ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

Alphabetical Index

NAEC0001

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, “DTC U1000, U1001 CAN COMMUNICATION LINE”.

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
A/T 1ST GR FNCTN	P0731	0731	2	X	AT-123
A/T 2ND GR FNCTN	P0732	0732	2	X	AT-129
A/T 3RD GR FNCTN	P0733	0733	2	X	AT-135
A/T 4TH GR FNCTN	P0734	0734	2	X	AT-141
A/T TCC S/V FNCTN	P0744	0744	2	X	AT-154
APP SEN 1/CIRC	P2122	2122	1	X	EC-675
APP SEN 1/CIRC	P2123	2123	1	X	EC-675
APP SEN 2/CIRC	P2127	2127	1	X	EC-682
APP SEN 2/CIRC	P2128	2128	1	X	EC-682
APP SENSOR	P2138	2138	1	X	EC-697
ASCD BRAKE SW	P1572	1572	1	—	EC-652
ASCD SW	P1564	1564	1	—	EC-645
ATF TEMP SEN/CIRC	P0710	0710	2	X	AT-108
BRAKE SW/CIRCUIT	P1805	1805	2	—	EC-669
CAN COMM CIRCUIT	U1000	1000*5	1	X	EC-166
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-166
CKP SEN/CIRCUIT	P0335	0335	2	X	EC-319
CLOSED LOOP-B1	P1148	1148	1	X	EC-541
CLOSED LOOP-B2	P1168	1168	1	X	EC-541
CMP SEN/CIRC-B1	P0340	0340	2	X	EC-326
CMP SEN/CIRC-B2	P0345	0345	2	X	EC-326
CTP LEARNING	P1225	1225	2	—	EC-558
CTP LEARNING	P1226	1226	2	—	EC-560
CYL 1 MISFIRE	P0301	0301	2	X	EC-305
CYL 2 MISFIRE	P0302	0302	2	X	EC-305
CYL 3 MISFIRE	P0303	0303	2	X	EC-305
CYL 4 MISFIRE	P0304	0304	2	X	EC-305
CYL 5 MISFIRE	P0305	0305	2	X	EC-305
CYL 6 MISFIRE	P0306	0306	2	X	EC-305
ECM	P0605	0605	1 or 2	X or —	EC-441
ECM BACK UP/CIRCUIT	P1065	1065	2	X	EC-443
ECT SEN/CIRC	P0117	0117	1	X	EC-204
ECT SEN/CIRC	P0118	0118	1	X	EC-204

Alphabetical Index (Cont'd)

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
ECT SENSOR	P0125	0125	1	X	EC-217
ENG OVER TEMP	P1217	1217	1	X	EC-553
ENGINE SPEED SIG	P0725	0725	2	X	AT-119
ETC ACTR	P1121	1121	1	X	EC-457
ETC FUNCTION/CIRC	P1122	1122	1	X	EC-459
ETC MOT	P1128	1128	1	X	EC-472
ETC MOT PWR	P1124	1124	1	X	EC-467
ETC MOT PWR	P1126	1126	1	X	EC-467
EVAP GROSS LEAK	P0455	0455	2	X	EC-394
EVAP PURG FLOW/MON	P0441	0441	2	X	EC-339
EVAP SMALL LEAK	P0442	0442	2	X	EC-349
EVAP SMALL LEAK	P1442	1442	2	X	EC-567
EVAP SYS PRES SEN	P0452	0452	2	X	EC-378
EVAP SYS PRES SEN	P0453	0453	2	X	EC-384
EVAP VERY SML LEAK	P0456	0456	2	X	EC-407
EVAP VERY SML LEAK	P1456	1456	2	X	EC-611
FTT SEN/CIRCUIT	P0182	0182	2	X	EC-293
FTT SEN/CIRCUIT	P0183	0183	2	X	EC-293
FTT SENSOR	P0181	0181	2	X	EC-290
FUEL LEV SEN SLOSH	P0460	0460	2	X	EC-423
FUEL LEVEL SENSOR	P0461	0461	2	X	EC-425
FUEL LEVL SEN/CIRC	P0462	0462	2	X	EC-428
FUEL LEVL SEN/CIRC	P0463	0463	2	X	EC-428
FUEL SYS-LEAN-B1	P0171	0171	2	X	EC-273
FUEL SYS-LEAN-B2	P0174	0174	2	X	EC-273
FUEL SYS-RICH-B1	P0172	0172	2	X	EC-282
FUEL SYS-RICH-B2	P0175	0175	2	X	EC-282
HO2S1 (B1)	P0132	0132	2	X	EC-224
HO2S1 (B1)	P0133	0133	2	X	EC-233
HO2S1 (B1)	P0134	0134	2	X	EC-246
HO2S1 (B1)	P1143	1143	2	X	EC-504
HO2S1 (B1)	P1144	1144	2	X	EC-512
HO2S1 (B2)	P0152	0152	2	X	EC-224
HO2S1 (B2)	P0153	0153	2	X	EC-233
HO2S1 (B2)	P0154	0154	2	X	EC-246
HO2S1 (B2)	P1163	1163	2	X	EC-504

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
HO2S1 (B2)	P1164	1164	2	X	EC-512
HO2S1 HTR (B1)	P0031	0031	2	X	EC-173
HO2S1 HTR (B1)	P0032	0032	2	X	EC-173
HO2S1 HTR (B2)	P0051	0051	2	X	EC-173
HO2S1 HTR (B2)	P0052	0052	2	X	EC-173
HO2S2 (B1)	P0138	0138	2	X	EC-255
HO2S2 (B1)	P0139	0139	2	X	EC-263
HO2S2 (B1)	P1146	1146	2	X	EC-521
HO2S2 (B1)	P1147	1147	2	X	EC-531
HO2S2 (B2)	P0158	0158	2	X	EC-255
HO2S2 (B2)	P0159	0159	2	X	EC-263
HO2S2 (B2)	P1166	1166	2	X	EC-521
HO2S2 (B2)	P1167	1167	2	X	EC-531
HO2S2 HTR (B1)	P0037	0037	2	X	EC-181
HO2S2 HTR (B1)	P0038	0038	2	X	EC-181
HO2S2 HTR (B2)	P0057	0057	2	X	EC-181
HO2S2 HTR (B2)	P0058	0058	2	X	EC-181
IAT SEN/CIRCUIT	P0112	0112	2	X	EC-200
IAT SEN/CIRCUIT	P0113	0113	2	X	EC-200
IAT SENSOR	P0127	0127	2	X	EC-220
INT/V TIM CONT-B1	P0011	0011	2	X	EC-169
INT/V TIM CONT-B1	P1110	1110	2	X	EC-448
INT/V TIM CONT-B2	P0021	0021	2	X	EC-169
INT/V TIM CONT-B2	P1135	1135	2	X	EC-448
INT/V TIM V/CIR-B1	P1111	1111	2	X	EC-451
INT/V TIM V/CIR-B2	P1136	1136	2	X	EC-451
ISC SYSTEM	P0506	0506	2	X	EC-432
ISC SYSTEM	P0507	0507	2	X	EC-434
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-314
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-314
L/PRESS SOL/CIRC	P0745	0745	2	X	AT-165
MAF SEN/CIRCUIT	P0101	0101	1	X	EC-187
MAF SEN/CIRCUIT	P0102	0102	1	X	EC-194
MAF SEN/CIRCUIT	P0103	0103	1	X	EC-194
MULTI CYL MISFIRE	P0300	0300	2	X	EC-305
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EL-389

Alphabetical Index (Cont'd)

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	Flashing*4	EC-95
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**	**—**	**—**
O/R CLTCH SOL/CIRC	P1760	1760	2	X	AT-185
P-N POS SW/CIRCUIT	P1706	1706	2	X	EC-663
PNP SW/CIRC	P0705	0705	2	X	AT-102
PURG VOLUME CONT/V	P0444	0444	2	X	EC-364
PURG VOLUME CONT/V	P0445	0445	2	X	EC-364
PURG VOLUME CONT/V	P1444	1444	2	X	EC-582
PW ST P SEN/CIRC	P0550	0550	2	—	EC-436
SENSOR POWER/CIRC	P1229	1229	1	X	EC-562
SFT SOL A/CIRC	P0750	0750	1	X	AT-171
SFT SOL B/CIRC	P0755	0755	1	X	AT-175
SWIRL CONT SOL/V	P1130	1130	2	X	EC-477
SWIRL CONT SOL/V	P1131	1131	2	X	EC-498
SWL CON VC SW/CIRC	P1165	1165	2	X	EC-543
TCC SOLENOID/CIRC	P0740	0740	2	X	AT-151
TCS C/U FUNCTN	P1211	1211	2	—	EC-549
TCS/CIRC	P1212	1212	2	—	EC-551
THERMSTAT FNCTN	P0128	0128	2	X	EC-222
TP SEN 1/CIRC	P0222	0222	1	X	EC-298
TP SEN 1/CIRC	P0223	0223	1	X	EC-298
TP SEN 2/CIRC	P0122	0122	1	X	EC-210
TP SEN 2/CIRC	P0123	0123	1	X	EC-210
TP SEN/CIRC A/T	P1705	1705	1	X	AT-179
TP SENSOR	P2135	2135	1	X	EC-690
TW CATALYST SYS-B1	P0420	0420	2	X	EC-334
TW CATALYST SYS-B2	P0430	0430	2	X	EC-334
VC CUT/V BYPASS/V	P1491	1491	2	X	EC-633
VC/V BYPASS/V	P1490	1490	2	X	EC-627
VEH SPD SEN/CIR AT*6	P0720	0720	2	X	AT-114
VEH SPEED SEN/CIRC*6	P0500	0500	2	X	EC-430
VENT CONTROL VALVE	P0447	0447	2	X	EC-371
VENT CONTROL VALVE	P1446	1446	2	X	EC-594
VENT CONTROL VALVE	P1448	1448	2	X	EC-602

*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: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

DTC No. Index

NAEC1181

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE".

X: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*4	EC-95
U1000	1000*5	CAN COMM CIRCUIT	1	X	EC-166
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-166
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**	**—**	**—**
P0011	0011	INT/V TIM CONT-B1	2	X	EC-169
P0021	0021	INT/V TIM CONT-B2	2	X	EC-169
P0031	0031	HO2S1 HTR (B1)	2	X	EC-173
P0032	0032	HO2S1 HTR (B1)	2	X	EC-173
P0037	0037	HO2S2 HTR (B1)	2	X	EC-181
P0038	0038	HO2S2 HTR (B1)	2	X	EC-181
P0051	0051	HO2S1 HTR (B2)	2	X	EC-173
P0052	0052	HO2S1 HTR (B2)	2	X	EC-173
P0057	0057	HO2S2 HTR (B2)	2	X	EC-181
P0058	0058	HO2S2 HTR (B2)	2	X	EC-181
P0101	0101	MAF SEN/CIRCUIT	1	X	EC-187
P0102	0102	MAF SEN/CIRCUIT	1	X	EC-194
P0103	0103	MAF SEN/CIRCUIT	1	X	EC-194
P0112	0112	IAT SEN/CIRCUIT	2	X	EC-200
P0113	0113	IAT SEN/CIRCUIT	2	X	EC-200
P0117	0117	ECT SEN/CIRC	1	X	EC-204
P0118	0118	ECT SEN/CIRC	1	X	EC-204
P0122	0122	TP SEN 2/CIRC	1	X	EC-210
P0123	0123	TP SEN 2/CIRC	1	X	EC-210
P0125	0125	ECT SENSOR	1	X	EC-217
P0127	0127	IAT SENSOR	2	X	EC-220
P0128	0128	THERMSTAT FNCTN	2	X	EC-222

DTC No. Index (Cont'd)

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0132	0132	HO2S1 (B1)	2	X	EC-224
P0133	0133	HO2S1 (B1)	2	X	EC-233
P0134	0134	HO2S1 (B1)	2	X	EC-246
P0138	0138	HO2S2 (B1)	2	X	EC-255
P0139	0139	HO2S2 (B1)	2	X	EC-263
P0152	0152	HO2S1 (B2)	2	X	EC-224
P0153	0153	HO2S1 (B2)	2	X	EC-233
P0154	0154	HO2S1 (B2)	2	X	EC-246
P0158	0158	HO2S2 (B2)	2	X	EC-255
P0159	0159	HO2S2 (B2)	2	X	EC-263
P0171	0171	FUEL SYS-LEAN-B1	2	X	EC-273
P0172	0172	FUEL SYS-RICH-B1	2	X	EC-282
P0174	0174	FUEL SYS-LEAN-B2	2	X	EC-273
P0175	0175	FUEL SYS-RICH-B2	2	X	EC-282
P0181	0181	FTT SENSOR	2	X	EC-290
P0182	0182	FTT SEN/CIRCUIT	2	X	EC-293
P0183	0183	FTT SEN/CIRCUIT	2	X	EC-293
P0222	0222	TP SEN 1/CIRC	1	X	EC-298
P0223	0223	TP SEN 1/CIRC	1	X	EC-298
P0300	0300	MULTI CYL MISFIRE	2	X	EC-305
P0301	0301	CYL 1 MISFIRE	2	X	EC-305
P0302	0302	CYL 2 MISFIRE	2	X	EC-305
P0303	0303	CYL 3 MISFIRE	2	X	EC-305
P0304	0304	CYL 4 MISFIRE	2	X	EC-305
P0305	0305	CYL 5 MISFIRE	2	X	EC-305
P0306	0306	CYL 6 MISFIRE	2	X	EC-305
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-314
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-314
P0335	0335	CKP SEN/CIRCUIT	2	X	EC-319
P0340	0340	CMP SEN/CIRC-B1	2	X	EC-326
P0345	0345	CMP SEN/CIRC-B2	2	X	EC-326
P0420	0420	TW CATALYST SYS-B1	2	X	EC-334
P0430	0430	TW CATALYST SYS-B2	2	X	EC-334
P0441	0441	EVAP PURG FLOW/MON	2	X	EC-339
P0442	0442	EVAP SMALL LEAK	2	X	EC-349
P0444	0444	PURG VOLUME CONT/V	2	X	EC-364

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0445	0445	PURG VOLUME CONT/V	2	X	EC-364
P0447	0447	VENT CONTROL VALVE	2	X	EC-371
P0452	0452	EVAP SYS PRES SEN	2	X	EC-378
P0453	0453	EVAP SYS PRES SEN	2	X	EC-384
P0455	0455	EVAP GROSS LEAK	2	X	EC-394
P0456	0456	EVAP VERY SML LEAK	2	X	EC-407
P0460	0460	FUEL LEV SEN SLOSH	2	X	EC-423
P0461	0461	FUEL LEVEL SENSOR	2	X	EC-425
P0462	0462	FUEL LEVL SEN/CIRC	2	X	EC-428
P0463	0463	FUEL LEVL SEN/CIRC	2	X	EC-428
P0500	0500	VEH SPEED SEN/CIRC*6	2	X	EC-430
P0506	0506	ISC SYSTEM	2	X	EC-432
P0507	0507	ISC SYSTEM	2	X	EC-434
P0550	0550	PW ST P SEN/CIRC	2	—	EC-436
P0605	0605	ECM	1 or 2	X or —	EC-441
P0705	0705	PNP SW/CIRC	2	X	AT-102
P0710	0710	ATF TEMP SEN/CIRC	2	X	AT-108
P0720	0720	VEH SPD SEN/CIR AT*6	2	X	AT-114
P0725	0725	ENGINE SPEED SIG	2	X	AT-119
P0731	0731	A/T 1ST GR FNCTN	2	X	AT-123
P0732	0732	A/T 2ND GR FNCTN	2	X	AT-129
P0733	0733	A/T 3RD GR FNCTN	2	X	AT-135
P0734	0734	A/T 4TH GR FNCTN	2	X	AT-141
P0740	0740	TCC SOLENOID/CIRC	2	X	AT-151
P0744	0744	A/T TCC S/V FNCTN	2	X	AT-156
P0745	0745	L/PRESS SOL/CIRC	2	X	AT-165
P0750	0750	SFT SOL A/CIRC	1	X	AT-171
P0755	0755	SFT SOL B/CIRC	1	X	AT-175
P1065	1065	ECM BACK UP/CIRCUIT	2	X	EC-443
P1110	1110	INT/V TIM CONT-B1	2	X	EC-448
P1111	1111	INT/V TIM V/CIR-B1	2	X	EC-451
P1121	1121	ETC ACTR	1	X	EC-457
P1122	1122	ETC FUNCTION/CIRC	1	X	EC-459
P1124	1124	ETC MOT PWR	1	X	EC-467
P1126	1126	ETC MOT PWR	1	X	EC-467
P1128	1128	ETC MOT	1	X	EC-472

DTC No. Index (Cont'd)

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1130	1130	SWIRL CONT SOL/V	2	X	EC-477
P1131	1131	SWIRL CONT SOL/V	2	X	EC-498
P1135	1135	INT/V TIM CONT-B2	2	X	EC-448
P1136	1136	INT/V TIM V/CIR-B2	2	X	EC-451
P1143	1143	HO2S1 (B1)	2	X	EC-504
P1144	1144	HO2S1 (B1)	2	X	EC-512
P1146	1146	HO2S2 (B1)	2	X	EC-521
P1147	1147	HO2S2 (B1)	2	X	EC-531
P1148	1148	CLOSED LOOP-B1	1	X	EC-541
P1163	1163	HO2S1 (B2)	2	X	EC-504
P1164	1164	HO2S1 (B2)	2	X	EC-512
P1165	1165	SWL CON VC SW/CIRC	2	X	EC-543
P1166	1166	HO2S2 (B2)	2	X	EC-521
P1167	1167	HO2S2 (B2)	2	X	EC-531
P1168	1168	CLOSED LOOP-B2	1	X	EC-541
P1211	1211	TCS C/U FUNCTN	2	—	EC-549
P1212	1212	TCS/CIRC	2	—	EC-551
P1217	1217	ENG OVER TEMP	1	X	EC-553
P1225	1225	CTP LEARNING	2	—	EC-558
P1226	1226	CTP LEARNING	2	—	EC-560
P1229	1229	SENSOR POWER/CIRC	1	X	EC-562
P1442	1442	EVAP SMALL LEAK	2	X	EC-567
P1444	1444	PURG VOLUME CONT/V	2	X	EC-582
P1446	1446	VENT CONTROL VALVE	2	X	EC-594
P1448	1448	VENT CONTROL VALVE	2	X	EC-602
P1456	1456	EVAP VERY SML LEAK	2	X	EC-611
P1490	1490	VC/V BYPASS/V	2	X	EC-627
P1491	1491	VC CUT/V BYPASS/V	2	X	EC-633
P1564	1564	ASCD SW	1	—	EC-645
P1572	1572	ASCD BRAKE SW	1	—	EC-652
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EL-389
P1705	1705	TP SEN/CIRC A/T	1	X	AT-179
P1706	1706	P-N POS SW/CIRCUIT	2	X	EC-663
P1760	1760	O/R CLTCH SOL/CIRC	2	X	AT-185
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-669
P2122	2122	APP SEN 1/CIRC	1	X	EC-675

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P2123	2123	APP SEN 1/CIRC	1	X	EC-675
P2127	2127	APP SEN 2/CIRC	1	X	EC-682
P2128	2128	APP SEN 2/CIRC	1	X	EC-682
P2135	2135	TP SENSOR	1	X	EC-690
P2138	2138	APP SENSOR	1	X	EC-697

*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: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAEC0002

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), side curtain air bag module (located in the headliner side of front and rear seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN 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, refer to RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connector (and by yellow harness protector or yellow insulation tape before the harness connectors).**

Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NAEC0003

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 terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to EL-8, “HARNESS CONNECTOR (SLIDE-LOCKING TYPE)”.**
- **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 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.**

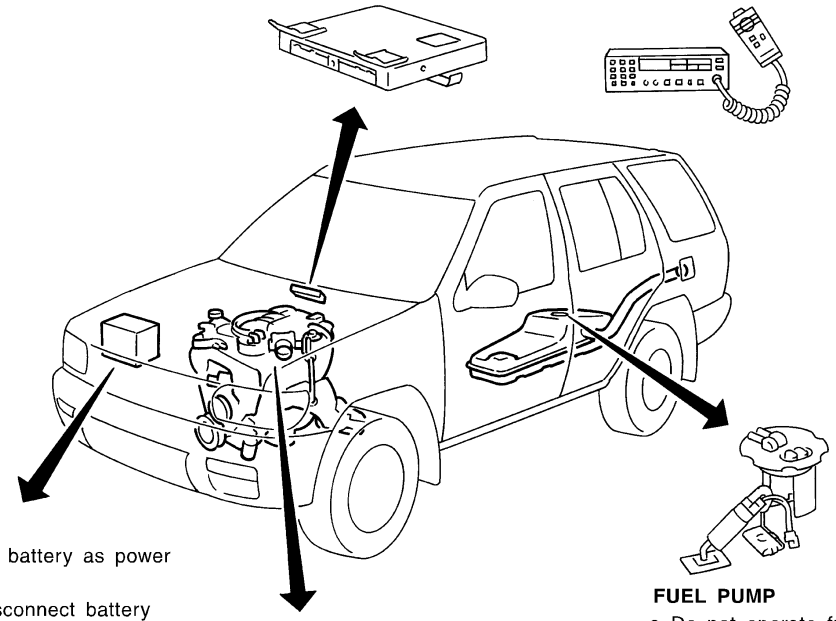
Engine Fuel & Emission Control System

NAEC0004

ECM
- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will not 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.

WIRELESS EQUIPMENT
- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING
- 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.

ENGINE CONTROL SYSTEM PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE) or crankshaft position sensor (POS).

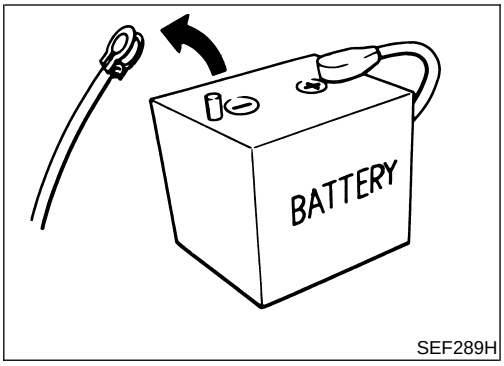
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ENGINE CONTROL SYSTEM HARNESS HANDLING
- 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 (3.9 in.) away from adjacent harnesses to prevent an engine control system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF952RG

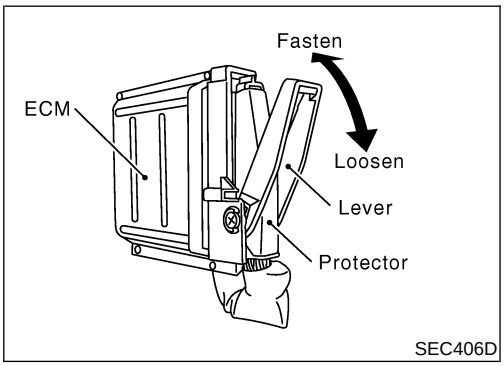
Precautions

NAEC0005



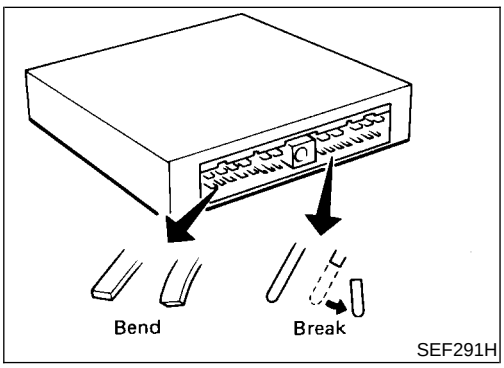
SEF289H

- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**



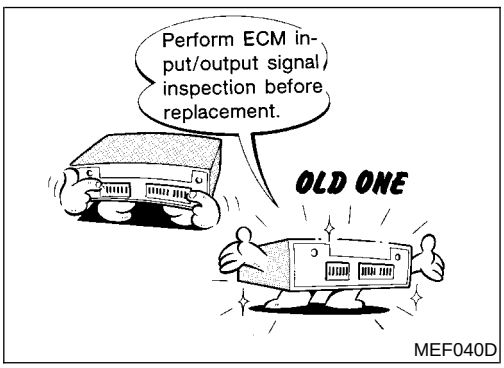
SEC406D

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at left.**



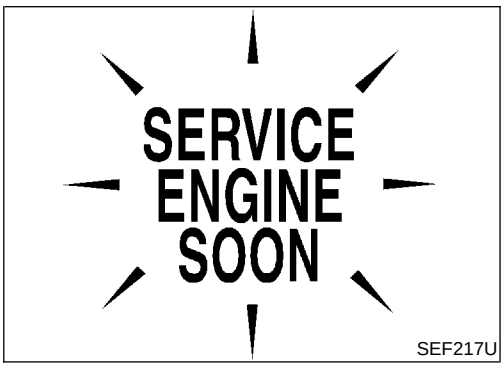
SEF291H

- **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.



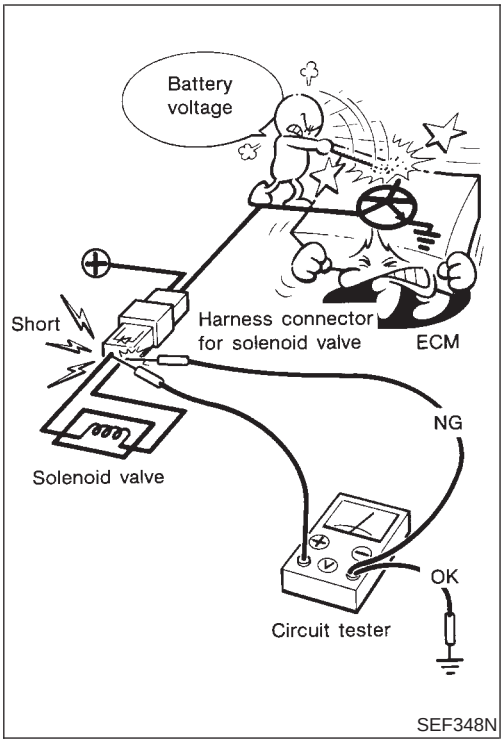
MEF040D

- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-141.**

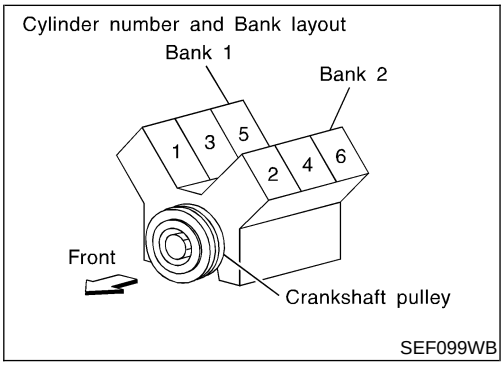


SEF217U

- **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 the ECM terminals, such as the ground.**



- **B1 indicates the bank 1 and B2 indicates the bank 2 as shown in the figure.**
- **Bank 1 includes No. 1 cylinder.**

Wiring Diagrams and Trouble Diagnosis

NAEC0006

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-11, "POWER SUPPLY ROUTING" for power distribution circuit

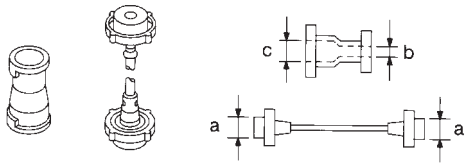
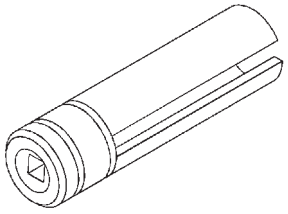
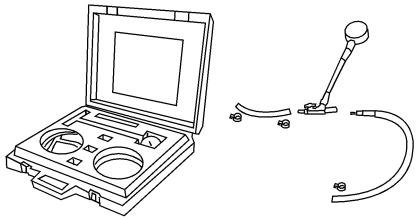
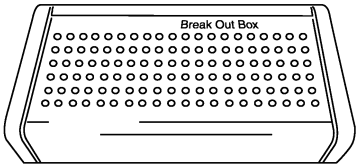
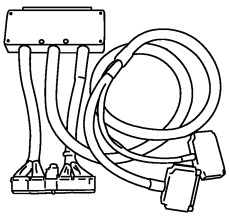
When you perform trouble diagnosis, refer to the following:

- GI-35, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

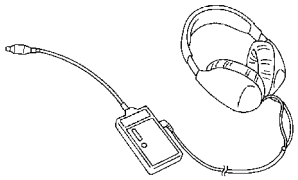
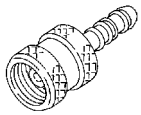
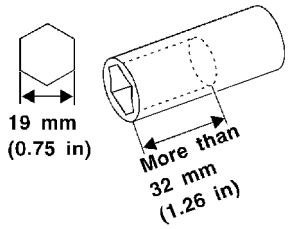
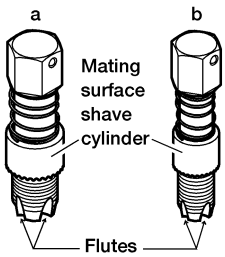
NAEC0007

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

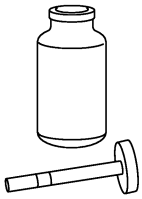
Tool number (Kent-Moore No.) Tool name	Description
EG17650301 (J-33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **a: 41.3 (1.626) dia.** Unit: mm (in)
KV10117100 (J-36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure with pressure gauge
KV109E0010 (J-46209) Break-out box	 NT825	Measuring the ECM signals with a circuit tester
KV109E0080 (J-45819) Y-cable adapter	 NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

NAEC0008

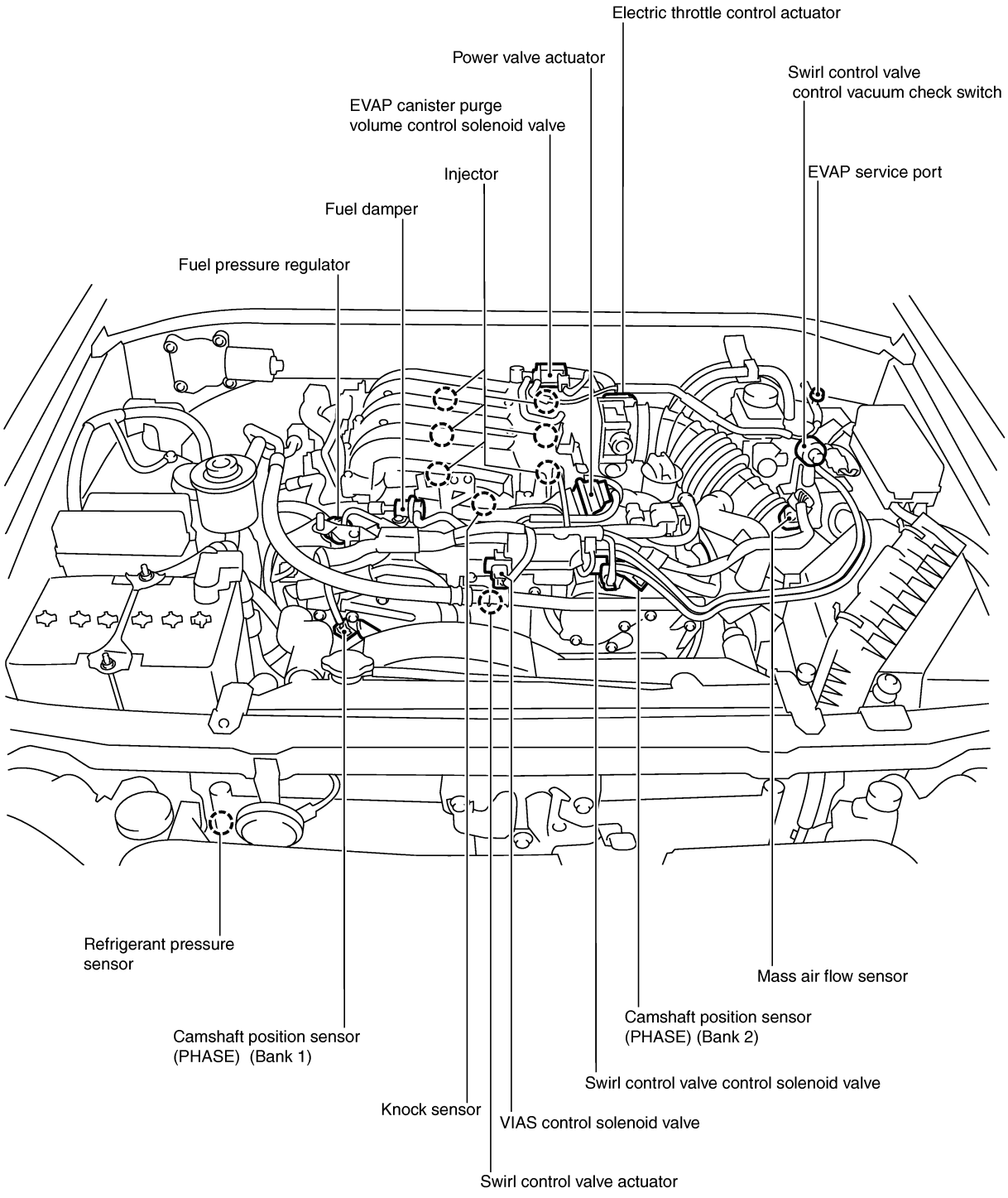
Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter (i.e.: MLR-8382)	 NT815	Checking fuel tank vacuum relief valve opening pressure
Leak detector (i.e., J-41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (i.e., J-41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter with pitch 1.5 mm, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter with pitch 1.25 mm, for Titania Oxygen Sensor**

Commercial Service Tools (Cont'd)

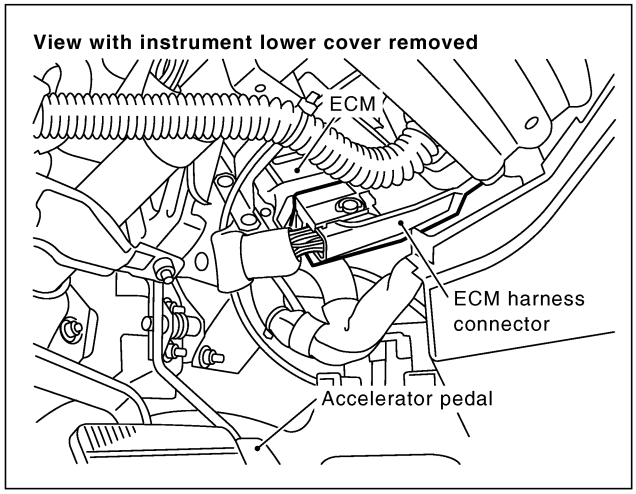
Tool name (Kent-Moore No.)	Description	
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

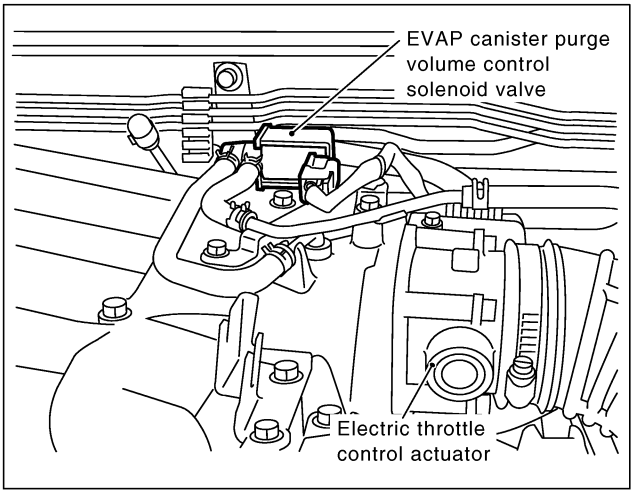
Engine Control Component Parts Location

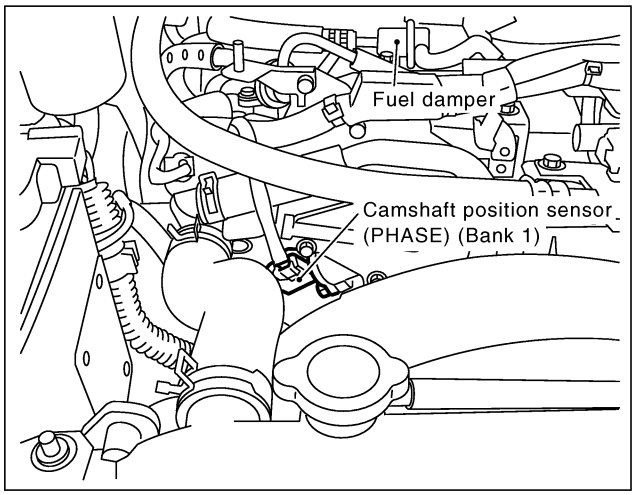
NAEC0009

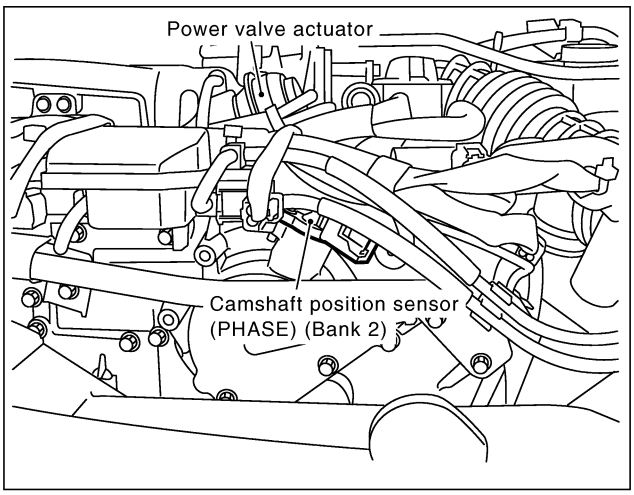


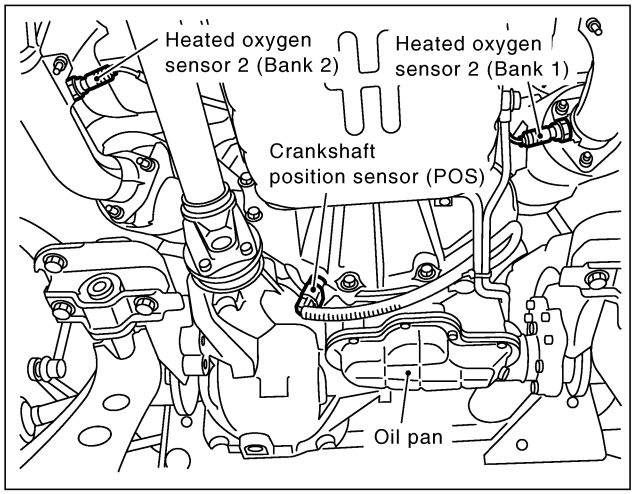
SEC407D

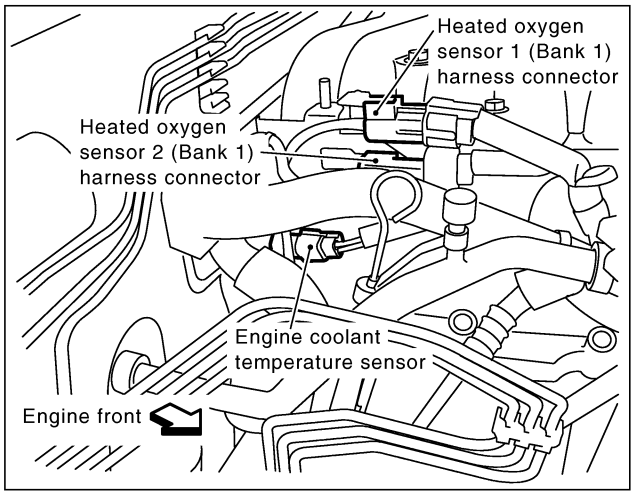

View with instrument lower cover removed
ECM
ECM harness connector
Accelerator pedal


