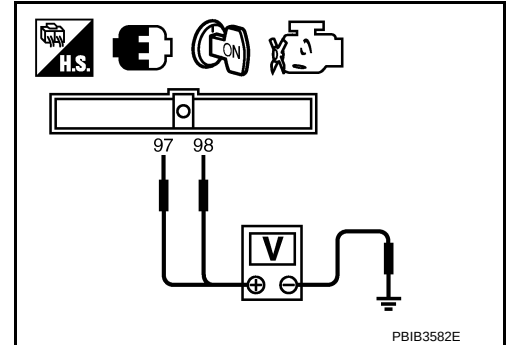
Component Inspection

INFOID:000000001646013

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 97 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
97 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.60V
	Fully depressed	1.95 - 2.40V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000001646014

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

DTC P2138 APP SENSOR

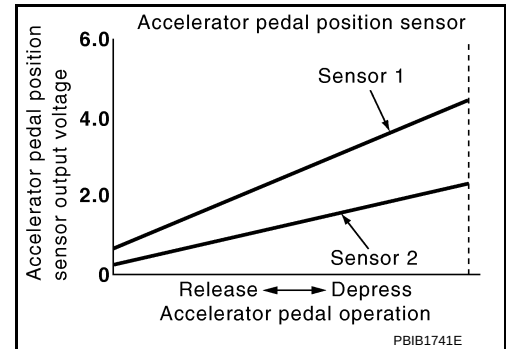
Component Description

INFOID:0000000001646015

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-III Reference Value in Data Monitor Mode

INFOID:0000000001646016

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	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 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 differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000001646017

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-482](#).

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

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.	• Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) Harness or connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is open or shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • EVAP control system pressure sensor • Refrigerant pressure sensor

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:0000000001646018

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.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to [EC-604, "Diagnosis Procedure"](#).

DTC P2138 APP SENSOR

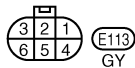
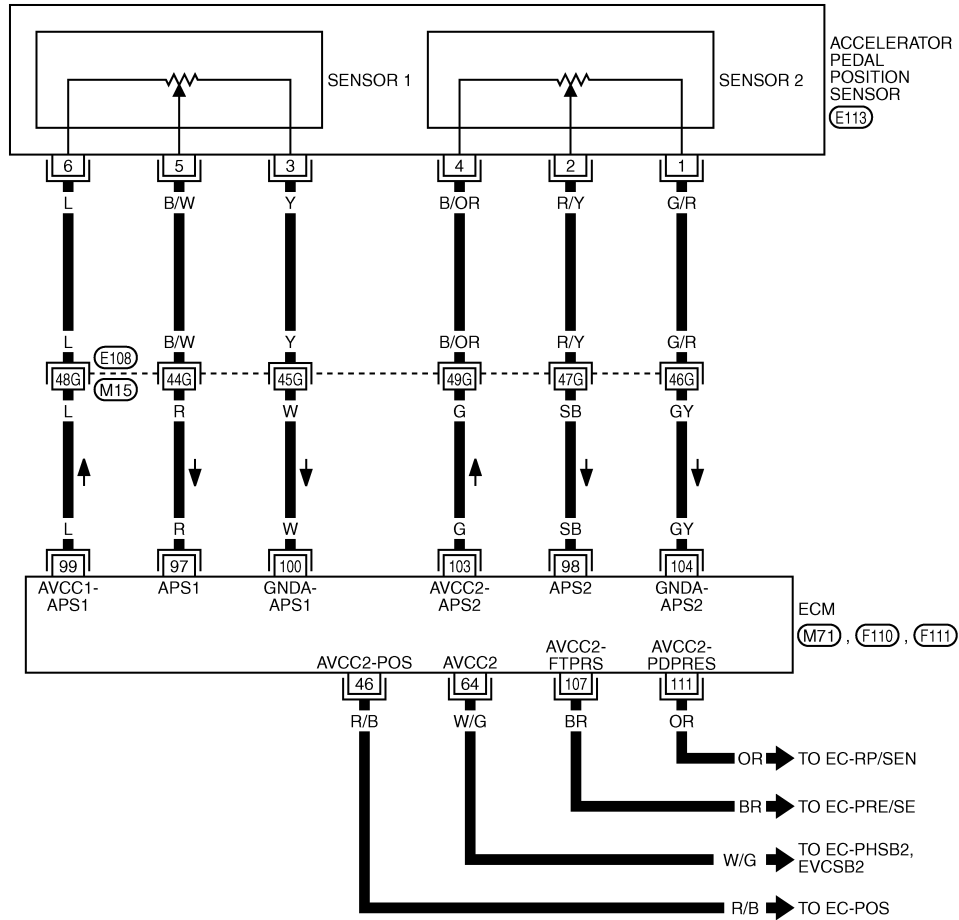
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646019

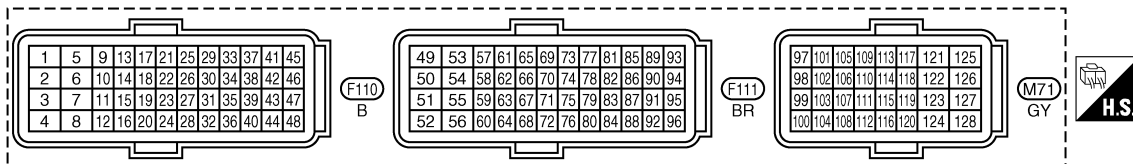
EC-APPS3-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE JUNCTION (SMJ)



TBWT1674E

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)
46	R/B	Sensor power supply [Crankshaft position sensor (POS)]	[Ignition switch: ON]	5V
64	W/G	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2)]	[Ignition switch: ON]	5V
97	R	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	3.9 - 4.7V
98	SB	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.15 - 0.60V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.40V
99	L	Sensor power supply (Accelerator pedal position sensor 1)	[Ignition switch: ON]	5V
100	W	Sensor ground (Accelerator pedal position sensor 1)	[Engine is running] • Warm-up condition • Idle speed	0V
103	G	Sensor power supply (Accelerator pedal position sensor 2)	[Ignition switch: ON]	5V
104	GY	Sensor ground (Accelerator pedal position sensor 2)	[Engine is running] • Warm-up condition • Idle speed	0V
107	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	5V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V

Diagnosis Procedure

INFOID:0000000001646020

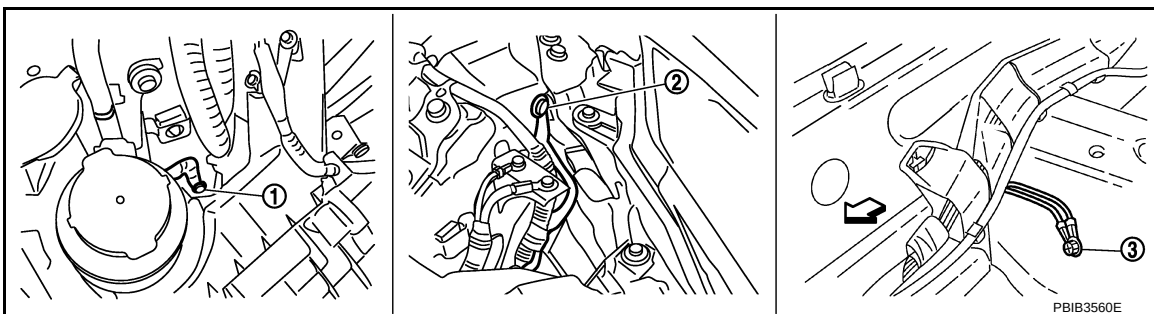
1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .

DTC P2138 APP SENSOR

< SERVICE INFORMATION >



1. Body ground E17

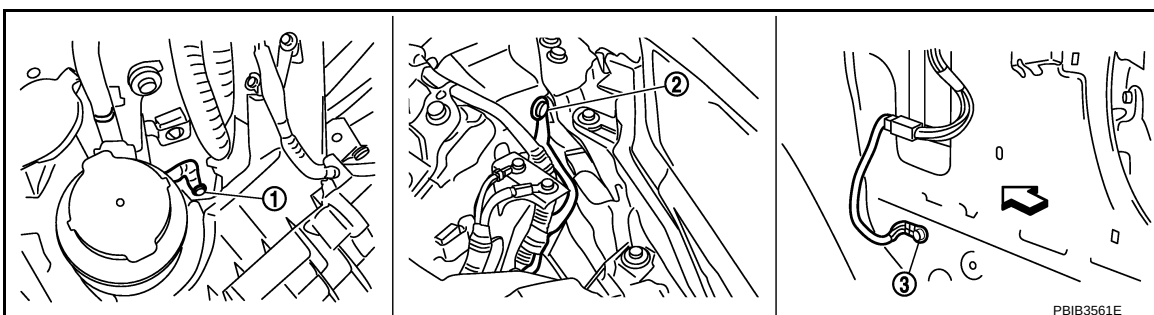
2. Body ground E43

3. Body ground B102

↶ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

↶ Vehicle front

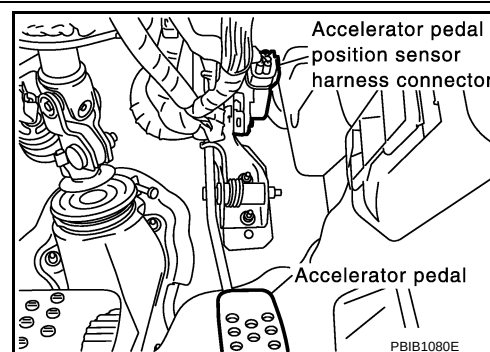
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



DTC P2138 APP SENSOR

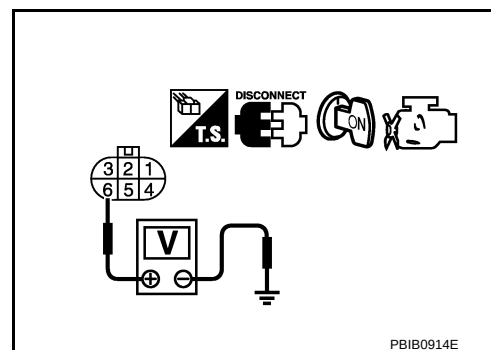
< SERVICE INFORMATION >

3. Check voltage between APP sensor terminal 6 and ground with CONSULT-III 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 E108, M15
- Harness for open or short between ECM and APP sensor

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

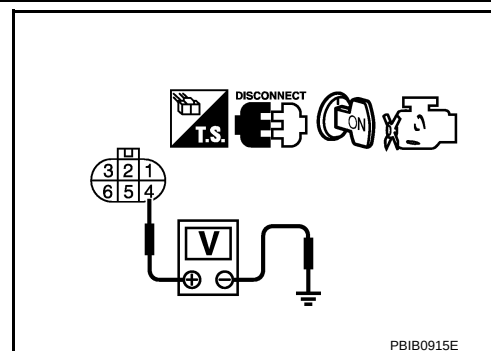
4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

- OK >> GO TO 9.
NG >> GO TO 5.



5.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 4 and ECM terminal 103.
Refer to Wiring Diagram.

Continuity should exist.

OK or NG

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open between ECM and APP sensor

>> Repair open circuit.

7.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
46	CKP sensor (POS) terminal 1	EC-369
64	CMP sensor (PHASE) (bank 2) terminal 1	EC-377
	EVT control position sensor (bank 2) terminal 1	EC-498

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

ECM terminal	Sensor terminal	Reference Wiring Diagram
103	APP sensor terminal 4	EC-595
107	EVAP control system pressure sensor terminal 3	EC-432
111	Refrigerant pressure sensor terminal 1	EC-658

OK or NG

OK >> GO TO 8.

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

8.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to [EC-373, "Component Inspection"](#) .)
- Camshaft position sensor (PHASE) (bank 2) (Refer to [EC-383, "Component Inspection"](#) .)
- Exhaust valve timing control position sensor (bank 2) (Refer to [EC-505, "Component Inspection"](#) .)
- EVAP control system pressure sensor (Refer to [EC-436, "Component Inspection"](#) .)
- Refrigerant pressure sensor (Refer to [ATC-63, "Magnet Clutch Circuit"](#) .)

OK or NG

OK >> GO TO 15.

NG >> Replace malfunctioning component.

9.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
APP sensor terminal 3 and ECM terminal 100.
APP sensor terminal 1 and ECM terminal 104,
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 11.

NG >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

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

11.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
ECM terminal 97 and APP sensor terminal 5,
ECM terminal 98 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 13.

NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

DTC P2138 APP SENSOR

< SERVICE INFORMATION >

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

13. CHECK APP SENSOR

Refer to [EC-608, "Component Inspection"](#).

OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

14. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
3. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
4. Perform [EC-77, "Idle Air Volume Learning"](#).

>> **INSPECTION END**

15. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

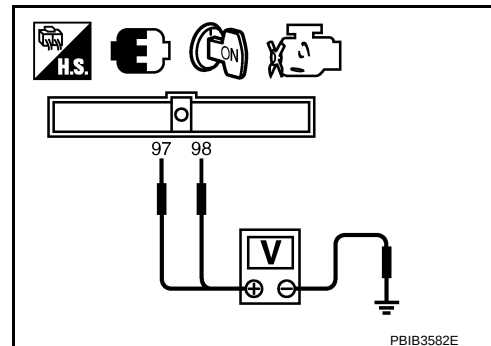
Component Inspection

INFOID:000000001646021

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 97 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
97 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.60V
	Fully depressed	1.95 - 2.40V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform [EC-76, "Accelerator Pedal Released Position Learning"](#).
6. Perform [EC-76, "Throttle Valve Closed Position Learning"](#).
7. Perform [EC-77, "Idle Air Volume Learning"](#).

Removal and Installation

INFOID:000000001646022

ACCELERATOR PEDAL

Refer to [ACC-3](#).

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

DTC P2A00, P2A03 A/F SENSOR 1

Component Description

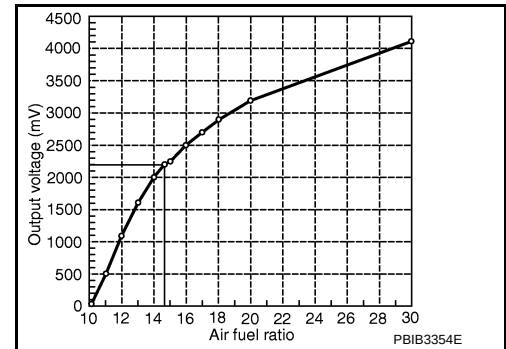
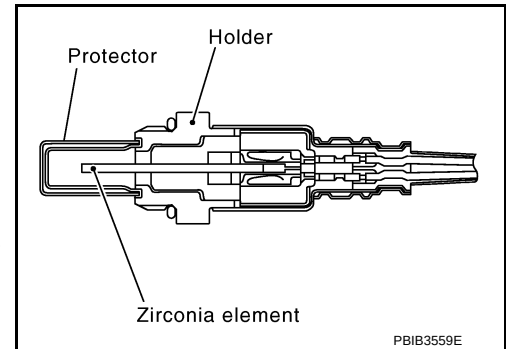
INFOID:000000001646023

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

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

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

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001646024

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:000000001646025

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	• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks
P2A03 2A03 (Bank 2)		• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	

DTC Confirmation Procedure

INFOID:000000001646026

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-III

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

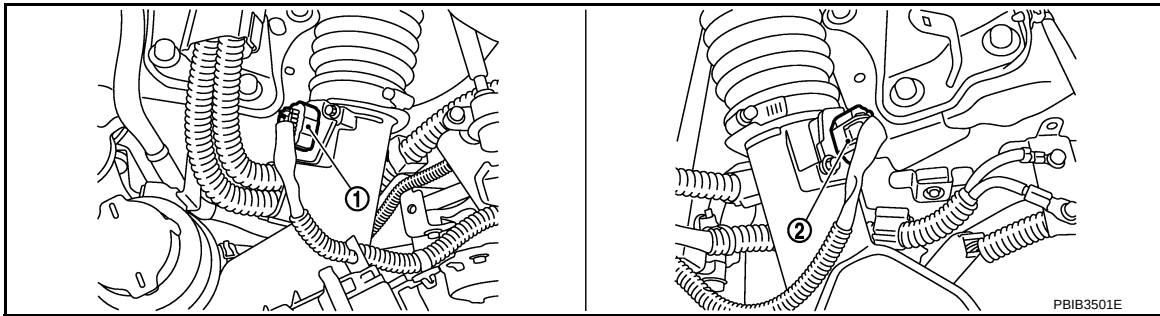
< SERVICE INFORMATION >

3. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
4. Clear the self-learning coefficient by touching "CLEAR".
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to [EC-614, "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. Disconnect mass air flow sensor (bank 1) harness connector.



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
6. Select Service \$03 with GST and make sure that DTC P0102 is detected.
7. Select Service \$04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service \$07 with GST.
If 1st trip DTC is detected, go to [EC-614, "Diagnosis Procedure"](#).

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

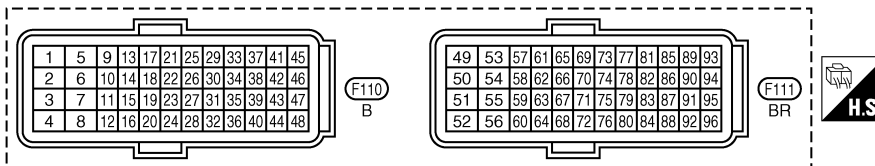
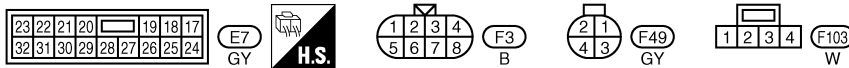
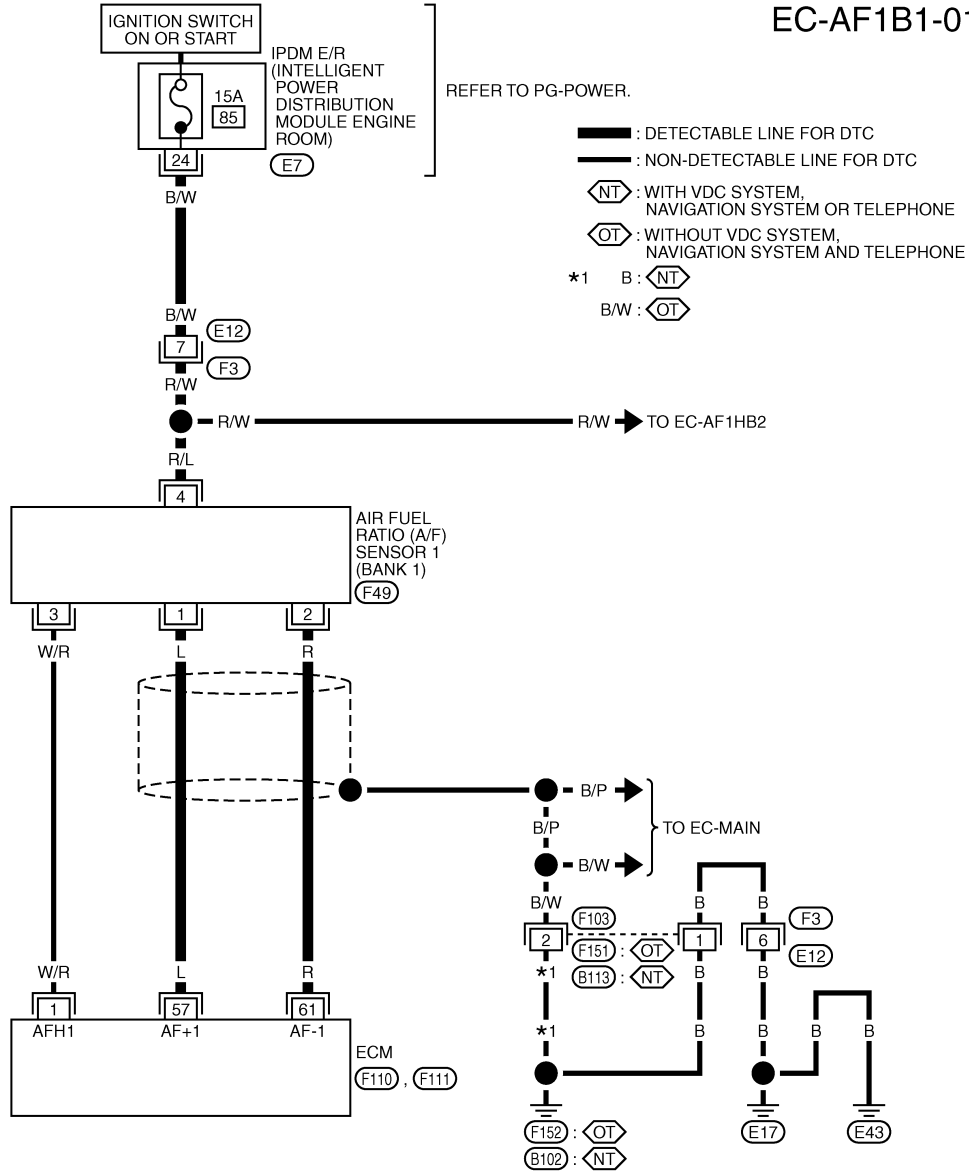
Wiring Diagram

INFOID:000000001646027

BANK 1

EC-AF1B1-01

EC



TBWT1632E

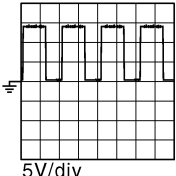
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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)
1	W/R	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8V★  PBIB3538E
57	L	A/F sensor 1 (bank 1)	[Ignition switch: ON]	2.2V
61	R	A/F sensor 1 (bank 1)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

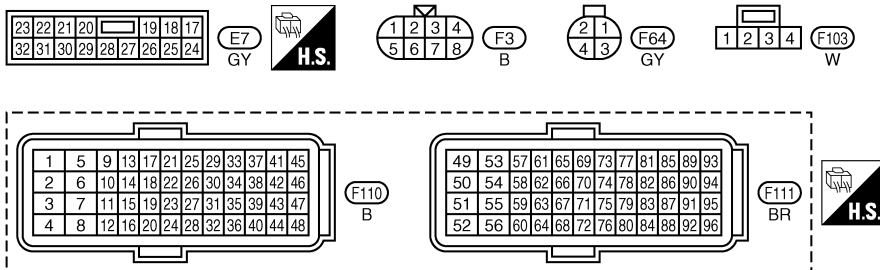
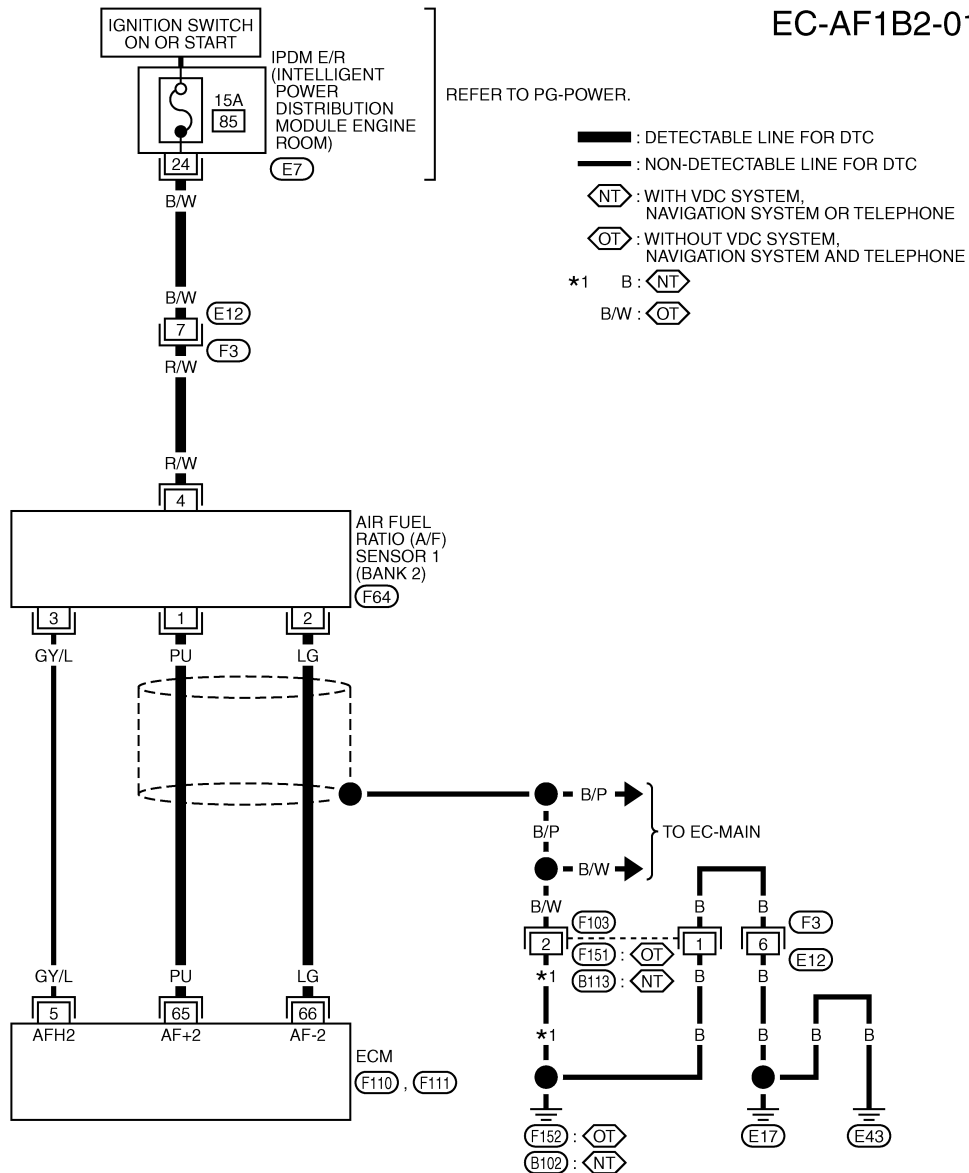
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

BANK 2

EC-AF1B2-01



TBW1633E

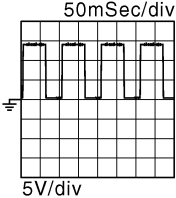
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

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 >

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	GY/L	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8★ 
65	PU	A/F sensor 1 (bank 2)	[Ignition switch: ON]	2.2V
66	LG	A/F sensor 1 (bank 2)	[Ignition switch: ON] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.

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

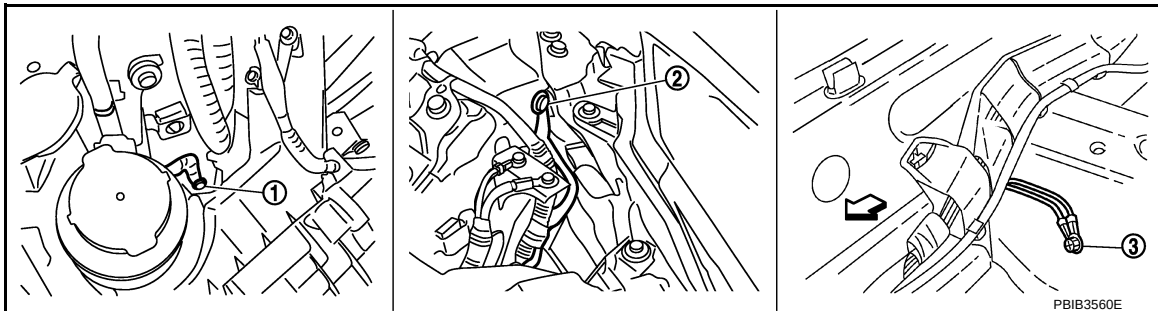
Diagnosis Procedure

INFOID:000000001646028

1.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17

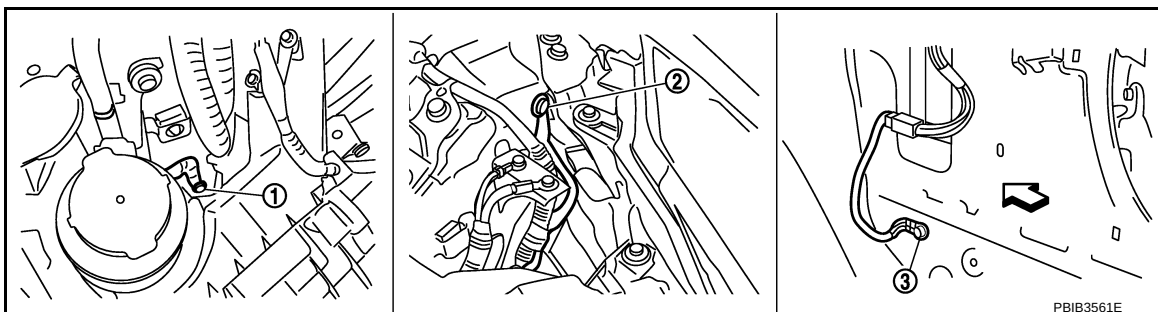
2. Body ground E43

3. Body ground B102

⇐: Vehicle front

Models without VDC system, navigation system and telephone

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

1. Body ground E17
2. Body ground E43
3. Body ground F152
(Passenger side view with dash side finisher removed)

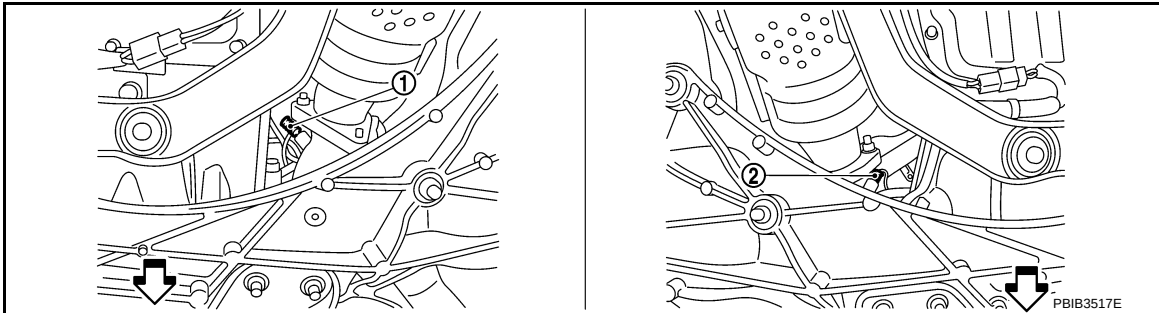
↩ Vehicle front

OK or NG

- OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO SENSOR 1

1. Loosen and retighten the air fuel ratio (A/F) sensor 1.



1. A/F sensor 1 (bank1)
2. A/F sensor 1 (bank 2)

↩ Vehicle front

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.
2. 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-III

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

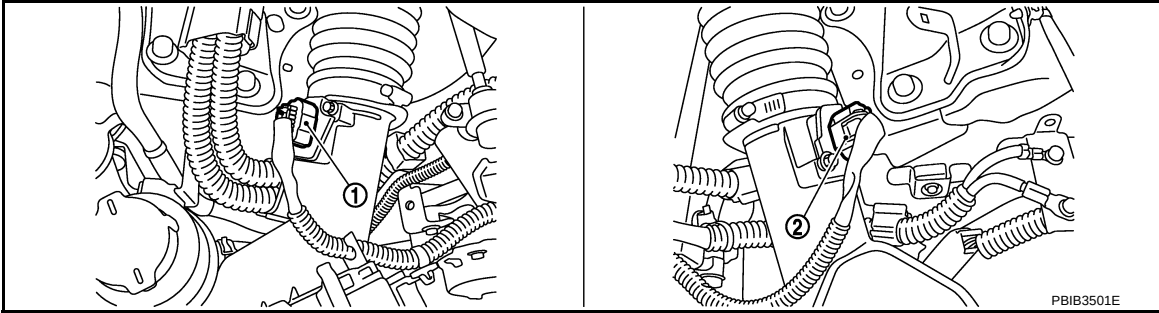
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
Is it difficult to start engine?**

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector.