EVAP canister purge volume control solenoid valve
Electric throttle control actuator

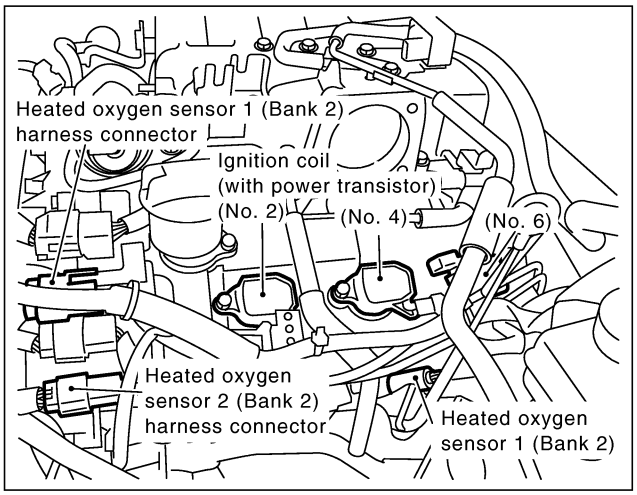

Fuel damper
Camshaft position sensor (PHASE) (Bank 1)

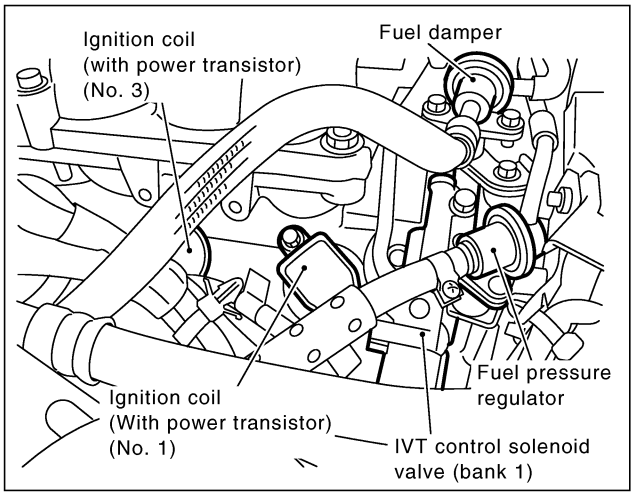

Power valve actuator
Camshaft position sensor (PHASE) (Bank 2)

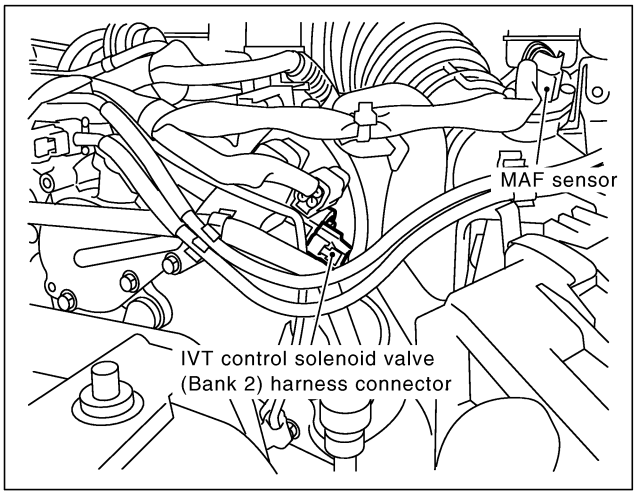

Heated oxygen sensor 2 (Bank 2)
Heated oxygen sensor 2 (Bank 1)
Crankshaft position sensor (POS)
Oil pan

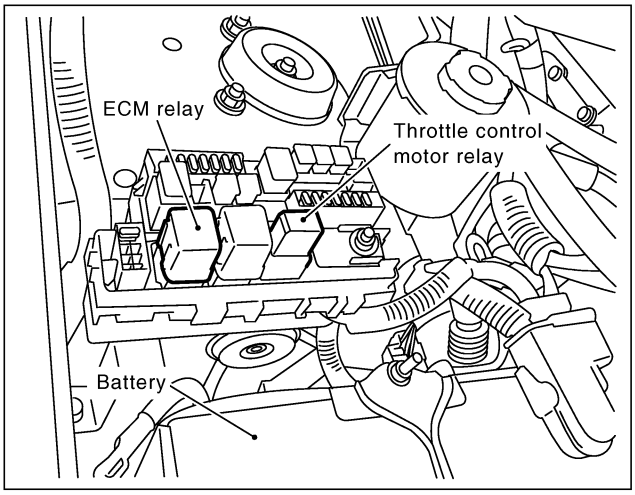

Heated oxygen sensor 1 (Bank 1) harness connector
Heated oxygen sensor 2 (Bank 1) harness connector
Engine coolant temperature sensor
Engine front

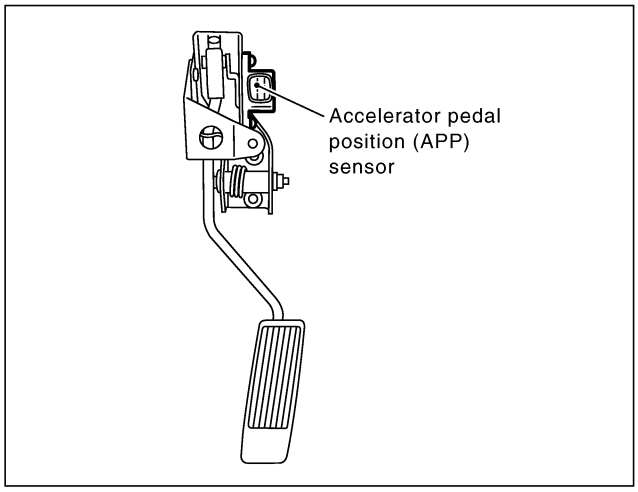
SEC408D

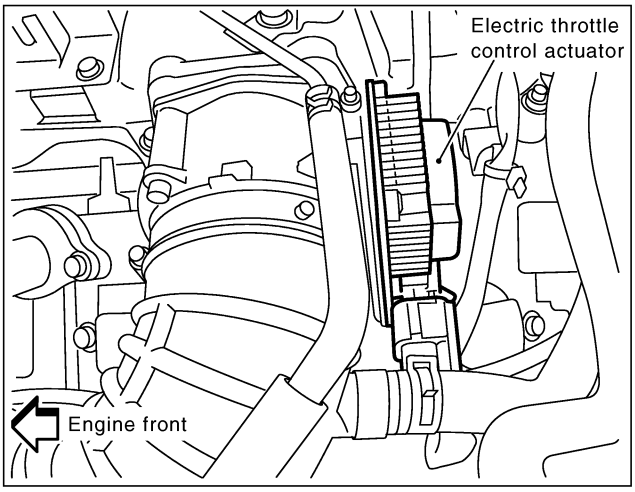

Heated oxygen sensor 1 (Bank 2) harness connector
Ignition coil (with power transistor) (No. 2)
(No. 4)
(No. 6)
Heated oxygen sensor 2 (Bank 2) harness connector
Heated oxygen sensor 1 (Bank 2)


Ignition coil (with power transistor) (No. 3)
Fuel damper
Fuel pressure regulator
Ignition coil (With power transistor) (No. 1)
IVT control solenoid valve (bank 1)

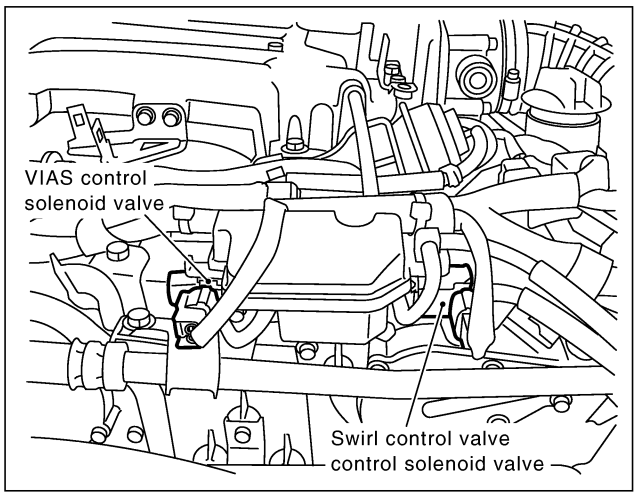

MAF sensor
IVT control solenoid valve (Bank 2) harness connector

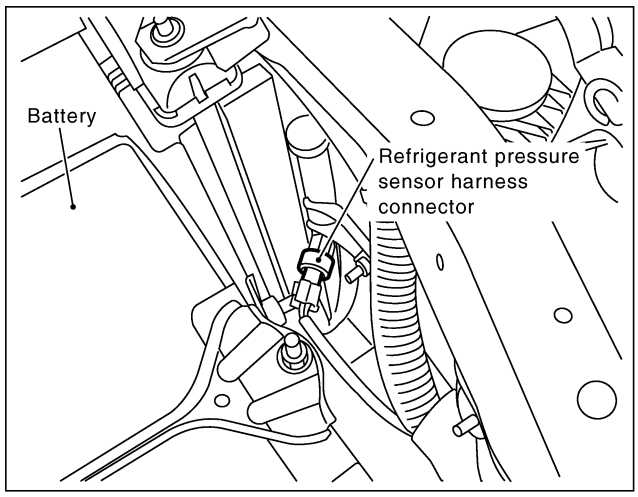

ECM relay
Throttle control motor relay
Battery

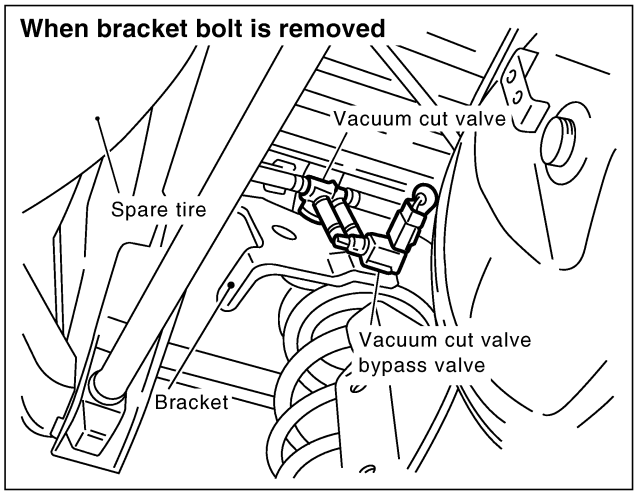

Accelerator pedal position (APP) sensor

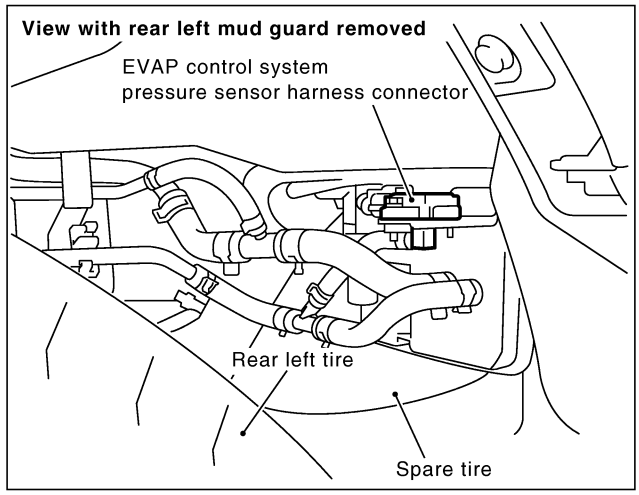

Electric throttle control actuator
Engine front

SEC409D

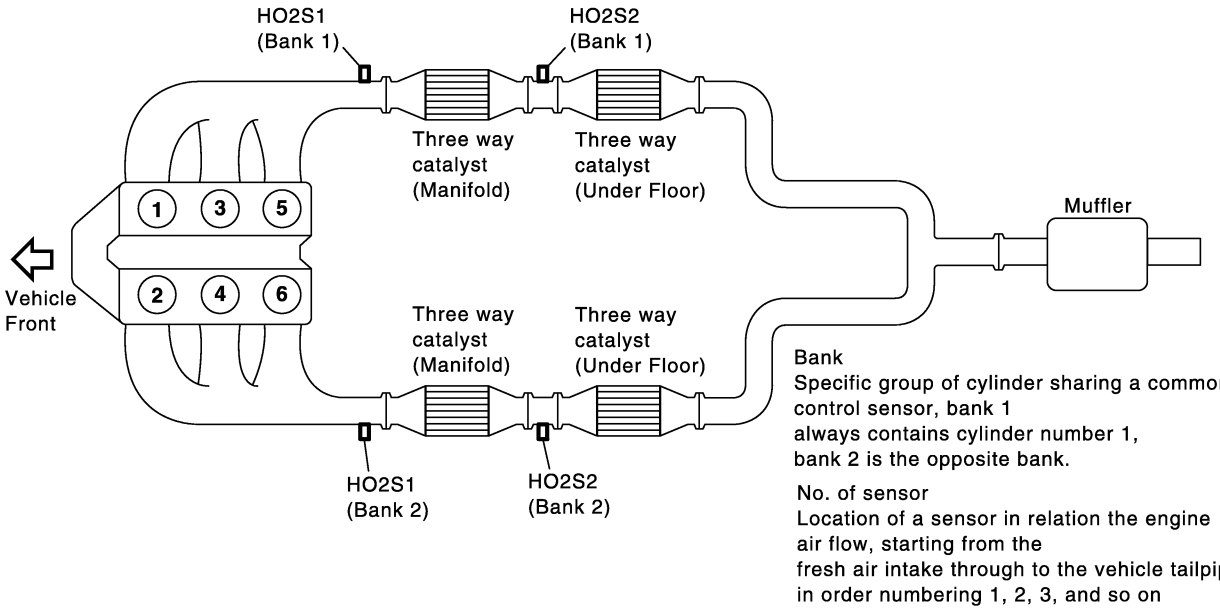

VIAS control
solenoid valve
Swirl control valve
control solenoid valve

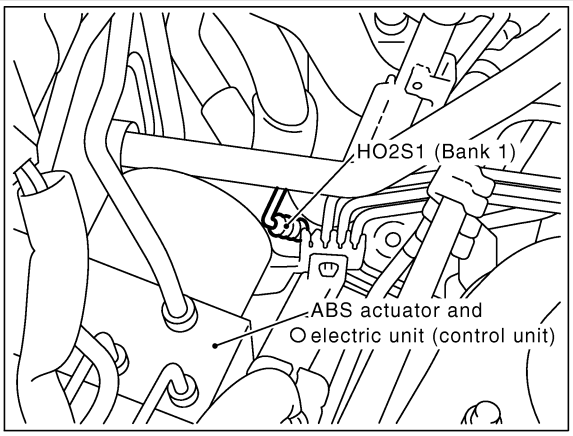

Battery
Refrigerant pressure
sensor harness
connector

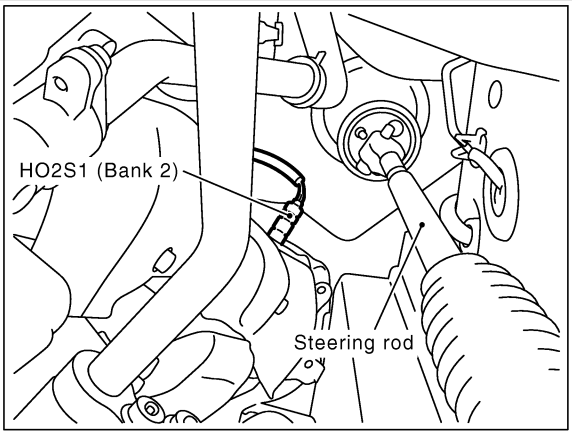

When bracket bolt is removed
Vacuum cut valve
Spare tire
Vacuum cut valve
bypass valve
Bracket

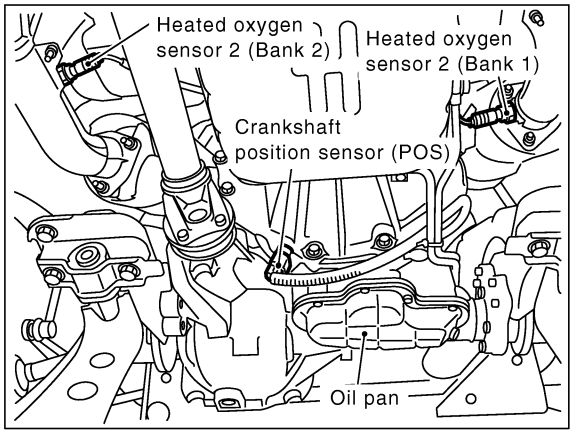

View with rear left mud guard removed
EVAP control system
pressure sensor harness connector
Rear left tire
Spare tire

SEC410D


HO2S1
(Bank 1)
HO2S2
(Bank 1)
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
Muffler
1
3
5
2
4
6
Vehicle
Front
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
HO2S1
(Bank 2)
HO2S2
(Bank 2)
Bank
Specific group of cylinder sharing a common control sensor, bank 1
always contains cylinder number 1,
bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe
in order numbering 1, 2, 3, and so on
PBIB1177E


HO2S1 (Bank 1)
ABS actuator and
electric unit (control unit)

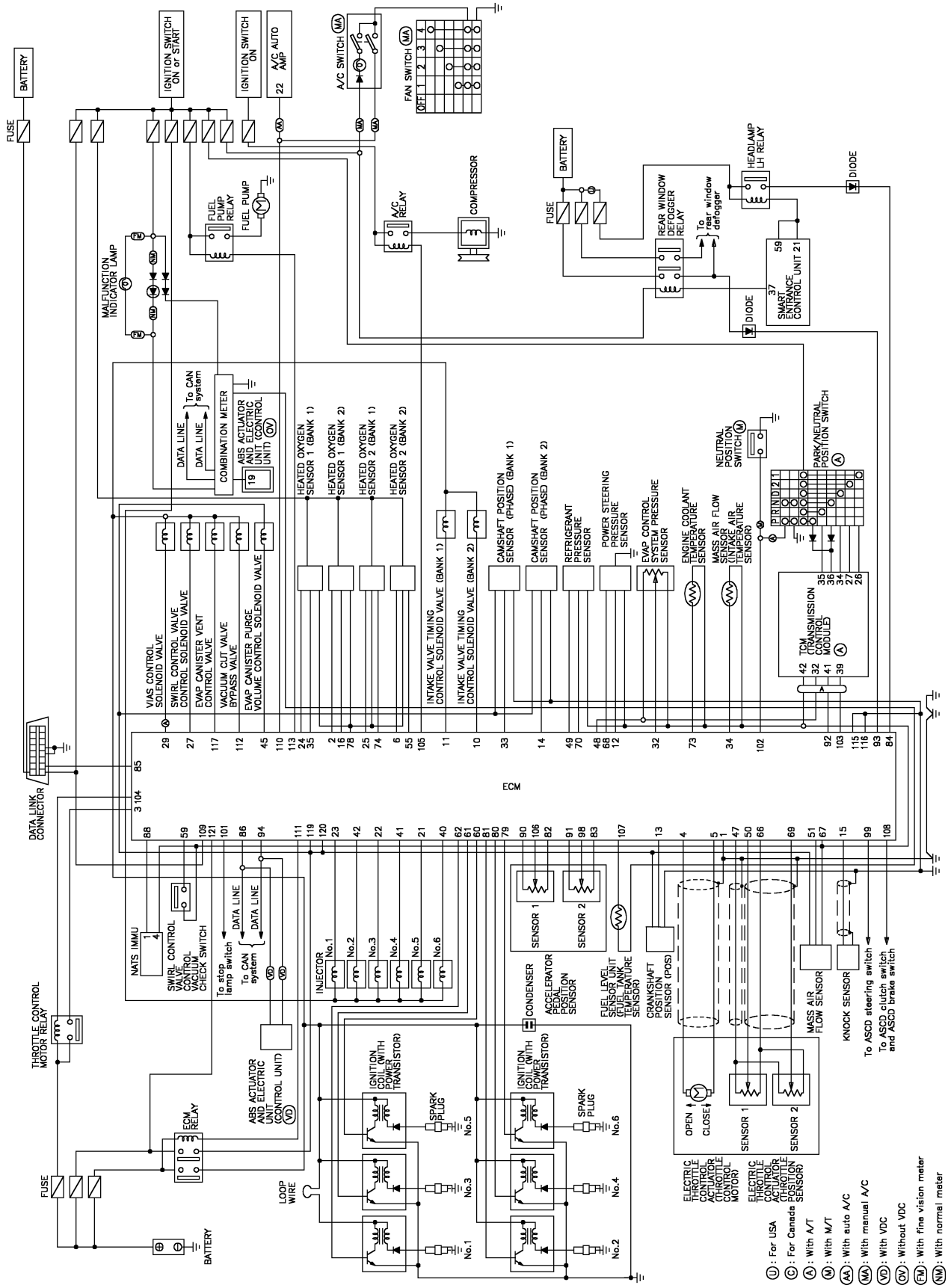

HO2S1 (Bank 2)
Steering rod


Heated oxygen
sensor 2 (Bank 2)
Heated oxygen
sensor 2 (Bank 1)
Crankshaft
position sensor (POS)
Oil pan

SEC577D

Circuit Diagram

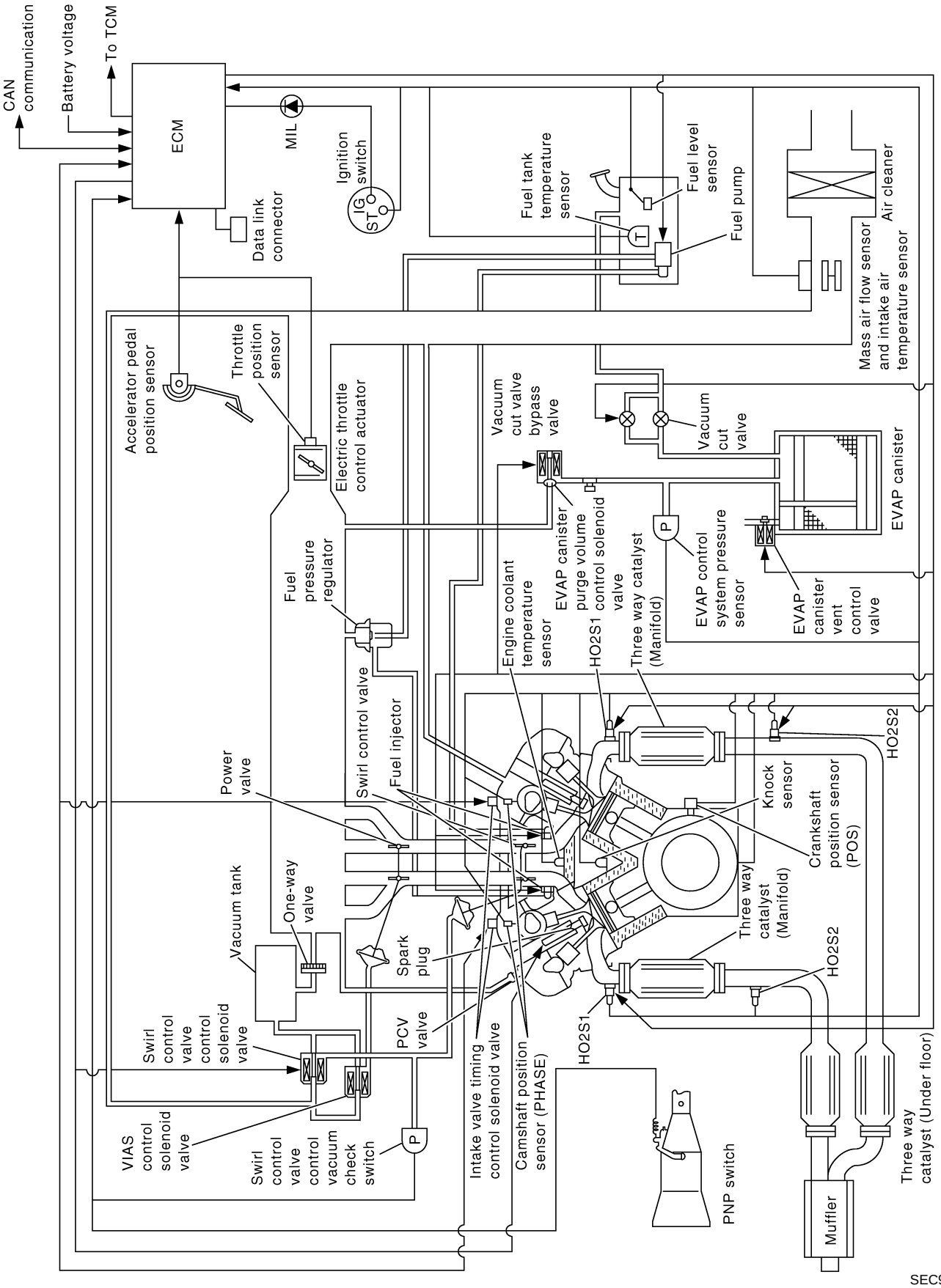
NAEC0010



MEC663E

System Diagram

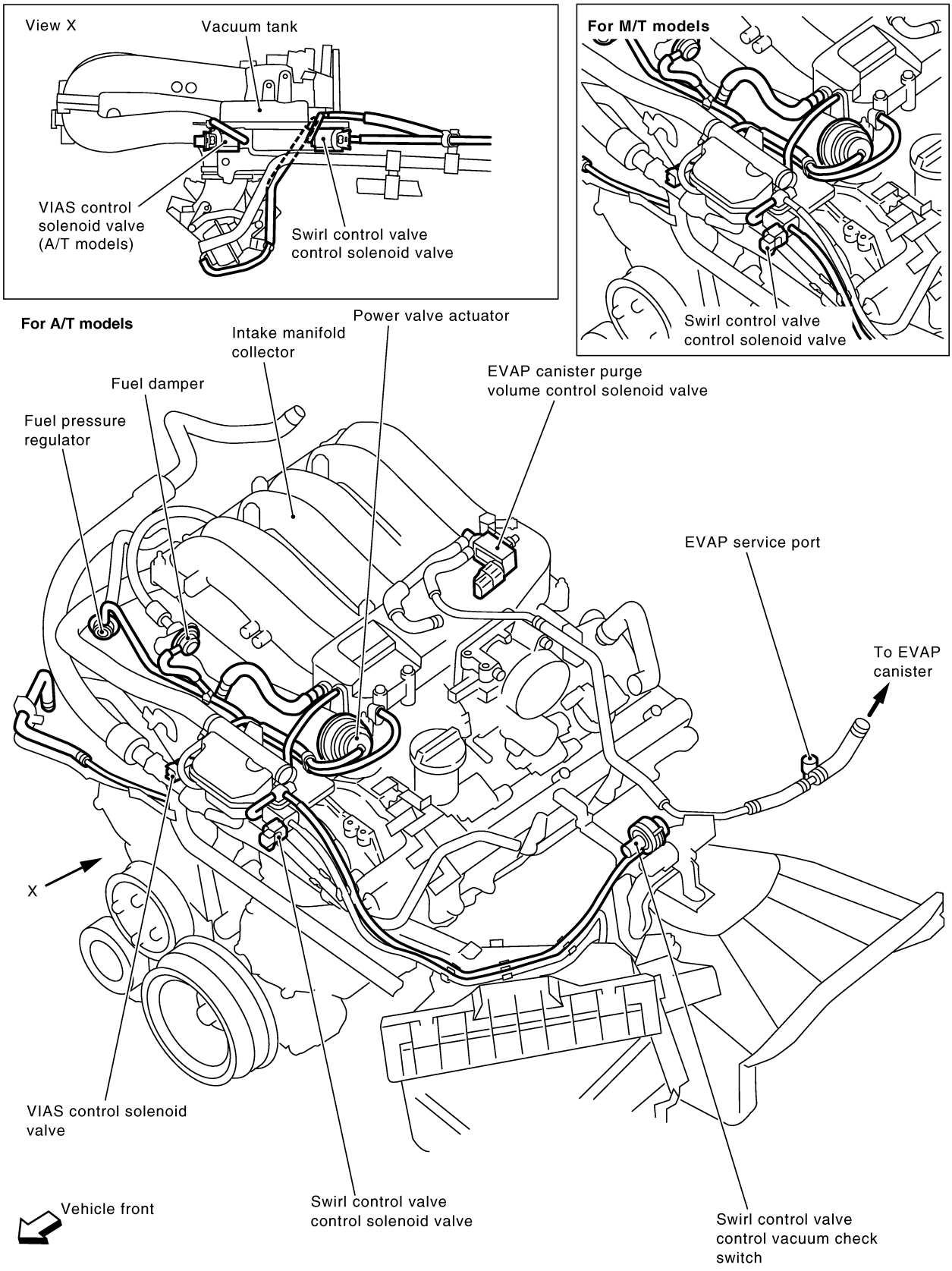
NAEC0011



Vacuum Hose Drawing

NAEC0012

Refer to “System Diagram”, EC-31 for Vacuum Control System.



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

SEC413D

System Chart

NAEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 • Ignition switch • Throttle position sensor • Accelerator pedal position sensor • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • EVAP control system pressure sensor • Battery voltage • Power steering pressure sensor • Vehicle speed signal*3 • Fuel tank temperature sensor *1 • Heated oxygen sensor 2*2 • TCM (Transmission control module)*3 • ABS actuator and electric unit (Control unit)*3 • Refrigerant pressure sensor • Electrical load • Fuel level sensor*1, *3 • ASCD steering switch • ASCD brake switch • ASCD clutch switch (M/T models) • Stop lamp switch	Fuel injection & mixture ratio control	Injector
	Electronic ignition system	Power transistor
	Idle air control system ASCD vehicle speed control	Electric throttle control actuator
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)*4
	Swirl control valve control	Swirl control valve control solenoid valve
	Power valve control	VIAS control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: This input signal is sent to the ECM through CAN communication line.
*4: This output signal is sent from the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

DESCRIPTION

NAEC0014

Input/Output Signal Chart

NAEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed signal*2	Vehicle speed		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
EVAP control system pressure sensor	Ambient air barometric pressure		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		

*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.

Basic Multiport Fuel Injection System

NAEC0014S02

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

NAEC0014S03

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

<Fuel increase>

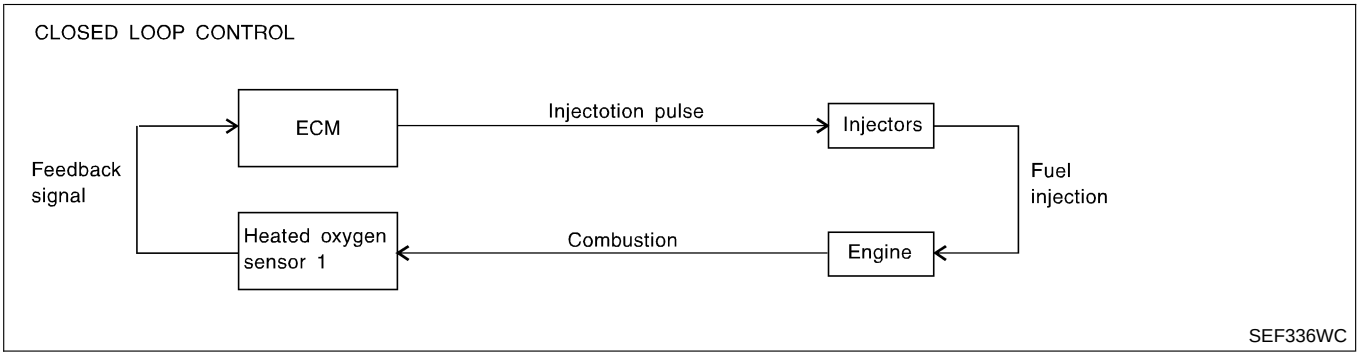
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NAEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen 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 the heated oxygen sensor 1, refer to EC-246. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

NAEC0014S05

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 heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen 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

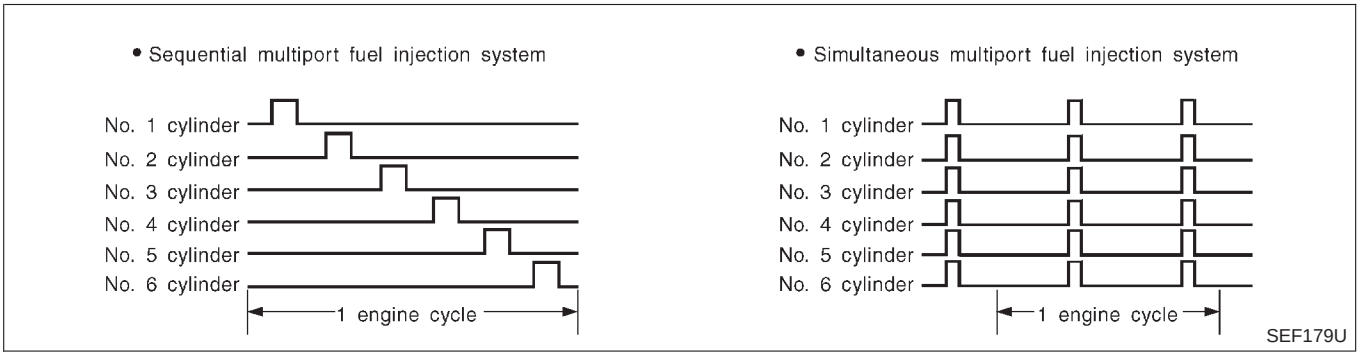
Mixture Ratio Self-learning Control

NAEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

Fuel Injection Timing

NAEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NAEC0014S0701

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

NAEC0014S0702

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 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

NAEC0014S08

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

Electronic Ignition (EI) System

DESCRIPTION

NAEC0015

Input/Output Signal Chart

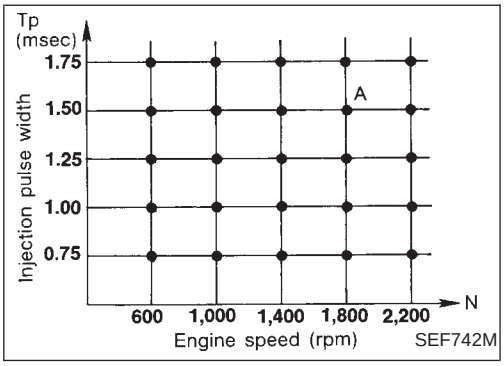
NAEC0015S01

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		
Vehicle speed signal*1	Vehicle speed		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
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 signals of engine speed and battery voltage.

System Description

NAEC0015S02



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. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

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

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

NAEC0016

NAEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	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		
Vehicle speed signal*1	Vehicle speed		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
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 signals of engine speed and battery voltage.

System Description

NAEC0016S02

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.