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-46, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?

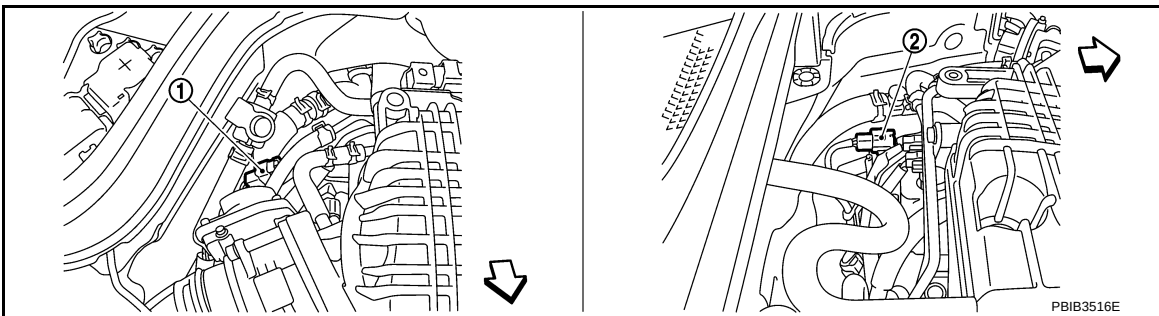
Is it difficult to start engine?

Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-306](#) or [EC-317](#).
No >> GO TO 5.

5. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.



1. A/F sensor 1 (bank 1) harness connector
2. A/F sensor 1 (bank 2) harness connector

← Vehicle front

3. Check harness connector for water.

Water should not exit.

OK or NG

- OK >> GO TO 6.
NG >> Repair or replace harness connector.

6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

DTC P2A00, P2A03 A/F SENSOR 1

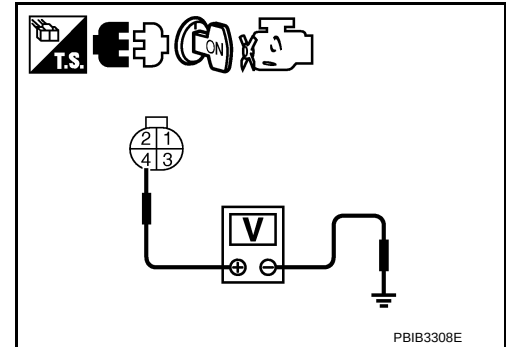
< SERVICE INFORMATION >

2. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III 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 E12, F3
- IPDM E/R harness connector E7
- 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 the following terminals.
Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	57
	2	61
Bank 2	1	65
	2	66

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	57	1	65
2	61	2	66

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 AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to [EC-162. "Component Inspection"](#).

OK or NG

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

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

10. CHECK INTERMITTENT INCIDENT

Perform [EC-134](#).

OK or NG

OK >> GO TO 11.

NG >> Repair or replace.

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

Replace malfunctioning 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 ON.
2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 13.

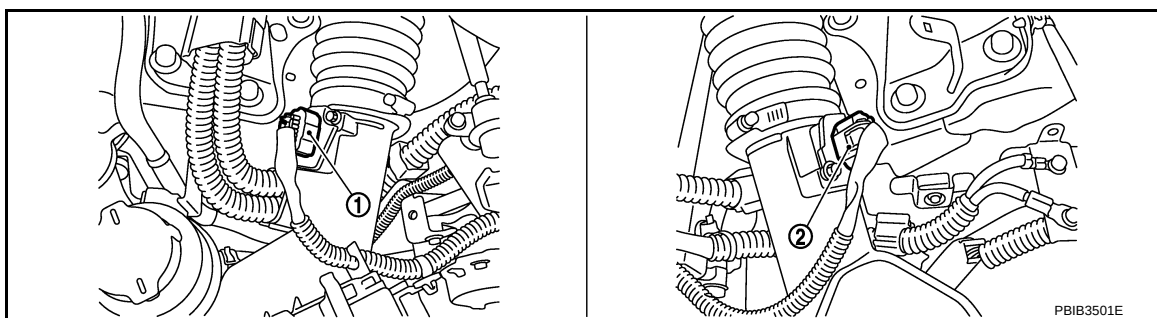
13. CLEAR THE SELF-LEARNING DATA.

 **With CONSULT-III**

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching "CLEAR".

 **Without CONSULT-III**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (bank 1) harness connector.



1. Mass air flow sensor (with intake air temperature sensor) (bank 1)
2. Mass air flow sensor (with intake air temperature sensor) (bank 2)

4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to [EC-46, "Emission-related Diagnostic Information"](#).
8. Make sure DTC P0000 is displayed.

>> GO TO 14.

14. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch OFF and then ON.

DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
3. Make sure that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

Removal and Installation

INFOID:000000001646029

AIR FUEL RATIO (A/F) SENSOR 1

Refer to [EM-23](#).

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ASCD BRAKE SWITCH

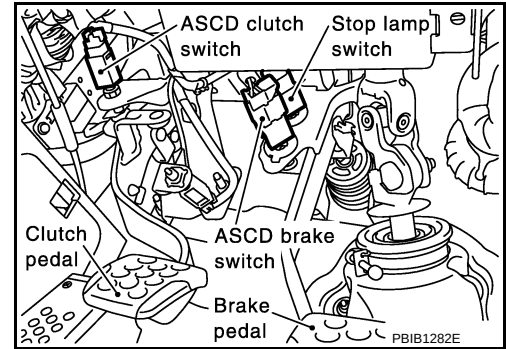
< SERVICE INFORMATION >

ASCD BRAKE SWITCH

Component Description

INFOID:0000000001646030

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-28](#) for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000001646031

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ASCD BRAKE SWITCH

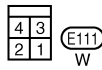
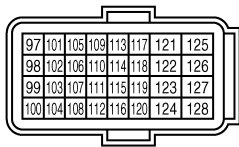
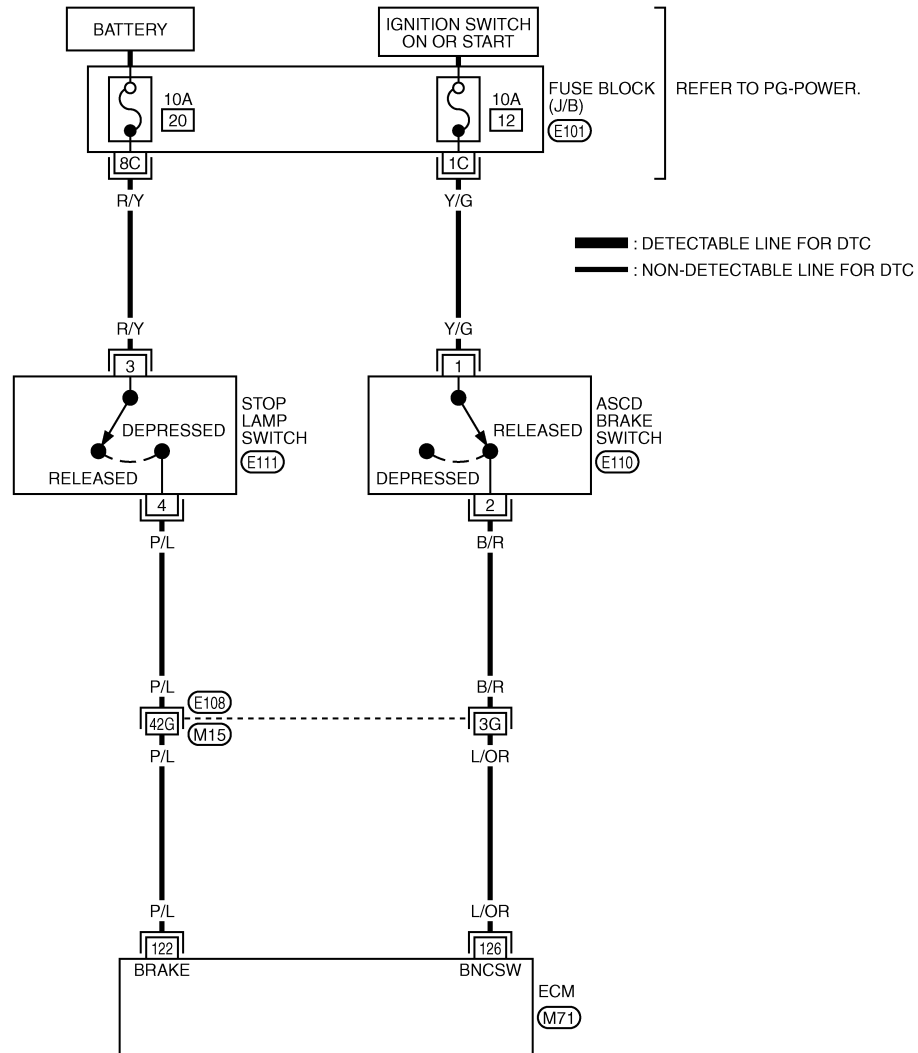
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646032

A/T MODELS

EC-ASCBOF-01



REFER TO THE FOLLOWING.
 (E108) -SUPER MULTIPLE JUNCTION (SMJ)
 (E101) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1675E

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)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
126	L/OR	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	0V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

M/T MODELS

EC-ASCBOF-02

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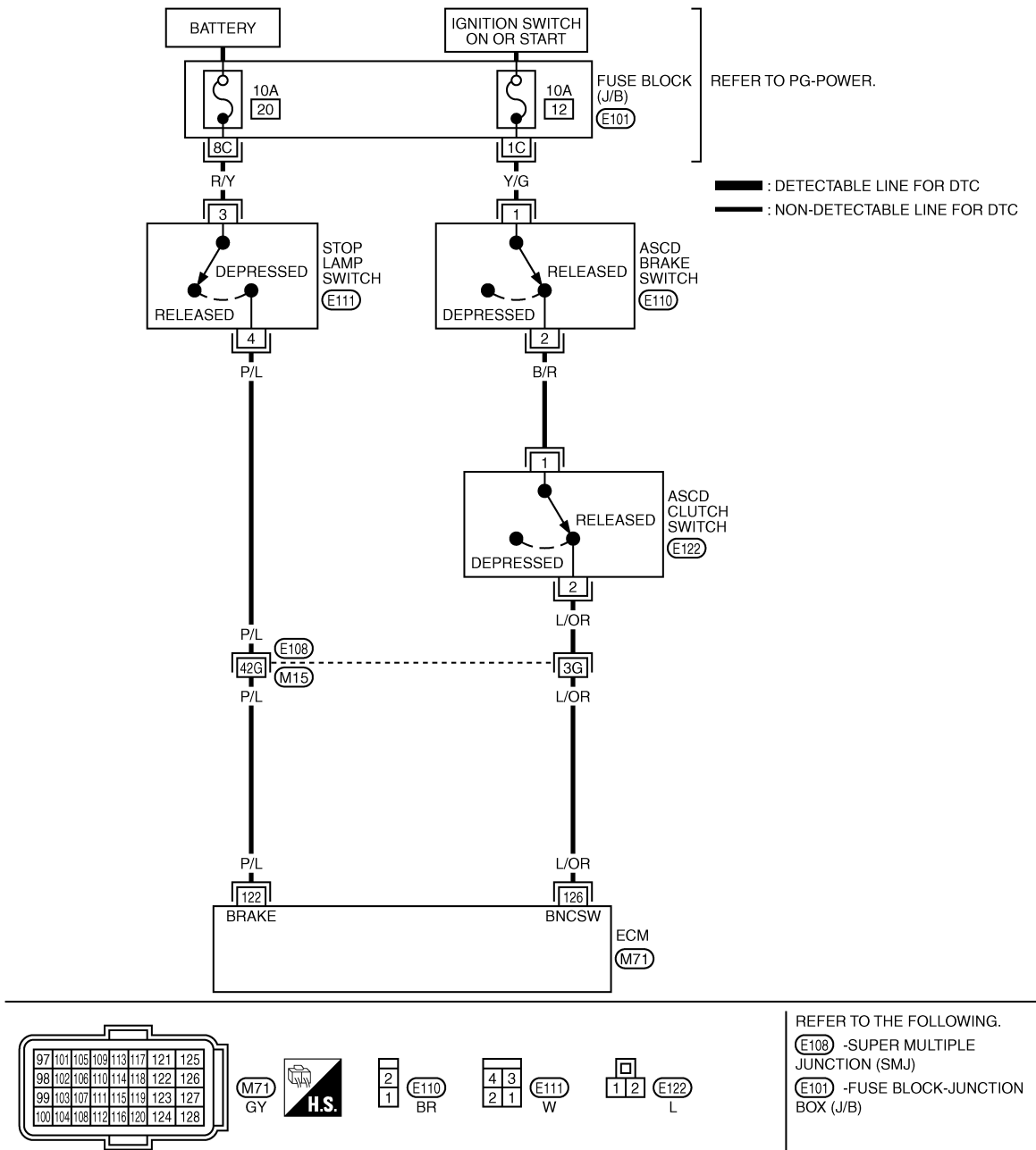
L

M

N

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P



TBWT1676E

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)
122	P/L	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
126	L/OR	ASCD brake switch	[Ignition switch: ON] • Brake pedal and/or clutch pedal: Slightly depressed	0V
			[Ignition switch: ON] • Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:000000001646033

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 126 and ground under the following conditions.

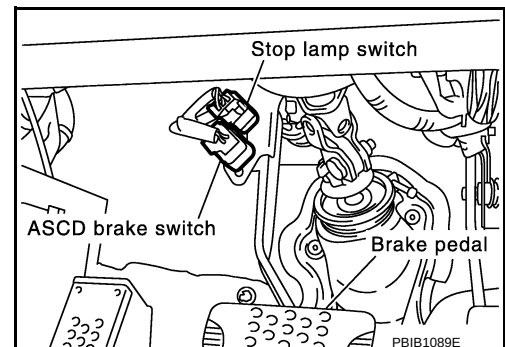
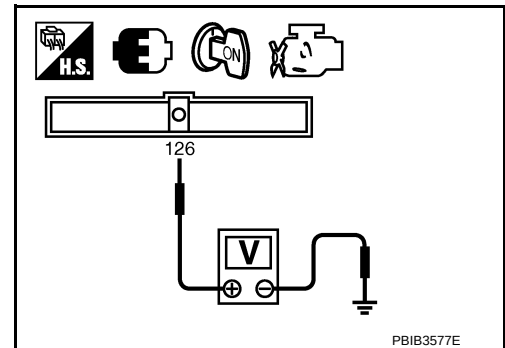
CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



ASCD BRAKE SWITCH

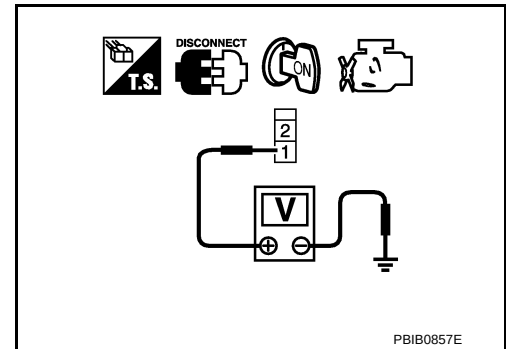
< SERVICE INFORMATION >

4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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.

4.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 126 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 >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD brake switch

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

6.CHECK ASCD BRAKE SWITCH

Refer to [EC-628. "Component Inspection"](#)

OK or NG

- OK >> GO TO 7.
NG >> Replace ASCD brake switch.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-134.](#)

>> **INSPECTION END**

M/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW1" indication under the following conditions.

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

CONDITION	INDICATION
Brake pedal and/or clutch pedal: Slightly depressed	OFF
Brake pedal and clutch pedal: Fully released	ON

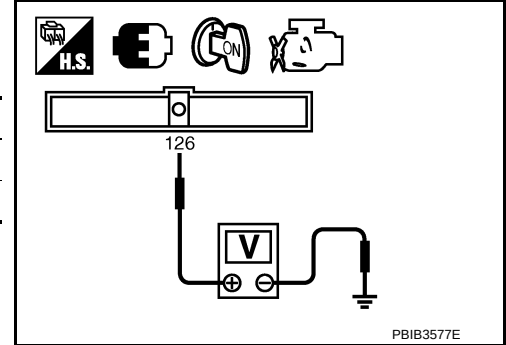
⊗ Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 126 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V
Brake pedal and clutch pedal: Fully released	Battery voltage

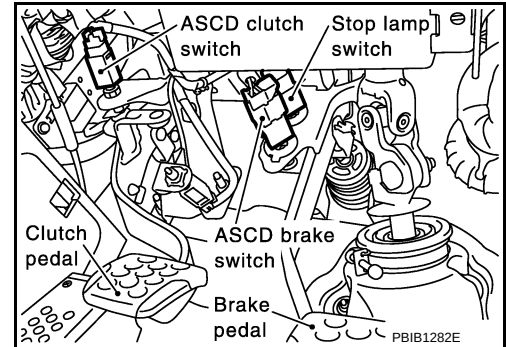
OK or NG

- OK >> **INSPECTION END**
 NG >> GO TO 2.



2.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

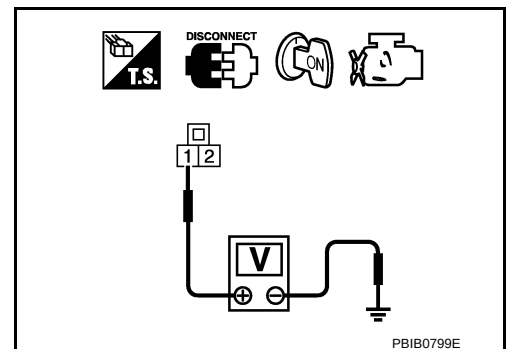


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

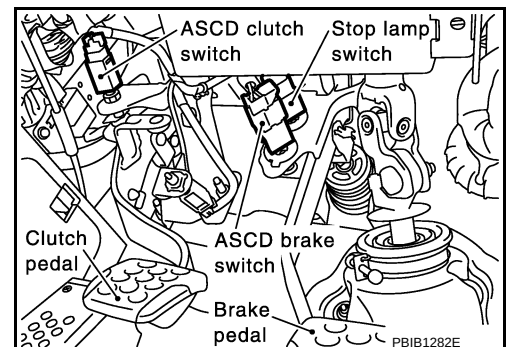
OK or NG

- OK >> GO TO 7.
 NG >> GO TO 3.



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.



ASCD BRAKE SWITCH

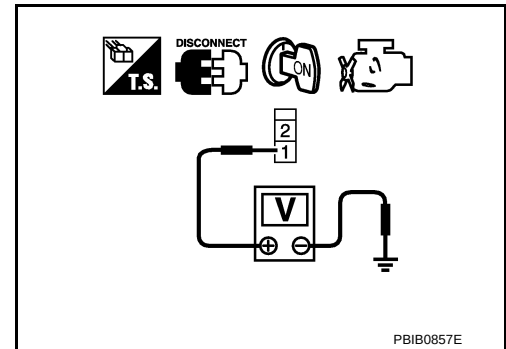
< SERVICE INFORMATION >

4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

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



4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 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. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch 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 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-628. "Component Inspection"](#)

OK or NG

- OK >> GO TO 10.
NG >> Replace ASCD brake switch.

7.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD clutch switch terminal 2 and ECM terminal 126. 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 >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD clutch switch

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

9.CHECK ASCD CLUTCH SWITCH

ASCD BRAKE SWITCH

< SERVICE INFORMATION >

Refer to [EC-628, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

NG >> Replace ASCD clutch switch.

10.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> INSPECTION END

Component Inspection

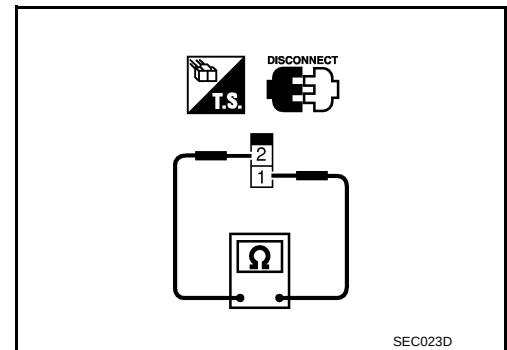
INFOID:000000001646034

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check 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-7](#), and perform step 3 again.

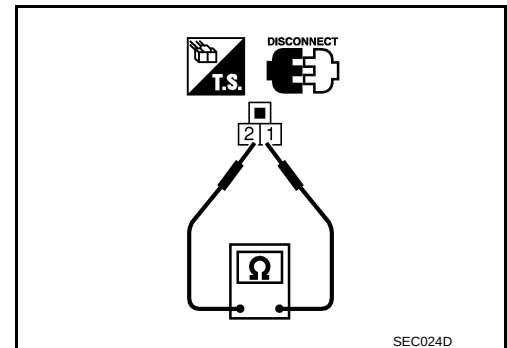


ASCD CLUTCH SWITCH (M/T MODELS)

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to [CL-5](#), and perform step 3 again.



ASCD INDICATOR

< SERVICE INFORMATION >

ASCD INDICATOR

Component Description

INFOID:000000001646035

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE, SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.

Refer to [EC-28](#) for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001646036

Specification data are reference value.

MONITOR ITEM	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 (89MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

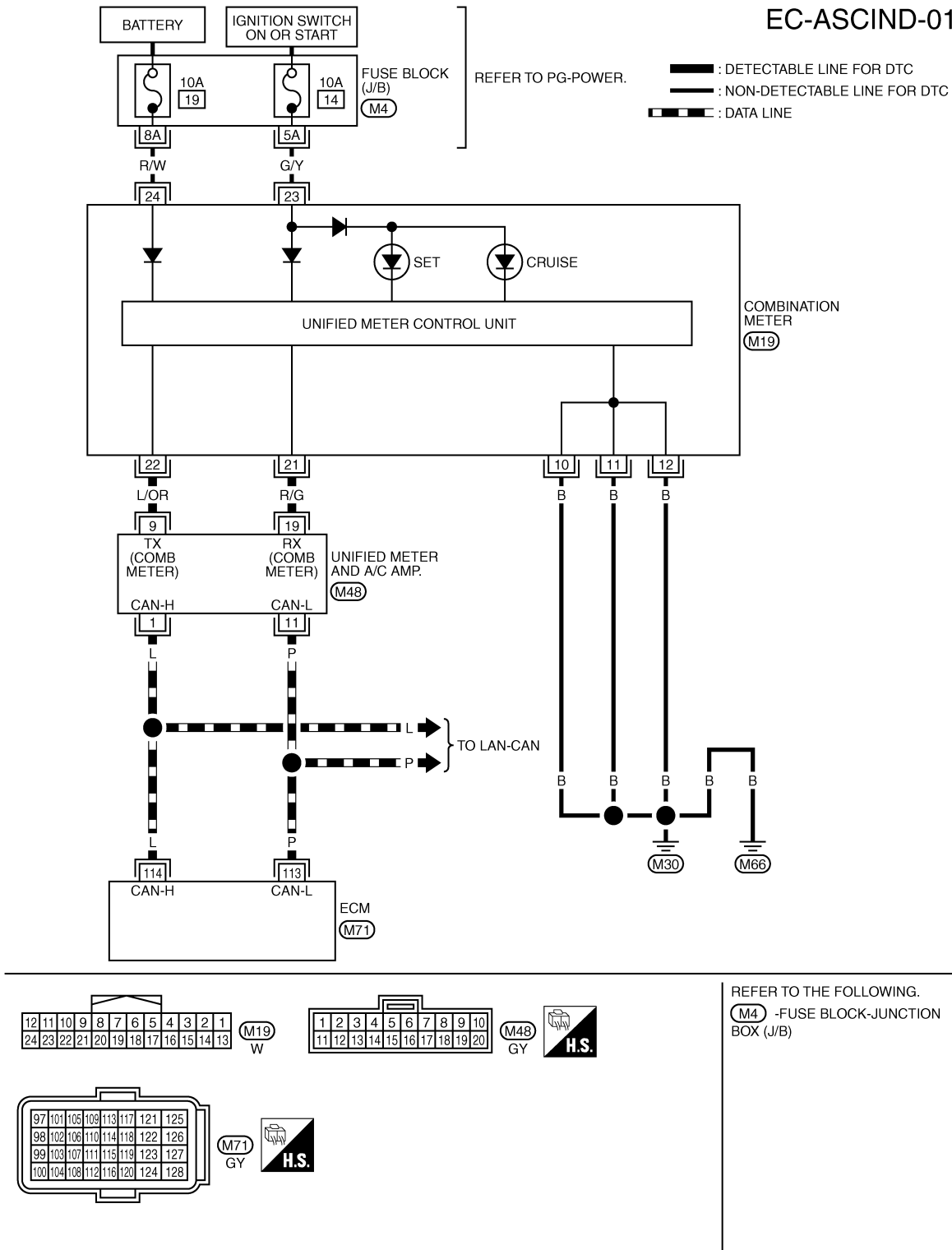
ASCD INDICATOR

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646037

EC-ASCIND-01



TBWT1677E

Diagnosis Procedure

INFOID:000000001646038

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

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 diagnoses for DTC U1000, U1001. Refer to [EC-144](#).

3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to [DI-44, "CONSULT-III Function \(METER/M&A\)"](#).

OK or NG

OK >> GO TO 4.

NG >> Go to [DI-49, "DTC \[B2202\] Meter Communication Circuit"](#).

4.CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

ELECTRICAL LOAD SIGNAL

Description

INFOID:000000001646039

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-III Reference Value in Data Monitor Mode

INFOID:000000001646040

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF

Diagnosis Procedure

INFOID:000000001646041

1.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Connect CONSULT-III and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

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.

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.

3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-III

Check "HEATER FAN SW" in "DATA MONITOR" mode with CONSULT-III under the following conditions.

Condition	Indication
Heater fan: Operating	ON
Heater fan: Not operating	OFF

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 6.

ELECTRICAL LOAD SIGNAL

< SERVICE INFORMATION >

4.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to [GW-51](#).

>> INSPECTION END

5.CHECK HEADLAMP SYSTEM

Refer to [LT-5](#) or [LT-31](#).

>> INSPECTION END

6.CHECK HEATER FAN CONTROL SYSTEM

Refer to [ATC-28](#).

>> INSPECTION END

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FUEL INJECTOR

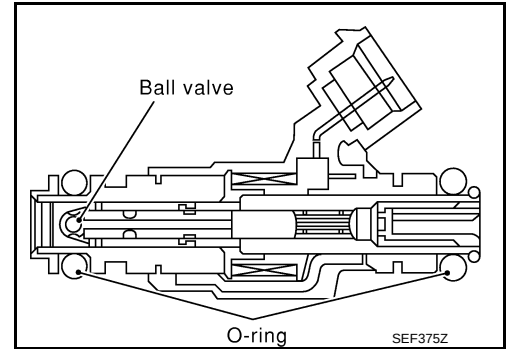
< SERVICE INFORMATION >

FUEL INJECTOR

Component Description

INFOID:000000001646042

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 fuel 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-III Reference Value in Data Monitor Mode

INFOID:000000001646043

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-126 .		
INJ PULSE-B1 INJ PULSE-B2	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) position • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

FUEL INJECTOR

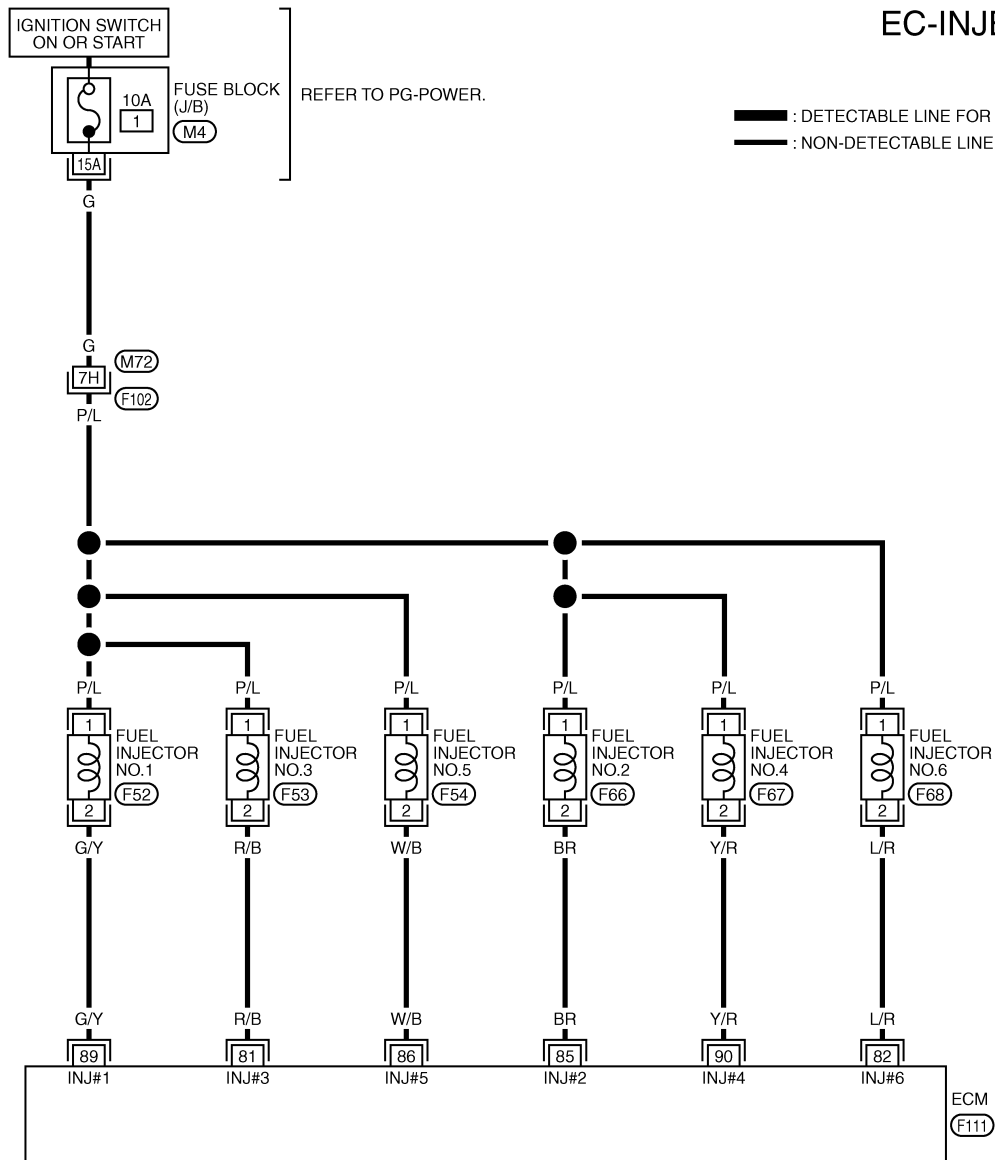
< SERVICE INFORMATION >

Wiring Diagram

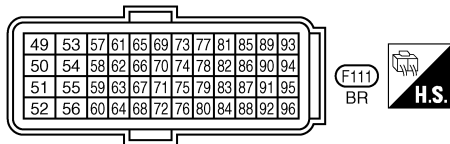
INFOID:000000001646044

EC-INJECT-01

EC



2 1 F52, F53, F54, F66, F67, F68
GY GY GY GY GY GY



REFER TO THE FOLLOWING.