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

NAEC0017

Input/Output Signal Chart

NAEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed signal*1	Vehicle speed	Fuel cut control	Injector
Park/neutral position (PNP) switch	Neutral position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		

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

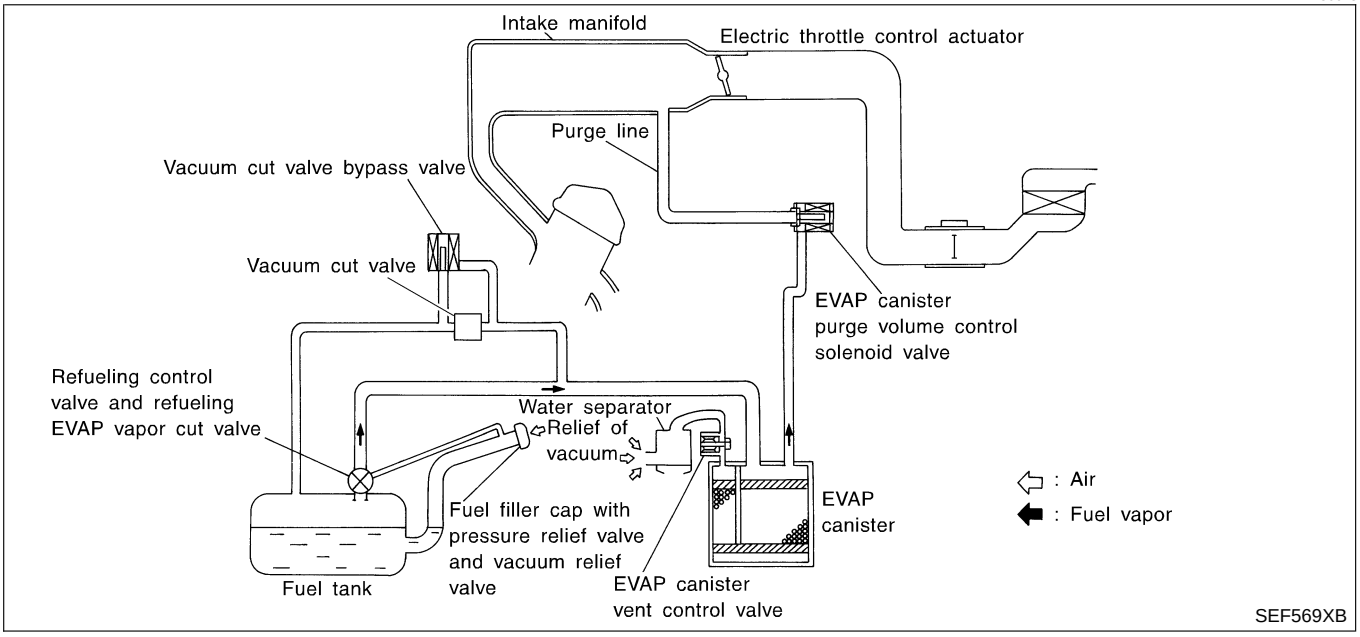
If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-34.

Evaporative Emission System

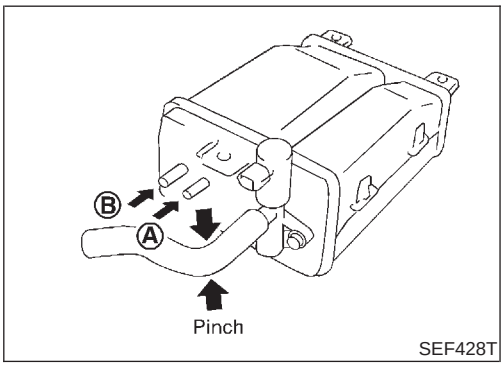
DESCRIPTION

NAEC0018



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.



SEF428T

INSPECTION

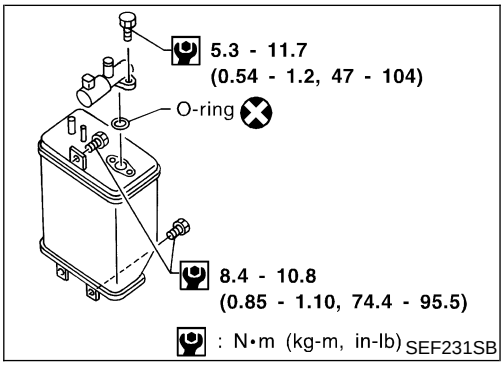
NAEC0019

EVAP Canister

NAEC0019S01

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.

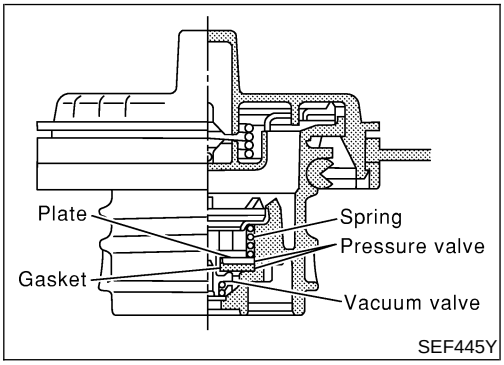


SEF231SB

Tightening Torque

NAEC0019S02

Tighten EVAP canister as shown in the figure.
Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



SEF445Y

Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

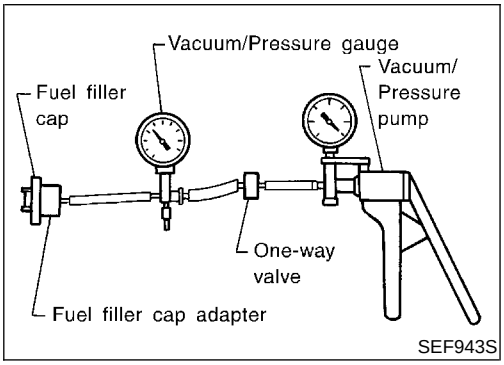
NAEC0019S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −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.



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve
NAEC0019S04

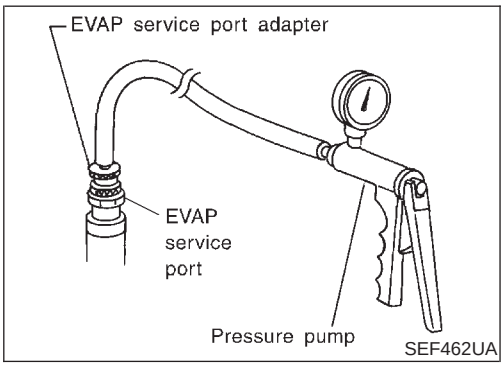
Refer to EC-633.

EVAP Canister Purge Volume Control Solenoid Valve
NAEC0019S05

Refer to EC-364.

Fuel Tank Temperature Sensor
NAEC0019S06

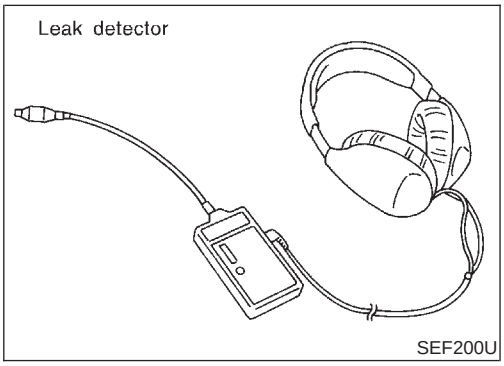
Refer to EC-290.



SEF462UA

Evap Service Port
NAEC0019S07

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.



SEF200U

How to Detect Fuel Vapor Leakage
NAEC0019S08

CAUTION:

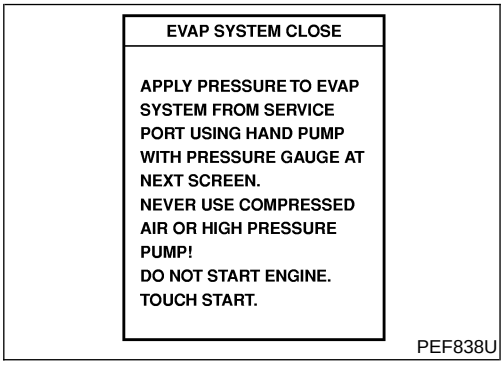
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

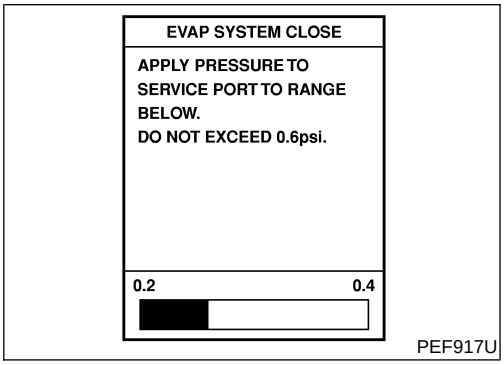
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT-II
NAEC0019S0801

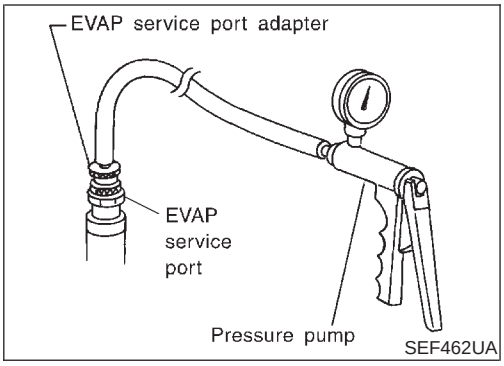
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch ON.
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.

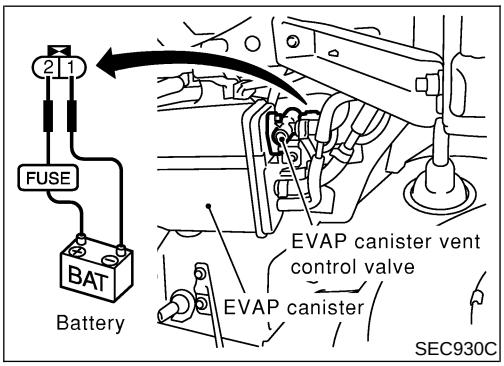


PEF838U



PEF917U





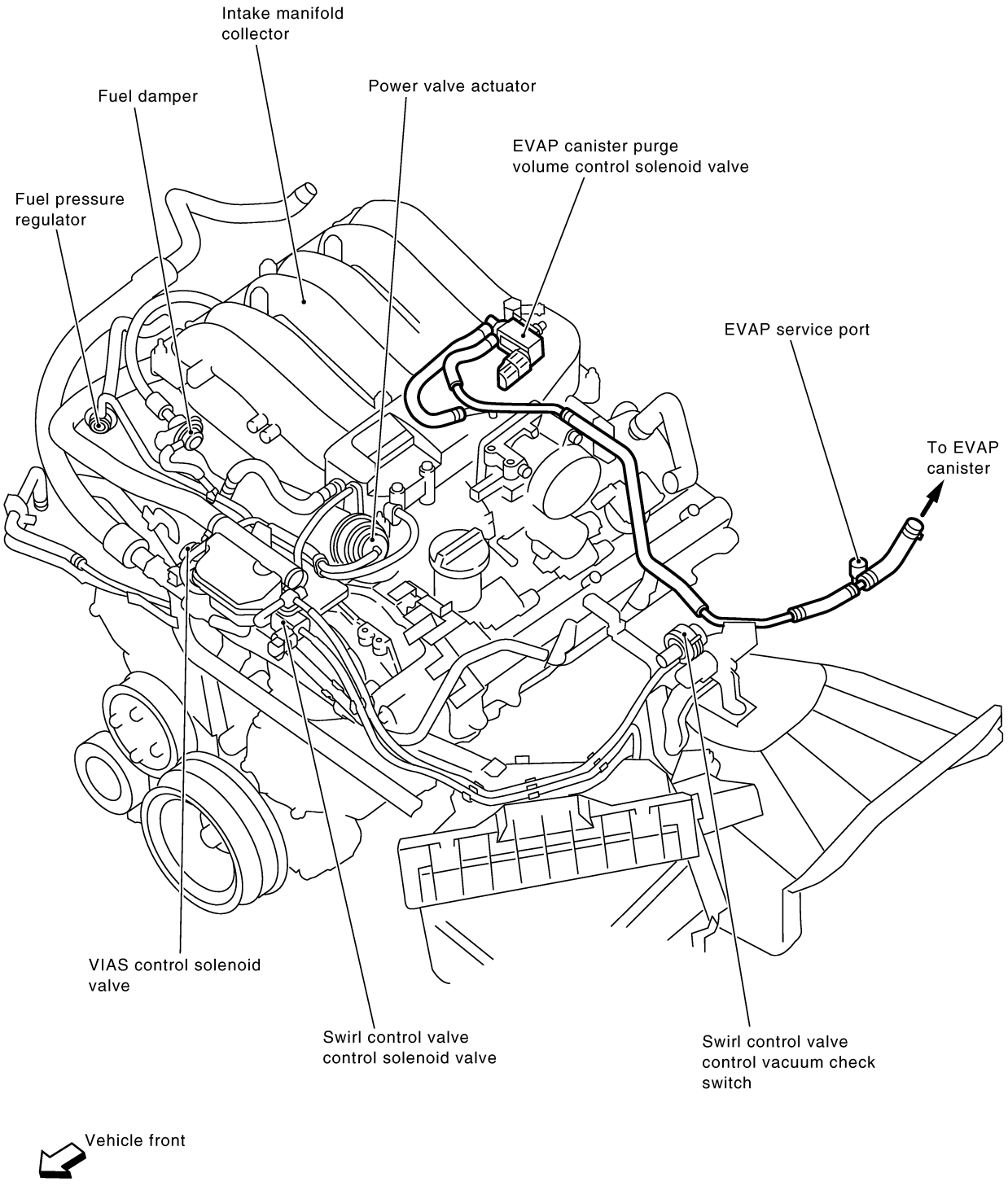
Without CONSULT-II

NAEC0019S0802

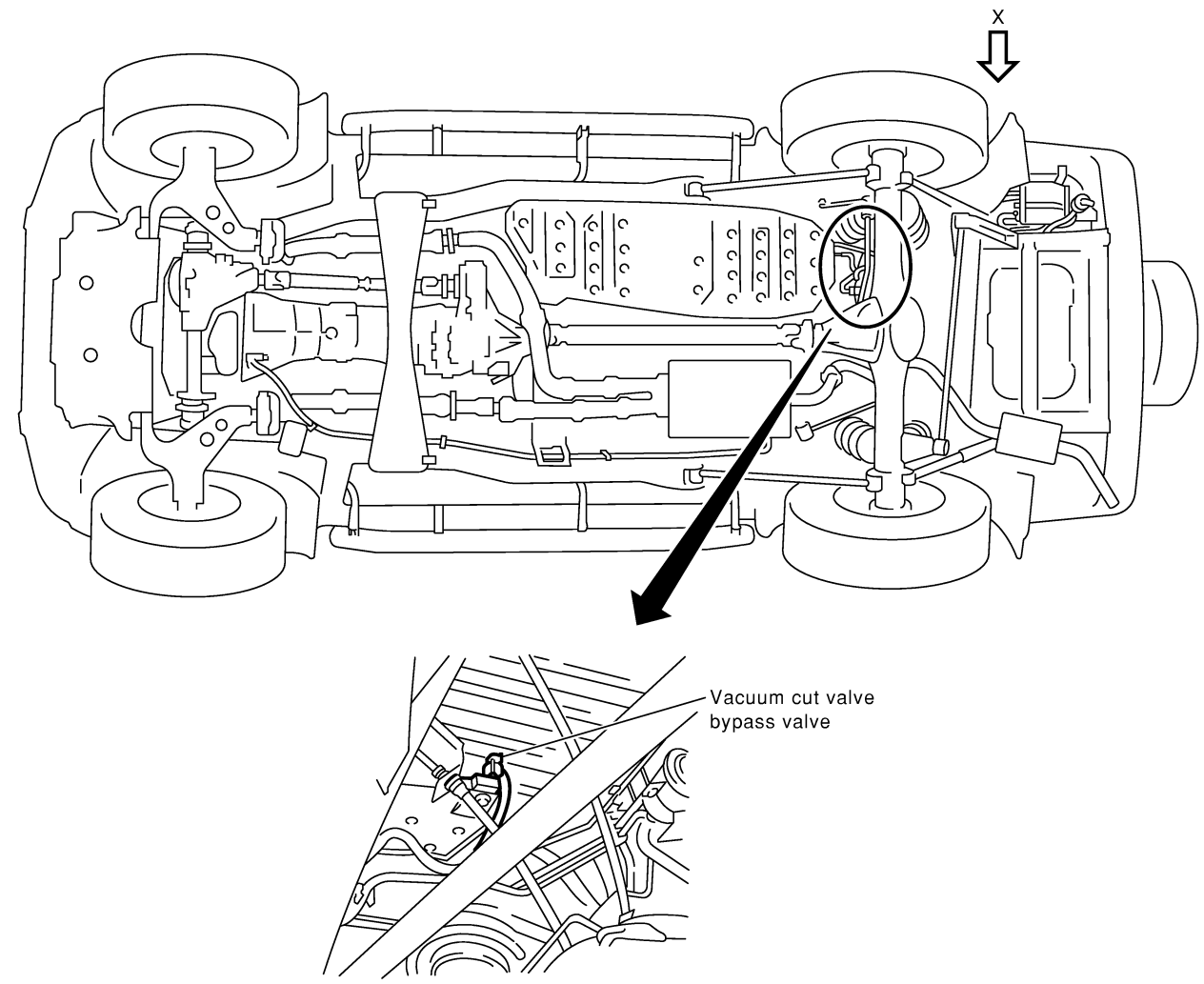
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 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 "EVAPORATIVE EMISSION LINE DRAWING", EC-42.

EVAPORATIVE EMISSION LINE DRAWING

NAEC0020



SEC414D



View X

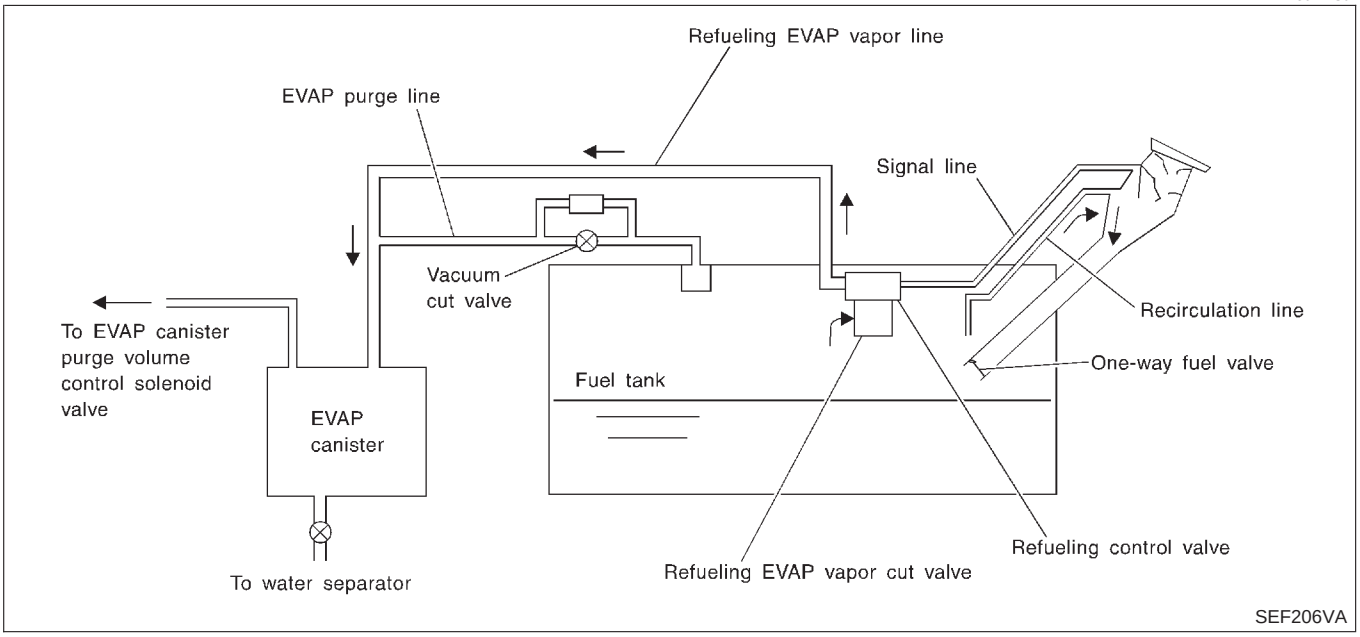
SEC927C

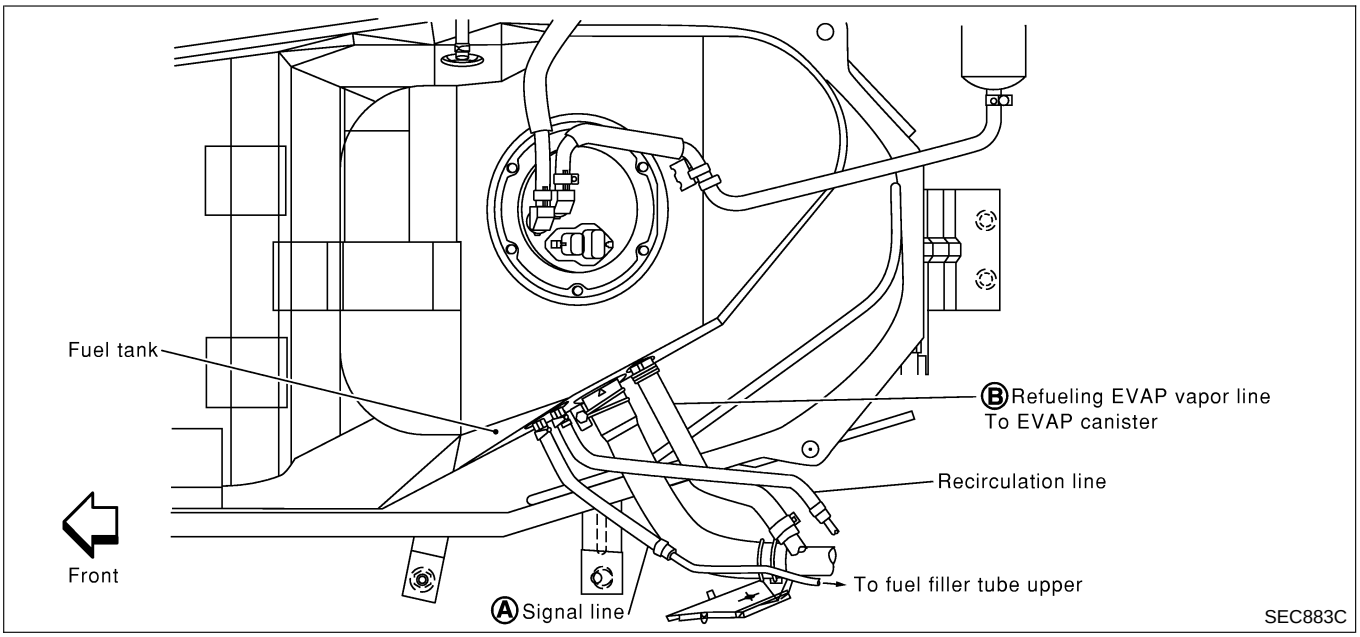
On Board Refueling Vapor Recovery (ORVR)

NAEC0744

SYSTEM DESCRIPTION

NAEC0744S01





From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor 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.
The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

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

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**

a) Put drained fuel in an explosion-proof container and put lid on securely.
b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-56.
c) 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.**

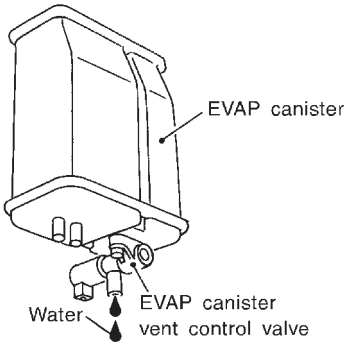
DIAGNOSTIC PROCEDURE

NAEC0744S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NAEC0744S0201

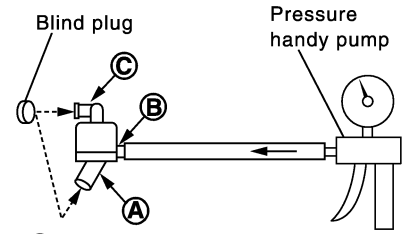
1	CHECK EVAP CANISTER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	
OK or NG	
OK ▶	GO TO 2.
NG ▶	GO TO 3.

2	CHECK IF EVAP CANISTER SATURATED WITH WATER
Does water drain from the EVAP canister?	
 SEF596U	
Yes or No	
Yes ▶	GO TO 3.
No (With CONSULT-II) ▶	GO TO 6.
No (Without CONSULT-II) ▶	GO TO 7.

3	REPLACE EVAP CANISTER
Replace EVAP canister with a new one.	
▶	GO TO 4.

4	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ : Bottom hole (To atmosphere)
Ⓑ : Emergency tube (From EVAP canister)
Ⓒ : Inlet port (To member)

PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

	▶	Repair or replace EVAP hose.

6	CHECK REFUELING EVAP VAPOR CUT VALVE

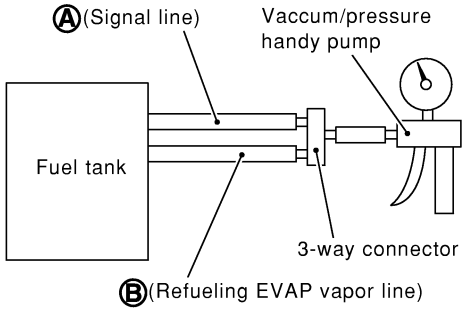
With CONSULT-II

1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
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 both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF968X

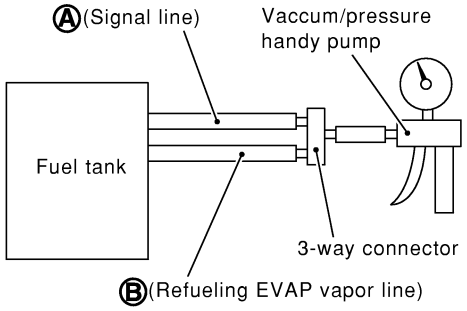
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

7	CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand 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 hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
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 both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



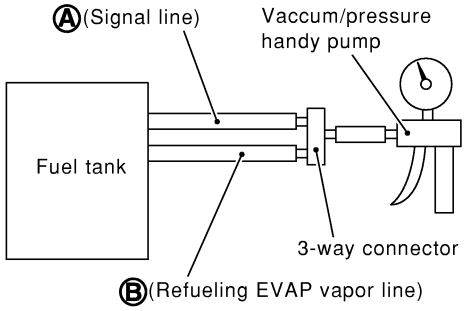
SEF968X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

8	CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



SEF968X

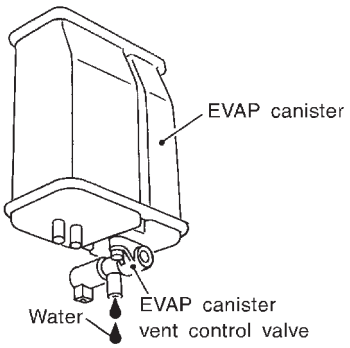
OK or NG

OK	▶	**INSPECTION END**
NG	▶	Replace refueling control valve with fuel tank.

Symptom: Cannot Refuel/Fuel Odor From The Fuel Filler Opening Is Strong While Refueling.

NAEC0744S0202

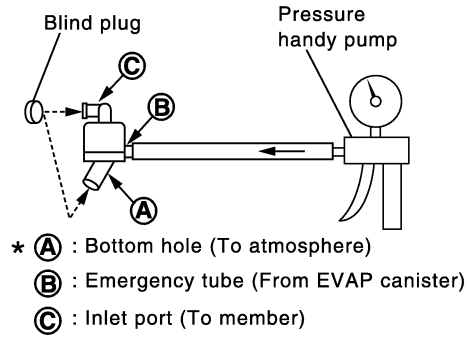
1	CHECK EVAP CANISTER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	
OK or NG	
OK ▶	GO TO 2.
NG ▶	GO TO 3.

2	CHECK IF EVAP CANISTER SATURATED WITH WATER
Does water drain from the EVAP canister?	
 SEF596U	
Yes or No	
Yes ▶	GO TO 3.
No ▶	GO TO 6.

3	REPLACE EVAP CANISTER
Replace EVAP canister with a new one.	
▶	GO TO 4.

4	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

	▶	Repair or replace EVAP hose.

6	CHECK VENT HOSES AND VENT TUBES

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

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE

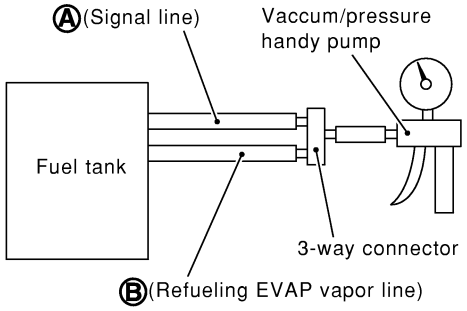
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



SEF968X

OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

9	CHECK REFUELING EVAP VAPOR CUT VALVE

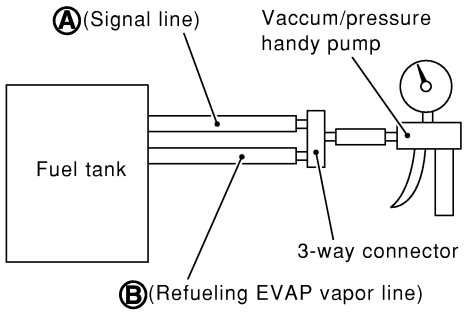
With CONSULT-II

1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
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 both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF968X

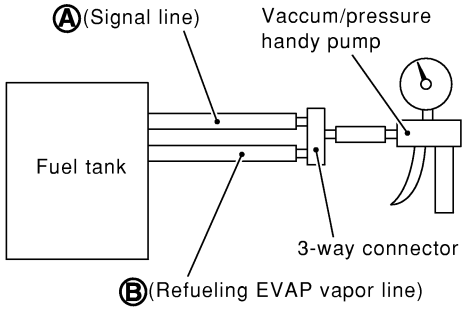
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

10	CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand 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 hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
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 both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF968X

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

11	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 12.
NG	▶	Replace fuel filler tube.

12	CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

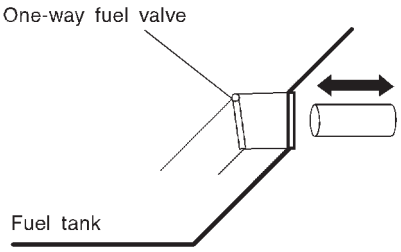
OK or NG

OK	▶	GO TO 13.
NG	▶	Repair or replace one-way fuel valve with fuel tank.

13	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.

After removing filler tube

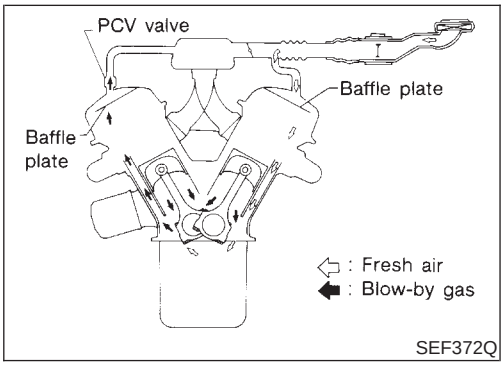


SEF665U

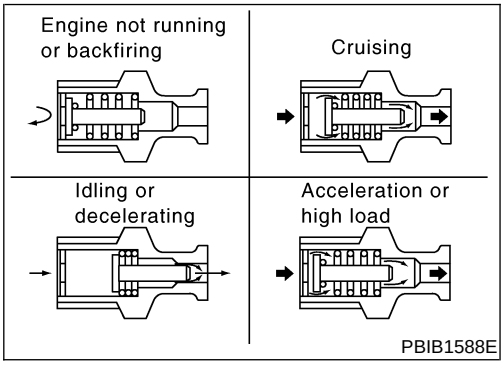
Do not drop any material into the tank.

OK or NG

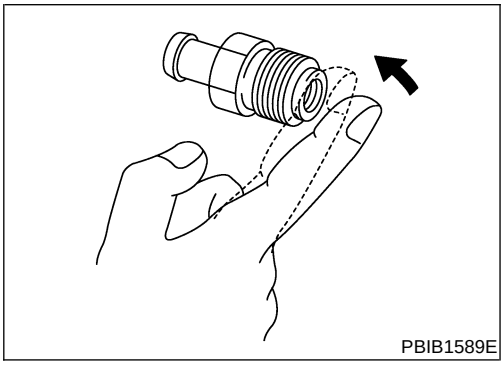
OK	▶	**INSPECTION END**
NG	▶	Replace fuel filler tube or replace one-way fuel valve with fuel tank.



SEF372Q



PBIB1588E



PBIB1589E

Positive Crankcase Ventilation

DESCRIPTION

NAEC0021

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.

INSPECTION

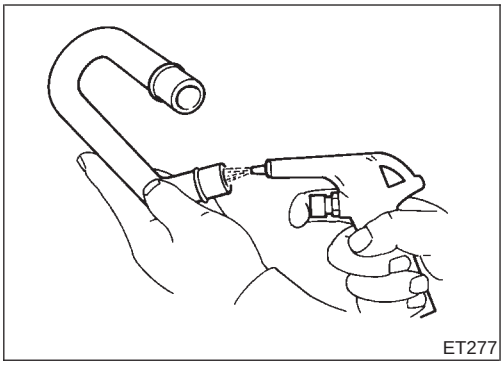
NAEC0022

PCV (Positive Crankcase Ventilation) Valve

NAEC0022S01

With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

Positive Crankcase Ventilation (Cont'd)


ET277

PCV Valve Ventilation Hose

NAEC0022S02

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.

CAN Communication

SYSTEM DESCRIPTION

NAEC1368

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 EL-409, "CAN Communication Unit" for details of CAN communication.

Automatic Speed Control Device (ASCD) System

DESCRIPTION

NAEC1370

Input/Output Signal Chart

NAEC1370S01

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		
Combination meter*	Vehicle speed		
TCM*	Power train revolution		

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

Basic ASCD System

NAEC1370S02

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.

Set Operation

NAEC1370S03

Press MAIN switch. (Then 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.)

Accel Operation

NAEC1370S04

If the RESUME/ACCEL 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

NAEC1370S05

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 (M/T models).
- A/T selector lever is shifted to P, N or R position (A/T models).
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

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

- Engine coolant temperature is slightly higher than the normal operating temperature: CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCEL switch.
- Malfunction for self-diagnosis regarding ASCD control: SET lamp will blink quickly.

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

Coast Operation

NAEC1370S06

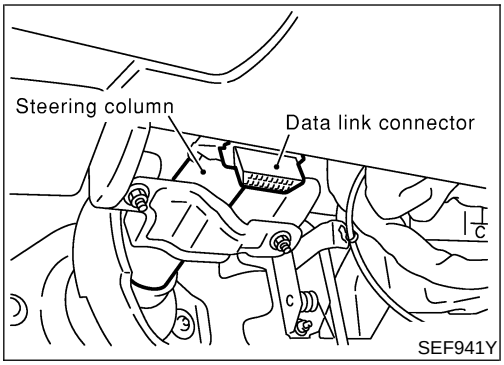
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

Resume Operation

NAEC1370S07

When the RESUME/ACCEL 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, N and R positions (A/T models).
- Vehicle speed is greater than 40 km/h (25 MPH) and 144 km/h (89 MPH).



SEF941Y

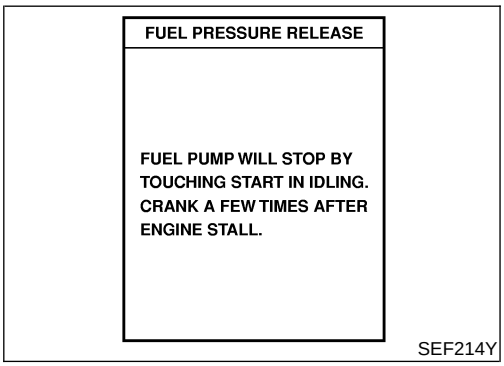
Fuel Pressure Release

NAEC0023

WITH CONSULT-II

NAEC0023S01

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

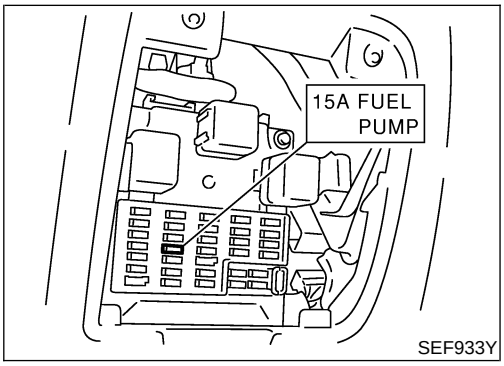


SEF214Y

WITHOUT CONSULT-II

NAEC0023S02

1. Remove fuel pump fuse located in fuse box.
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.



SEF933Y

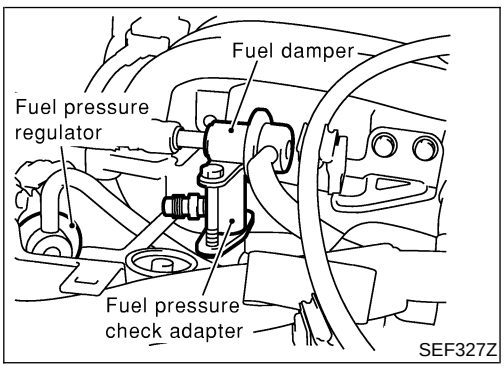
Fuel Pressure Check

NAEC0024

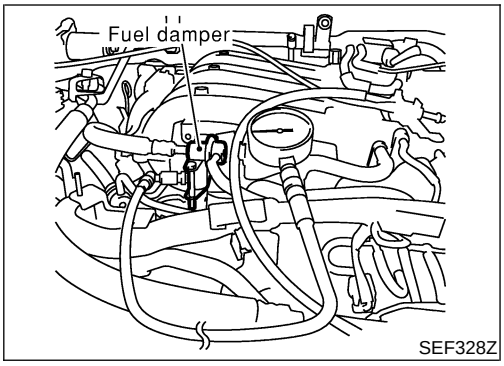
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**
- **Do not perform fuel pressure check with electrical system operating (i.e. lights, rear window defogger, A/C etc.). Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

1. Release fuel pressure to zero.
2. Disconnect fuel tube joint between fuel damper and injector tube and set fuel pressure check adapter (J-44321).