(F102) -SUPER MULTIPLE JUNCTION (SMJ)

(M4) -FUSE BLOCK-JUNCTION BOX (J/B)

TBWT1678E

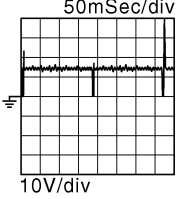
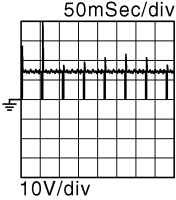
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

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)
81	R/B	Fuel injector No. 3	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★ 
82	L/R	Fuel injector No. 6		
85	BR	Fuel injector No. 2		
86	W/B	Fuel injector No. 5		
89	G/Y	Fuel injector No. 1		
90	Y/R	Fuel injector No. 4	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

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

Diagnosis Procedure

INFOID:000000001646045

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-III

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

ⓧ Without CONSULT-III

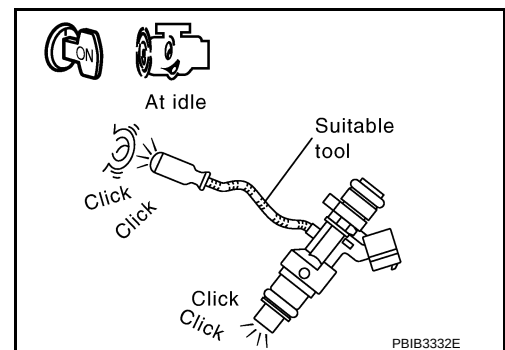
1. Start engine and let it idle.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

OK or NG

OK >> INSPECTION END.

NG >> GO TO 3.



3. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

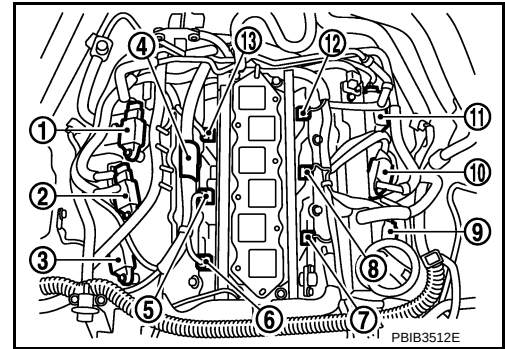
1. Turn ignition switch OFF.

FUEL INJECTOR

< SERVICE INFORMATION >

2. Disconnect fuel injector harness connector.

- 1 : Ignition coil No.5 (with power transistor)
- 2 : Ignition coil No.3 (with power transistor)
- 3 : Ignition coil No.1 (with power transistor)
- 4 : Condenser
- 5 : Fuel injector No.3
- 6 : Fuel injector No.1
- 7 : Fuel injector No.2
- 8 : Fuel injector No.4
- 9 : Ignition coil No.2 (with power transistor)
- 10 : Ignition coil No.4 (with power transistor)
- 11 : Ignition coil No.6 (with power transistor)
- 12 : Fuel injector No.6
- 13 : Fuel injector No.5



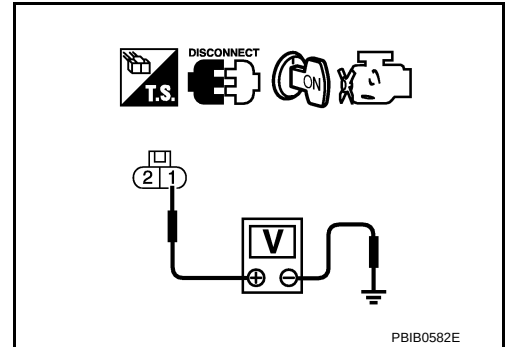
3. Turn ignition switch ON.

4. Check voltage between fuel injector terminal 1 and ground with CONSULT-III 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 M72, F102
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between fuel injector and fuse

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

5.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between fuel injector terminal 2 and ECM terminals 81, 82, 85, 86, 89, 90. 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 FUEL INJECTOR

Refer to [EC-638. "Component Inspection"](#).

OK or NG

- OK >> GO TO 7.
- NG >> Replace malfunctioning fuel injector.

7.CHECK INTERMITTENT INCIDENT

FUEL INJECTOR

< SERVICE INFORMATION >

Refer to [EC-134](#).

>> INSPECTION END

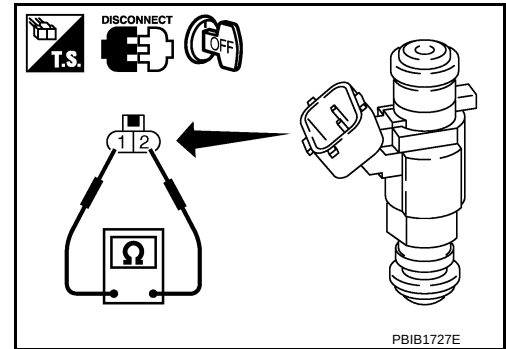
Component Inspection

INFOID:0000000001646046

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.3Ω [at 10 - 60°C (50 - 140°F)]



INFOID:0000000001646047

Removal and Installation

FUEL INJECTOR

Refer to [EM-35](#).

FUEL PUMP

< SERVICE INFORMATION >

FUEL PUMP

Description

INFOID:000000001646048

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.

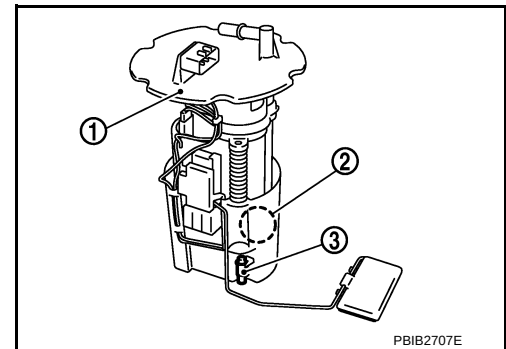
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal 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: ON	Operates for 1 second.
Engine running or cranking	Operates.
Engine: 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.

- 1 : Fuel level sensor unit and fuel pump
- 2 : Fuel pressure regulator
- 3 : Fuel tank temperature sensor



CONSULT-III Reference Value in Data Monitor Mode

INFOID:000000001646049

Specification data are reference values.

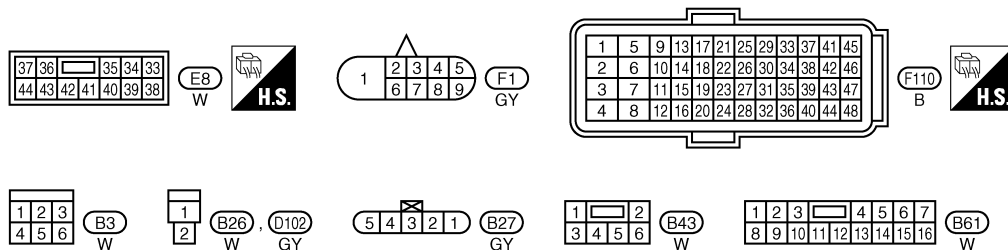
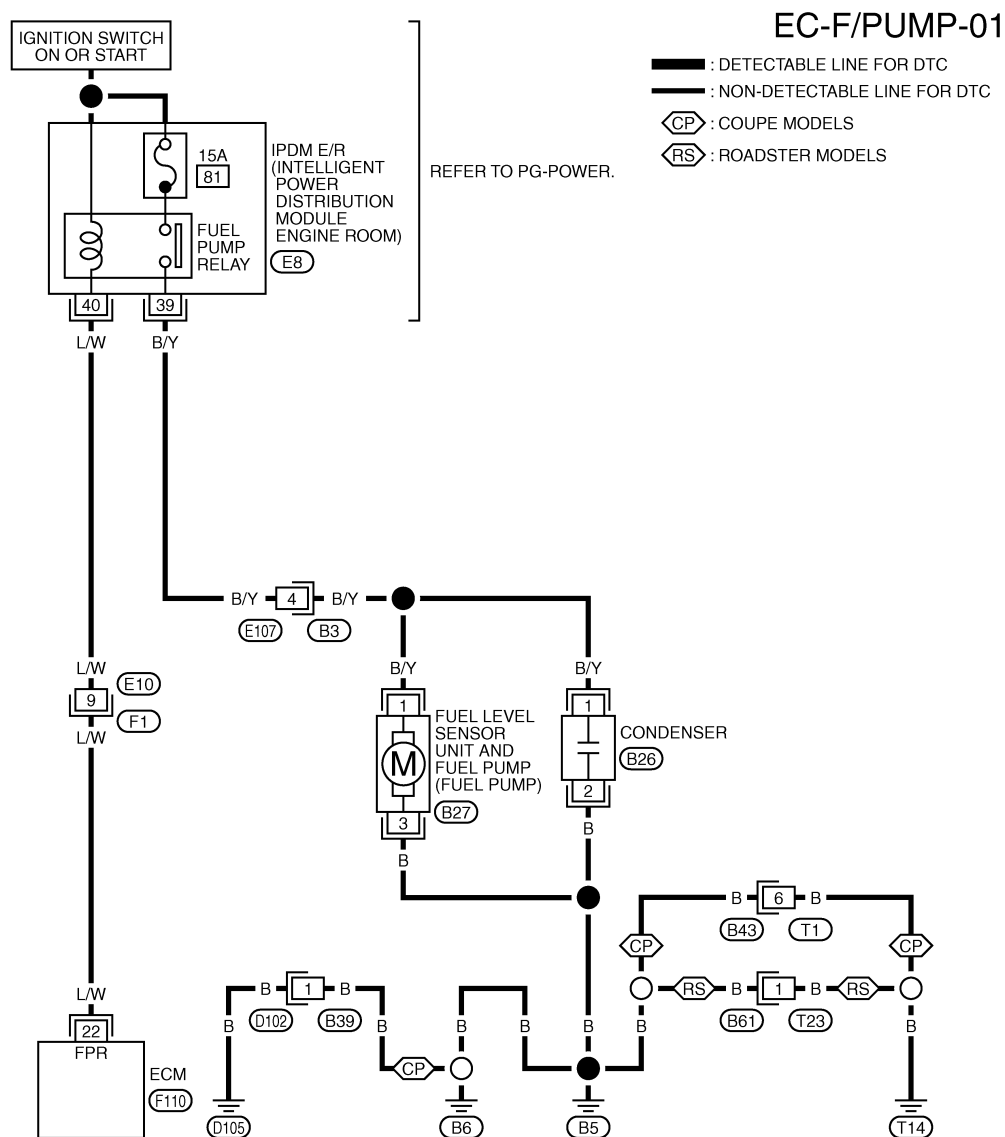
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking	ON
	• Except above conditions	OFF

FUEL PUMP

< SERVICE INFORMATION >

Wiring Diagram

INFOID:0000000001646050



TBWT1679E

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)
22	L/W	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:0000000001646051

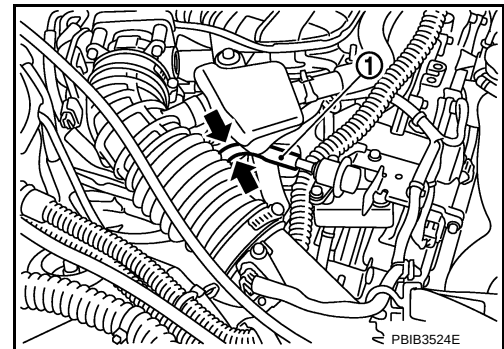
1.CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

- OK >> **INSPECTION END**
NG >> GO TO 2.



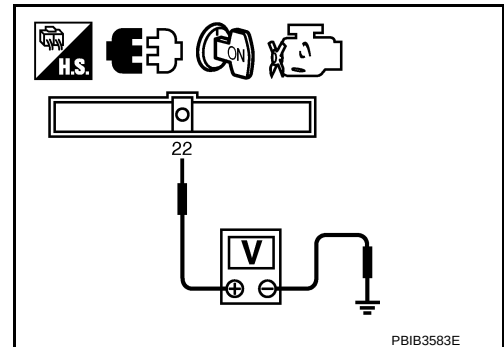
2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 22 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 5.
NG >> GO TO 3.



3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Disconnect IPDM E/R harness connector E8.
2. Check harness continuity between IPDM E/R terminal 40 and ECM terminal 22. 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 15.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between IPDM E/R and ECM

FUEL PUMP

< SERVICE INFORMATION >

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

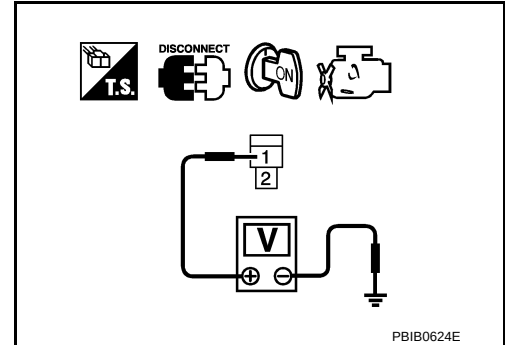
5. CHECK CONDENSER POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect condenser harness connector.
4. Turn ignition switch ON.
5. Check voltage between condenser terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

- OK >> GO TO 9.
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 POWER SUPPLY CIRCUIT-II

1. Disconnect IPDM E/R harness connector E8.
2. Check harness continuity between IPDM E/R terminal 39 and condenser 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 15.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E107, B3
- Harness for open or short between IPDM E/R and condenser

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

9. CHECK CONDENSER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser 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 11.
NG >> GO TO 10

FUEL PUMP

< SERVICE INFORMATION >

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B43, T1 (Coupe models)
- Harness connectors B39, D102 (Coupe models)
- Harness connectors B61, T23 (Roadster models)
- Harness for open or short between condenser and ground

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

11.CHECK CONDENSER

Refer to [EC-643, "Component Inspection"](#).

OK or NG

- OK >> GO TO 12.
NG >> Replace condenser.

12.CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Disconnect harness connectors E107, B3.
3. Check harness continuity between the following;
"fuel level sensor unit and fuel pump" terminal 1 and harness connector B3 terminal 4,
"fuel level sensor unit and fuel pump" terminal 3 and ground.
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 14.
NG >> GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector B3
- Harness connectors B43, T1 (Coupe models)
- Harness connectors B39, D102 (Coupe models)
- Harness connectors B61, T23 (Roadster models)
- Harness for open or short between "fuel level sensor unit and fuel pump" and harness connector B3
- Harness for open or short between "fuel level sensor unit and fuel pump" and ground

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

14.CHECK FUEL PUMP

Refer to [EC-643, "Component Inspection"](#).

OK or NG

- OK >> GO TO 15.
NG >> Replace "fuel level sensor unit and fuel pump".