SEF327Z



3. Install pressure gauge to the fuel pressure check adapter as shown in the figure.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

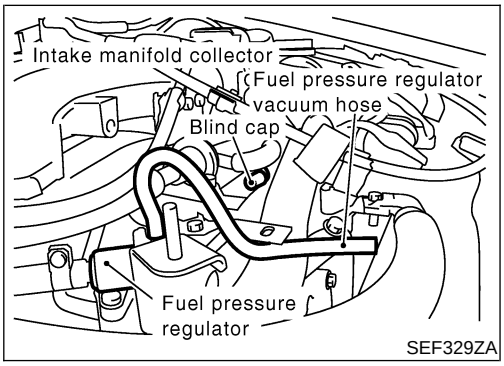
Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

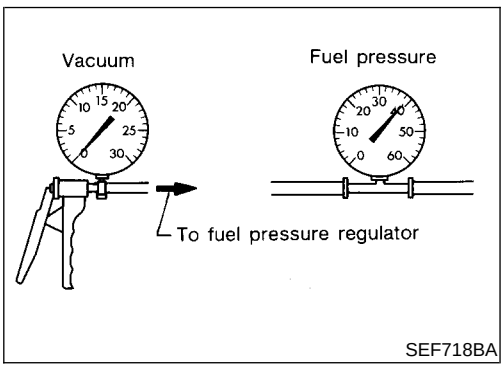
If results are unsatisfactory, perform Fuel Pressure Regulator Check.

Fuel Pressure Regulator Check

NAEC0025

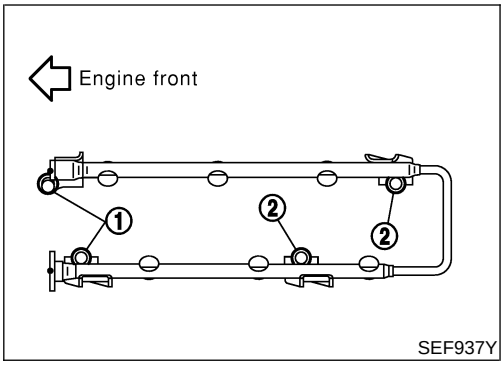
1. Stop engine and disconnect fuel pressure regulator vacuum hose from vacuum gallery.
2. Plug vacuum gallery with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.

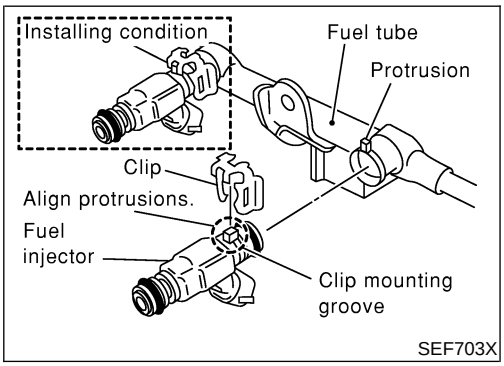




4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.





Injector

REMOVAL AND INSTALLATION

NAEC0026

1. Release fuel pressure to zero.
2. Remove intake manifold collector. Refer to EM-24, “TIMING CHAIN”.
3. Remove fuel tube assemblies in numerical sequence as shown in the figure at left.
4. Expand and remove clips securing fuel injectors.
5. Extract fuel injectors straight from fuel tubes.

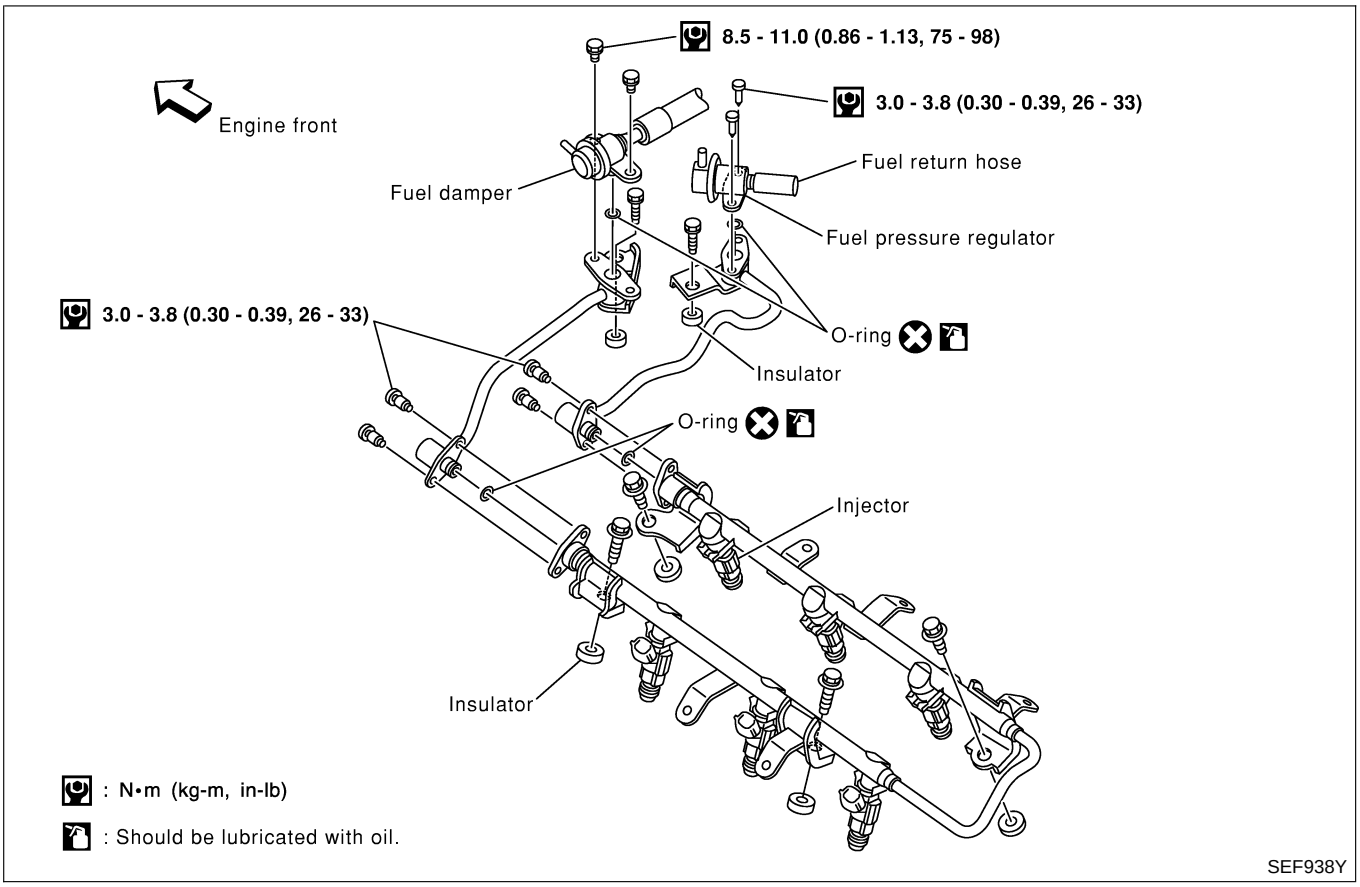
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

6. Carefully install O-rings, including the one used with the pressure regulator.

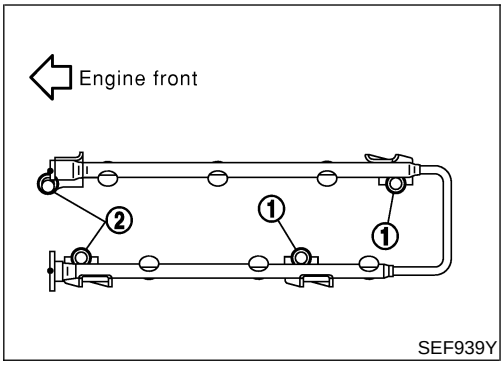
- **Lubricate O-rings with a smear of engine oil.**
- **Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings.**
- **Discard old clips; replace with new ones.**

7. Position clips in grooves on fuel injectors.

- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**



8. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
9. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tubes are engaged with clips.



SEF939Y

10. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages.
    : Tightening torque N·m (kg-m, ft-lb)
    1st stage:
    9.3 - 10.8 (1.0 - 1.1, 6.9 - 7.9)
    2nd stage:
    20.6 - 26.5 (2.1 - 2.7, 16 - 19)
11. Install all parts removed in reverse order of removal.

CAUTION:
After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.

How to Check Idle Speed and Ignition Timing

NAEC0607

IDLE SPEED

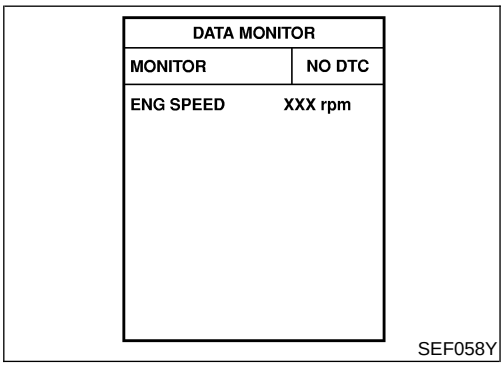
NAEC0607S01

WITH CONSULT-II

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

WITH GST

Check idle speed with GST.



SEF058Y

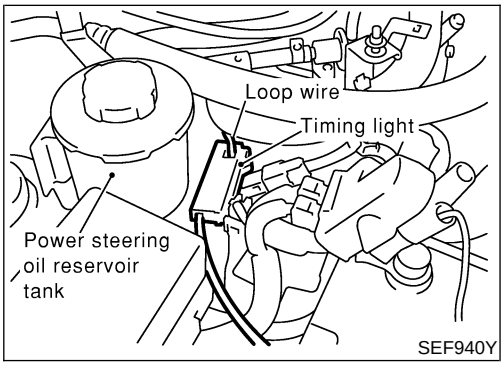
IGNITION TIMING

NAEC0607S02

Any of following two methods may be used.

- **Method A**

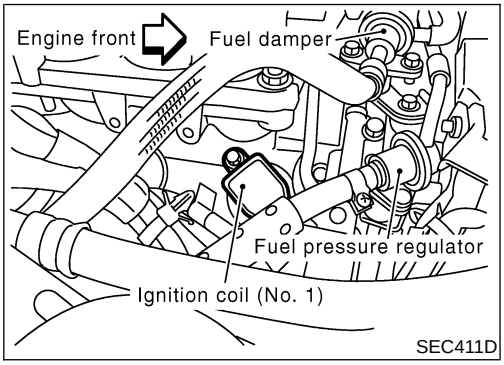
a) Attach timing light to loop wire as shown.
b) Check ignition timing.



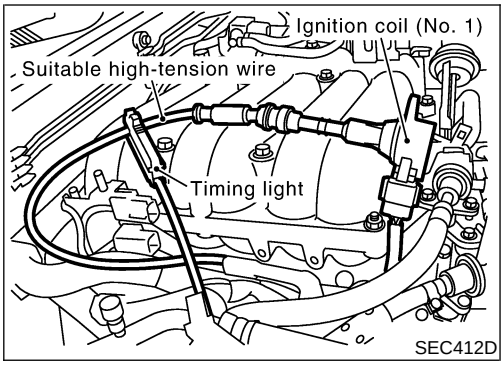
SEF940Y

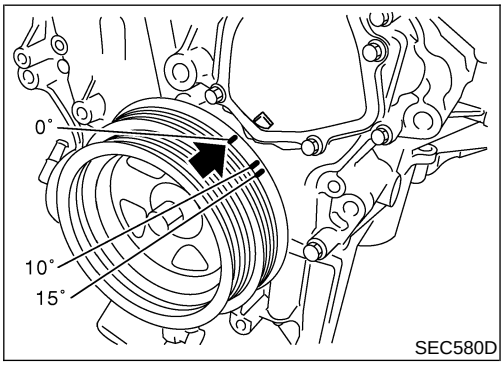
- **Method B**

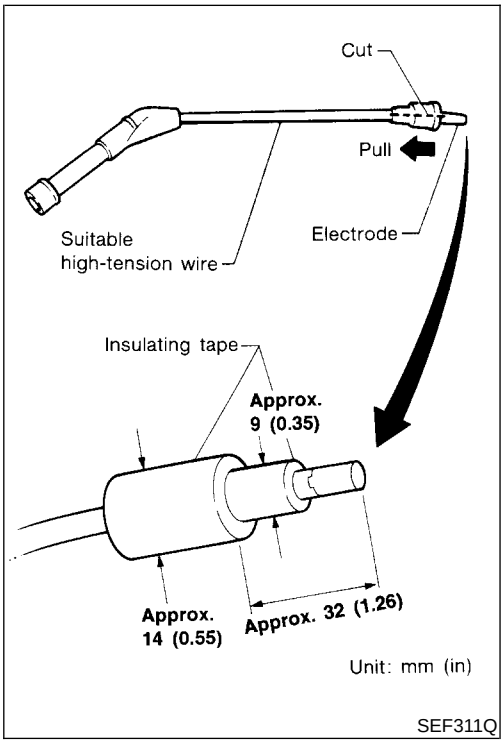
a) Remove No. 1 ignition coil.



SEC411D







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

c) Check ignition timing.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

=NAEC0028

PREPARATION

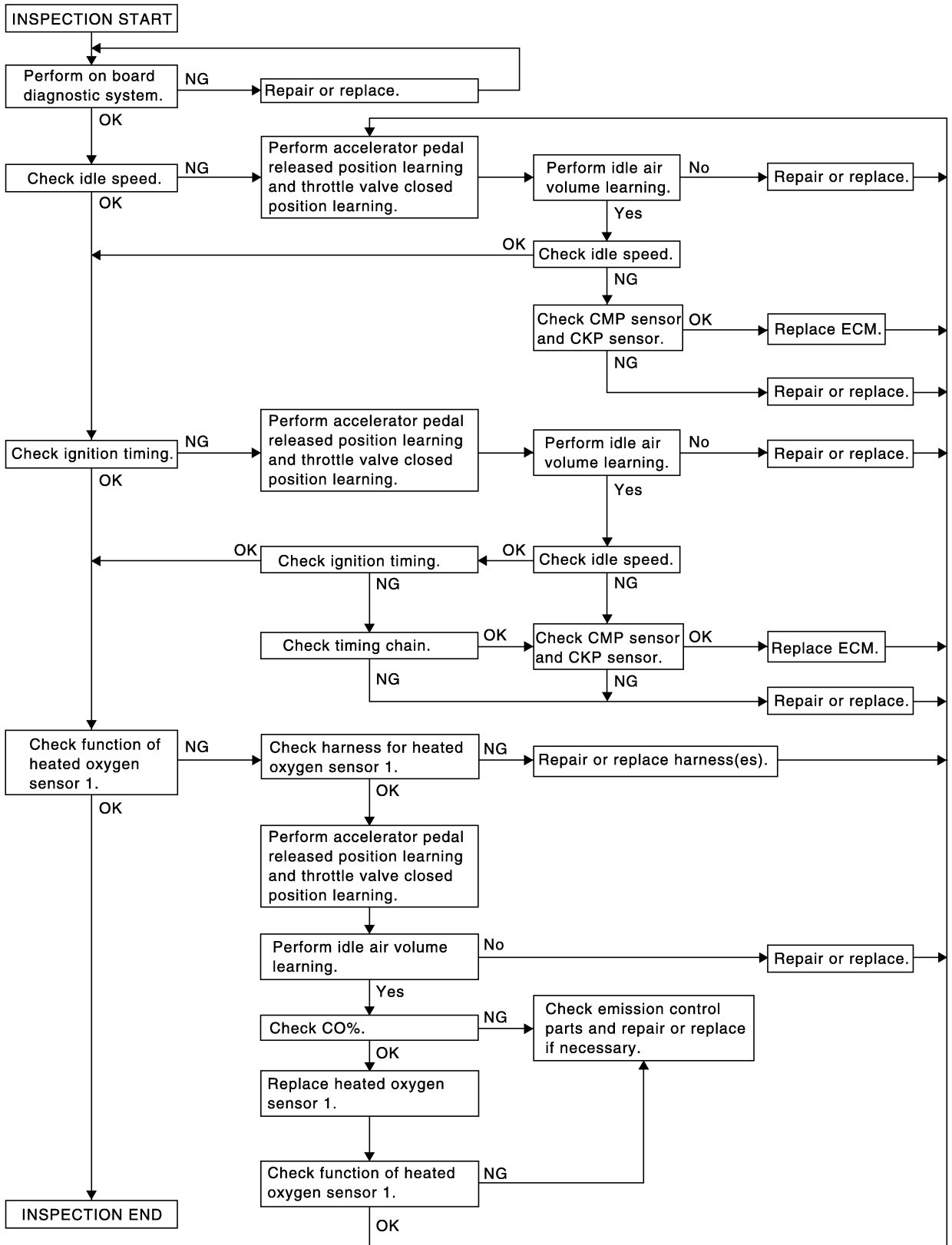
NAEC0028S01

1) Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- Throttle valve
- Evaporative emission system

2) On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in N position.
4) When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5) Turn off headlamps, heater blower, rear defogger.
6) Keep front wheels pointed straight ahead.

Overall Inspection Sequence

NAEC0028S0101



NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

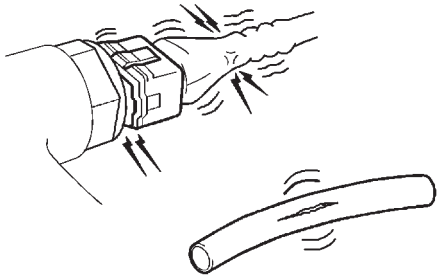
PBIB1054E

INSPECTION PROCEDURE

=NAEC0028S02

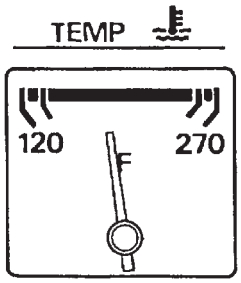
1	INSPECTION START

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



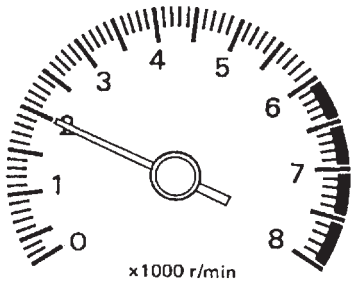
SEF983U

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.



SEF976U

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



SEF977U

6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

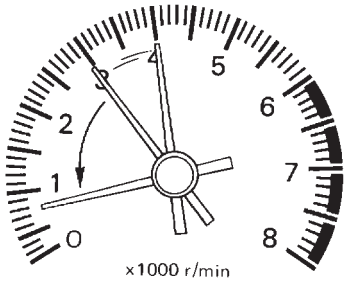
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	REPAIR OR REPLACE
Repair or replace components as necessary according to corresponding Diagnostic Procedure.	
	▶ GO TO 3.

3	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



SEF978U

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

M/T: 750±50 rpm
A/T: 750±50 rpm (in P or N position)

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed.

M/T: 750±50 rpm
A/T: 750±50 rpm (in P or N position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 4.

4	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.

	▶	GO TO 5.

5	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-73.

	▶	GO TO 6.

6	PERFORM IDLE AIR VOLUME LEARNING	
Perform "Idle Air Volume Learning", EC-73. **Is Idle Air Volume Learning carried out successfully?**		
	Yes or No	
Yes	▶	GO TO 7.
No	▶	1. Follow the instruction of Idle Air Volume Learning. 2. GO TO 4.

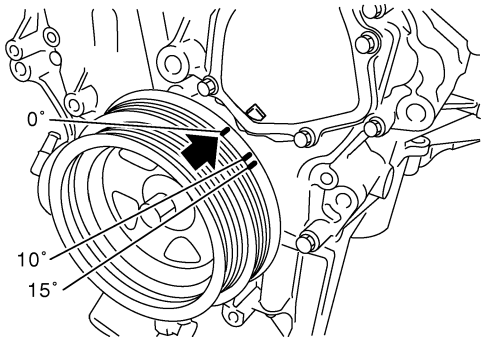
7	CHECK TARGET IDLE SPEED AGAIN	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in "DATA MONITOR" mode with CONSULT-II. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in P or N position)**		
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in P or N position)**		
	OK or NG	
OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Check camshaft position sensor (PHASE) and circuit. Refer to "DTC P0340, P0345 CMP SENSOR (PHASE)", EC-326. ● Check crankshaft position sensor (POS) and circuit. Refer to "DTC P0335 CKP SENSOR (POS)", EC-319.		
	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 NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93.		
	▶	GO TO 4.

10	CHECK IGNITION TIMING

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



SEC580D

M/T: 15°±5° BTDC
A/T: 15°±5° BTDC (in P or N position)

OK or NG

OK (With CONSULT-II)	▶	GO TO 19.
OK (Without CONSULT-II)	▶	GO TO 20.
NG	▶	GO TO 11.

11	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.

	▶	GO TO 12.

12	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-73.

	▶	GO TO 13.

13	PERFORM IDLE AIR VOLUME LEARNING

Perform "Idle Air Volume Learning", EC-73.
Is Idle Air Volume Learning carried out successfully?

Yes or No

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

14	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in P or N position)

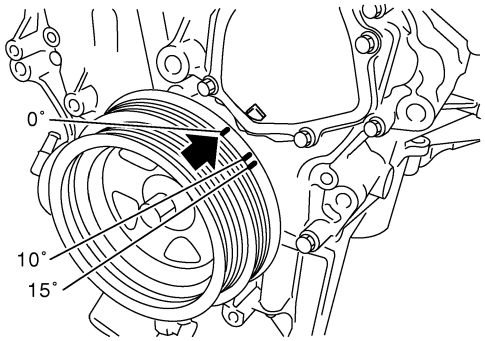
Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in P or N position)

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 17.

15	CHECK IGNITION TIMING AGAIN

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



SEC580D

M/T: 15°±5° BTDC
A/T: 15°±5° BTDC (in P or N position)

OK or NG

OK (With CONSULT-II)	▶	GO TO 19.
OK (Without CONSULT-II)	▶	GO TO 20.
NG	▶	GO TO 16.

16	CHECK TIMING CHAIN INSTALLATION

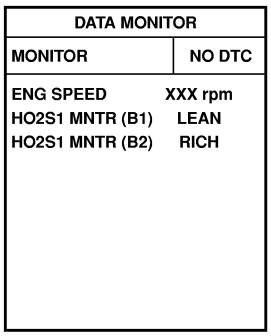
Check timing chain installation. Refer to EM-24, "TIMING CHAIN".

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 "DTC P0340, P0345 CMP SENSOR (PHASE)", EC-326. ● Check crankshaft position sensor (POS) and circuit. Refer to "DTC P0335 CKP SENSOR (POS)", EC-319. **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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93.		
	▶	GO TO 4.

19	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
With CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.  PBIB0120E **1 time: RICH → LEAN → RICH** **2 times: RICH → LEAN → RICH → LEAN → RICH** **OK or NG**		
OK	▶	GO TO 21.
NG (Monitor does not fluctuate.)	▶	GO TO 23.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 31.

20	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

Without CONSULT-II

1. Stop engine and set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODE", EC-95.
2. Start engine and run it at about 2,000 rpm for about 2 minutes under no-load.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK	▶	GO TO 22.
NG (MIL does not come on)	▶	GO TO 23.
NG (MIL comes on less than 5 times)	▶	GO TO 31.

21	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

With CONSULT-II

1. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB0120E

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 24.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 31.

22	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

Without CONSULT-II

1. Switch the monitored sensor from bank 1 to bank 2. Refer to "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa", EC-95.
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK	▶	**INSPECTION END**
NG (MIL does not come on)	▶	GO TO 24.
NG (MIL comes on less than 5 times)	▶	GO TO 31.

23	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS
1. Turn ignition switch OFF and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 1) harness connector. 4. Check harness continuity between ECM terminal 35 and heated oxygen sensor 1 (bank 1) terminal 1. Refer to "Wiring Diagram", EC-226. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 25.
NG ▶	1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 1). 2. GO TO 4.

24	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS
1. Turn ignition switch OFF and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 2) harness connector. 4. Check harness continuity between ECM terminal 16 and heated oxygen sensor 1 (bank 2) terminal 1. Refer to "Wiring Diagram", EC-227. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 25.
NG ▶	1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 2). 2. GO TO 4.

25	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
1. Reconnect ECM harness connector. 2. Perform "Accelerator pedal released position learning", EC-73.	
▶	GO TO 26.

26	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Perform "Throttle Valve Closed Position Learning", EC-73.	
▶	GO TO 27.

27	PERFORM IDLE AIR VOLUME LEARNING
Perform "Idle Air Volume Learning", EC-73. **Is Idle Air Volume Learning carried out successfully?**	
Yes or No	
Yes (With CONSULT-II) ▶	GO TO 28.
Yes (Without CONSULT-II) ▶	GO TO 29.
No ▶	1. Follow the instruction of Idle Air Volume Learning. 2. GO TO 4.

28	CHECK CO %

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check CO %.

ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

Idle CO: 0.7 - 9.9% and engine runs smoothly.

OK or NG

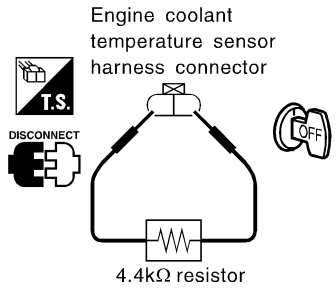
OK	▶	GO TO 31.
NG	▶	GO TO 30.

29	CHECK CO %

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check CO %.

   Idle CO: 0.7 - 9.9% and engine runs smoothly.
7. After checking CO %, turn ignition switch OFF, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



SEF982UA

OK or NG

OK	▶	GO TO 31.
NG	▶	GO TO 30.

30	RECONNECT HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Reconnect heated oxygen sensor 1 harness connector.

	▶	GO TO 34.

31	REPLACE HEATED OXYGEN SENSOR 1	
1. Stop engine. 2. Replace heated oxygen sensor 1 on the malfunctioning bank.		
With CONSULT-II	▶	GO TO 32.
Without CONSULT-II	▶	GO TO 33.

32	CHECK HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) SIGNAL	
With CONSULT-II 1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. 2. See "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds. **1 time: RICH → LEAN → RICH** **2 times: RICH → LEAN → RICH → LEAN → RICH**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 34.

33	CHECK HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) SIGNAL	
Without CONSULT-II 1. Set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to "How to Switch Diagnostic Test Mode", EC-95. 2. Switch the monitored sensor to the malfunctioning bank. Refer to "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa", EC-95. 3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 34.

34	DETECT MALFUNCTIONING PART	
Check the following. ● Check mass air flow sensor and its circuit, and repair or replace if necessary. Refer to EC-187, EC-194. ● Check injector and its circuit, and repair or replace if necessary. Refer to EC-724. ● Check engine coolant temperature sensor and its circuit, and repair or replace if necessary. Refer to EC-204. ● Check fuel pressure and repair or replace if necessary. Refer to EC-56.		
OK or NG		
OK	▶	GO TO 36.
NG	▶	1. Repair or replace. 2. GO TO 35.

35	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC might be displayed. Erase the stored memory in ECM and TCM. Refer to "How to Erase Emission-related Diagnostic Information", EC-91 and AT-60.		
	▶	GO TO 4.

36	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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS", EC-93.	
▶	GO TO 4.

Accelerator Pedal Released Position Learning

NAEC1183

DESCRIPTION

NAEC1183S01

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

NAEC1183S02

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

Throttle Valve Closed Position Learning

NAEC1184

DESCRIPTION

NAEC1184S01

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitorizing 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

NAEC1184S02

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

NAEC1182

DESCRIPTION

NAEC1182S01

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

NAEC1182S02

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)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is 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-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

OPERATION PROCEDURE

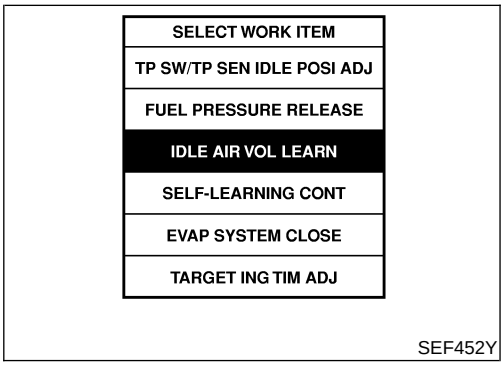
NAEC1182S03

With CONSULT-II

NAEC1182S0301

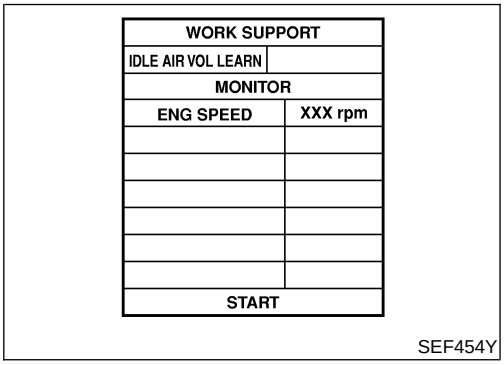
NOTE:
Before perform Idle Air Volume Learning, make sure that Accelerator Pedal Released Position Learning and Throttle Valve Closed Position Learning are completed.
If not, perform "Accelerator Pedal Released Position Learning", EC-73 and "Throttle Valve Closed Position Learning", EC-73.

1. Start engine and warm it up to normal operating temperature.
2. Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.



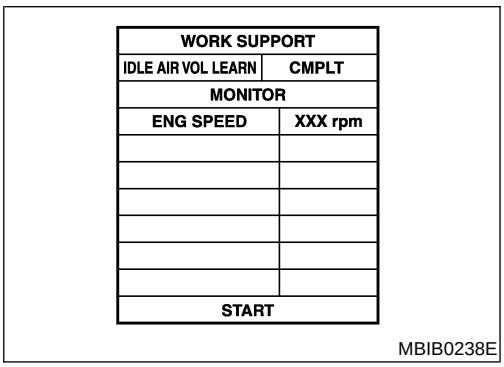
SEF452Y

3. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.



SEF454Y

4. Touch "START" and wait 20 seconds.



MBIB0238E

5. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.
6. 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	M/T: 750±50 rpm A/T: 750±50 rpm (in P or N position)

Ignition timing	M/T: 15±5° BTDC A/T: 15±5° BTDC (in P or N position)

Without CONSULT-II

NAEC1182S0302

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.**

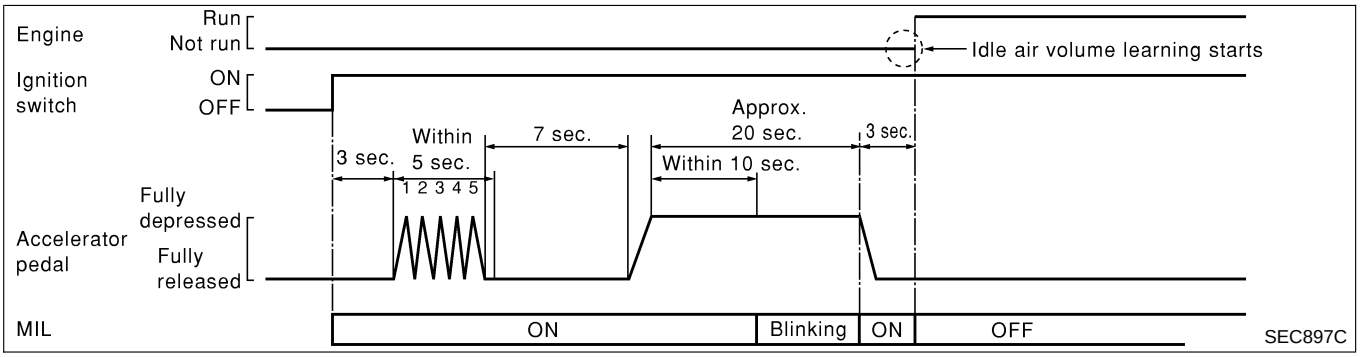
NOTE:

Before perform Idle Air Volume Learning, make sure that Accelerator Pedal Released Position Learning and Throttle Valve Closed Position Learning are completed.
If not, perform "Accelerator Pedal Released Position Learning", EC-73 and "Throttle Valve Closed Position Learning", EC-73.

1. Start engine and warm it up to normal operating temperature.
2. Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
5. Repeat the following procedure quickly five times within 5 seconds.

1) Fully depress the accelerator pedal.
2) Fully release the accelerator pedal.

6. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turns ON.
7. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
8. Start engine and let it idle.
9. Wait 20 seconds.



10. 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	M/T: 750±50 rpm A/T: 750±50 rpm (in P or N position)
Ignition timing	M/T: 15±5° BTDC A/T: 15±5° BTDC (in P or N position)

11. 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

NAEC1182S04

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-151, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE".
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.**

Introduction

NAEC0029

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	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979
Calibration ID	Mode 9 of SAE 1979

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

X: Applicable —: Not applicable

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

*: 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-130.)

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting MIL up when there is a malfunction on engine control system.
  Therefore, when electrically controlled throttle and part of ECM related diagnosis is continuously detected as NG for 5 trips, ECM warns the driver that engine control system has a malfunction 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

Two Trip Detection Logic

NAEC0030

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

Two Trip Detection Logic (Cont'd)

X: Applicable —: Not Exit

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	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
One trip detection diagnoses (Refer to EC-9.)	—	X	—	—	X	—	—	—
Except above	—	—	—	X	—	X	X	—

*1: Except ECM

Emission-related Diagnostic Information

NAEC0031

DTC AND 1ST TRIP DTC

NAEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-87. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 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 II, refer to EC-121. 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

NAEC0031S0101

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

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0117, P0340, P1065, etc.

These DTCs are prescribed by SAE J2012.

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

No TOOLS

The number of times the MIL blinks in Diagnostic Test Mode II (Self-diagnostic Results) indicates the DTC. (Example: 0117, 0340, 1065, etc.)

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NAEC0031S02

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 and absolute pressure at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-107.
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", EC-91.

SYSTEM READINESS TEST (SRT) CODE

NAEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 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.

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

NAEC0031S0310

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

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	1	EVAP control system (small leak) (negative pressure)	P0442, P1442
	2	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P0456, P1456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1 (lean shift monitoring)	P1143, P1163
		Heated oxygen sensor 1 (rich shift monitoring)	P1144, P1164
		Heated oxygen sensor 1 (response monitoring)	P0133, P0153
		Heated oxygen sensor 2 (min. voltage monitoring)	P1146, P1166
		Heated oxygen sensor 2 (max. voltage monitoring)	P1147, P1167
		Heated oxygen sensor 2 (response monitoring)	P0139, P0159
HO2S HTR	2	Heated oxygen sensor 1 heater	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

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

SRT Set Timing

=NAEC0031S0311

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 ← ON →	OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL "ON")
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) for the following reasons:

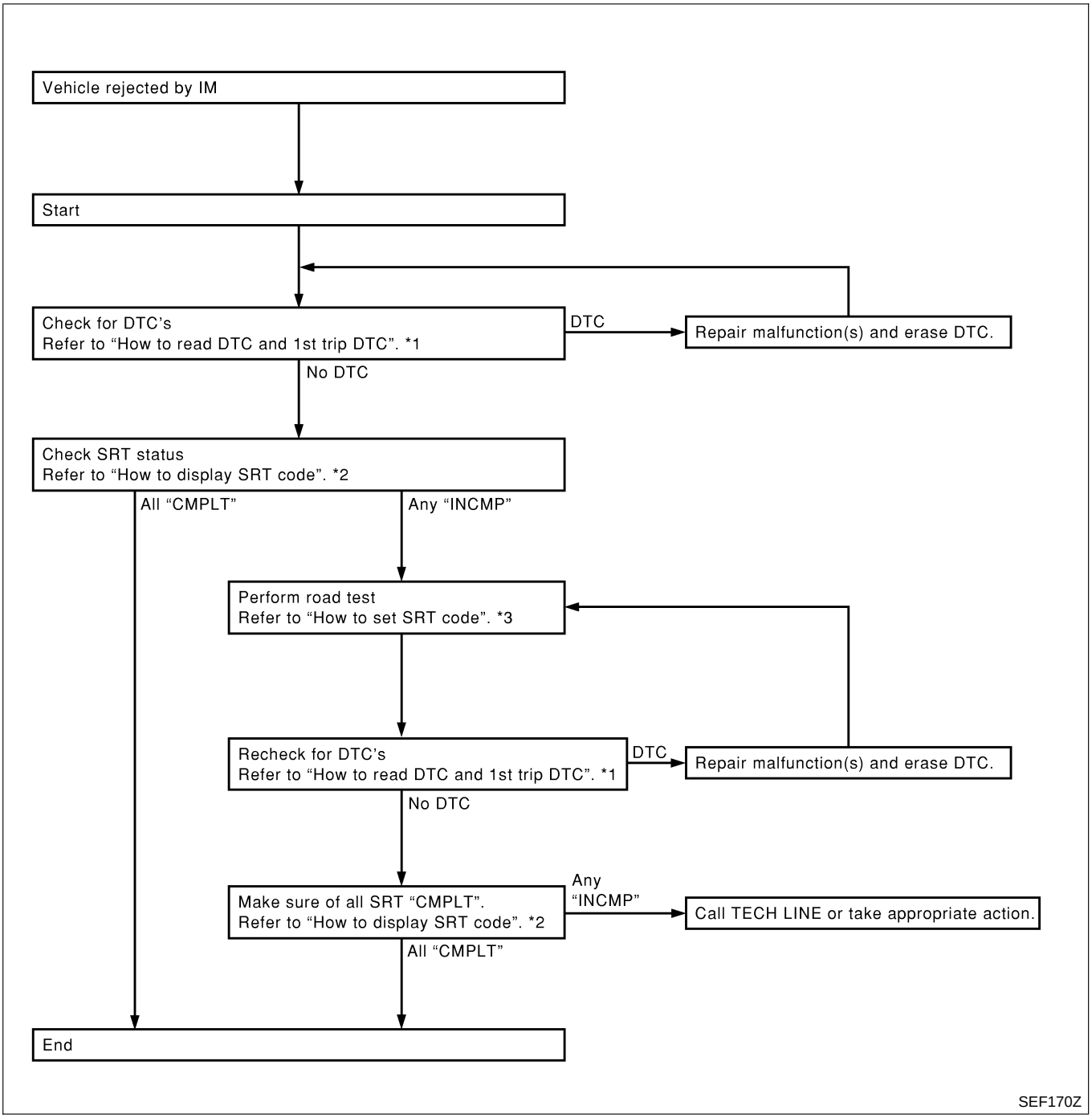
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory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

NAEC0031S0312

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 EC-78 *2 EC-82 *3 EC-83

How to Display SRT Code

NAEC0031S0301

With CONSULT-II

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

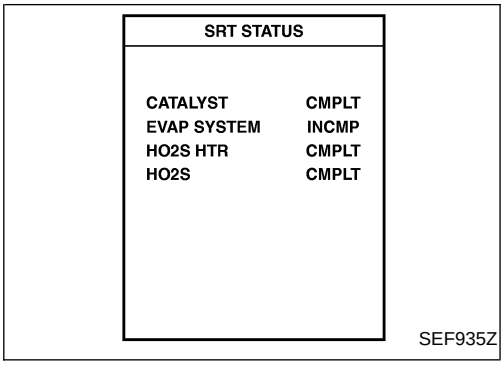
For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

With GST

Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.

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



How to Set SRT Code

NAEC0031S0302

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

With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-80.

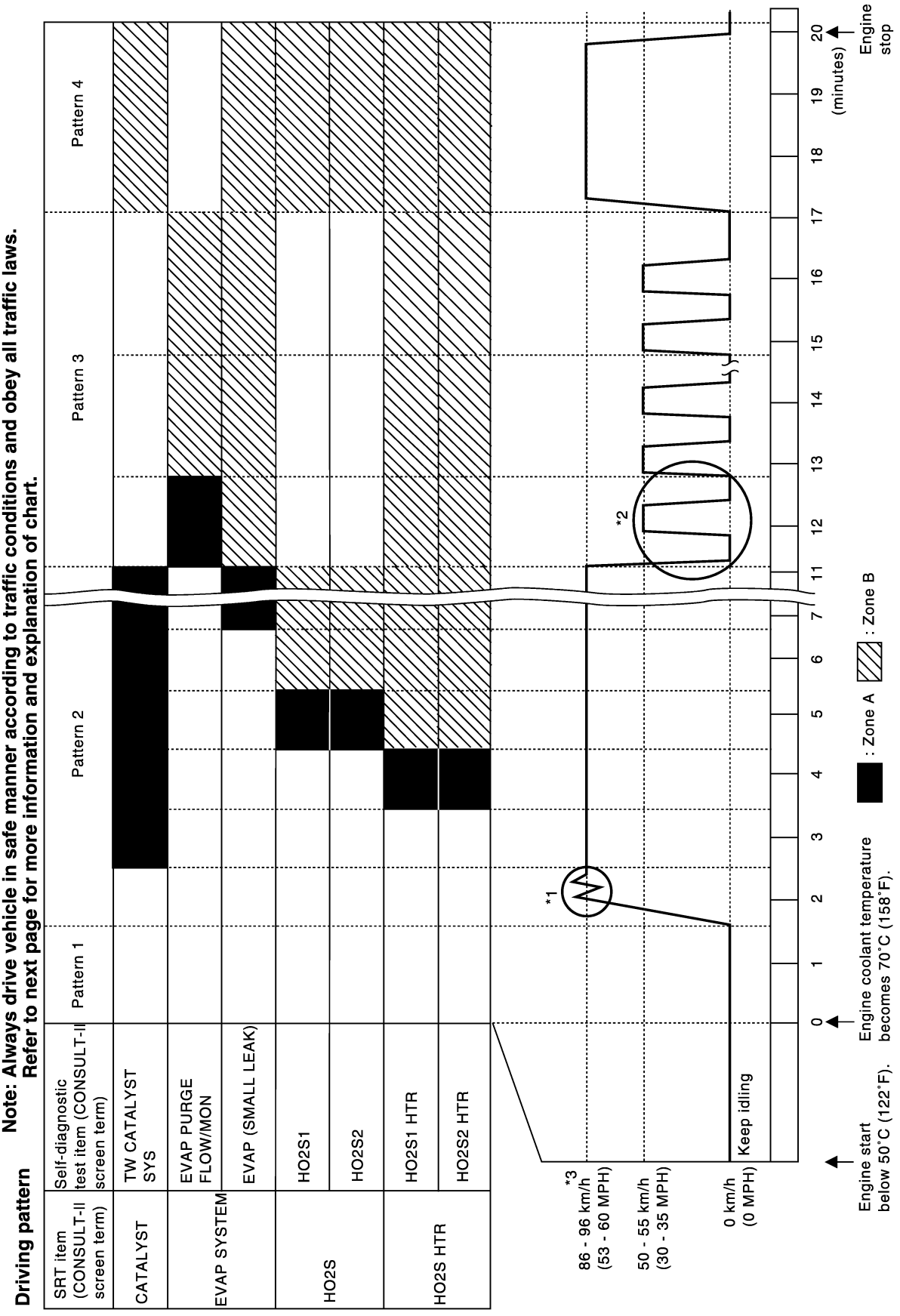
Without CONSULT-II

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

Driving Pattern

NAEC0031S0303

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.



PBIB1053E

- 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:

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

Pattern 1:

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

Pattern 2:

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

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

Pattern 4:

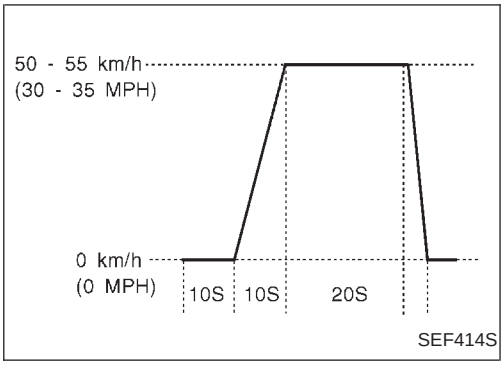
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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: Operate the vehicle in the following driving pattern.

1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2) Repeat driving pattern shown below at least 10 times.

- **During acceleration, hold the accelerator pedal as steady as possible.**



*3: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

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

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.

	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)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	21 (13)	21 (13)	24 (15)
2nd to 3rd	37 (23)	26 (16)	40 (25)
3rd to 4th	53 (33)	44 (27)	64 (40)
4th to 5th	63 (39)	58 (36)	72 (45)

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	50 (30)
2nd	89 (55)
3rd	128 (80)
4th	—
5th	—

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

NAEC0031S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

SRT item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
	Three way catalyst function (Bank 2)	P0430	03H	02H	Max.	1/128
		P0430	04H	82H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm^2
		P1456	07H	03H	Max.	1/128 mm^2

SRT item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
HO2S	Heated oxygen sensor 1 (Bank 1)	P0133	09H	04H	Max.	16 ms
		P1143	0AH	84H	Min.	10 mV
		P1144	0BH	04H	Max.	10 mV
		P0132	0CH	04H	Max.	10 mV
		P0134	0DH	04H	Max.	1 s
	Heated oxygen sensor 1 (Bank 2)	P0153	11H	05H	Max.	16 ms
		P1163	12H	85H	Min.	10 mV
		P1164	13H	05H	Max.	10 mV
		P0152	14H	05H	Max.	10 mV
		P0154	15H	05H	Max.	1 s
	Heated oxygen sensor 2 (Bank 1)	P0139	19H	86H	Min.	10 mV/500 ms
		P1147	1AH	86H	Min.	10 mV
		P1146	1BH	06H	Max.	10 mV
		P0138	1CH	06H	Max.	10 mV
	Heated oxygen sensor 2 (Bank 2)	P0159	21H	87H	Min.	10 mV/500 ms
		P1167	22H	87H	Min.	10 mV
		P1166	23H	07H	Max.	10 mV
		P0158	24H	07H	Max.	10 mV
HO2S HTR	Heated oxygen sensor 1 heater (Bank 1)	P0032	29H	08H	Max.	20 mV
		P0031	2AH	88H	Min.	20 mV
	Heated oxygen sensor 1 heater (Bank 2)	P0052	2BH	09H	Max.	20 mV
		P0051	2CH	89H	Min.	20 mV
	Heated oxygen sensor 2 heater (Bank 1)	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV
	Heated oxygen sensor 2 heater (Bank 2)	P0058	2FH	0BH	Max.	20 mV
		P0057	30H	8BH	Min.	20 mV

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NAEC0031S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/Test limit	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*5	—	—	—	EC-166
CAN COMM CIRCUIT	U1001	1001*5	—	—	X	EC-166
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**	**—**	**—**	**—**
INT/V TIM CONT-B1	P0011	0011	—	—	X	EC-169

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/Test limit	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
INT/V TIM CONT-B2	P0021	0021	—	—	X	EC-169
HO2S1 HTR (B1)	P0031	0031	X	X	X	EC-173
HO2S1 HTR (B1)	P0032	0032	X	X	X	EC-173
HO2S2 HTR (B1)	P0037	0037	X	X	X	EC-181
HO2S2 HTR (B1)	P0038	0038	X	X	X	EC-181
HO2S1 HTR (B2)	P0051	0051	X	X	X	EC-173
HO2S1 HTR (B2)	P0052	0052	X	X	X	EC-173
HO2S2 HTR (B2)	P0057	0057	X	X	X	EC-181
HO2S2 HTR (B2)	P0058	0058	X	X	X	EC-181
MAF SEN/CIRCUIT	P0101	0101	—	—	—	EC-187
MAF SEN/CIRCUIT	P0102	0102	—	—	—	EC-194
MAF SEN/CIRCUIT	P0103	0103	—	—	—	EC-194
IAT SEN/CIRCUIT	P0112	0112	—	—	X	EC-200
IAT SEN/CIRCUIT	P0113	0113	—	—	X	EC-200
ECT SEN/CIRC	P0117	0117	—	—	—	EC-204
ECT SEN/CIRC	P0118	0118	—	—	—	EC-204
TP SEN 2/CIRC	P0122	0122	—	—	—	EC-210
TP SEN 2/CIRC	P0123	0123	—	—	—	EC-210
ECT SENSOR	P0125	0125	—	—	—	EC-217
IAT SENSOR	P0127	0127	—	—	X	EC-220
THERMSTAT FNCTN	P0128	0128	—	—	X	EC-222
HO2S1 (B1)	P0132	0132	—	X	X	EC-224
HO2S1 (B1)	P0133	0133	X	X	X	EC-233
HO2S1 (B1)	P0134	0134	—	X	X	EC-246
HO2S2 (B1)	P0138	0138	—	X	X	EC-255
HO2S2 (B1)	P0139	0139	X	X	X	EC-263
HO2S1 (B2)	P0152	0152	—	X	X	EC-224
HO2S1 (B2)	P0153	0153	X	X	X	EC-233
HO2S1 (B2)	P0154	0154	—	X	X	EC-246
HO2S2 (B2)	P0158	0158	—	X	X	EC-255
HO2S2 (B2)	P0159	0159	X	X	X	EC-263
FUEL SYS-LEAN-B1	P0171	0171	—	—	X	EC-273
FUEL SYS-RICH-B1	P0172	0172	—	—	X	EC-282
FUEL SYS-LEAN-B2	P0174	0174	—	—	X	EC-273
FUEL SYS-RICH-B2	P0175	0175	—	—	X	EC-282
FTT SENSOR	P0181	0181	—	—	X	EC-290

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/Test limit	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
FTT SEN/CIRCUIT	P0182	0182	—	—	X	EC-293
FTT SEN/CIRCUIT	P0183	0183	—	—	X	EC-293
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-298
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-298
MULTI CYL MISFIRE	P0300	0300	—	—	X	EC-305
CYL 1 MISFIRE	P0301	0301	—	—	X	EC-305
CYL 2 MISFIRE	P0302	0302	—	—	X	EC-305
CYL 3 MISFIRE	P0303	0303	—	—	X	EC-305
CYL 4 MISFIRE	P0304	0304	—	—	X	EC-305
CYL 5 MISFIRE	P0305	0305	—	—	X	EC-305
CYL 6 MISFIRE	P0306	0306	—	—	X	EC-305
KNOCK SEN/CIRC-B1	P0327	0327	—	—	X	EC-314
KNOCK SEN/CIRC-B1	P0328	0328	—	—	X	EC-314
CKP SEN/CIRCUIT	P0335	0335	—	—	X	EC-319
CMP SEN/CIRC-B1	P0340	0340	—	—	X	EC-326
CMP SEN/CIRC-B2	P0345	0345	—	—	X	EC-326
TW CATALYST SYS-B1	P0420	0420	X	X	X	EC-334
TW CATALYST SYS-B2	P0430	0430	X	X	X	EC-334
EVAP PURG FLOW/MON	P0441	0441	X	X	X	EC-339
EVAP SMALL LEAK	P0442	0442	X	X	X	EC-349
PURG VOLUME CONT/V	P0444	0444	—	—	X	EC-364
PURG VOLUME CONT/V	P0445	0445	—	—	X	EC-364
VENT CONTROL VALVE	P0447	0447	—	—	X	EC-371
EVAP SYS PRES SEN	P0452	0452	—	—	X	EC-378
EVAP SYS PRES SEN	P0453	0453	—	—	X	EC-384
EVAP GROSS LEAK	P0455	0455	X	X	X	EC-394
EVAP VERY SML LEAK	P0456	0456	X*4	X	X	EC-407
FUEL LEV SEN SLOSH	P0460	0460	—	—	X	EC-423
FUEL LEVEL SENSOR	P0461	0461	—	—	X	EC-425
FUEL LEVL SEN/CIRC	P0462	0462	—	—	X	EC-428
FUEL LEVL SEN/CIRC	P0463	0463	—	—	X	EC-428
VEH SPEED SEN/CIRC*6	P0500	0500	—	—	X	EC-430
ISC SYSTEM	P0506	0506	—	—	X	EC-432
ISC SYSTEM	P0507	0507	—	—	X	EC-434
PW ST P SEN/CIRC	P0550	0550	—	—	X	EC-436
ECM	P0605	0605	—	—	X	EC-441

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/Test limit	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
PNP SW/CIRC	P0705	0705	—	—	X	AT-102
ATF TEMP SEN/CIRC	P0710	0710	—	—	X	AT-108
VEH SPD SEN/CIR AT*6	P0720	0720	—	—	X	AT-114
ENGINE SPEED SIG	P0725	0725	—	—	X	AT-119
A/T 1ST GR FNCTN	P0731	0731	—	—	X	AT-123
A/T 2ND GR FNCTN	P0732	0732	—	—	X	AT-129
A/T 3RD GR FNCTN	P0733	0733	—	—	X	AT-135
A/T 4TH GR FNCTN	P0734	0734	—	—	X	AT-141
TCC SOLENOID/CIRC	P0740	0740	—	—	X	AT-151
A/T TCC S/V FNCTN	P0744	0744	—	—	X	AT-156
L/PRESS SOL/CIRC	P0745	0745	—	—	X	AT-165
SFT SOL A/CIRC	P0750	0750	—	—	—	AT-171
SFT SOL B/CIRC	P0755	0755	—	—	—	AT-175
ECM BACK UP/CIRCUIT	P1065	1065	—	—	X	EC-443
INT/V TIM CONT-B1	P1110	1110	—	—	X	EC-448
INT/V TIM V/CIR-B1	P1111	1111	—	—	X	EC-451
ETC ACTR	P1121	1121	—	—	—	EC-457
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-459
ETC MOT PWR	P1124	1124	—	—	—	EC-467
ETC MOT PWR	P1126	1126	—	—	—	EC-467
ETC MOT	P1128	1128	—	—	—	EC-472
SWIRL CONT SOL/V	P1130	1130	—	—	X	EC-477
SWIRL CONT SOL/V	P1131	1131	—	—	X	EC-498
INT/V TIM CONT-B2	P1135	1135	—	—	X	EC-448
INT/V TIM V/CIR-B2	P1136	1136	—	—	X	EC-451
HO2S1 (B1)	P1143	1143	X	X	X	EC-504
HO2S1 (B1)	P1144	1144	X	X	X	EC-512
HO2S2 (B1)	P1146	1146	X	X	X	EC-521
HO2S2 (B1)	P1147	1147	X	X	X	EC-531
CLOSED LOOP-B1	P1148	1148	—	—	—	EC-541
HO2S1 (B2)	P1163	1163	X	X	X	EC-504
HO2S1 (B2)	P1164	1164	X	X	X	EC-512
SWL CON VC SW/CIRC	P1165	1165	—	—	X	EC-543
HO2S2 (B2)	P1166	1166	X	X	X	EC-521
HO2S2 (B2)	P1167	1167	X	X	X	EC-531
CLOSED LOOP-B2	P1168	1168	—	—	—	EC-541

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/Test limit	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
TCS C/U FUNCTN	P1211	1211	—	—	X	EC-549
TCS/CIRC	P1212	1212	—	—	X	EC-551
ENG OVER TEMP	P1217	1217	—	—	—	EC-553
CTP LEARNING	P1225	1225	—	—	X	EC-558
CTP LEARNING	P1226	1226	—	—	X	EC-560
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-562
EVAP SMALL LEAK	P1442	1442	X	X	X	EC-567
PURG VOLUME CONT/V	P1444	1444	—	—	X	EC-582
VENT CONTROL VALVE	P1446	1446	—	—	X	EC-594
VENT CONTROL VALVE	P1448	1448	—	—	X	EC-602
EVAP VERY SML LEAK	P1456	1456	X*4	X	X	EC-611
VC/V BYPASS/V	P1490	1490	—	—	X	EC-627
VC CUT/V BYPASS/V	P1491	1491	—	—	X	EC-633
ASCD SW	P1564	1564	—	—	—	EC-645
ASCD BRAKE SW	P1572	1572	—	—	—	EC-652
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	X	EL-389
TP SEN/CIRC A/T	P1705	1705	—	—	—	AT-179
P-N POS SW/CIRCUIT	P1706	1706	—	—	X	EC-663
O/R CLTCH SOL/CIRC	P1760	1760	—	—	X	AT-185
BRAKE SW/CIRCUIT	P1805	1805	—	—	X	EC-669
APP SEN 1/CIRC	P2122	2122	—	—	—	EC-675
APP SEN 1/CIRC	P2123	2123	—	—	—	EC-675
APP SEN 2/CIRC	P2127	2127	—	—	—	EC-682
APP SEN 2/CIRC	P2128	2128	—	—	—	EC-682
TP SENSOR	P2135	2135	—	—	—	EC-690
APP SENSOR	P2138	2138	—	—	—	EC-697

*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), these numbers are controlled by NISSAN.
*4: SRT code will not be set if the self-diagnostic result is NG.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

NAEC0031S06

NAEC0031S0601

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

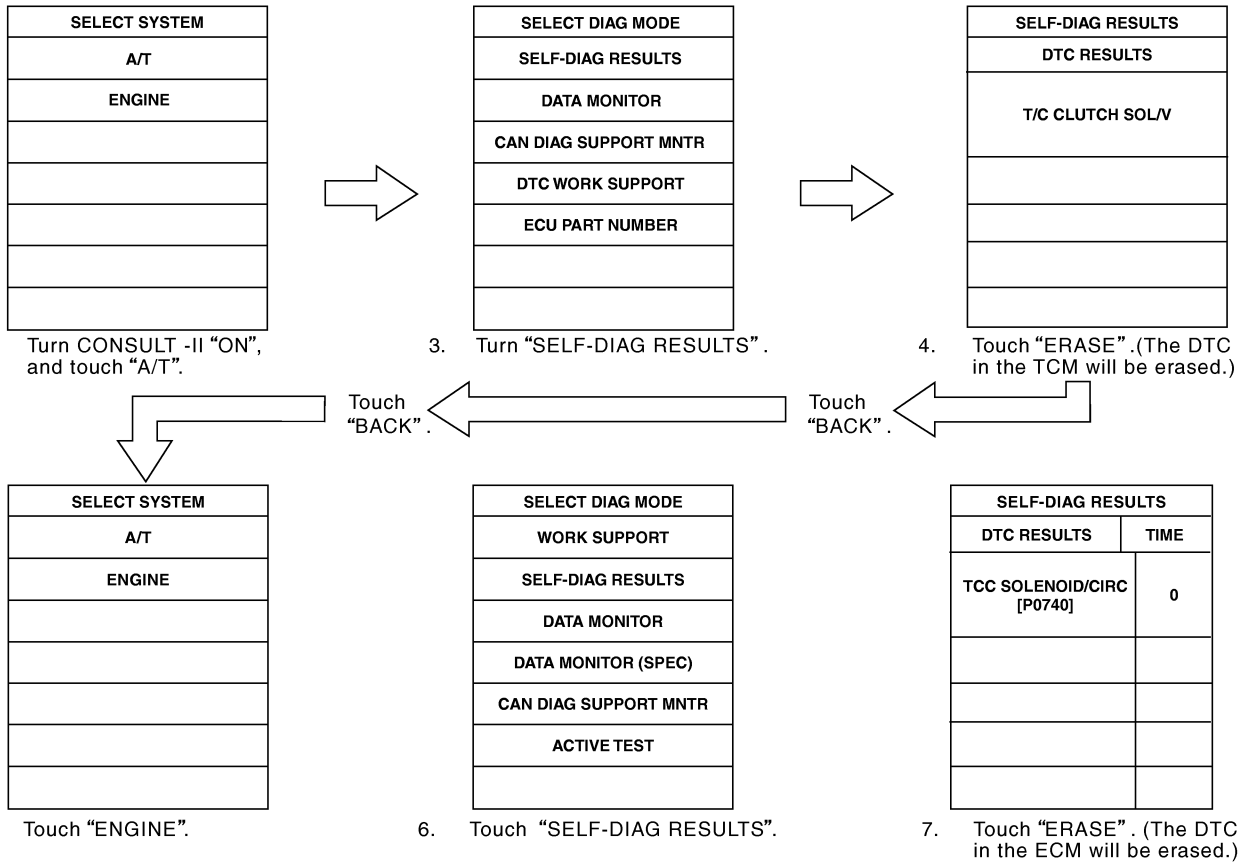
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".

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

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

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



SAT857K

The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

How to Erase DTC (GST With GST)

NAEC0031S0604

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

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

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform "HOW TO ERASE DTC (WITH GST)". Refer to AT-36. (The DTC in TCM will be erased.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to Erase DTC (NO TOOLS No Tools)

NAEC0031S0605

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

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10

seconds and then turn it ON (engine stopped) again.
2. Perform "How to Erase DTC (No Tools)", AT-36. (The DTC in TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-95, "HOW TO SWITCH DIAGNOSTIC MODE".

- **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.**

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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.

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NAEC0031S08

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

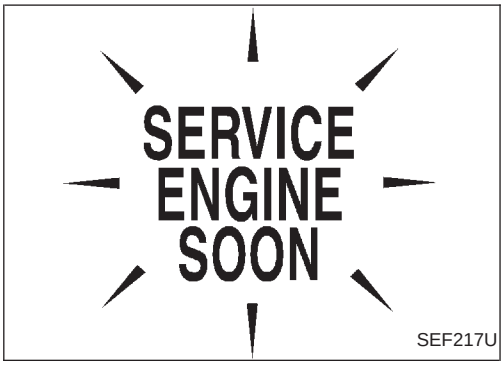
SEF515Y

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to EL-389, "NVIS (Nissan Vehicle Immobilizer System — NATS)".**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NAEC0032



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 EL-145, “WARNING LAMPS” or see EC-757.

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

NAEC0032S01

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● One trip detection diagnoses ● “Misfire (Possible three way catalyst damage)”
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting MIL up when there is a malfunction on engine control system.
  Therefore, when electrically controlled throttle and part of ECM related diagnosis is continuously detected as NG for 5 trips, ECM warns the driver that engine control system has a malfunction 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

NAEC0032S0102

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. How to Switch Diagnostic Test Mode.
How to switch the diagnostic test (function) modes, and details of the above functions are described later.How to Switch Diagnostic Test Mode.
The following emission-related diagnostic information is cleared when the ECM memory is erased.

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values
7. Others

How to Switch Diagnostic Test Mode

NAEC0032S07

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.**

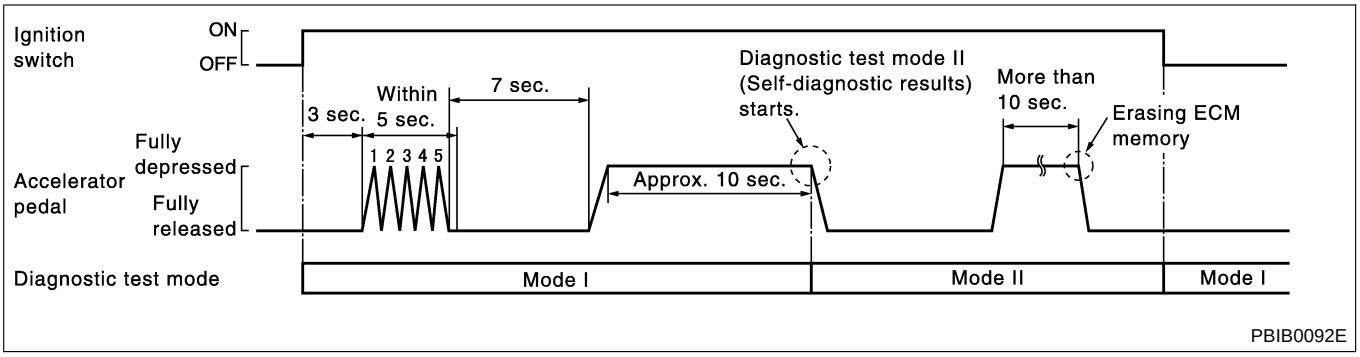
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

NAEC0032S0701

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

1) Fully depress the accelerator pedal.
2) 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.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

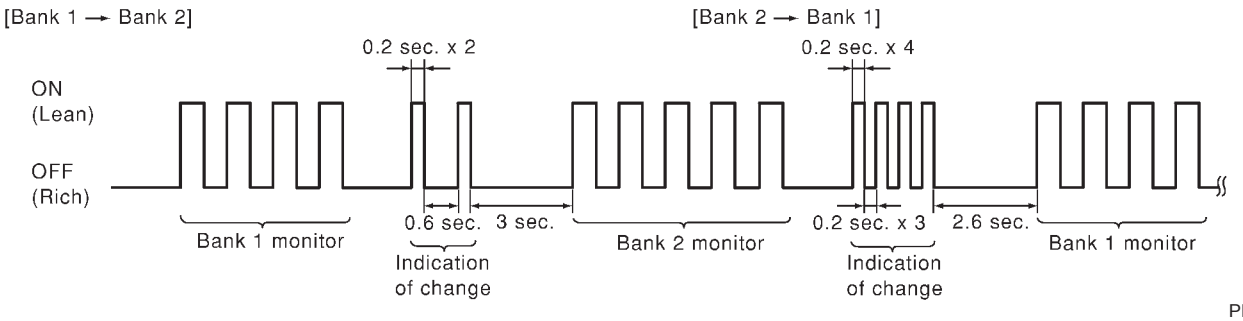
NAEC0032S0702

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to How to Set Diagnostic Test Mode II (Self-diagnostic Results).
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor.

How to Set Diagnostic Switch Monitored Sensor from Bank 1 to Bank 2 or Vice versa

NAEC0032S0703

1. Fully depress the accelerator pedal quickly and then release it immediately.
2. Make sure that monitoring sensor has changed by MIL blinking as follows.



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

NAEC0032S0704

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

NAEC0032S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-145, "WARNING LAMPS" or see EC-757.

Diagnostic Test Mode I — Malfunction Warning

NAEC0032S04

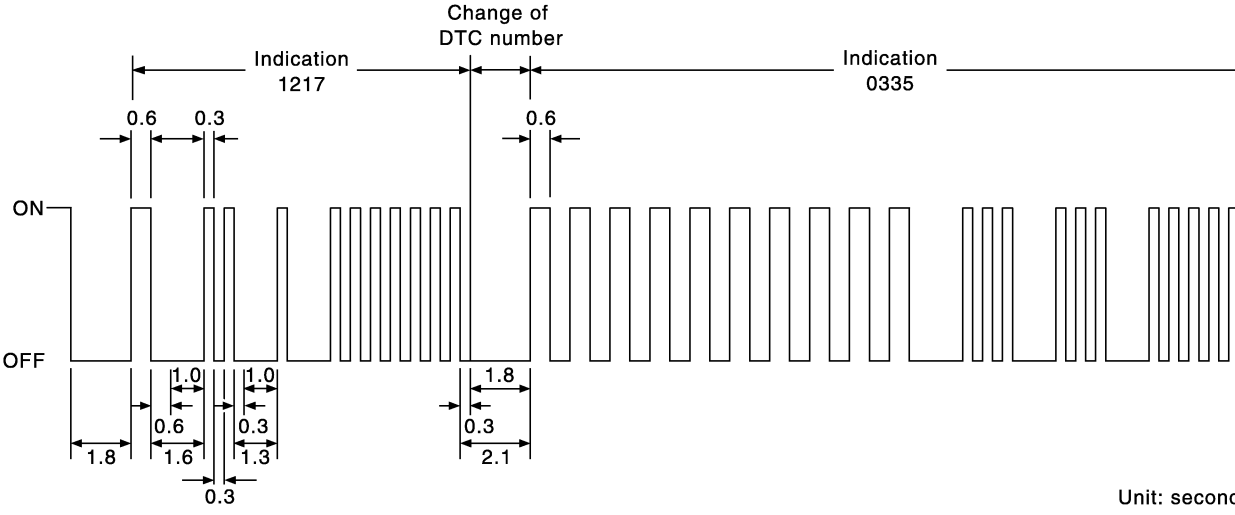
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

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

Diagnostic Test Mode II — Self-Diagnostic Results

NAEC0032S08

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



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See "TROUBLE DIAGNOSIS — INDEX", EC-9.)

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

NAEC0032S0801

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to How to Switch Diagnostic Test Mode.

- **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.**

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor

NAEC0032S09

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

=NAEC0033

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

NAEC0033S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-77.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

NAEC0033S02

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 EC-100.

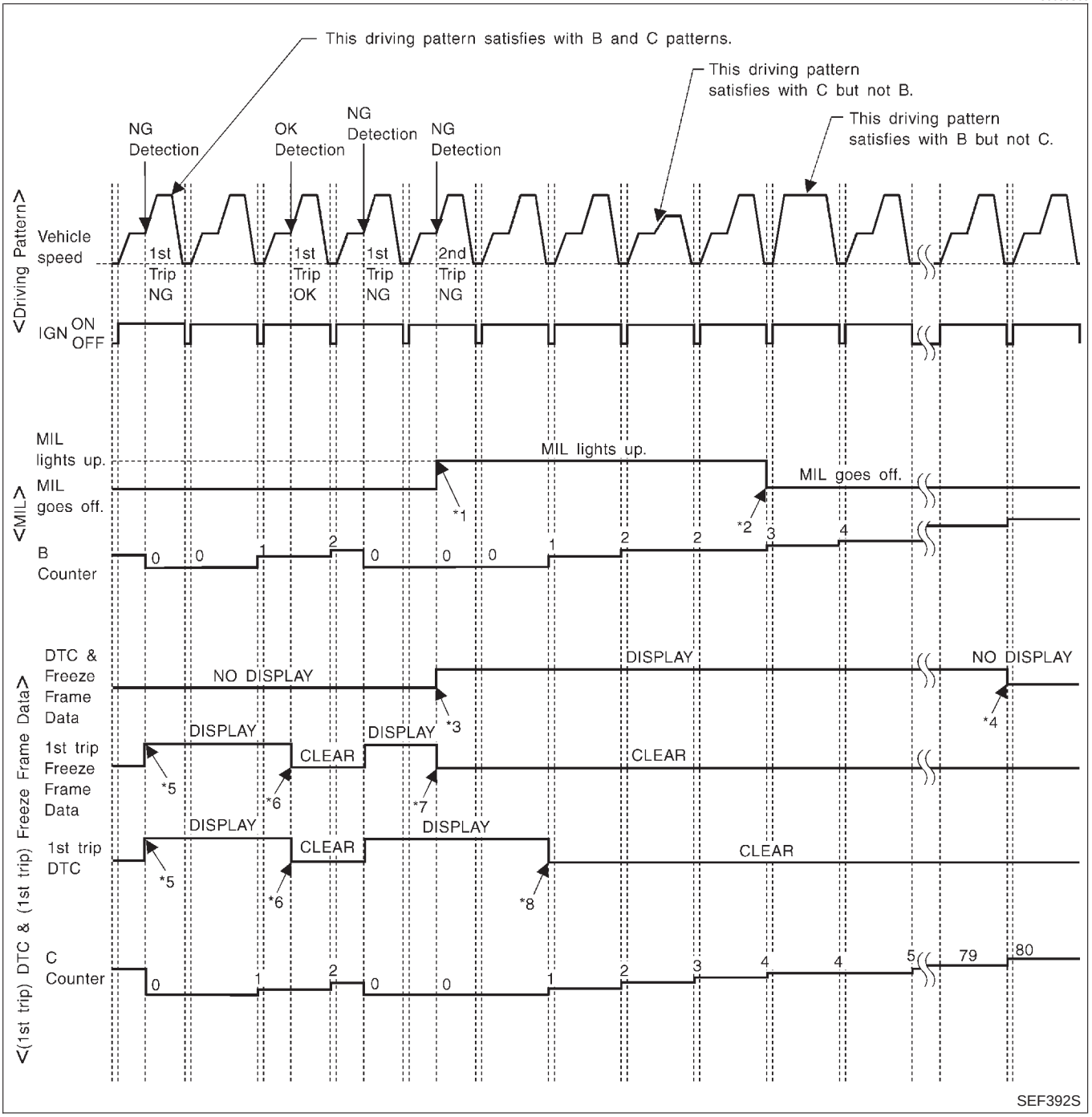
For details about patterns A and B under “Other”, see EC-102.