15.CHECK INTERMITTENT INCIDENT

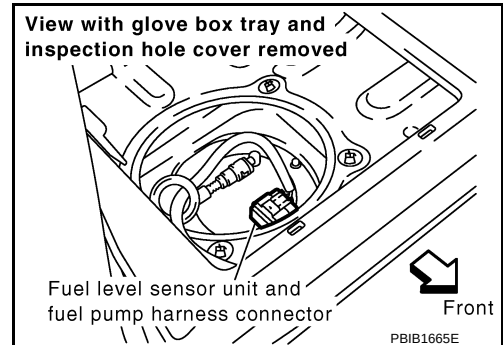
Refer to [EC-134](#).

OK or NG

- OK >> Replace IPDM E/R.
NG >> Repair or replace harness or connectors.

Component Inspection

FUEL PUMP

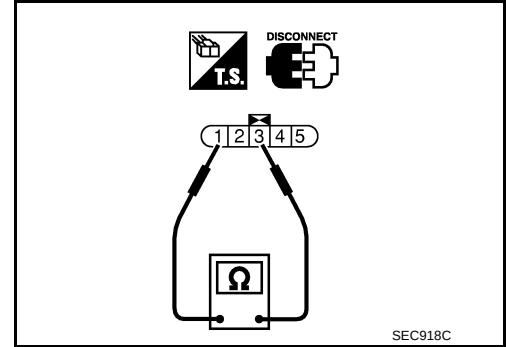


FUEL PUMP

< SERVICE INFORMATION >

1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
2. Check resistance between "fuel level sensor unit and fuel pump" terminals 1 and 3.

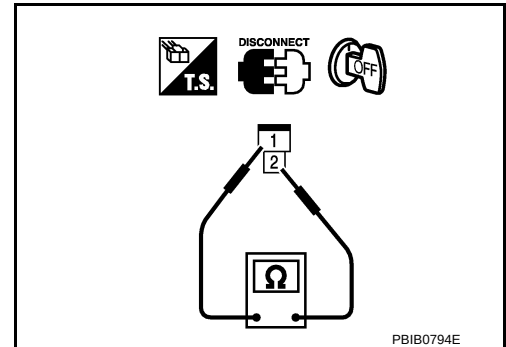
Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]



CONDENSER

1. Disconnect condenser harness connector.
2. Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 MΩ [at 25°C (77°F)]



INFOID:000000001646053

Removal and Installation

FUEL PUMP

Refer to [FL-4](#).

IGNITION SIGNAL

< SERVICE INFORMATION >

IGNITION SIGNAL

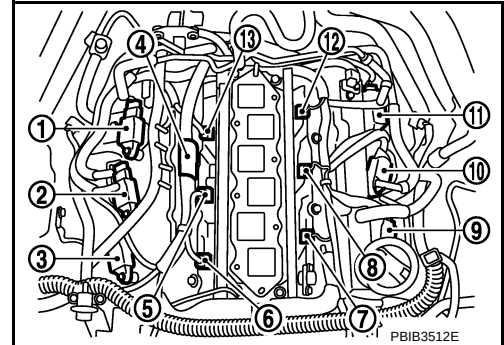
Component Description

INFOID:000000001646054

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 coil No.5 (with power transistor)
- 2 : Ignition col No.3 (with power transistor)
- 3 : Ignition coil No.1 (with power transistor)
- 4 : Condenser
- 5 : Fuel injector No.3
- 6 : Fuel injector No.1
- 7 : Fuel injector No.2
- 8 : Fuel injector No.4
- 9 : Ignition coil No.2 (with power transistor)
- 10 : Ignition coil No.4 (with power transistor)
- 11 : Ignition coil No.6 (with power transistor)
- 12 : Fuel injector No.6
- 13 : Fuel injector No.5



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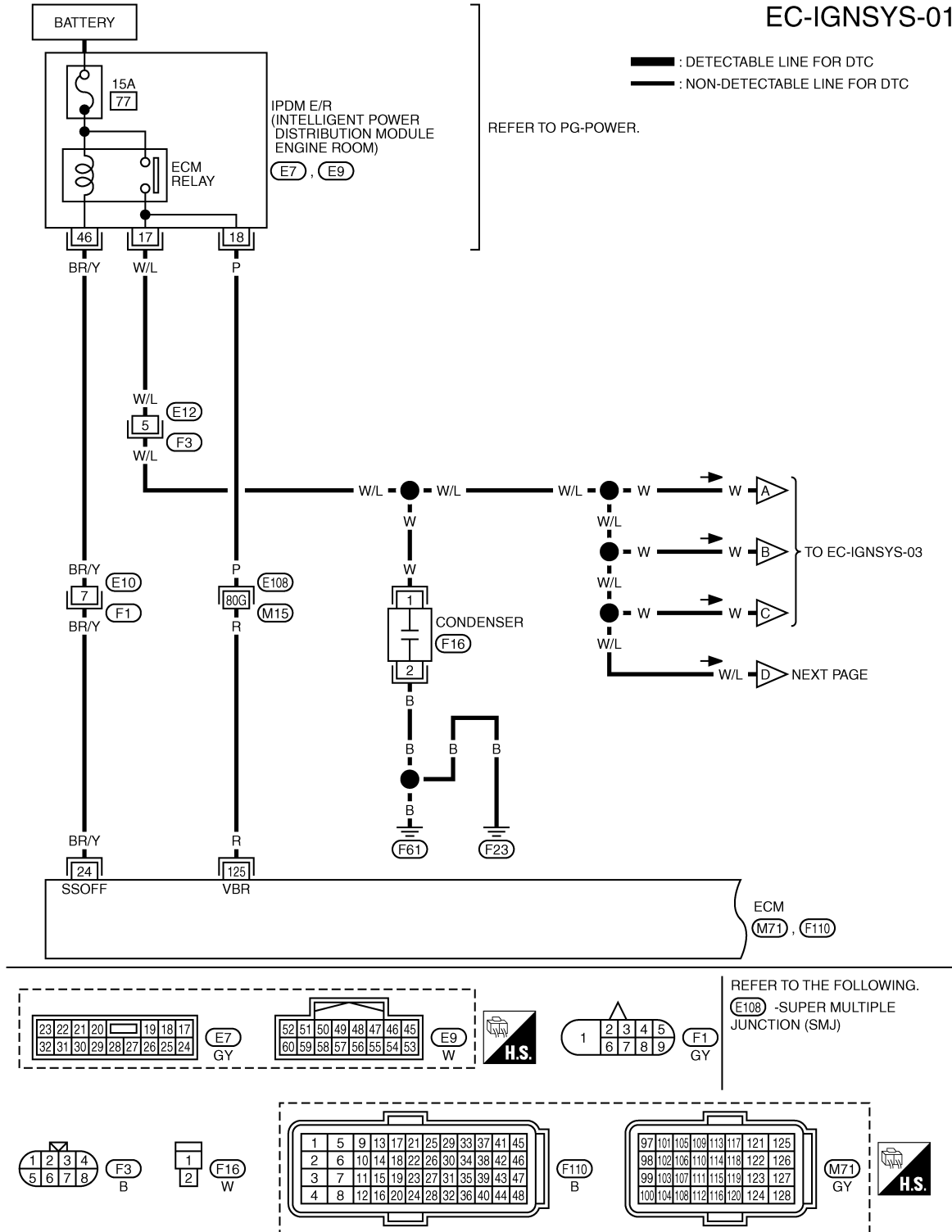
IGNITION SIGNAL

< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646055

EC-IGNSYS-01



TBWT1680E

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)
24	BR/Y	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)
125	R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

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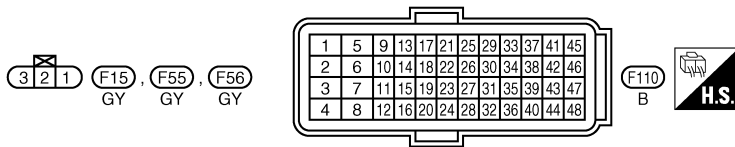
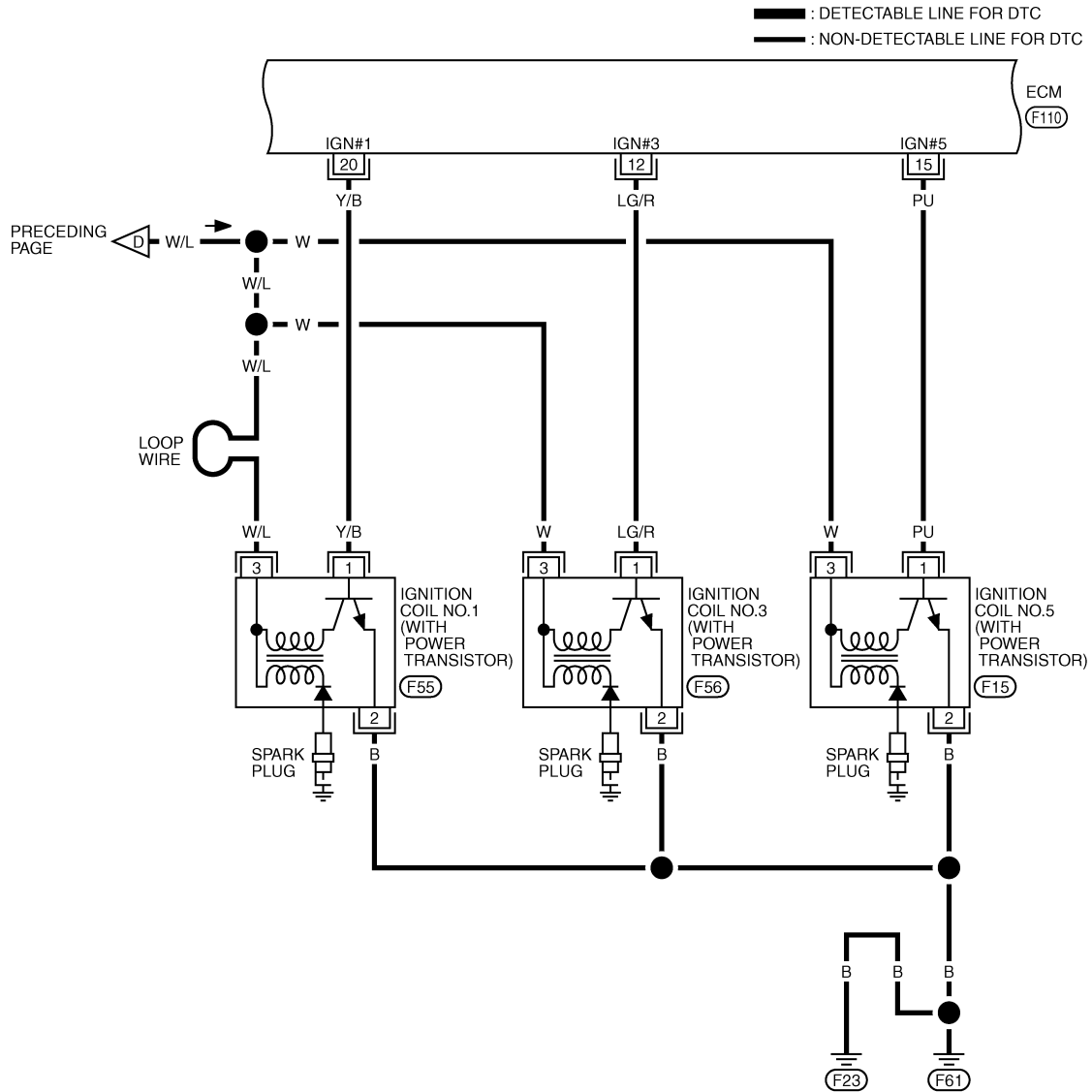
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IGNITION SIGNAL

< SERVICE INFORMATION >

EC-IGNSYS-02



TBWT1681E

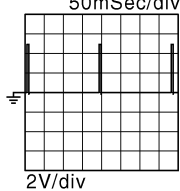
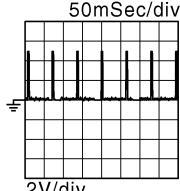
Specification data are reference values and are measured between each terminal and ground.
 Pulse signal is measured by CONSULT-III.

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 >

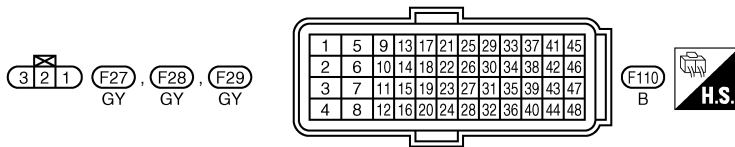
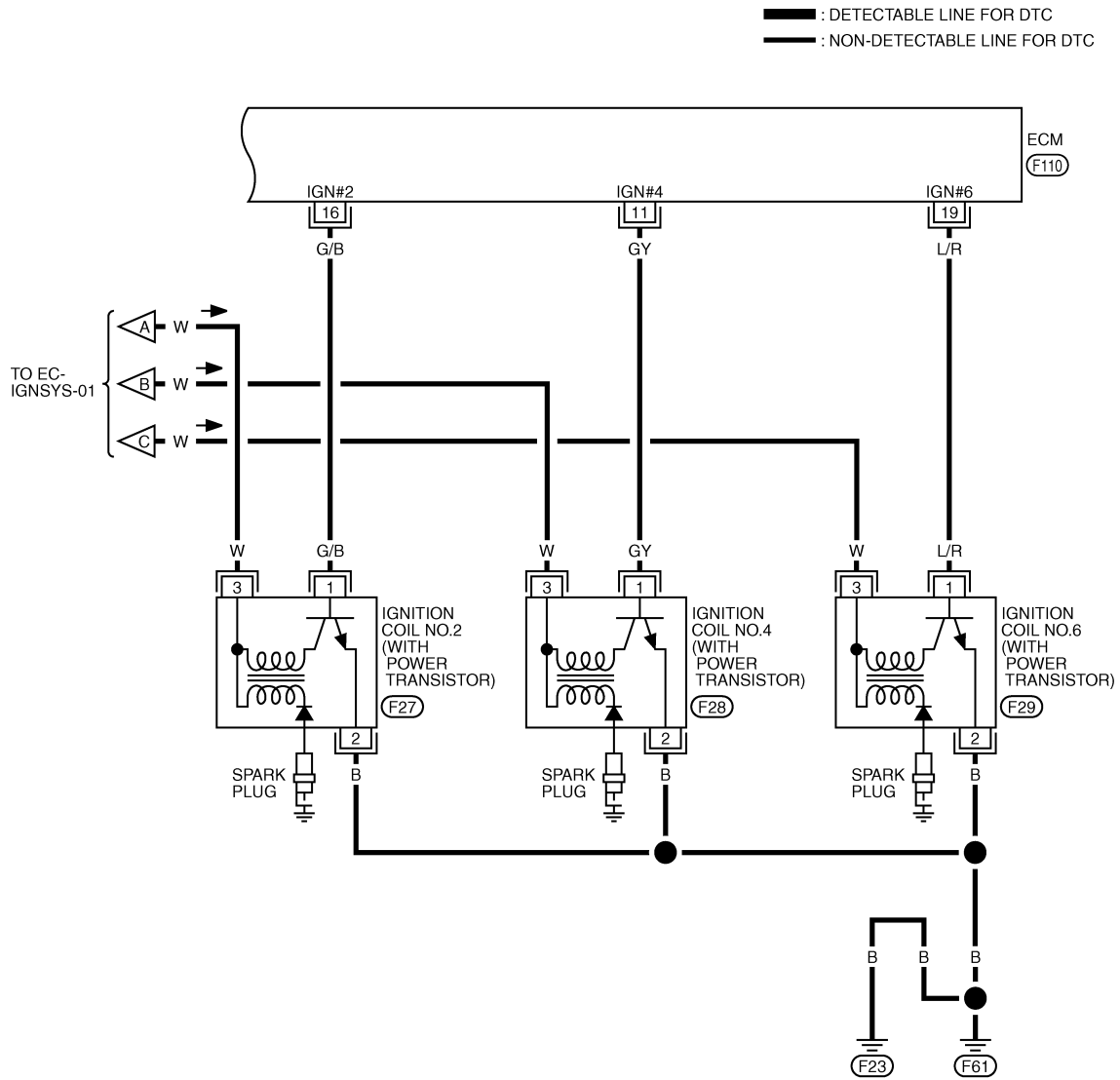
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12 15 20	LG/R PU Y/B	Ignition signal No. 3 Ignition signal No. 5 Ignition signal No. 1	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  PBIB3543E
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4V★  PBIB3544E

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

IGNITION SIGNAL

< SERVICE INFORMATION >

EC-IGNSYS-03



TBWT1682E

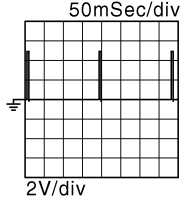
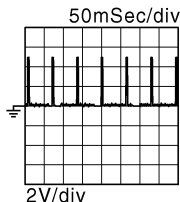
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

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)
11 16 19	GY G/B L/R	Ignition signal No. 4 Ignition signal No. 2 Ignition signal No. 6	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  50mSec/div 2V/div PBIB3543E
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4V★  50mSec/div 2V/div PBIB3544E

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

Diagnosis Procedure

INFOID:000000001646056

1.CHECK ENGINE START

Turn ignition switch OFF and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT-III)>>GO TO 2.

Yes (Without CONSULT-III)>>GO TO 3.

No >> GO TO 4.

2.CHECK OVERALL FUNCTION

With CONSULT-III

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.

2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3.CHECK OVERALL FUNCTION

Without CONSULT-III

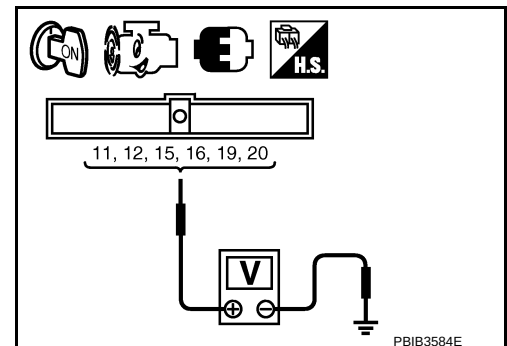
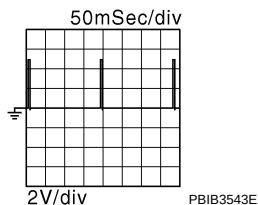
1. Let engine idle.

2. Read the voltage signal between ECM terminals 11, 12, 15, 16, 19, 20 and ground with an oscilloscope.

3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:

The pulse cycle changes depending on rpm at idle.



OK or NG

IGNITION SIGNAL

< SERVICE INFORMATION >

- OK >> **INSPECTION END**
NG >> GO TO 10.

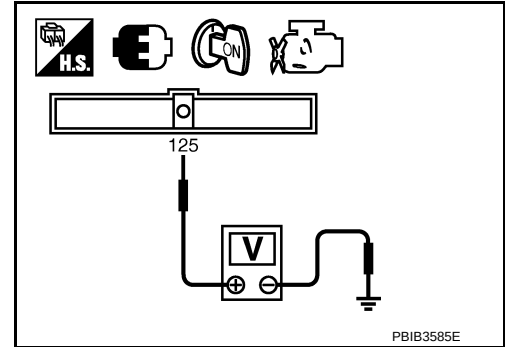
4.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 125 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

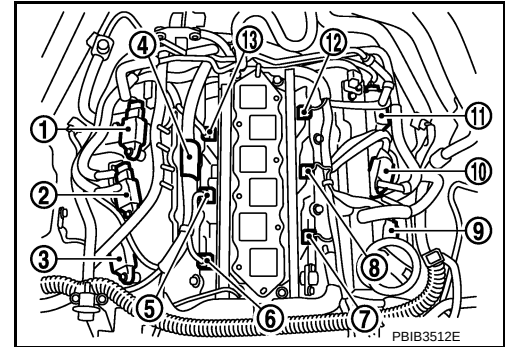
- OK >> GO TO 5.
NG >> Go to [EC-135](#).



5.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

- 1 : Ignition coil No.5 (with power transistor)
- 2 : Ignition coil No.3 (with power transistor)
- 3 : Ignition coil No.1 (with power transistor)
- 4 : Condenser
- 5 : Fuel injector No.3
- 6 : Fuel injector No.1
- 7 : Fuel injector No.2
- 8 : Fuel injector No.4
- 9 : Ignition coil No.2 (with power transistor)
- 10 : Ignition coil No.4 (with power transistor)
- 11 : Ignition coil No.6 (with power transistor)
- 12 : Fuel injector No.6
- 13 : Fuel injector No.5

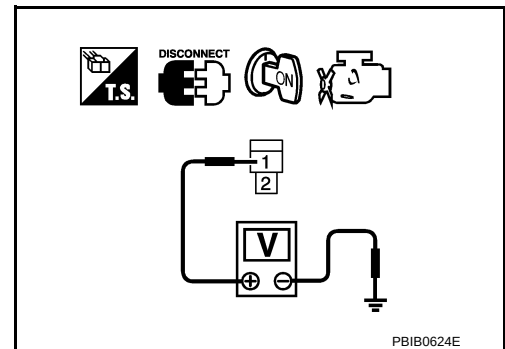


3. Turn ignition switch ON.
4. Check voltage between condenser terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 8.
NG >> GO TO 6.



6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E7.
3. Check harness continuity between IPDM E/R terminal 17 and condenser 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 14.

IGNITION SIGNAL

< SERVICE INFORMATION >

NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between IPDM E/R and condenser

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

8.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser 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

Refer to [EC-654, "Component Inspection"](#).

OK or NG

OK >> GO TO 10.

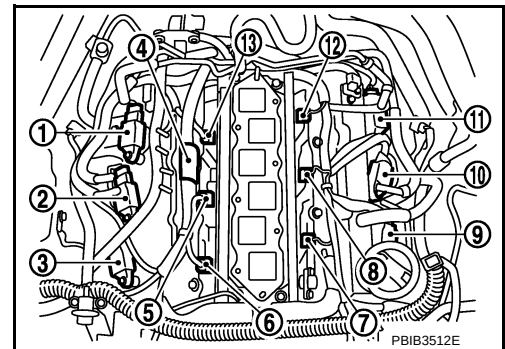
NG >> Replace condenser.

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 coil No.5 (with power transistor)
- 2 : Ignition coil No.3 (with power transistor)
- 3 : Ignition coil No.1 (with power transistor)
- 4 : Condenser
- 5 : Fuel injector No.3
- 6 : Fuel injector No.1
- 7 : Fuel injector No.2
- 8 : Fuel injector No.4
- 9 : Ignition coil No.2 (with power transistor)
- 10 : Ignition coil No.4 (with power transistor)
- 11 : Ignition coil No.6 (with power transistor)
- 12 : Fuel injector No.6
- 13 : Fuel injector No.5

4. Turn ignition switch ON.



IGNITION SIGNAL

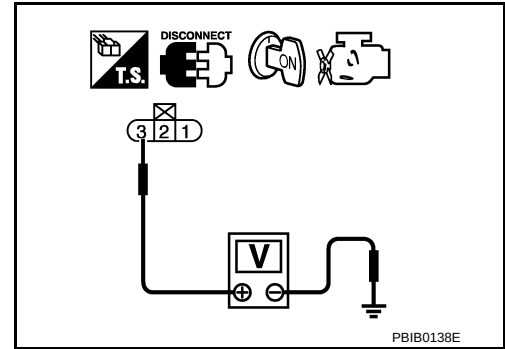
< SERVICE INFORMATION >

5. Check voltage between ignition coil terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

- OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



11. 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 12.
NG >> Repair open circuit or short to power in harness or connectors.

12. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 11, 12, 15, 16, 19, 20 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 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to [EC-654, "Component Inspection"](#).

OK or NG

- OK >> GO TO 14.
NG >> Replace malfunctioning ignition coil with power transistor.

14. CHECK INTERMITTENT INCIDENT

Refer to [EC-134](#).

OK or NG

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

Component Inspection

INFOID:000000001646057

IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

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.

IGNITION SIGNAL

< SERVICE INFORMATION >

3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
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 IPDM E/R to release fuel pressure.
NOTE:
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
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 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 part.

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 17 mm or more is taken.

NOTE:

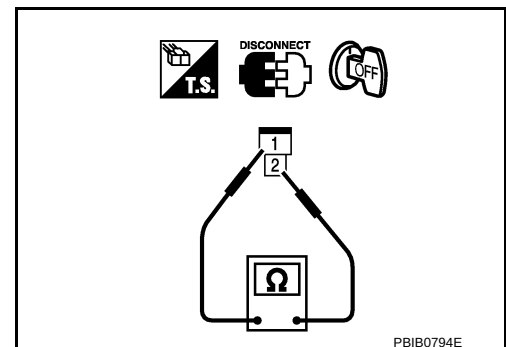
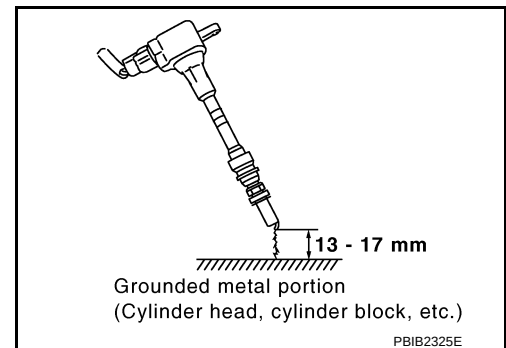
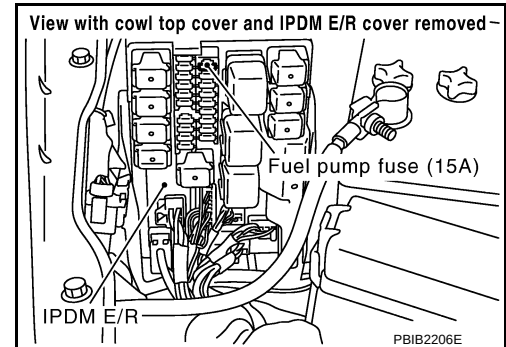
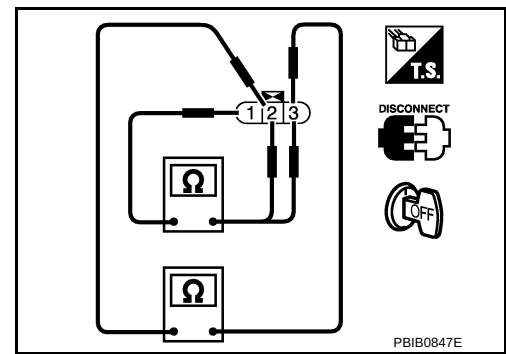
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

17. If NG, Replace ignition coil with power transistor.

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 M Ω [at 25°C (77°F)]



IGNITION SIGNAL

< SERVICE INFORMATION >

Removal and Installation

INFOID:000000001646058

IGNITION COIL WITH POWER TRANSISTOR

Refer to [EM-32](#).

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

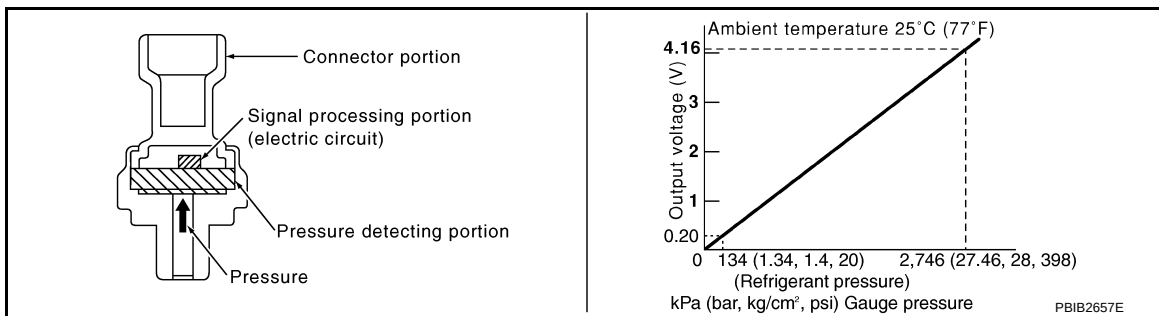
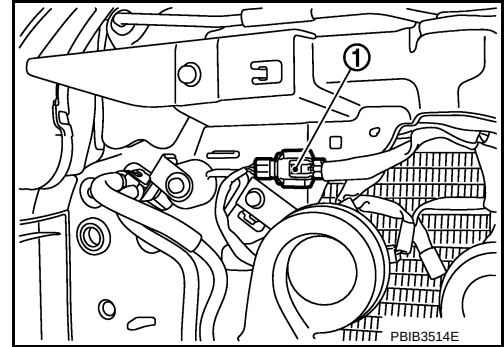
REFRIGERANT PRESSURE SENSOR

Component Description

INFOID:000000001646059

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.

1 : Refrigerant pressure sensor harness connector



REFRIGERANT PRESSURE SENSOR

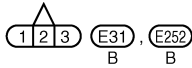
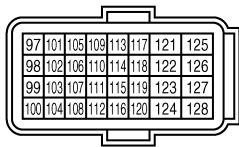
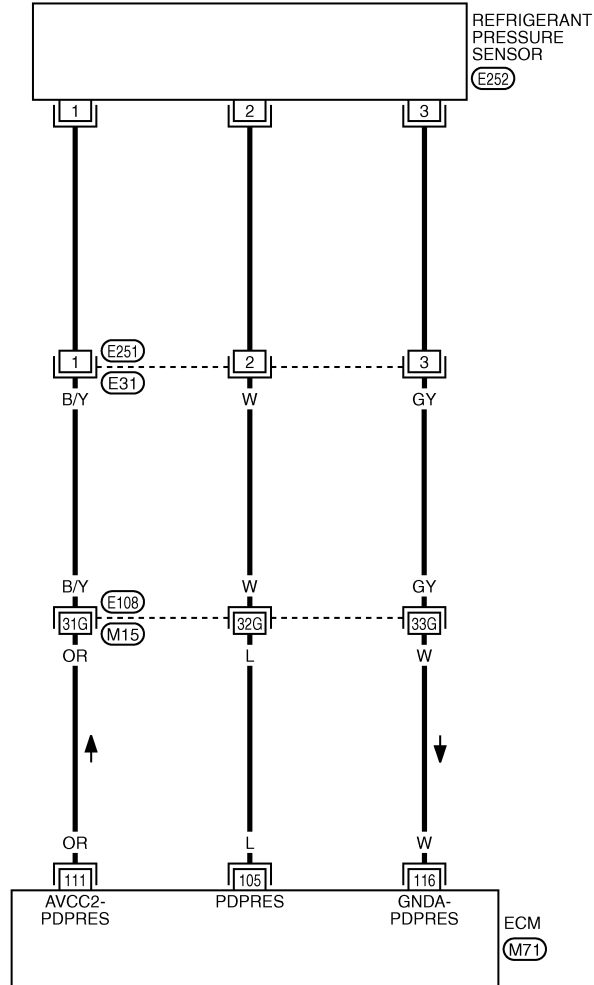
< SERVICE INFORMATION >

Wiring Diagram

INFOID:000000001646060

EC-RP/SEN-01

— : DETECTABLE LINE FOR DTC
 — : NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE JUNCTION (SMJ)

TBWT1683E

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)
105	L	Refrigerant pressure sensor	[Engine is running] • Warm-up condition • Both A/C switch and blower switch: ON (Compressor operates.)	1.0 - 4.0V
111	OR	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	5V
116	W	Sensor ground (Refrigerant pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	0V

Diagnosis Procedure

INFOID:000000001646061

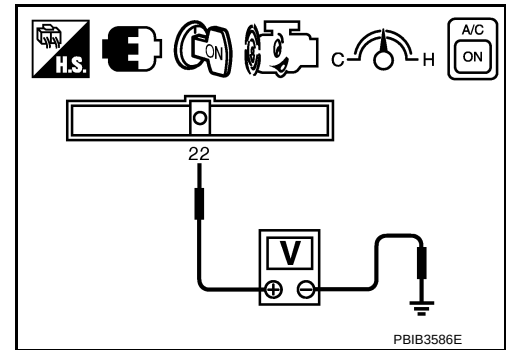
1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.