*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"

=NAEC0033S03



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

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

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

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

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

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

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

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

NAEC0033S04

<Driving Pattern B>

NAEC0033S0401

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 malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in OBD SYSTEM OPERATION CHART)

<Driving Pattern C>

NAEC0033S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
   Engine coolant temperature (T) condition:

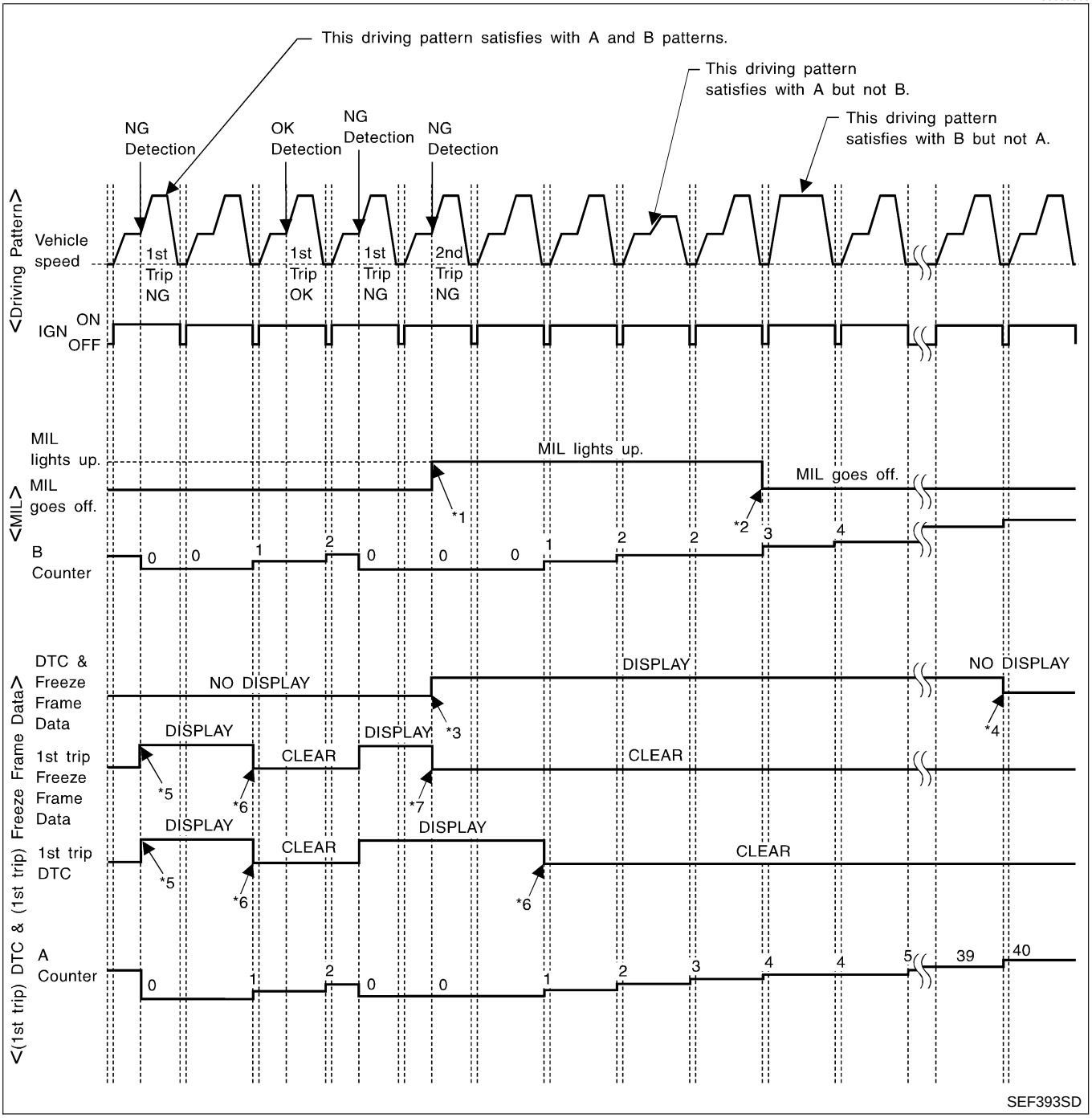
- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

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 (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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

NAEC0033S05



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

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

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

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

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

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

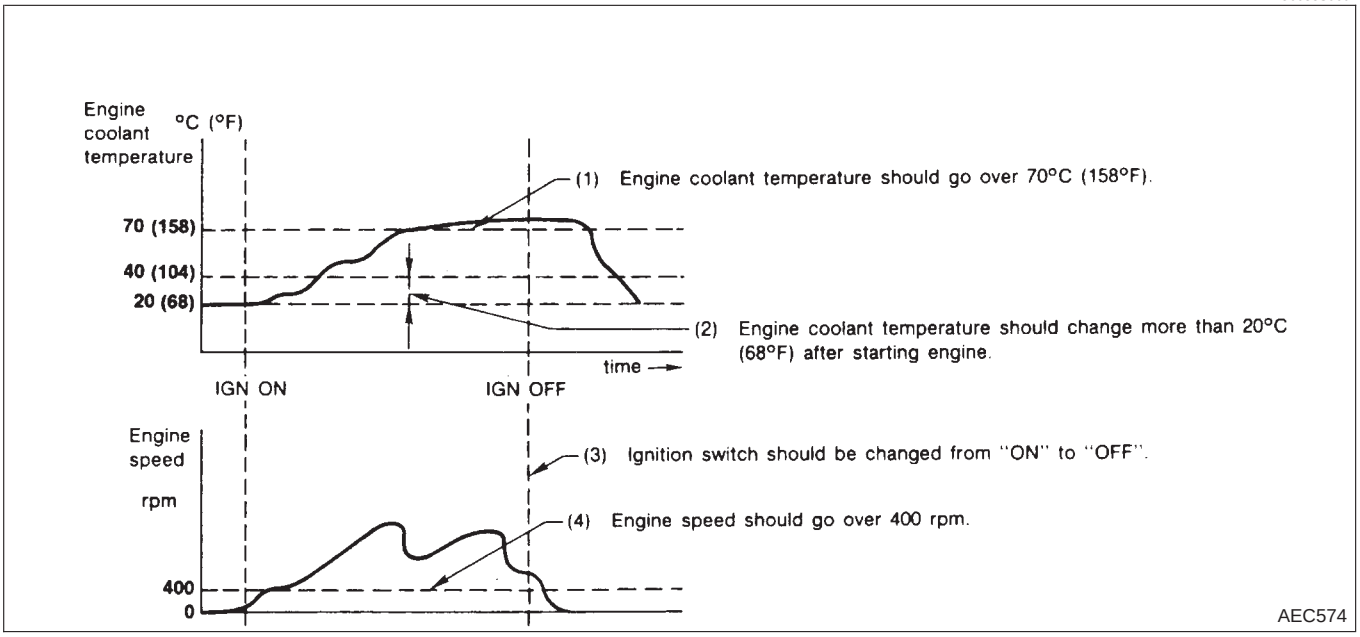
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NAEC0033S06

<Driving Pattern A>

NAEC0033S0601



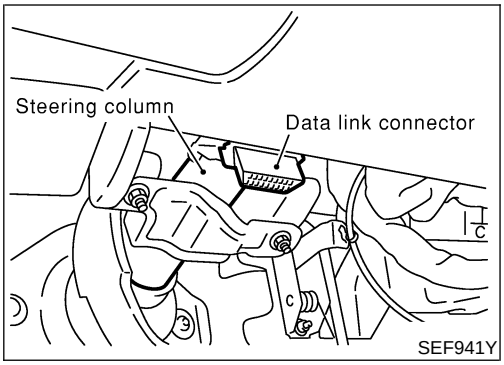
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NAEC0033S0602

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", EC-98).



SEF941Y

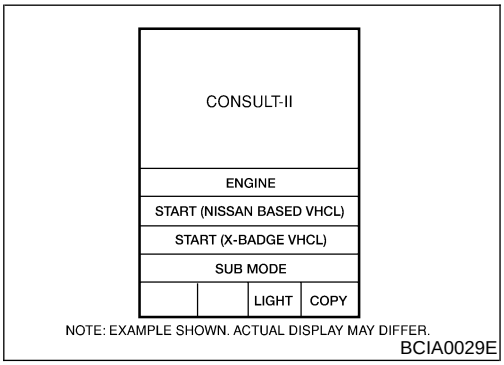
CONSULT-II Function (ENGINE)

=NAEC0034

INSPECTION PROCEDURE

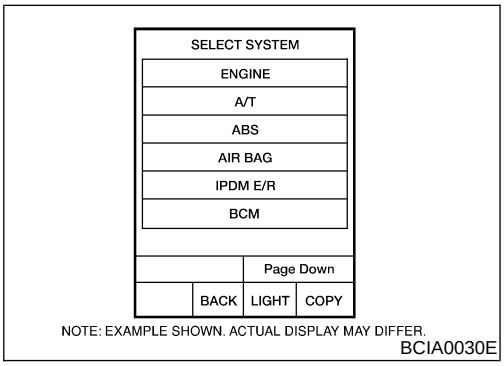
NAEC0034S01

1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel near the fuse box cover.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0029E

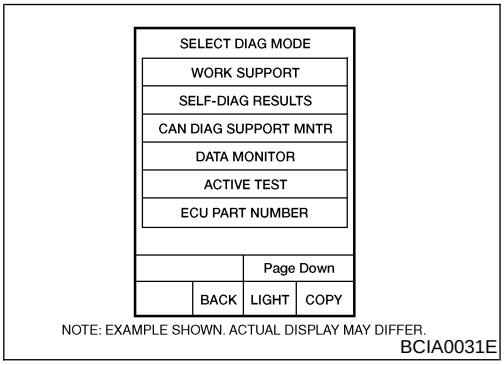
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

5. Touch “ENGINE”.

If “ENGINE” is not indicated, go to GI-42, “CONSULT-II Data Link Connector (DLC) Circuit”.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NAEC0034S02

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		X	X	X	X			
		Crankshaft position sensor (PHASE)		X						
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1		X		X	X		X	X
		Heated oxygen sensor 2		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Accelerator pedal position sensor		X		X	X			
		Throttle position sensor		X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Intake air temperature sensor		X	X	X	X			
		Knock sensor		X						
		Refrigerant pressure sensor				X	X			
		Ignition switch (start signal)				X	X			
		Closed throttle position switch (Accelerator pedal position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering pressure sensor		X		X	X			
		Battery voltage				X	X			
		Load signal				X	X			
		Swirl control valve control vacuum check switch		X		X	X			
		Fuel level sensor		X		X	X			
		Intake valve timing control position sensor		X		X	X			
		ASCD steering switch		X		X	X			
		ASCD brake switch		X		X	X			

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)				X	X	X		
		Throttle control motor		X						
		Throttle control motor relay		X		X	X			
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		Heated oxygen sensor 1 heater		X		X	X		X	
		Heated oxygen sensor 2 heater		X		X	X		X	
		EVAP canister vent control valve	X	X		X	X	X		
		Vacuum cut valve bypass valve	X	X		X	X	X		X
		Swirl control valve control solenoid valve		X		X	X	X		
		VIAS control solenoid valve				X	X	X		
		Intake valve timing control solenoid valve		X		X	X	X		
		Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-79.

FUNCTION

=NAEC0034S03

Diagnostic test mode	Function
WORK SUPPORT	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
SELF-DIAG 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.*1
DATA MONITOR	Input/Output data in the ECM can be read.
DATA MONITOR (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN DIAGNOSTIC SUPPORT MONITOR	The results of transmit/receive diagnosis of CAN communication can be read.
ACTIVE TEST	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
FUNCTION TEST	Conducted by CONSULT-II instead of a technician to determine whether each system is OK or NG.
DTC & SRT CONFIRMATION	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM PART NUMBER	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

WORK SUPPORT MODE

NAEC0034S04

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
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND 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 ● TANK FUEL 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-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system

WORK ITEM	CONDITION	USAGE
TARGET IGN TIM ADJ*	• IDLE CONDITION	• When adjusting target ignition timing • If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed.
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed

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

SELF-DIAGNOSTIC MODE

NAEC0034S05

DTC and 1st Trip DTC

NAEC0034S0501

Regarding items of DTC and 1st trip DTC, refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-9.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NAEC0034S0502

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to "TROUBLE DIAGNOSIS — INDEX", 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. "Mode2": Open loop due to detected system malfunction "Mode3": Open loop due to driving conditions (power enrichment, deceleration enleanment) "Mode4": Closed loop - using oxygen sensor(s) as feedback for fuel control "Mode5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
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.
S-FUEL TRM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
L-FUEL TRM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
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.
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.

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

DATA MONITOR MODE

=NAEC0034S06
X: Applicable

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	X	X	• 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]	X	X	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	X	X	• 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.
HO2S1 (B1) [V]	X	X	• The signal voltage of the front heated oxygen sensor is displayed.	
HO2S1 (B2) [V]	X			
HO2S2 (B1) [V]	X		• The signal voltage of the rear heated oxygen sensor is displayed.	
HO2S2 (B2) [V]	X			
HO2S1 MNTR (B1) [RICH/LEAN]	X	X	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	X			
HO2S2 MNTR (B1) [RICH/LEAN]	X		• 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) [RICH/LEAN]	X			
VHCL SPEED SE [km/h] or [mph]	X	X	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	X	X	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	X	X	• 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 [V]	X			
THRTL SEN 1 [V]	X	X	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	X			
FUEL T/TMP SE [°C] or [°F]	X		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	X	X	• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EVAP SYS PRES [V]	X		• The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	X		• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	X	X	• 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]	X	X	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	X	X	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	X	X	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	X	X	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
LOAD SIGNAL [ON/OFF]	X	X	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	X		• Indicates [ON/OFF] condition from ignition switch.	
BRAKE SW [ON/OFF]			• Indicates [ON/OFF] condition from the stop lamp switch signal.	
SWRL CONT S/V [ON/OFF]			• The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. • ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened.	
INJ PULSE-B1 [msec]		X	• 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 [msec]				
B/FUEL SCHDL [msec]		X	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		X	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
A/F ALPHA-B1 [%]		X	• 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 [%]		X		
AIR COND RLY [ON/OFF]		X	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		X	• 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 signal) 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.	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
INT/V TIM (B1) [°CA]			• Indicate [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				

Monitored item [Unit]	ECM input signals	Main signals	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) [%]				
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
VIAS S/V [ON/OFF]			• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. • OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating.	
SWL CON VC SW	X		• Indicates [ON/OFF] condition from the swirl control valve control vacuum check switch. ON ... Swirl control valve is not operational. OFF ... Swirl control valve is operational.	
IDL A/V LEARN			• 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.	
AC PRESS SEN [V]			• The signal voltage from the refrigerant pressure sensor is displayed.	
SET VHCL SPD [km/h] or [mph]			• The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			• Indicates [ON/OFF] condition from RESUME/ACCEL 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, and ASCD clutch switch signal (M/T models).	
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.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
AT OD CANCEL [ON/OFF]			• Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
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.	
Voltage [V]			• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequenty [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

NOTE:

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

DATA MONITOR (SPEC) MODE

NAEC0034S11

X: Applicable

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	X	X	• The signal voltage of the mass air flow sensor specification is displayed.	• When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		X	• Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	• When the engine is running, specification range is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		X		

NOTE:

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

ACTIVE TEST MODE

NAEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensor
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever N • Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SWIRL CONT SOL VALVE	• Ignition switch: ON • Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
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-II.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve ON and OFF with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
VC/V BYPASS/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve ON and OFF with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
V/T ASSIGN ANGLE	• Engine: After warming up, hold engine speed at 2,500 rpm. • Change the intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Intake valve timing control solenoid valve

DTC & SRT CONFIRMATION MODE

NAEC0034S08

SRT STATUS Mode

NAEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-79.

SRT Work Support Mode

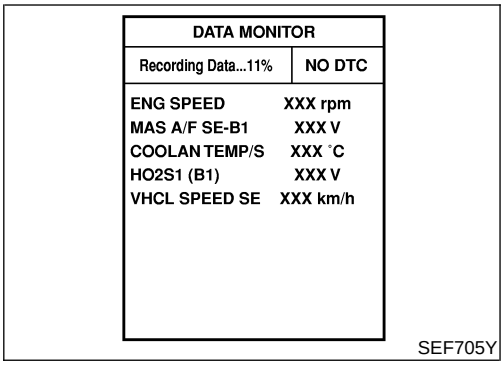
NAEC0034S0803

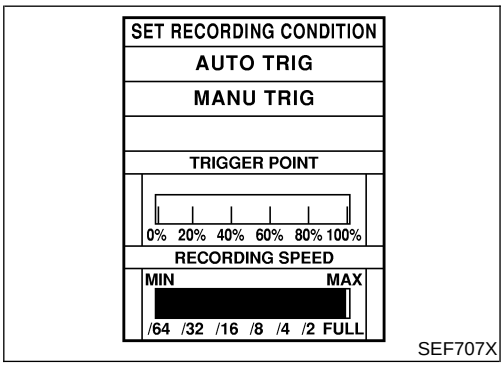
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

NAEC0034S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-349, 567
	EVP V/S LEAK P0456/P1456		EC-407, 611
	PURG VOL CN/V P1444		EC-582
	PURGE FLOW P0441		EC-339
	VC CUT/V BP/V P1491		EC-633
HO2S1	HO2S1 (B1) P0134		EC-246
	HO2S1 (B1) P1143		EC-504
	HO2S1 (B1) P1144		EC-512
	HO2S1 (B1) P0133		EC-233
	HO2S1 (B2) P0154		EC-246
	HO2S1 (B2) P1163		EC-504
	HO2S1 (B2) P1164		EC-512
	HO2S1 (B2) P0153		EC-233
HO2S2	HO2S2 (B1) P1146		EC-521
	HO2S2 (B1) P1147		EC-531
	HO2S2 (B1) P0139		EC-263
	HO2S2 (B2) P1166		EC-521
	HO2S2 (B2) P1167		EC-531
	HO2S2 (B2) P0159		EC-263





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

NAEC0034S10

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

1) "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during " Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.

2) "MANU TRIG" (Manual trigger):

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

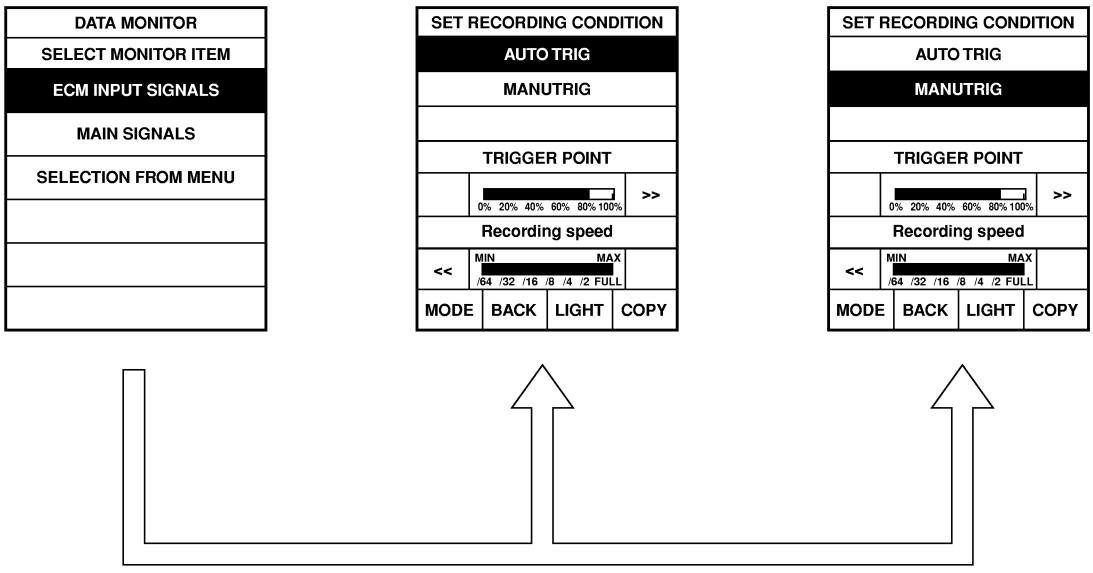
Use these triggers as follows:

1) "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI-25, "Incident Simulation Tests".)

2) "MANU TRIG"

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

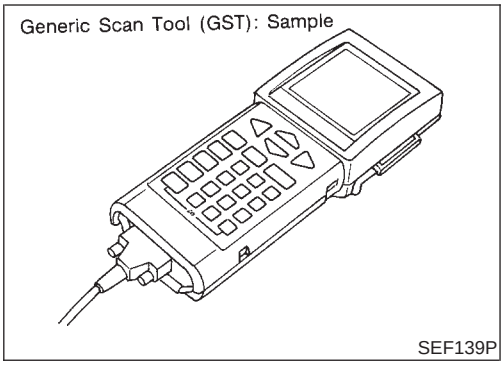


"SETTING"

"AUTO TRIG"
A malfunction can be displayed on "DATA MONITOR" screen automatically if detected.

"MANU TRIG"
A malfunction can not be displayed on "DATA MONITOR" screen automatically even if detected.

SEF714Y



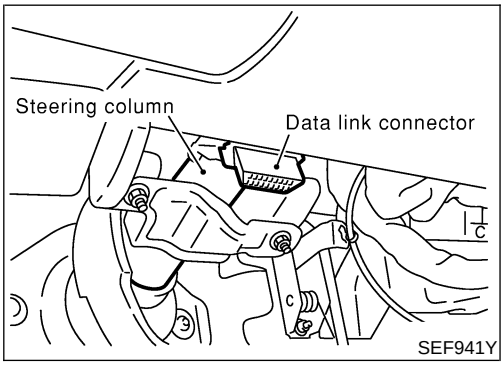
Generic Scan Tool (GST)

=NAEC0035

DESCRIPTION

NAEC0035S01

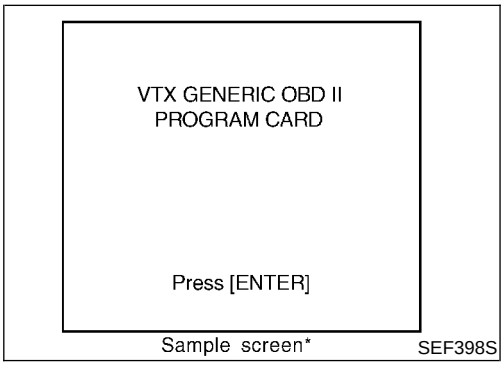
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



INSPECTION PROCEDURE

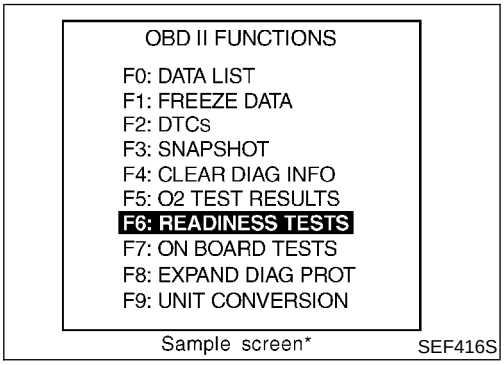
NAEC0035S02

1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the fuse box cover.



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.

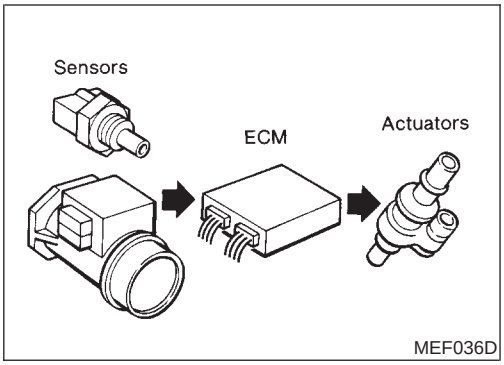
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

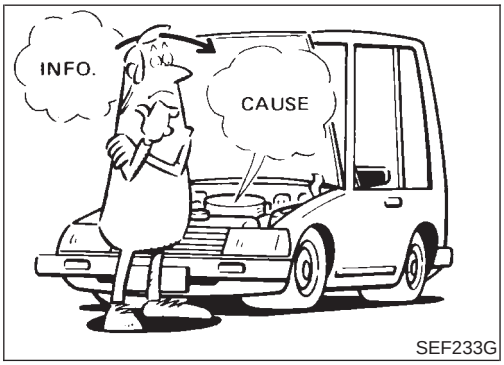
FUNCTION

NAEC0035S03

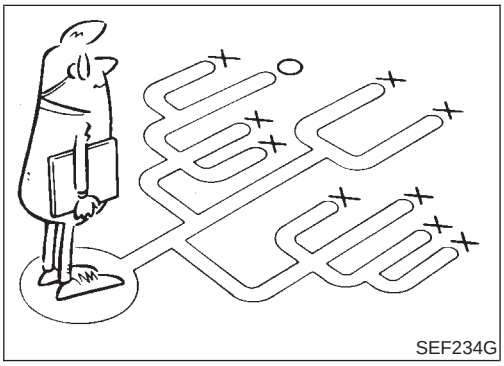
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-107).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch ON position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.



MEF036D



SEF233G



SEF234G

KEY POINTS

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

SEF907L

Introduction

NAEC0036

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 incidents such as vacuum leaks, fouled spark plugs, or other incidents with the engine.

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

A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-121.

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 next page should be used.

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

DIAGNOSTIC WORKSHEET

NAEC0036S01

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

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

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

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

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

Worksheet Sample

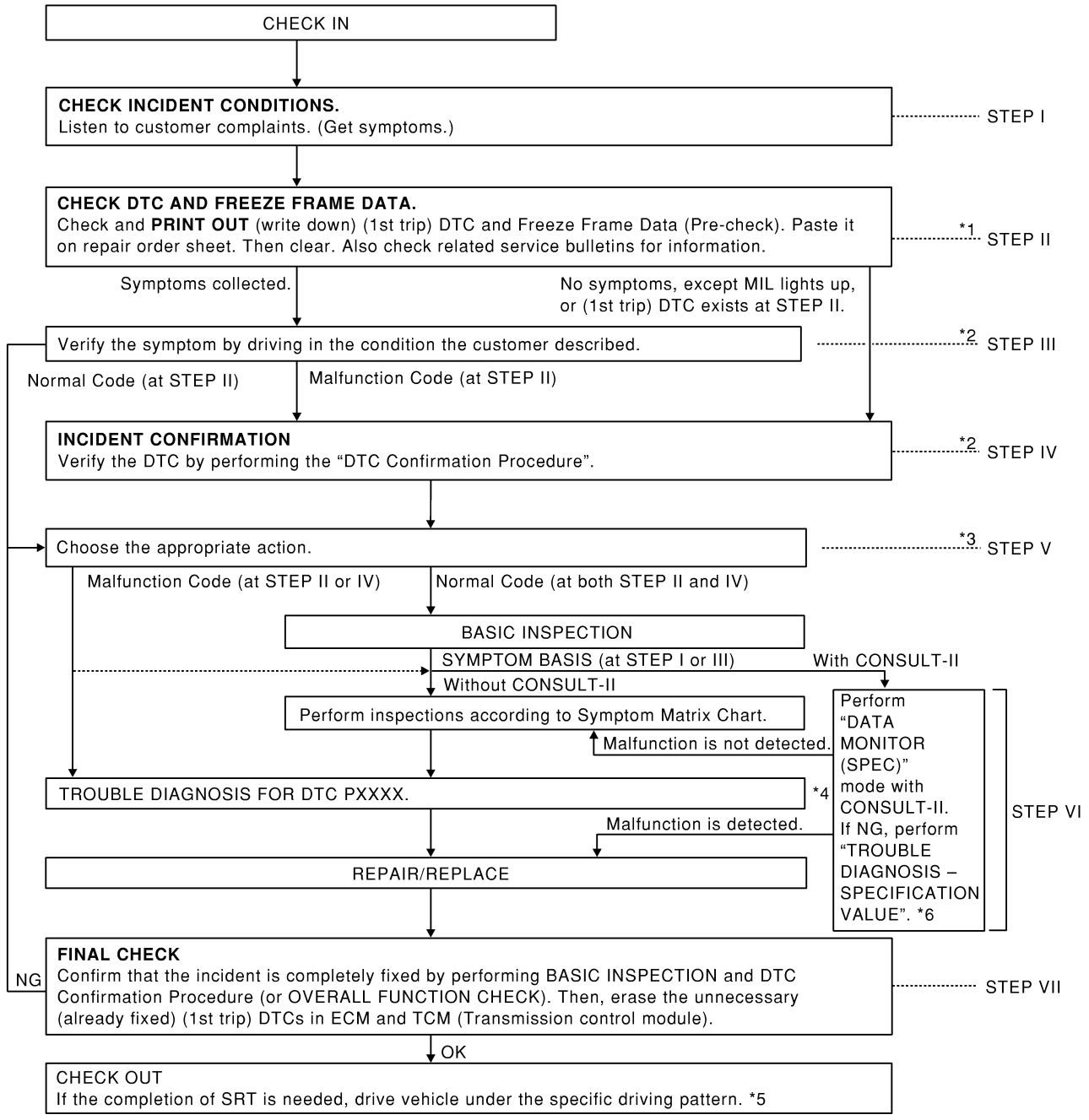
NAEC0036S0101

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

MTBL0017

Work Flow

NAEC0037



PBIB1043E

*1 If time data of "SELF-DIAG RESULTS" is other than [0] or [1t], perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

*2 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-157.

*4 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

*5 EC-84

*6 EC-151

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NAEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-120.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-91.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-131.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The NG result of the Overall Function Check is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-123.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-151. (If malfunction is detected, proceed to "REPAIR REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-131.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-135, 141. The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-27, "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-91 and AT-35.)

Basic Inspection

NAEC0038

Precaution:

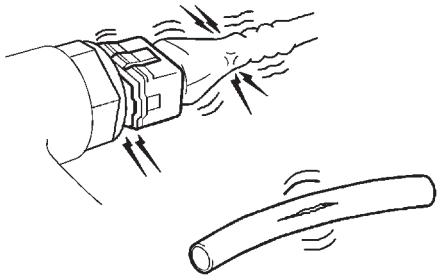
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

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
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- Hoses and ducts for leaks



SEF983U

▶ GO TO 2.

2	REPAIR OR REPLACE

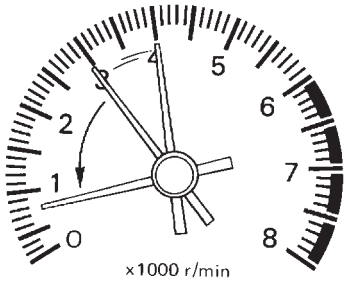
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

▶ GO TO 3.

3	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



SEF978U

3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in P or N position)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in P or N position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 4.

4	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.

	▶	GO TO 5.

5	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-73.

	▶	GO TO 6.

6	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-73. **Is Idle Air Volume Learning carried out successfully?** **Yes or No**		
Yes	▶	GO TO 7.
No	▶	1. Follow the instruction of Idle Air Volume Learning. 2. GO TO 4.

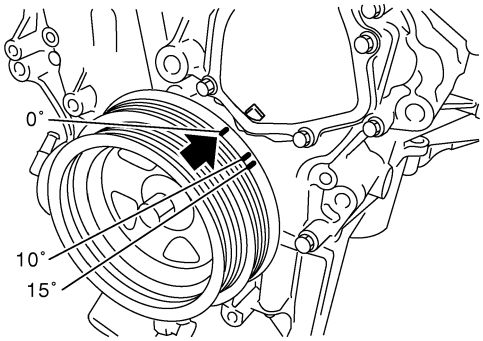
7	CHECK TARGET IDLE SPEED AGAIN	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in "DATA MONITOR" mode with CONSULT-II. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in P or N position)**		
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in P or N position)** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Check camshaft position sensor (PHASE) and circuit. Refer to EC-326. ● Check crankshaft position sensor (POS) and circuit. Refer to EC-319. **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 the rarely the case.) 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93.		
	▶	GO TO 4.

10	CHECK IGNITION TIMING

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



SEC580D

M/T: 15°±5° BTDC
A/T: 15°±5° BTDC (in P or N position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11.

11	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.

	▶	GO TO 12.

12	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-73.

	▶	GO TO 13.

13	PERFORM IDLE AIR VOLUME LEARNING

Refer to "Idle Air Volume Learning", EC-73.
Is Idle Air Volume Learning carried out successfully?

Yes or No

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

14	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.
   MT: 750±50 rpm
   AT: 750±50 rpm (in P or N position)

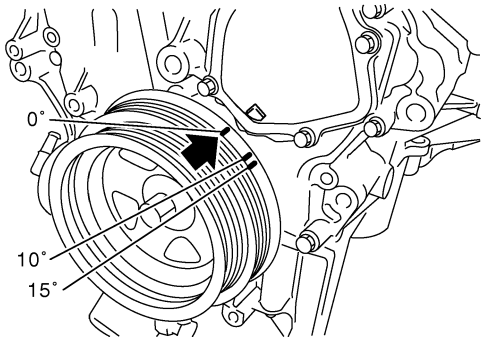
Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in P or N position)

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 17.

15	CHECK IGNITION TIMING AGAIN

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



SEC580D

M/T: 15°±5° BTDC
A/T: 15°±5° BTDC (in P or N position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 16.

16	CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-24, "TIMING CHAIN".

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-326.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-319.

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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93.	
▶	GO TO 4.

DTC Inspection Priority Chart

NAEC0039

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

Priority	Detected items (DTC)
1	• U1000, U1001 CAN communication line • P0101, P0102, P0103 MAF sensor • P0112, P0113, P0127 IAT sensor • P0117, P0118, P0125 ECT sensor • P0122, P0123, P0222, P0223, P1225, P1226, P2135 Throttle position sensor • P0128 Thermostat function • P0181, P0182, P0183 FTT sensor • P0327, P0328 KS • P0335 CKP sensor (POS) • P0340, P0345 CMP sensor (PHASE) • P0460, P0461, P0462, P0463 Fuel level sensor • P0500 VSS • P0605 ECM • P1229 Sensor power supply • P1706 PNP switch • P2122, P2123, P2127, P2128, P2138 Accelerator pedal position sensor
2	• P0031, P0032, P0051, P0052 HO2S1 heater • P0037, P0038, P0057, P0058 HO2S2 heater • P0132-P0134, P1143, P1144 and P0152-P0154, P1163, P1164 HO2S1 • P0138, P0139, P1146, P1147 and P0158, P0159, P1166, P1167 HO2S2 • P0441 EVAP control system purge flow monitoring • P0444, P0445, P1444 EVAP canister purge volume control solenoid valve • P0447, P1446, P1448 EVAP canister vent control valve • P0452, P0453 EVAP control system pressure sensor • P0550 Power steering pressure sensor • P0705-P0755, P1705, P1760 A/T related sensors, solenoid valves and switches • P1065 ECM power supply • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1165 Swirl control valve control vacuum check switch • P1217 Engine over temperature (OVERHEAT) • P1490, P1491 Vacuum cut valve bypass valve • P1805 Brake switch
3	• P0011, P0021, P1110, P1135 Intake valve timing control • P0171, P0172 and P0174, P0175 Fuel injection system function • P0300-P0306 Misfire • P0420, P0430 Three way catalyst function • P0442, P0455, P0456, P1442, P1456 EVAP control system • P0506, P0507 ISC system • P0731-P0734, P0744 A/T function • P1121 Electric throttle control actuator • P1124, P1126, P1128 Electric throttle control actuator • P1130, P1131 Swirl control valve control solenoid valve • P1148, P1168 Closed loop control • P1211 ABS/TCS control unit • P1212 ABS/TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch

Fail-safe Chart

=NAEC0040

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

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0102
P0103</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="6">P0117
P0118</td><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided
(CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0122
P0123
P0222
P0223
P2135</td><td>Throttle position sensor</td><td colspan="2">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.</td></tr>
<tr><td rowspan="3">P1121</td><td rowspan="3">Electric throttle control actuator</td><td colspan="2">(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.</td></tr>
<tr><td colspan="2">(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.</td></tr>
<tr><td colspan="2">(When ECM detects the throttle valve is stuck open:)
While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.
The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P1122</td><td>Electric throttle control function</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1124
P1126</td><td>Throttle control relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1128</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1229</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P2122
P2123
P2127
P2128
P2138</td><td>Accelerator pedal position sensor</td><td colspan="2">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.</td></tr>
</table>

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting MIL up when there is a malfunction on engine control system.
  Therefore, when electrically controlled throttle and part of ECM related diagnosis is continuously detected as NG for 5 trips, ECM warns the driver that engine control system has a malfunction and MIL circuit is open by means of operating fail-safe function.

Fail-safe Chart (Cont'd)

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

NAEC0041

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NAEC0041S01

		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-729
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-57
	Injector circuit	1	1	2	3	2		2	2			2			EC-724
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-38
Air	Positive crankcase ventilation system												1		EC-53
	Incorrect idle speed adjustment						1	1	1	1		1			EC-123
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-457, 459, 467, 472
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-123
	Ignition circuit	1	1	2	2	2		2	2			2			EC-714
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-157
Air conditioner circuit							3			3				2	HA section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

		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	
Engine control	Crankshaft position sensor (POS) circuit	2	2												EC-319
	Camshaft position sensor (PHASE) circuit	3	2												EC-326
	Mass air flow sensor circuit	1			2										EC-187, EC-194
	Heated oxygen sensor 1 circuit				3										EC-246
	Engine coolant temperature sensor circuit	1	1	2		2	3	2	2	3		2			EC-204, 217
	Throttle position sensor circuit						2			2					EC-210, 298, 558, 560, 562, 690
	Accelerator pedal position sensor circuit			3	2	1	2			2					EC-675, 682, 697
	Vehicle speed sensor circuit		2	3		3						3			EC-430
	Knock sensor circuit			2											EC-314
	ECM	2	2	3	3	3	3	3	3	3	3				EC-441
	Park/Neutral position switch circuit			3		3						3			EC-663
	Power steering pressure sensor circuit		2					3	3						EC-436
	Electrical load signal circuit														EC-753
	Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-451
	Refrigerant pressure sensor circuit		2				3			3		4			EC-736
	ABS actuator and electric unit (control unit)			4											EC-549, 551
	Swirl control valve control solenoid valve circuit					1									EC-477
	VIAS control solenoid valve circuit					1									EC-705

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NAEC0041S02

		SYMPTOM													Reference section
		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												FE section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct		5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket	5													
Cranking	Battery	1	1	1		1		1	1			1		1	EL section
	Alternator circuit														
	Starter circuit	3													
	Flywheel/Drive plate	6													EM section
	PNP switch	4													AT section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

		SYMPTOM													Reference section
		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	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			
	Camshaft														
	Intake valve timing control														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5	5	5		5					FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM, LC section
	Oil level (Low)/Filthy oil														LC section
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					
	Water pump														
	Water gallery														
	Coolant level (low)/Contaminated coolant														MA section

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

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference section
	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	
NVIS (NISSAN Vehicle Immobilizer System — NATS)	1	1												EC-93 or EL section

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC0042

Remarks:

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

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	• See "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-151.		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	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	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	• See "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-151.		
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	15°±5° BTDC
		2,000 rpm	More than 25° BTDC
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B1 A/F ALPHA-B2	• See "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-151.		
EVAP SYS PRES	• Ignition switch: ON		1.8 - 4.8V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 1 second) • Engine running and cranking		ON
	Except as shown above		OFF
VENT CONT/V	• Ignition switch: ON		OFF

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine: After warming up • Engine speed: Below 3,600 rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,200 rpm		OFF
	• Engine speed: Below 3,200 rpm after the following conditions are met. • After warming up • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: N • No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
SWRL CONT S/V	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) and 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) and 50°C (122°F).		OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).		ON
VIAS S/V	• Engine: After warming up	1,800 - 3,600 rpm	ON
		Except above conditions	OFF
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever N • Quickly depressed accelerator pedal • No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever N • Quickly depressed accelerator pedal • No-load	Idle	0%
		2,000 rpm	Approximately 40%
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
VEH SPEED SE	• Turn drive wheels and compare CONSULT-II 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.

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

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/ACCEL switch: Pressed	ON
		RESUME/ACCEL switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	• Ignition switch: ON	Brake pedal: Fully released Clutch pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed Clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	• Ignition switch: ON	CRUISE lamp: Illuminated	ON
		CRUISE lamp: Not illuminated	OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating.	ON
		ASCD is not operating.	OFF

*: 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.