Voltage: 1.0 - 4.0V

OK or NG

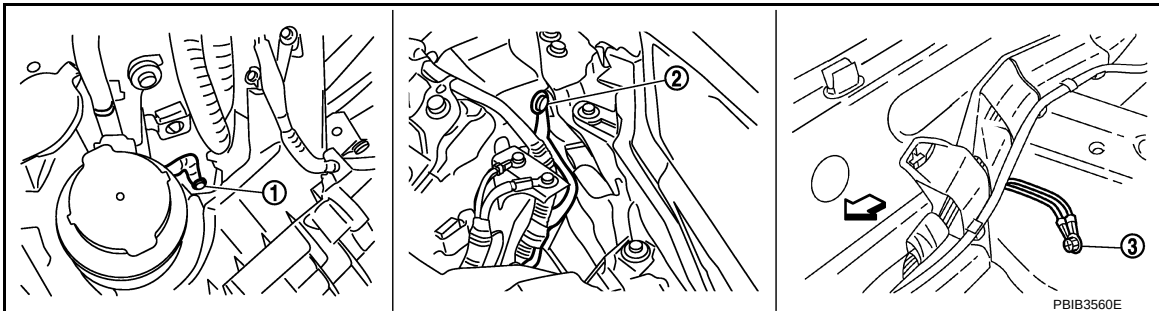
- OK >> **INSPECTION END**
NG >> GO TO 2.



2.CHECK GROUND CONNECTIONS

Models with VDC system, navigation system or telephone

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .



1. Body ground E17

2. Body ground E43

3. Body ground B102

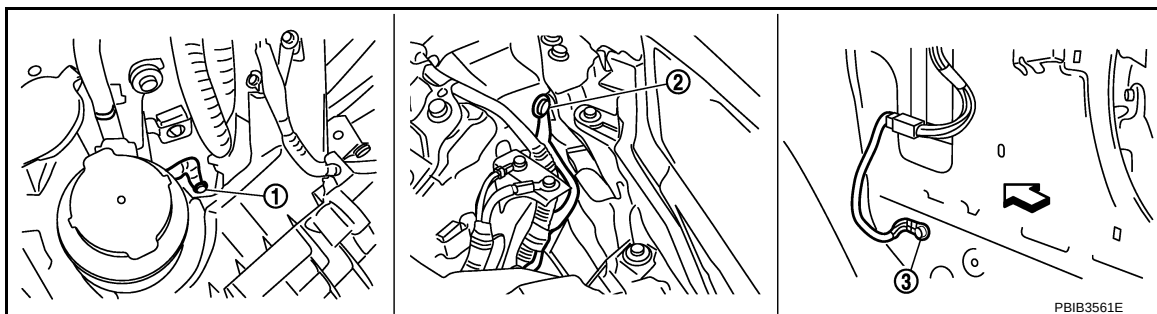
↶ Vehicle front

Models without VDC system, navigation system and telephone

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Loosen and retighten ground screws on the body. Refer to [EC-142, "Ground Inspection"](#) .

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >



1. Body ground E17

2. Body ground E43

3. Body ground F152
(Passenger side view with dash side
finisher removed)

← Vehicle front

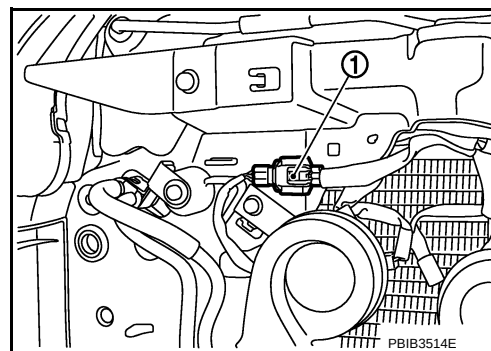
OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector (1).
2. Turn ignition switch ON.



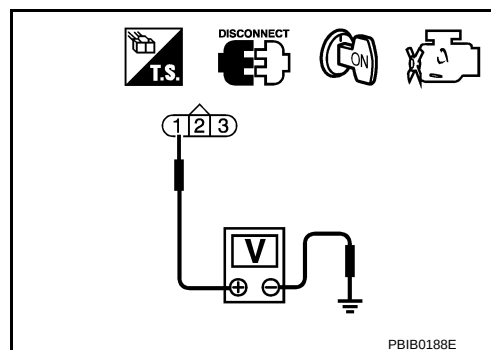
3. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E251, E31
- 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.

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 116.
Refer to Wiring Diagram.

REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

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 E251, E31
- 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 105 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

OK >> GO TO 9.

NG >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E251, E31
- 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-134](#).

OK or NG

OK >> Replace refrigerant pressure sensor.

NG >> Repair or replace.

Removal and Installation

INFOID:0000000001646062

REFRIGERANT PRESSURE SENSOR

Refer to [ATC-120, "Removal and Installation of Refrigerant Pressure Sensor"](#).

A

EC

C

D

E

F

G

H

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K

L

M

N

O

P

MIL AND DATA LINK CONNECTOR

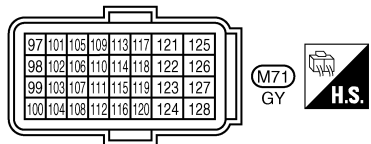
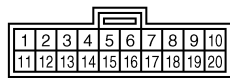
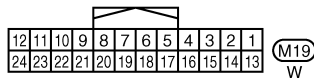
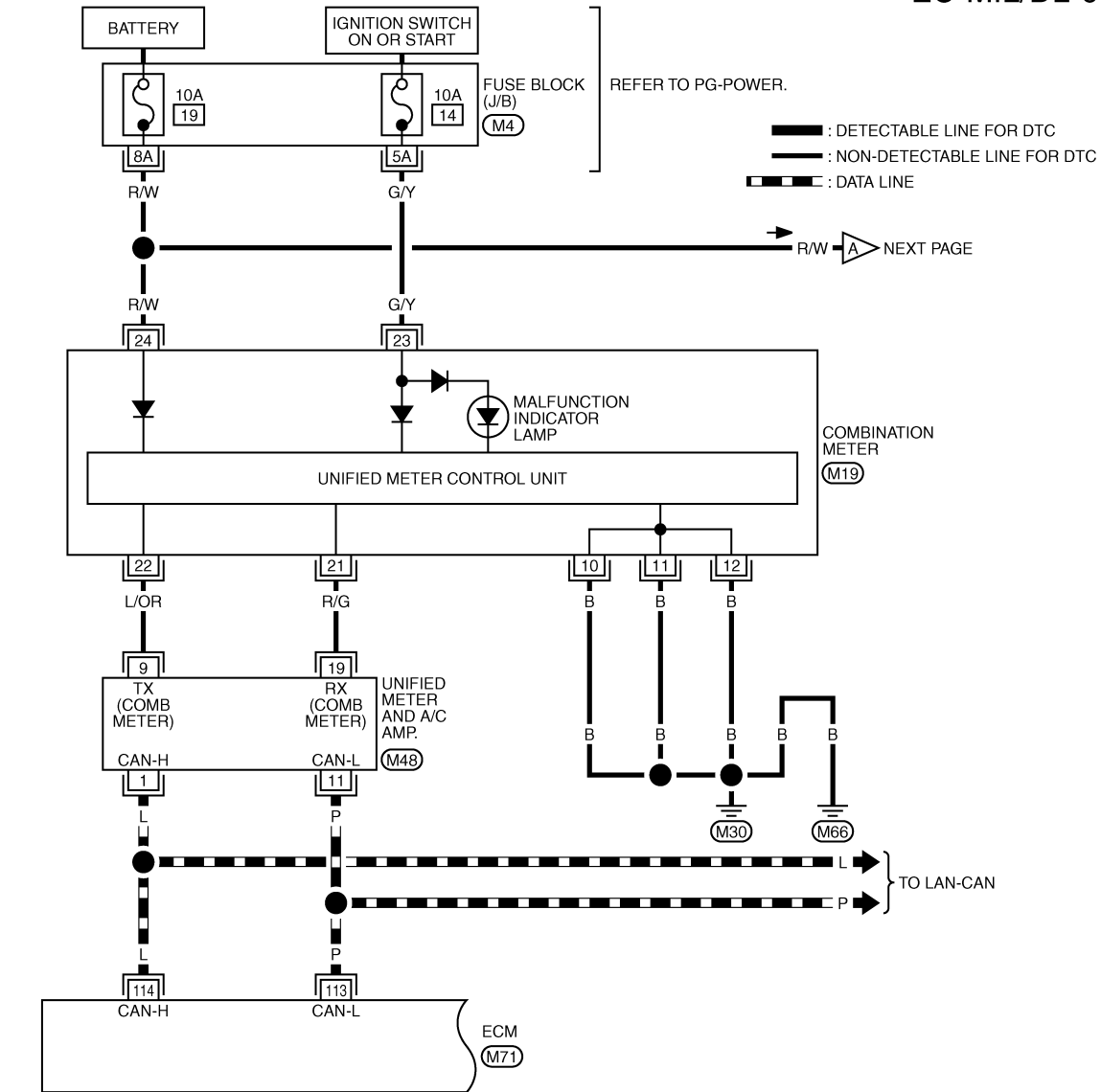
< SERVICE INFORMATION >

MIL AND DATA LINK CONNECTOR

Wiring Diagram

INFOID:000000001646063

EC-MIL/DL-01



REFER TO THE FOLLOWING.
 (M4) - FUSE BLOCK-JUNCTION BOX (J/B)

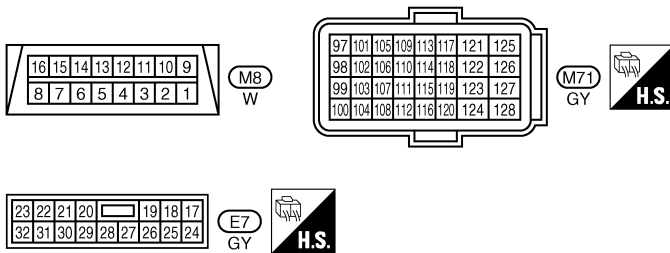
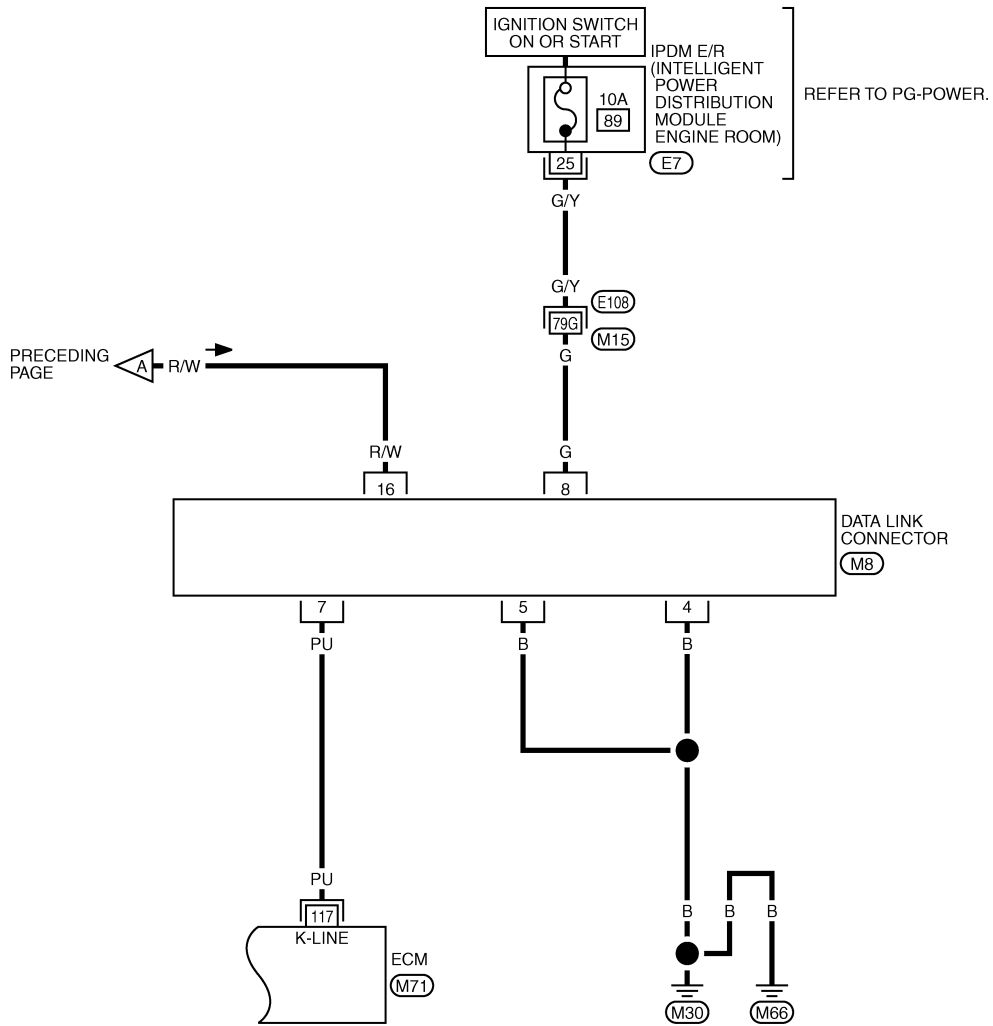
TBWT1685E

MIL AND DATA LINK CONNECTOR

< SERVICE INFORMATION >

EC-MIL/DL-02

— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC



TBWT1686E

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:0000000001646064

Fuel pressure at idling kPa (kg/cm ² , psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

INFOID:0000000001646065

Target idle speed	A/T	No load* (in P or N position)	650 ± 50 rpm
	M/T	No load* (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	650 rpm or more
	M/T	In Neutral position	800 rpm or more
Ignition timing	A/T	In P or N position	16° ± 5° BTDC
	M/T	In Neutral position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000001646066

Conditions	Calculated load value % (Using CONSULT-III or GST)
At idle	5 - 35
At 2,500 rpm	5 - 35

Mass Air Flow Sensor

INFOID:0000000001646067

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.8 - 1.1V*
Mass air flow (Using CONSULT-III or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 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:0000000001646068

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:0000000001646069

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

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:0000000001646070

Resistance [at 25°C (77°F)]	1.8 - 2.44Ω

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

Heated Oxygen sensor 2 Heater

INFOID:0000000001646071

A

Resistance [at 25°C (77°F)]	3.4 - 4.4Ω

Crankshaft Position Sensor (POS)

INFOID:0000000001646072

EC

Refer to [EC-373, "Component Inspection"](#).

Camshaft Position Sensor (PHASE)

INFOID:0000000001646073

C

Refer to [EC-383, "Component Inspection"](#).

Throttle Control Motor

INFOID:0000000001646074

D

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

E

Fuel Injector

INFOID:0000000001646075

F

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.3Ω

Fuel Pump

INFOID:0000000001646076

G

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

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K

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M

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