Major Sensor Reference Graph in Data Monitor Mode

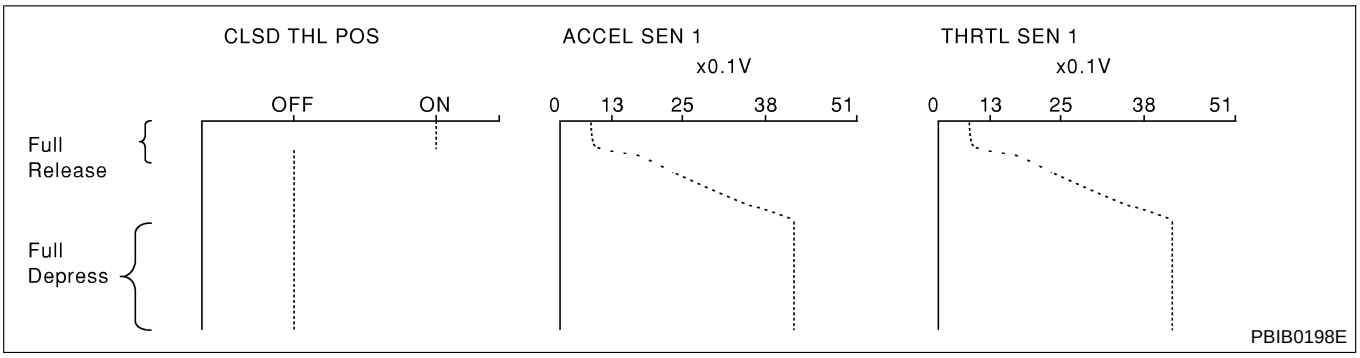
=NAEC0043

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

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

NAEC0043S01

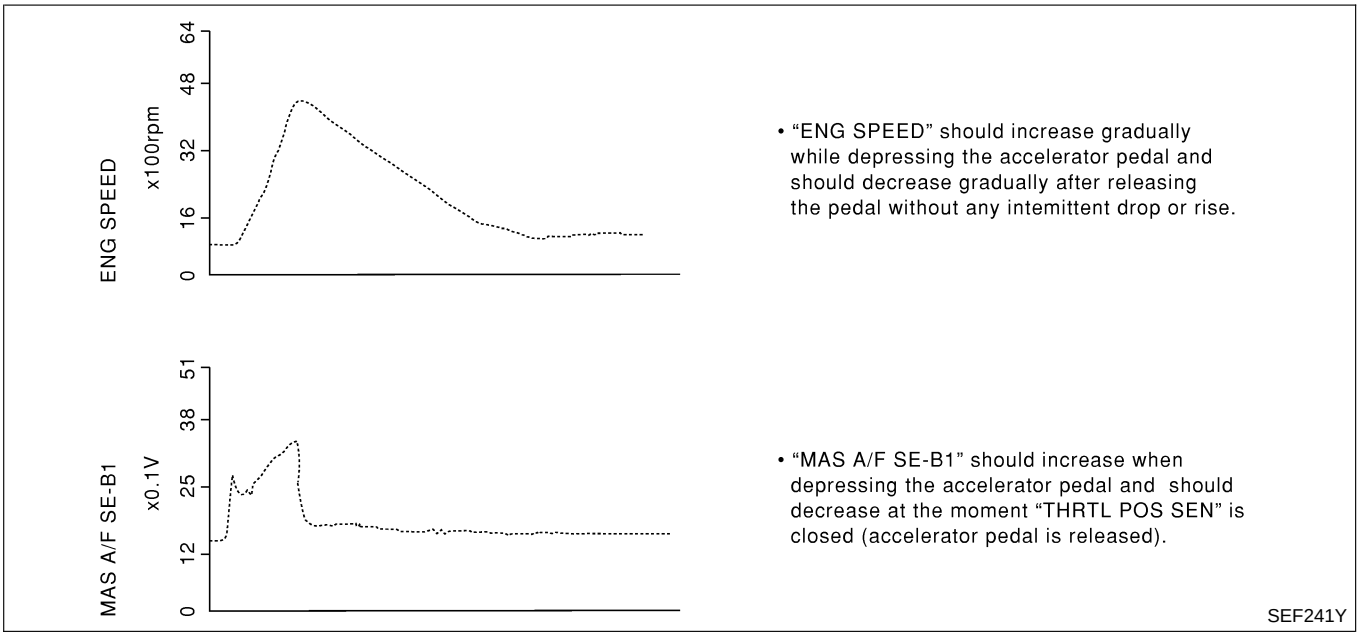
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T models) or with shift lever in 1st position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.

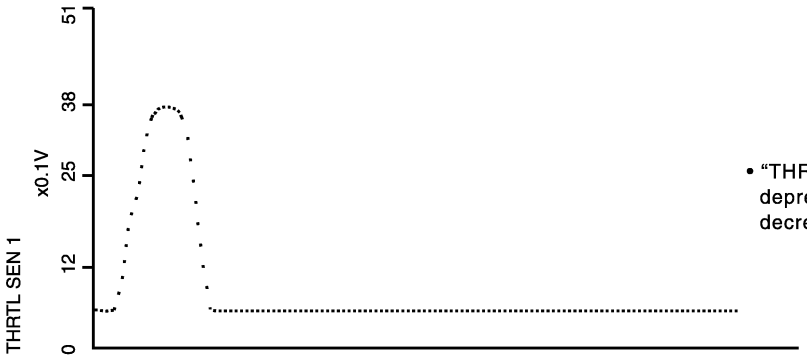


ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

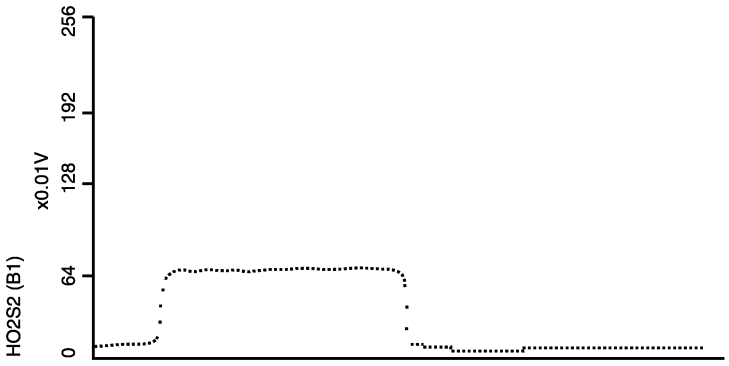
NAEC0043S02

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

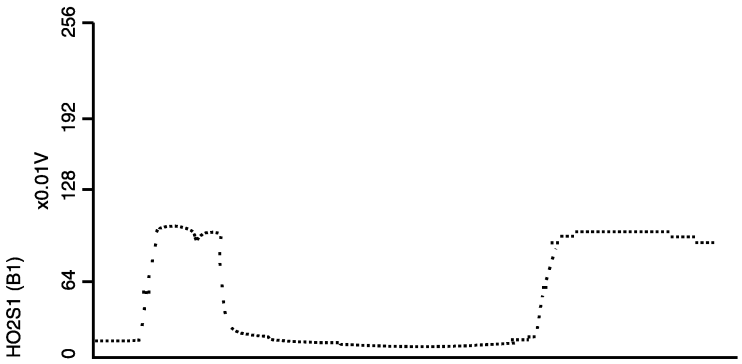




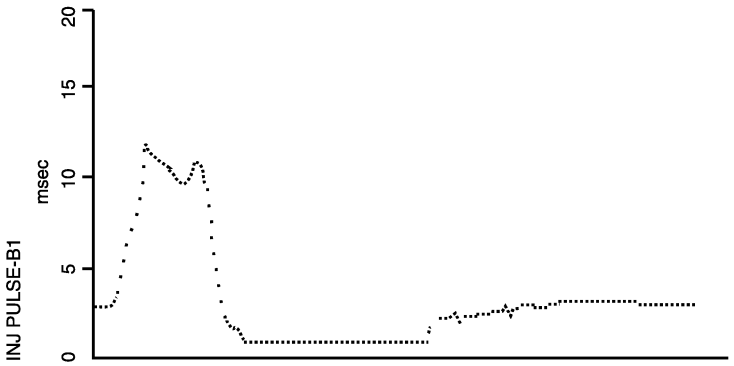
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

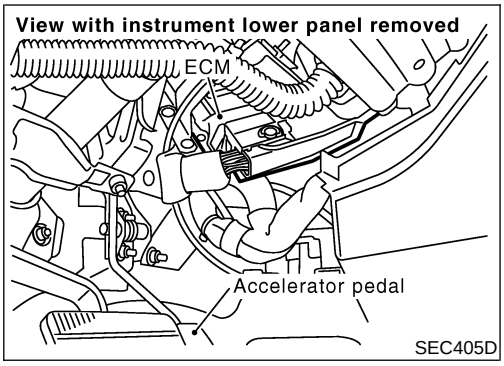


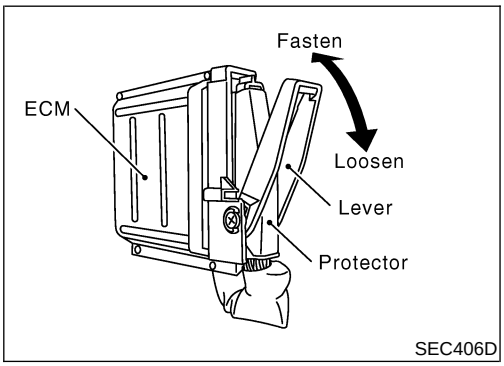
- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

PBIB0668E





ECM Terminals and Reference Value

NAEC0044

PREPARATION

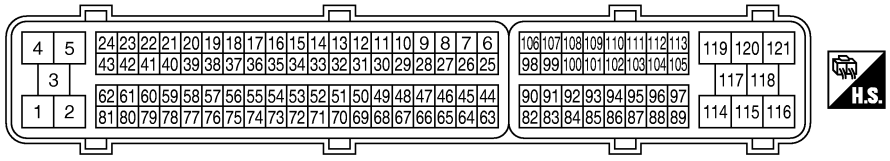
NAEC0044S01

1. ECM is located behind the driver side instrument lower panel. For this inspection, remove driver side instrument lower panel.
2. Remove ECM harness connector.
3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.

- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NAEC0044S02



PBIB1192E

ECM INSPECTION TABLE

NAEC0044S03

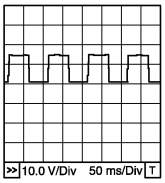
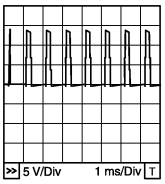
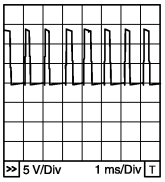
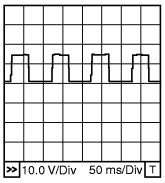
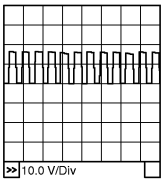
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

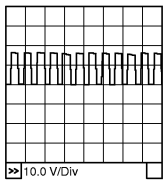
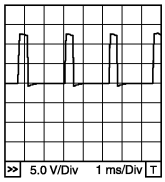
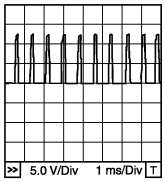
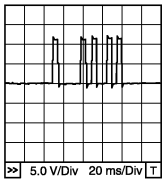
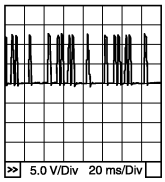
CAUTION:

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

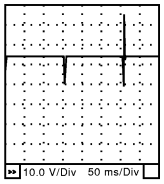
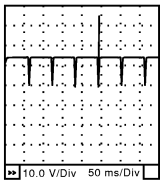
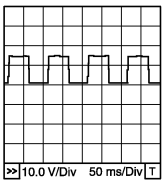
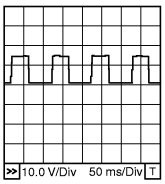
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground

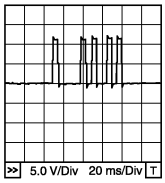
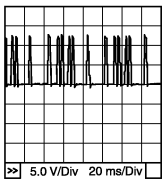
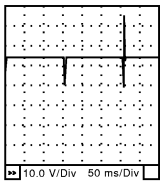
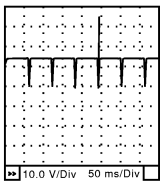
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/G	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
3	OR	Throttle control motor relay power supply	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is fully depressed	0 - 14V★  PBIB1105E
6	R/W	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm. ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Approximately 5V★  SEC981D
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
10	P/L	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** ● When revving engine up to 2,000 rpm quickly.	7 - 8V★  PBIB1790E

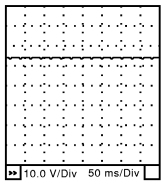
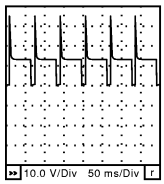
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	OR/B	Intake valve timing control solenoid valve (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly.	7 - 8V★  PBIB1790E
12	R/B	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
13	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 1.6V★  PBIB1041E
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 1.5V★  PBIB1042E
14	OR	Camshaft position sensor (PHASE) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB1040E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

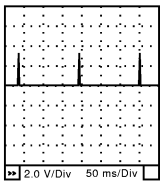
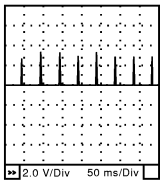
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
21 22 23	L/W R/Y R/B	Injector No. 5 Injector No. 3 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)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
24	L/OR	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
25	P/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm. ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Approximately 5V★  SEC981D
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
27	G	Swirl control valve control solenoid valve	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 - 50°C (59 - 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)

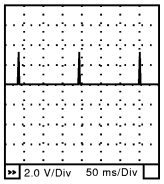
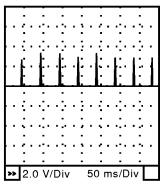
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V
32	L/G	EVAP control system pressure sensor	**[Ignition switch ON]**	1.8 - 4.8V
33	Y/G	Camshaft position sensor (PHASE) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB1040E
34	B/P	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
40 41 42	PU/R R/L R/W	Injector No. 6 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)★  SEC991C
47	L	Sensor power supply (Throttle position sensor)	**[Ignition switch ON]**	Approximately 5V
48	P/B	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
49	P/B	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5V
50	BR	Throttle position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Gear position: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch ON] ● Engine stopped ● Gear position: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
51	OR	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.1V
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm after the following conditions are met. ● After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	W/B	Swirl control valve control vacuum check switch	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 - 50°C (59 - 122°F).	Approximately 5V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	0 - 1.0V
60 61 62	PU/W L/R Y/R	Ignition signal No. 5 Ignition signal No. 3 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★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEC987C
66	BR/Y	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	L	Sensor power supply (Power steering pressure sensor)	**[Ignition switch ON]**	Approximately 5V
69	BR/W	Throttle position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Gear position: D (A/T models) ● Shift lever position is 1st. (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch ON] ● Engine stopped ● Gear position: D (A/T models) ● Shift lever position is 1st. (M/T models) ● Accelerator pedal fully depressed	More than 0.36V
70	W/PU	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON. (Compressor operates.)	1.0 - 4.0V
73	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm after the following conditions are met. ● After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
79 80 81	GY/R GY G/R	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEC987C
82	B/R	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	OR	Lighting switch	**[Ignition switch ON]** ● Lighting switch is in 2nd.	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Lighting switch is OFF.	0V
85	LG/R	Data link connector	**[Ignition switch ON]** ● CONSULT-II or GST is disconnected.	Approximately 5V
86	R	CAN communication line	**[Ignition switch ON]**	Approximately 1.7 - 2.3V Output voltage varies with the communication status.
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch ON]**	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V
93	B/L	Rear window defogger switch	**[Ignition switch ON]** ● Rear window defogger switch is ON.	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Rear window defogger switch is OFF.	0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	L	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
98	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.15 - 0.6V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	1.95 - 2.4V
99	L/Y	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2V
			[Ignition switch ON] ● RESUME/ACCEL switch: Pressed	Approximately 3V
101	G/Y	Stop lamp switch	**[Ignition switch ON]** ● Brake pedal is fully released	Approximately 0V
			[Ignition switch ON] ● Brake pedal is depressed	BATTERY VOLTAGE (11 - 14V)
102	L	PNP switch	**[Ignition switch ON]** ● Gear position is P or N.	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
104	L	Throttle control motor relay	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON]	0 - 1.0V
106	L	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	3.9 - 4.7V
107	G/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	L/Y	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal is depressed ● Clutch pedal is depressed (M/T models)	Approximately 0V
			[Ignition switch ON] ● Brake pedal is fully released ● Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)
109	R	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
111	L/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
112	G/W	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
113	R/L	Fuel pump relay	**[Ignition switch ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch ON] ● More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
117	G/R	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	B/W B/W	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/R	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

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

Description

NAEC0717

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

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

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

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

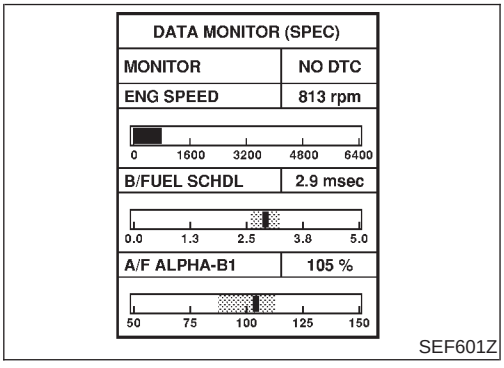
Testing Condition

NAEC0718

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 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*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 10 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.



Inspection Procedure

NAEC0719

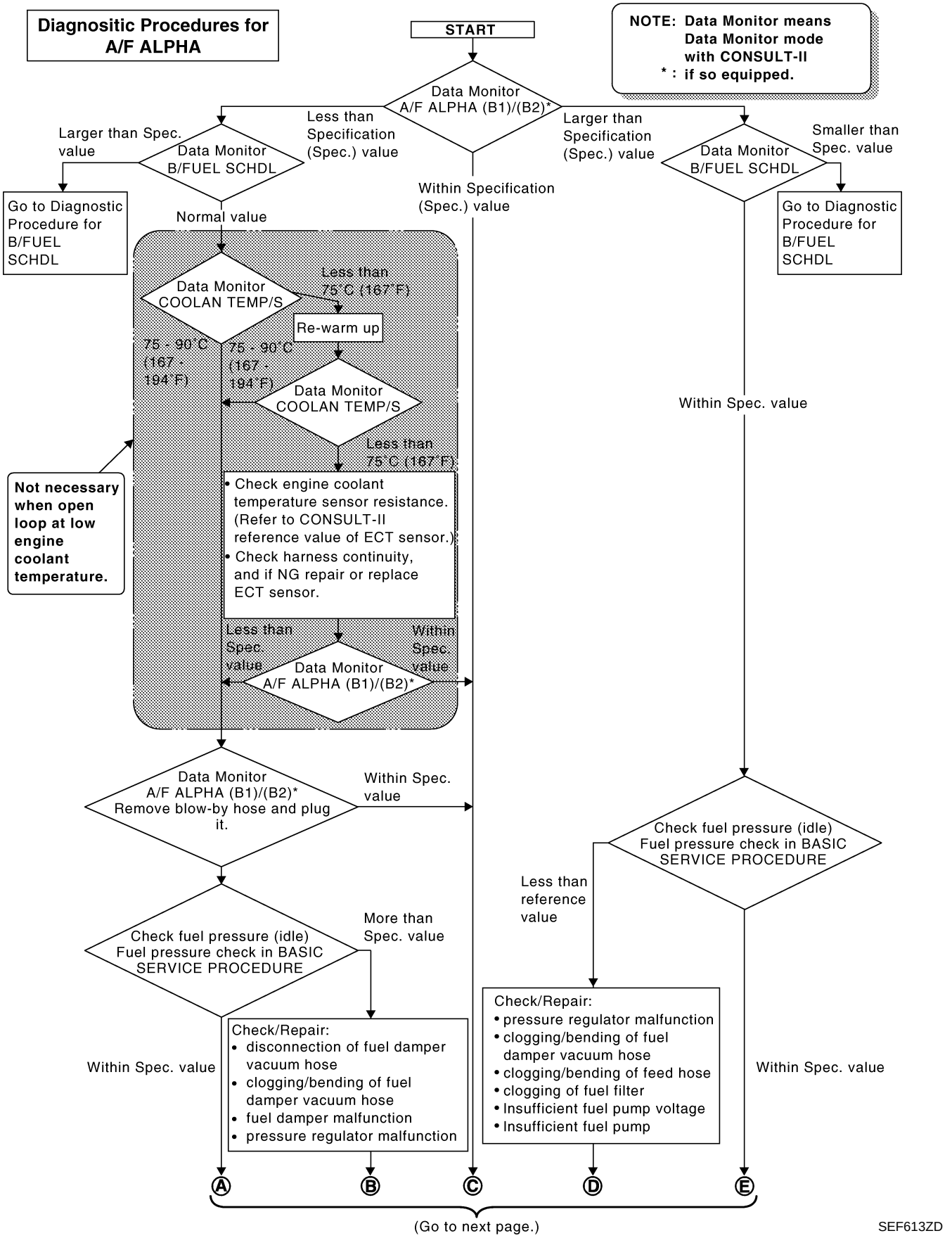
NOTE:

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

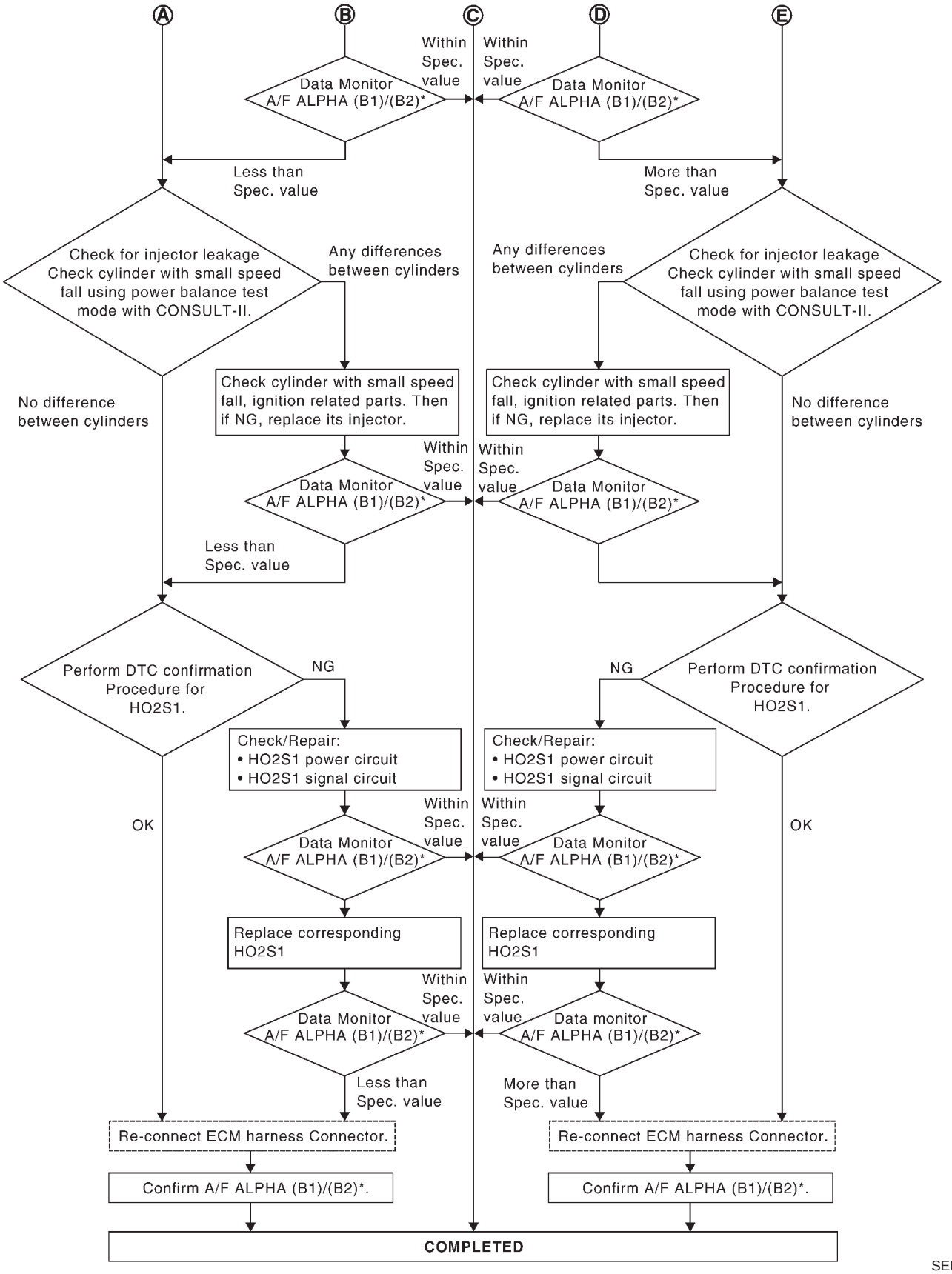
1. Perform "Basic Inspection", EC-123.
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2" and "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to "Diagnostic Procedure", EC-152.

Diagnostic Procedure

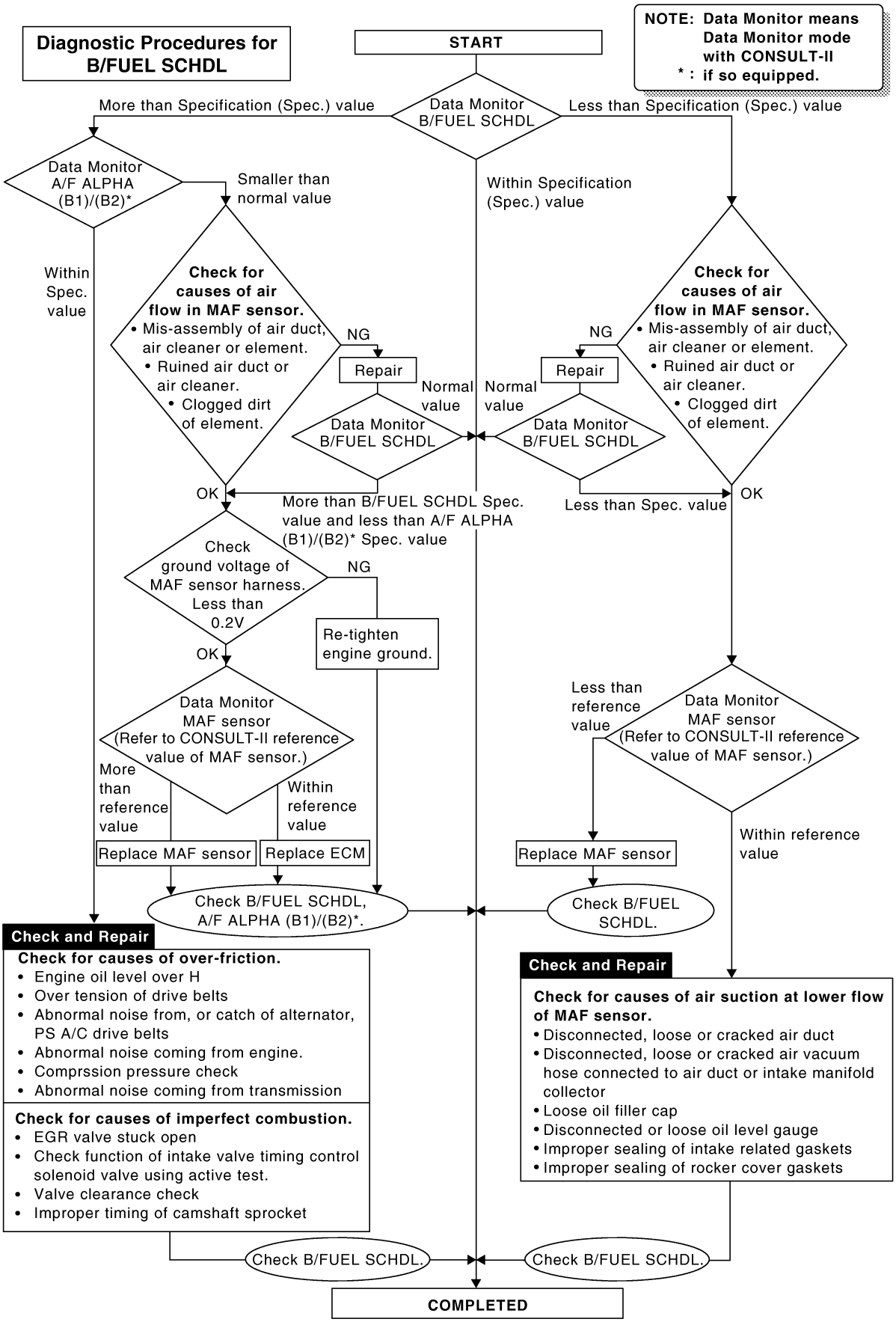
NAEC0720



SEF613ZD


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Data Monitor A/F ALPHA (B1)/(B2)*
Within Spec. value
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Perform DTC confirmation Procedure for HO2S1.
NG
OK
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Replace corresponding HO2S1
Data monitor A/F ALPHA (B1)/(B2)*
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
Re-tighten engine ground.
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Less than Spec. value
Less than reference value
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenoid valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check B/FUEL SCHDL.
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

Description

NAEC0045

Intermittent incidents (I/I) 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 I/I 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 I/I REPORT SITUATIONS

NAEC0045S01

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

Diagnostic Procedure

NAEC0046

1	INSPECTION START	
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-91.		
	▶	GO TO 2.

2	CHECK GROUND TERMINALS	
Check ground terminals for corroding or loose connection. Refer to GI-30, "GROUND INSPECTION".		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT	
Perform GI-25, "Incident Simulation Tests".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK CONNECTOR TERMINALS	
Refer to GI-22, "How to Check Enlarged Contact Spring of Terminal".		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace connector.

ECM Terminals and Reference Value

NAEC0648

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

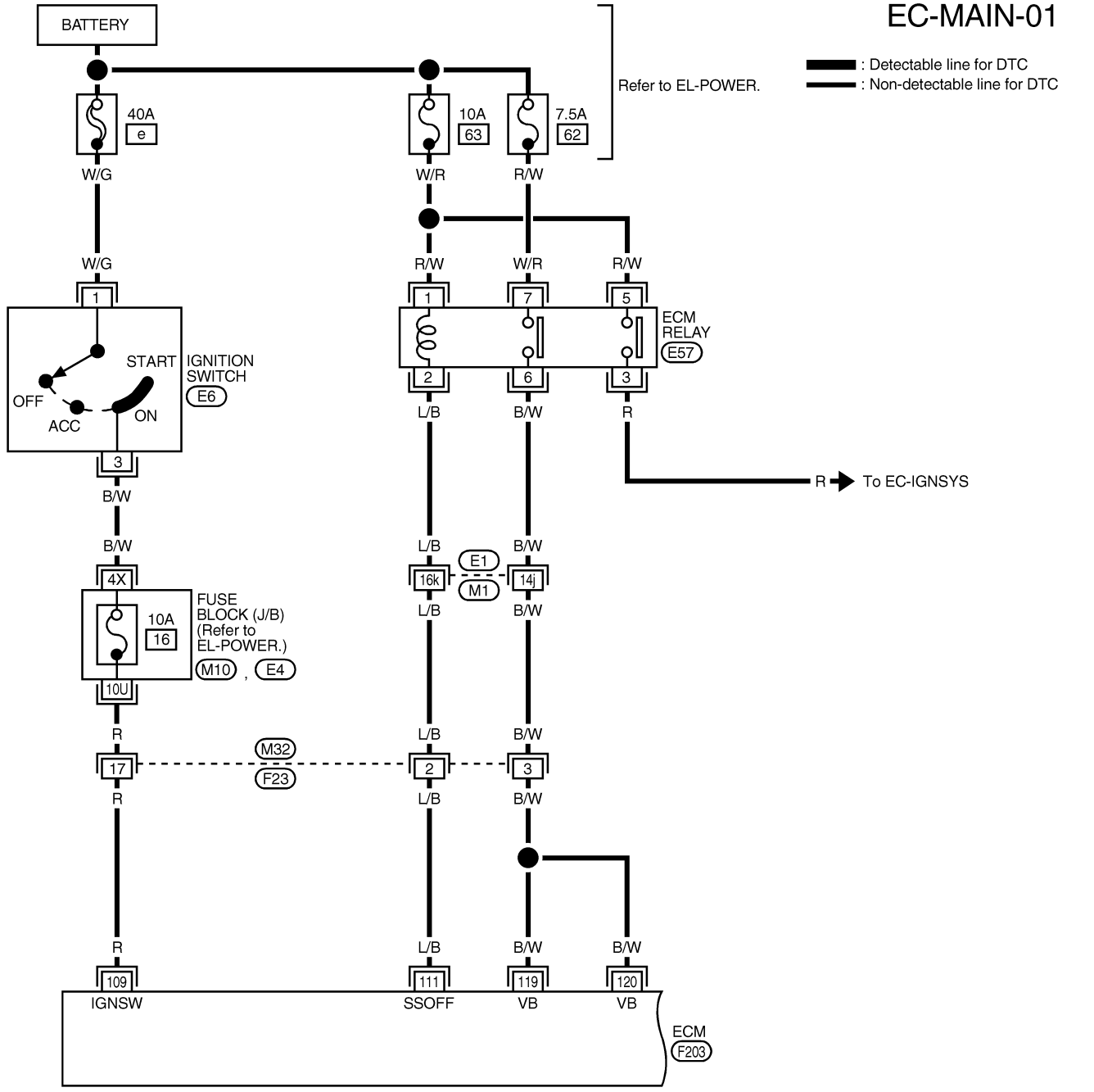
CAUTION:

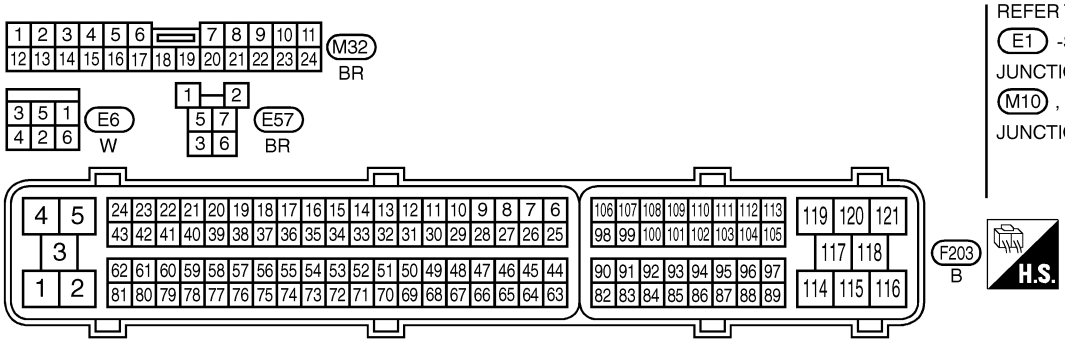
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
109	R	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
111	L/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
116	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	B/W B/W	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

NAEC0047



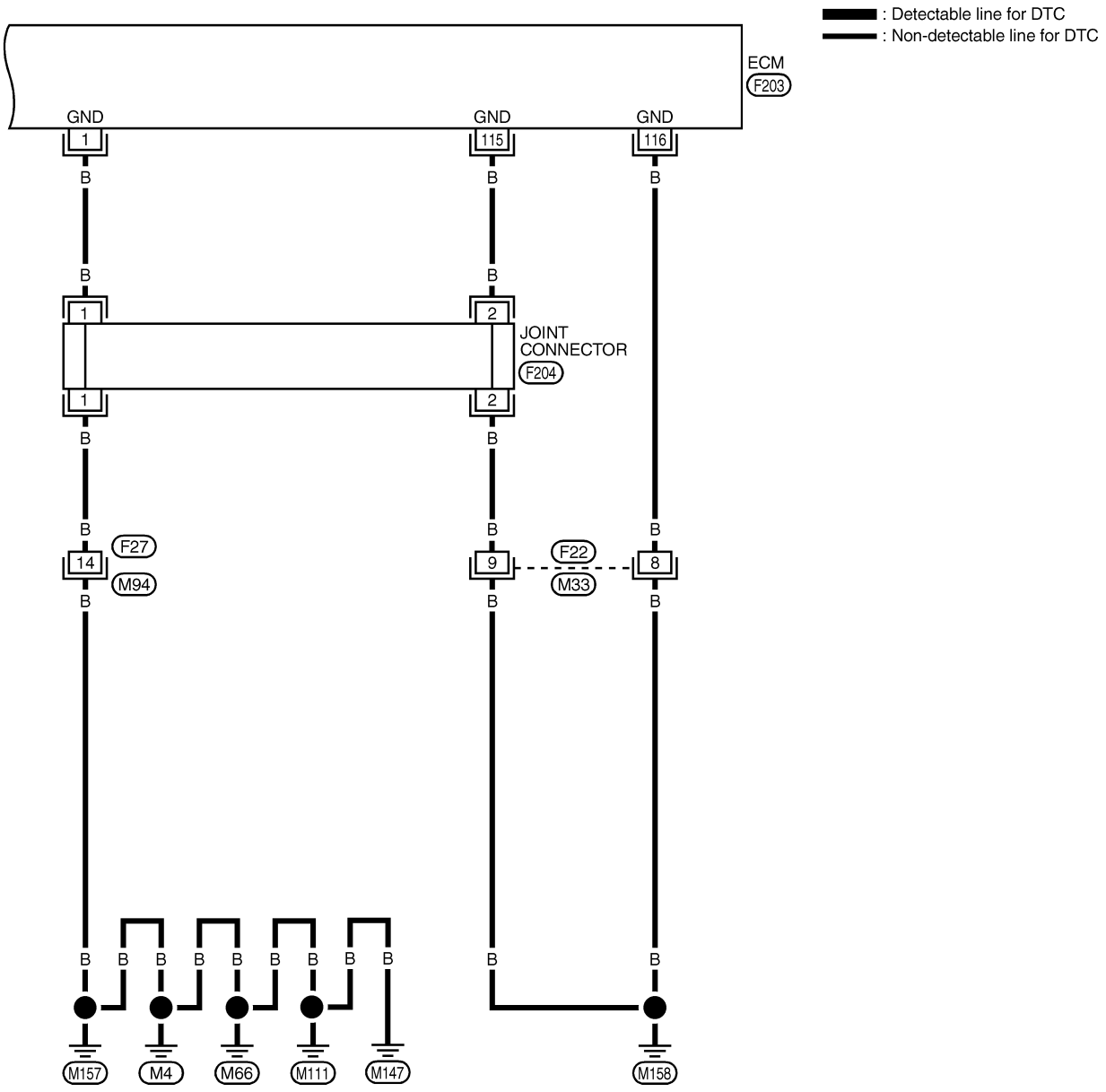


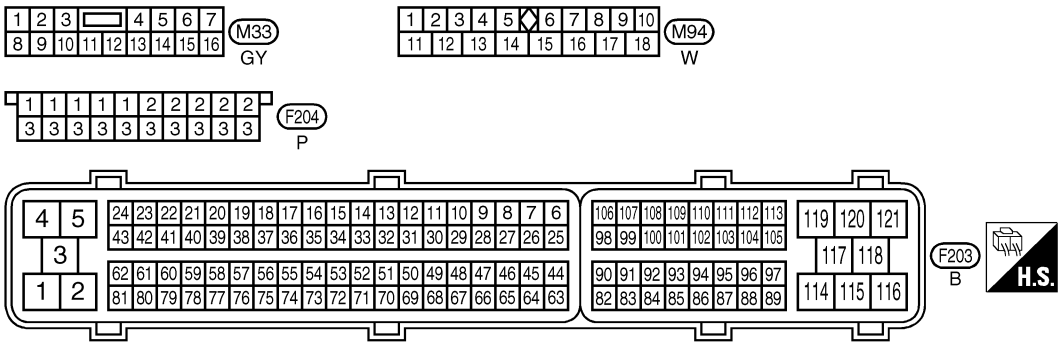
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E4 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC076E

Wiring Diagram (Cont'd)

EC-MAIN-02



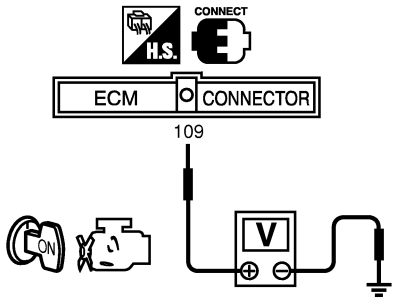


MEC077E

Diagnostic Procedure

NAEC0049

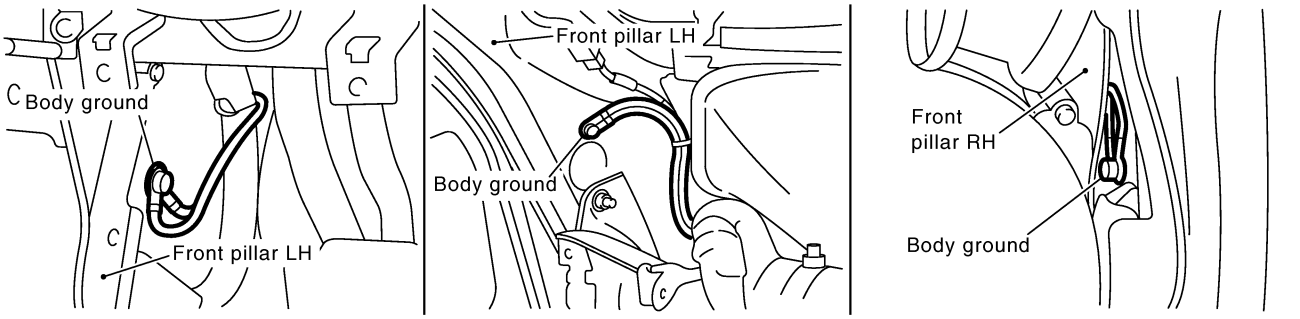
1	INSPECTION START
Start engine. **Is engine running?**	
Yes or No	
Yes ▶	GO TO 11.
No ▶	GO TO 2.

2	CHECK ECM POWER SUPPLY CIRCUIT-I
1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.	
 MBIB0015E	
Voltage: Battery voltage	
OK or NG	
OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● Harness connectors M32, F23 ● Fuse block (J/B) connectors E4, M10 ● Harness for open or short between ECM and ignition switch	
▶	Repair harness or connectors.

4	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



SEC997D

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace ground connections.

5	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

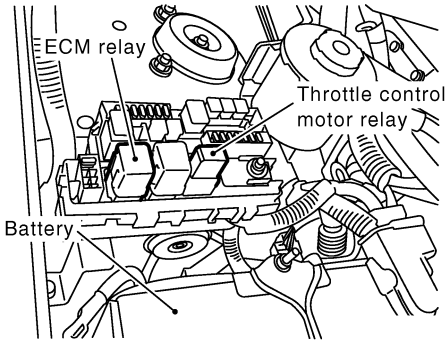
6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector
- Harness connectors F27, M94
- Harness connectors F22, M33
- Harness for open between ECM and ground

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

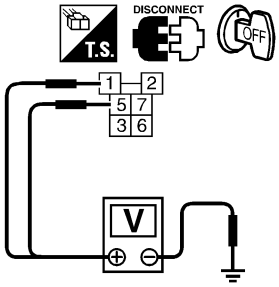
7	CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.



SEC425D

2. Check voltage between ECM relay terminals 1, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF956Y

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness for open or short between ECM relay and battery

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

9	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay 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 "IGNITION SIGNAL", EC-714.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

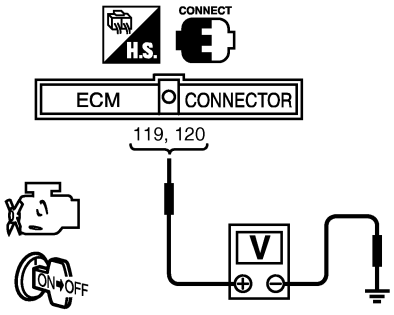
Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between ECM relay and ECM

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

Diagnostic Procedure (Cont'd)

11	CHECK ECM POWER SUPPLY CIRCUIT-III

1. Stop engine.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.



PBIB1630E

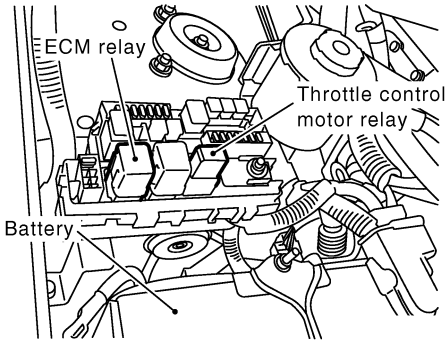
Voltage:
After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

OK or NG

OK	▶	GO TO 17.
NG (Battery voltage does not exist.)	▶	GO TO 12.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 14.

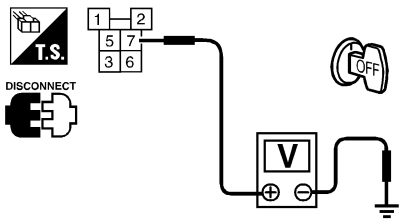
12	CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



SEC425D

2. Check voltage between ECM relay terminal 7 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF957Y

OK or NG

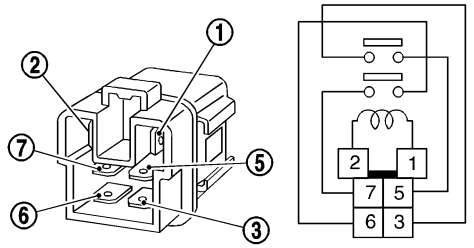
OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART
Check the following. ● 7.5A fuse ● Harness for open or short between ECM relay and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK ECM POWER SUPPLY CIRCUIT-V
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 6. 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 16.
NG ▶	GO TO 15.

15	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness for open or short between ECM and ECM relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

16	CHECK ECM RELAY
1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5, 6 and 7.	



Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

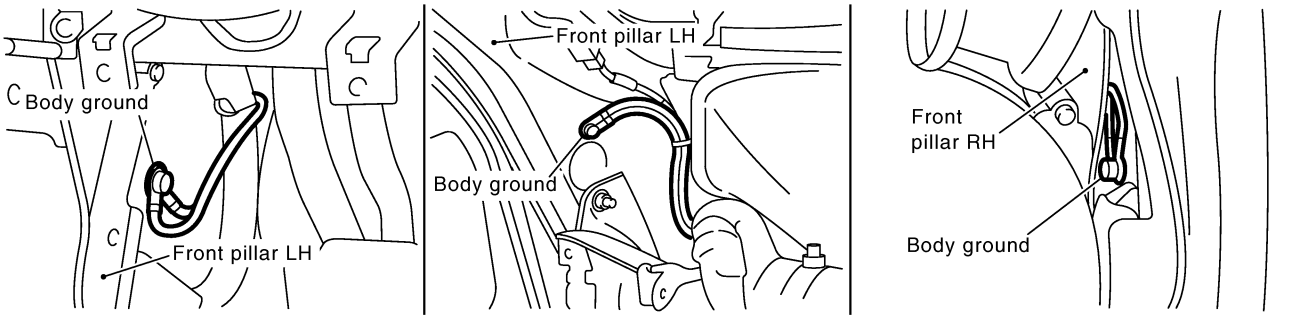
SEF296X

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM relay.

17	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



SEC997D

OK or NG

OK	▶	GO TO 18.
NG	▶	Repair or replace ground connections.

18	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 19.

19	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector
- Harness connectors F27, M94
- Harness connectors F22, M33
- Harness for open between ECM relay and ground

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

20	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**

Ground Inspection

=NAEC1415

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.

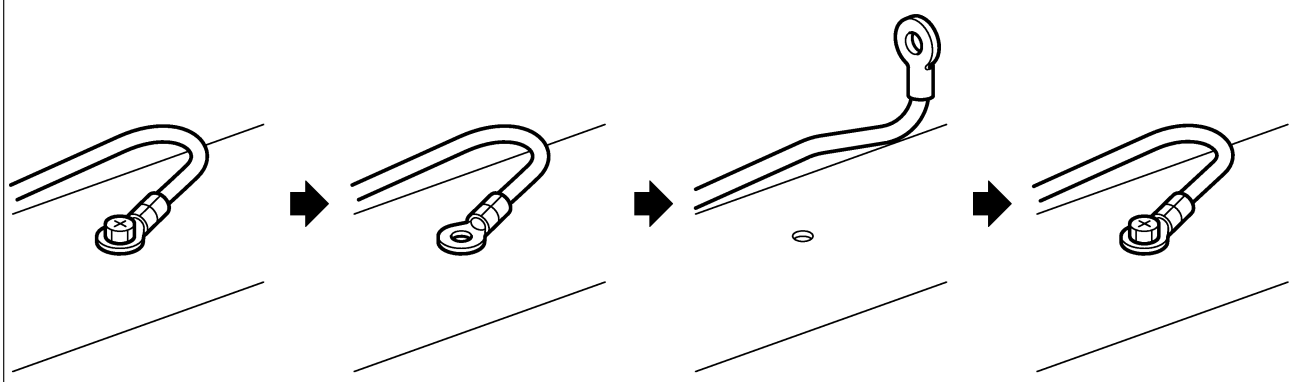
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on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

When inspecting a ground connection follow these rules:

1) Remove the ground bolt or screw.
2) Inspect all mating surfaces for tarnish, dirt, rust, etc.
3) Clean as required to assure good contact.
4) Reinstall bolt or screw securely.
5) Inspect for “add-on” accessories which may be interfering with the ground circuit.
6) 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 “Ground Distribution”, EL-19.

Ground Inspection



PBIB1870E

Description

NAEC1185

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 electonic 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

NAEC1186

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	• ECM cannot communicate to other control units. • ECM cannot communicate for more than the specified time.	• Harness or connectors (CAN communication line is open or shorted.)
U1001*2 1001*2			

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

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

DTC Confirmation Procedure

NAEC1187

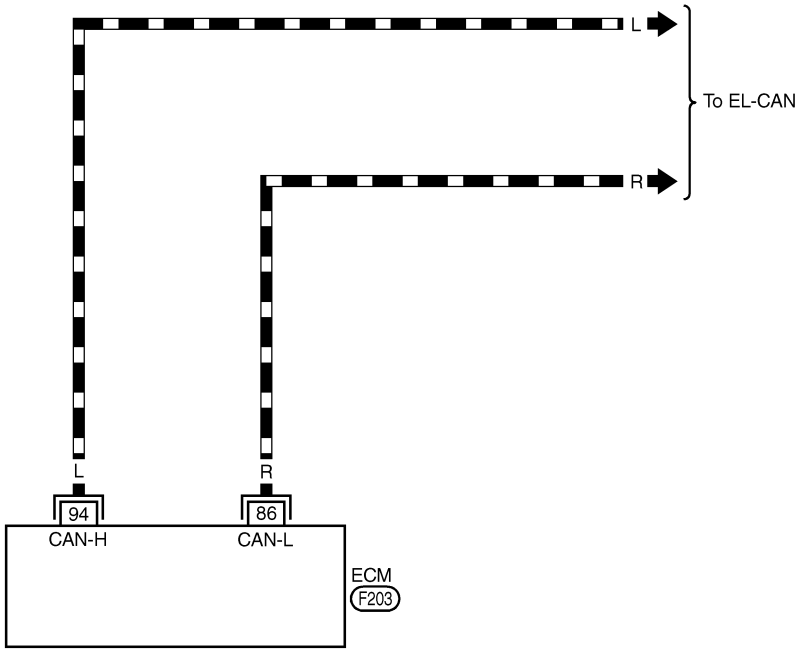
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to “Diagnostic Procedure” EC-168.

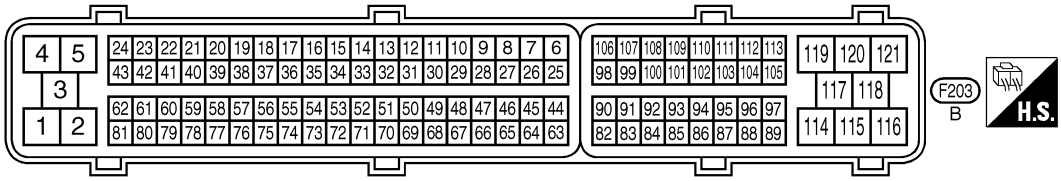
Wiring Diagram

NAEC1188

EC-CAN-01

: DATA LINE





MEC124E

Diagnostic Procedure

NAEC1189

Go to EL-409, “CAN Communication Unit”.

Description

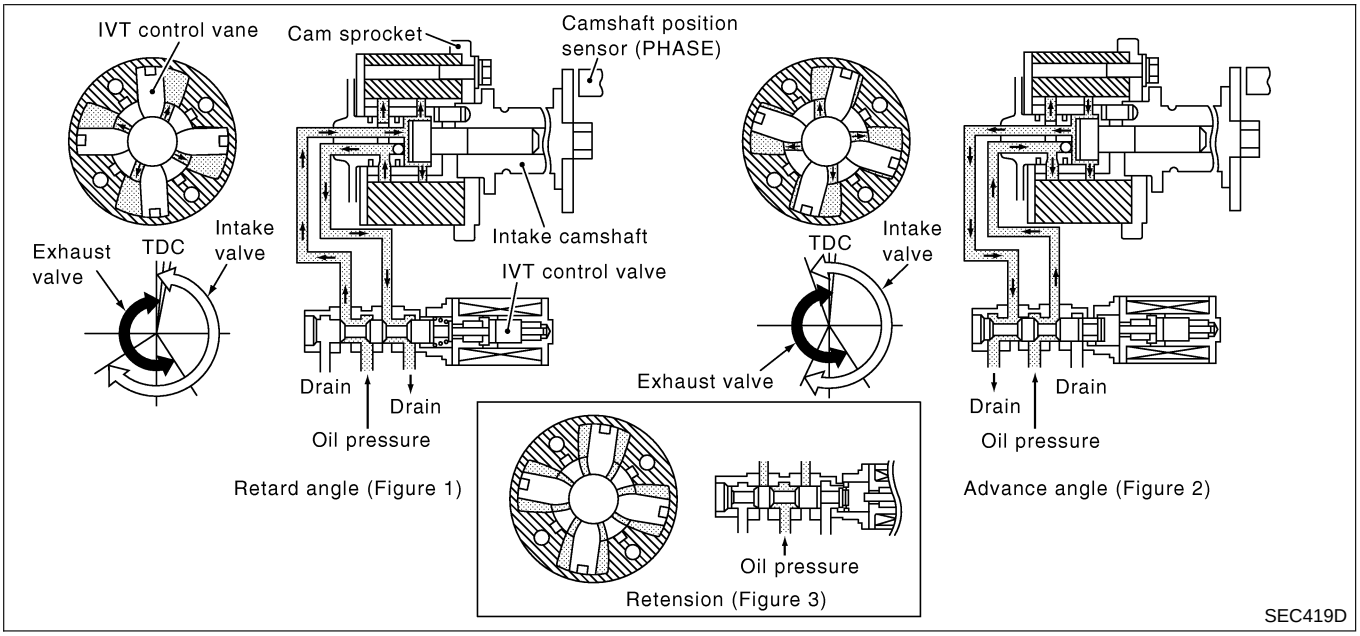
NAEC0821

SYSTEM DESCRIPTION

NAEC0821S01

Sensor	Input signal to ECM function	ECM	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		
Vehicle speed signal*1	Vehicle speed		

*1: 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-II Reference Value in Data Monitor Mode

=NAEC0822

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever: N (A/T), Neutral (M/T) • Quickly depressed accelerator pedal • No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever: N (A/T), Neutral (M/T) • Quickly depressed accelerator pedal • No-load	Idle	0%
		2,000 rpm	Approximately 40%

On Board Diagnosis Logic

NAEC0824

DTC No.	Trouble diagnosis name	DTC 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) • Accumulation of debris to the signal pick-up portion of the camshaft
P0021 0021 (Bank 2)			

FAIL-SAFE MODE

NAEC0824S01

When 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

NAEC0825

CAUTION:

Always drive at a safe speed.

NOTE:

- **If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136, EC-451.**
- **If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.**

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

SEF353Z

WITH CONSULT-II

NAEC0825S03

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Maintain the following conditions for at least 20 conecutive seconds.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMPS	More than 60°C (140°F)
Selector lever	1st position

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

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-171.

WITH GST

NAEC0825S04

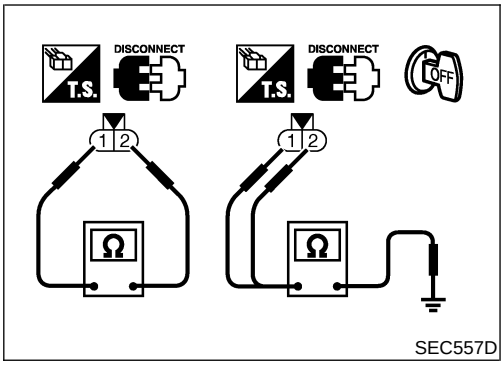
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1191

1	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-172. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Replace intake valve timing control solenoid valve.

2	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. For Wiring Diagram, refer to EC-321 for CKP sensor (POS) and EC-328 for CMP sensor (PHASE). **OK or NG**		
	▶	**INSPECTION END**



Component Inspection

=NAEC1192

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

NAEC1192S01

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

Terminals	Resistance
1 and 2	7.0 - 7.5Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)

Description

NAEC0826

SYSTEM DESCRIPTION

NAEC0826S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

NAEC0826S02

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

NAEC0827

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

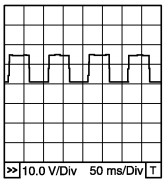
ECM Terminals and Reference Value

NAEC0828

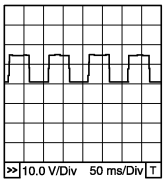
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/G	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

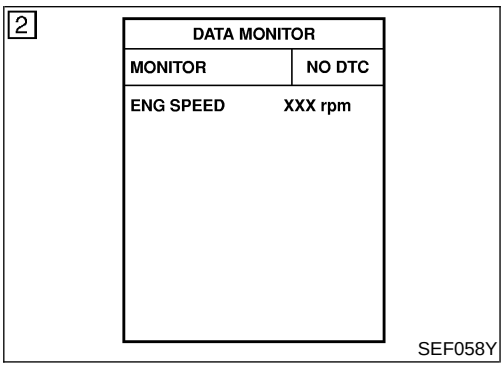
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	L/OR	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

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

On Board Diagnosis Logic

NAEC0829

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0031 0031 (Bank 1) P0051 0051 (Bank 2)	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heated oxygen sensor 1 heater
P0032 0032 (Bank 1) P0052 0052 (Bank 2)	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heated oxygen sensor 1 heater



DTC Confirmation Procedure

NAEC0830

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 11V and 16V at idle.

WITH CONSULT-II

NAEC0830S01

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 "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 6 seconds at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-178.

WITH GST

NAEC0830S02

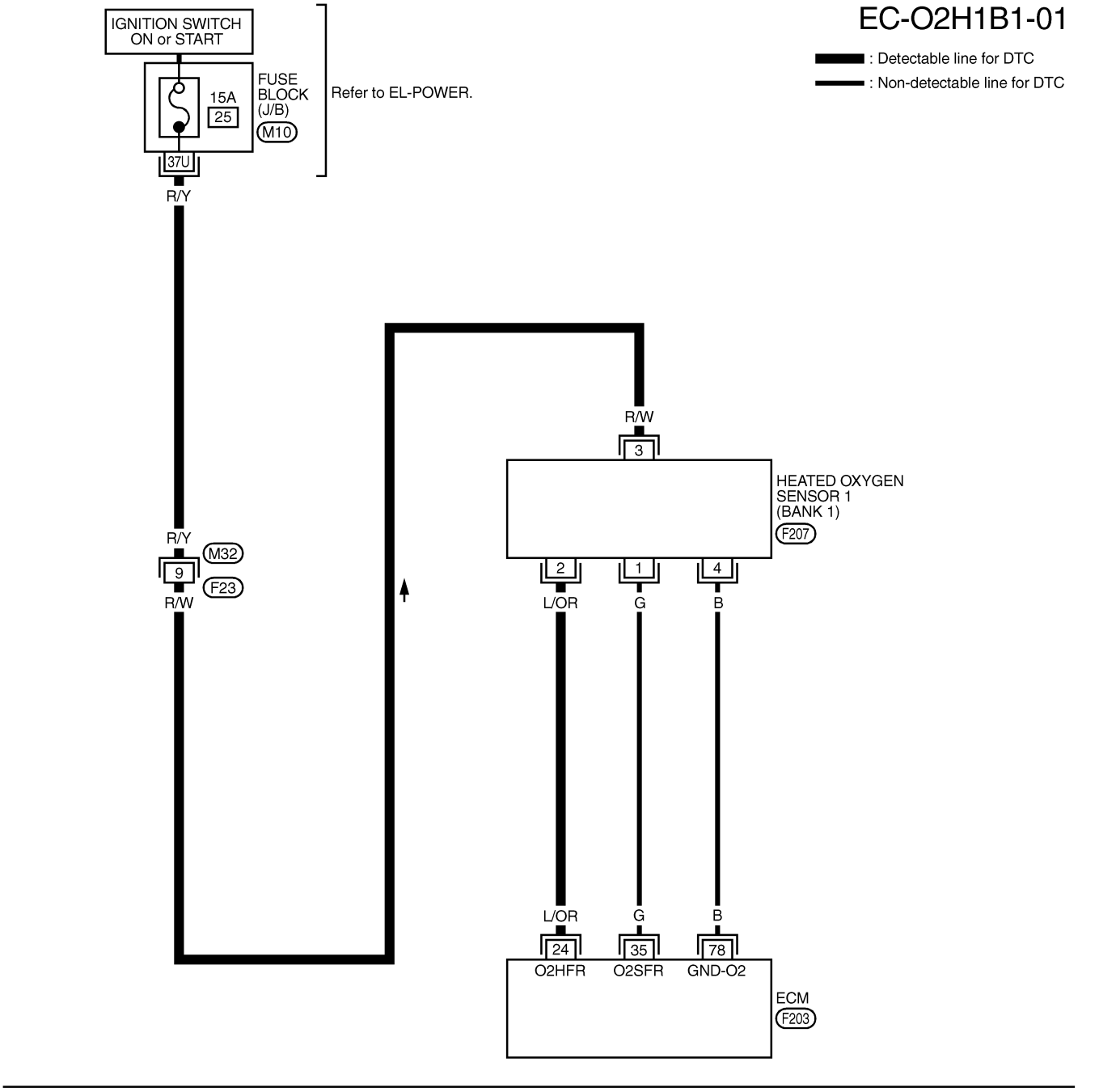
Follow the procedure "With CONSULST-II" above.

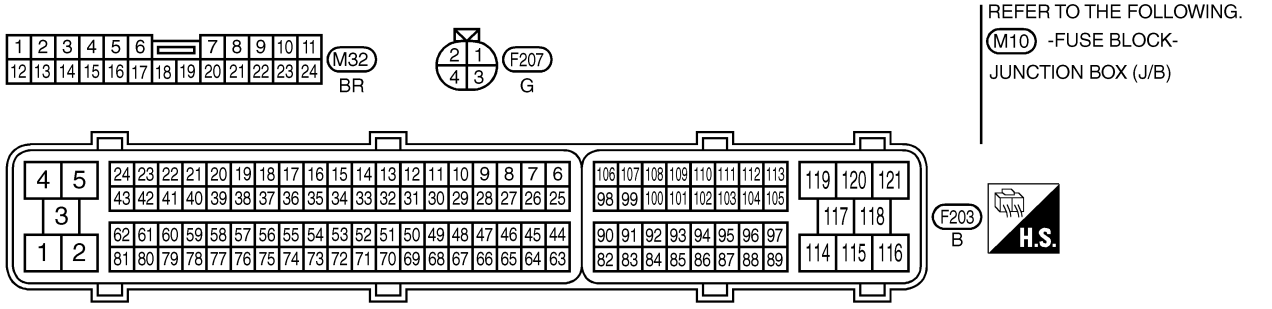
Wiring Diagram

NAEC0831

BANK 1

NAEC0831S01

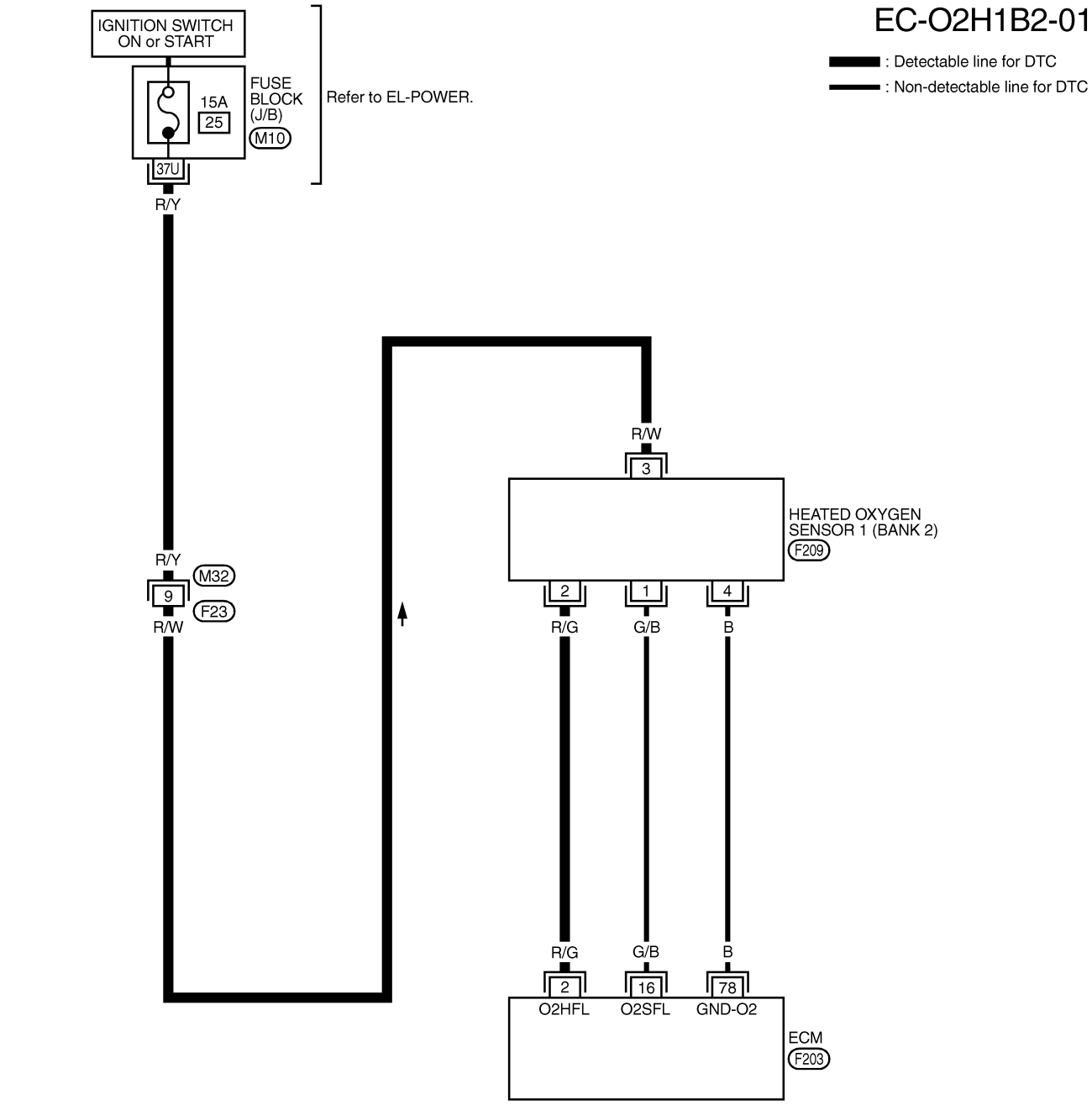


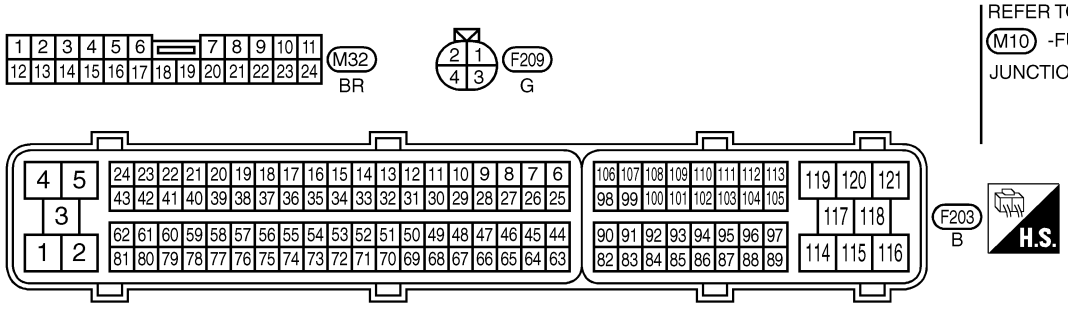


MEC078E

BANK 2

NAEC0831S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

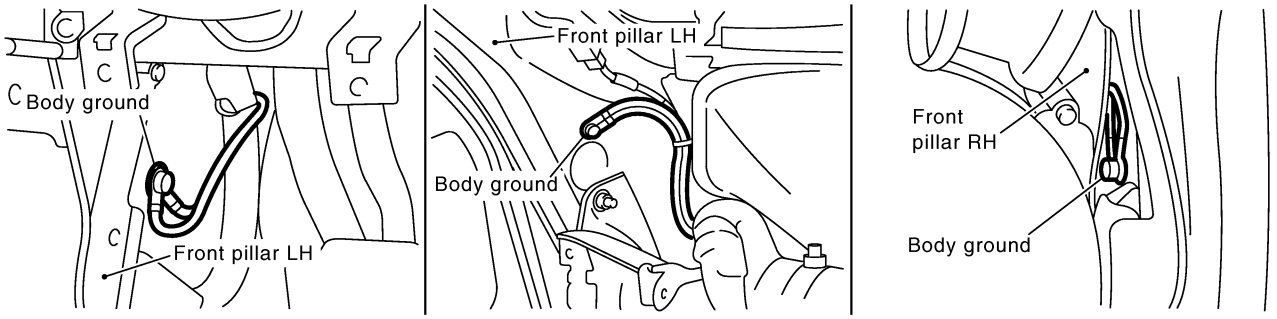
MEC079E

Diagnostic Procedure

NAEC0832

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



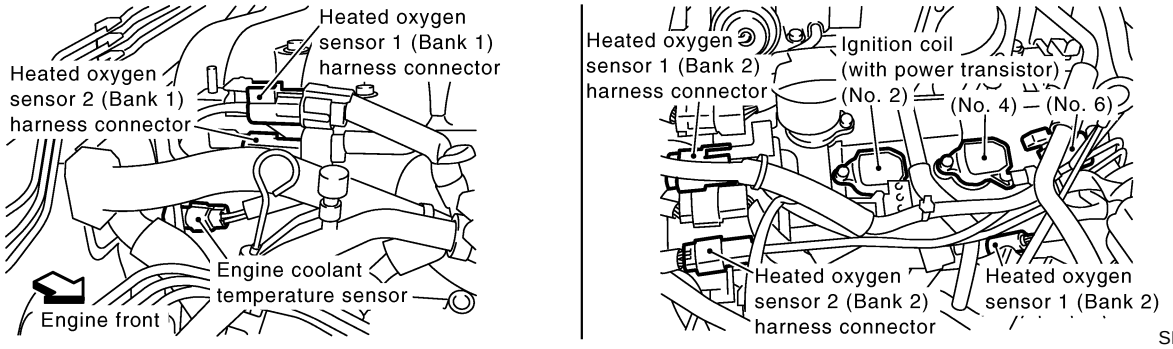
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

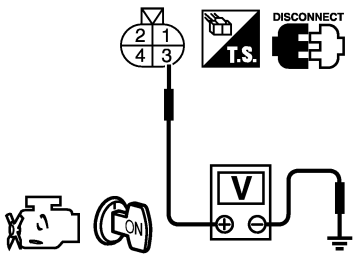
2	CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.



SEC999D

2. Turn ignition switch ON.
3. Check voltage between HO2S1 terminal 3 and ground with CONSULT-II or tester.



PBIB0112E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 15A fuse ● Harness for open or short between heated oxygen sensor 1 and fuse	
▶	Repair harness or connectors.

4	CHECK HO2S1 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 HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0031, P0032	24	2	Bank 1
P0051, P0052	2	2	Bank 2

MTBL1349

Continuity should exist.

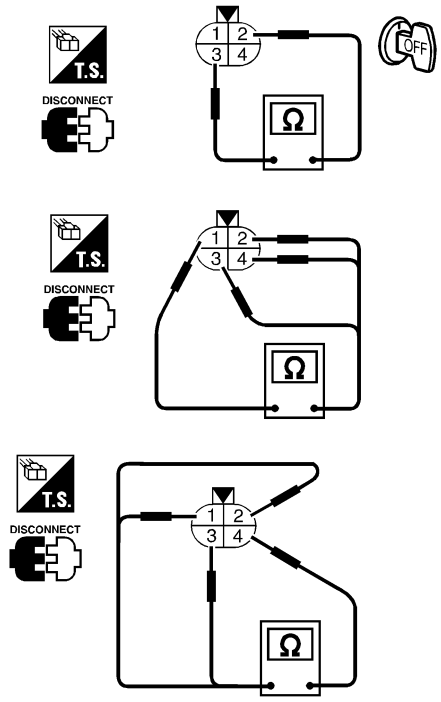
4. Also check harness for short to ground and short to power.

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 1 HEATER

Check resistance between HO2S1 terminals as follows.



SEF249Y

Terminals	Resistance
2 and 3	3.3 - 4.0Ω at 25 °C (77 °F)
1 and 2, 3, 4 4 and 1, 2, 3	∞Ω (Continuity should not exist.)

MTBL1782

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.**

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

▶ **INSPECTION END**

Description

NAEC0833

SYSTEM DESCRIPTION

NAEC0833S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor heater 2 control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

NAEC0833S02

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,200	OFF
Below 3,200 (After the following conditions are met.) ● After warming up ● After 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-II Reference Value in Data Monitor Mode

NAEC0834

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,200 rpm.	OFF
	● Engine speed: Below 3,200 rpm after the following conditions are met. ● After warming up ● After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

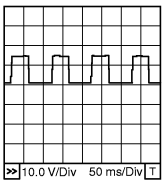
ECM Terminals and Reference Value

NAEC0835

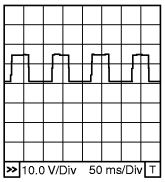
Specification data are reference values and are measured between each terminal and ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R/W	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm. ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Approximately 5V★  SEC981D
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

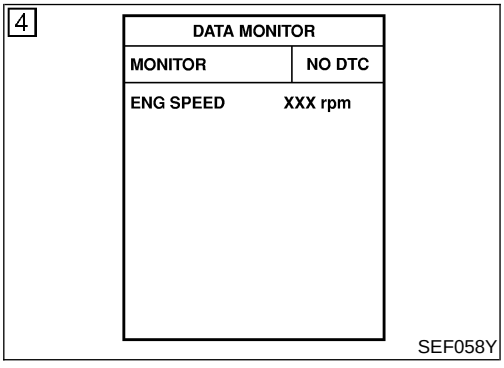
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm. ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Approximately 5V★  SEC981D
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

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

On Board Diagnosis Logic

NAEC0836

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0037 0037 (Bank 1)	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heated oxygen sensor 2 heater
P0057 0057 (Bank 2)			
P0038 0038 (Bank 1)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heated oxygen sensor 2 heater
P0058 0058 (Bank 2)			



SEF058Y

DTC Confirmation Procedure

NAEC0837

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 11V and 16V at idle.

WITH CONSULT-II

NAEC0837S01

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to the normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5) Let engine idle for 1 minute.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

WITH GST

NAEC0837S02

Follow the procedure "With CONSULST-II" above.

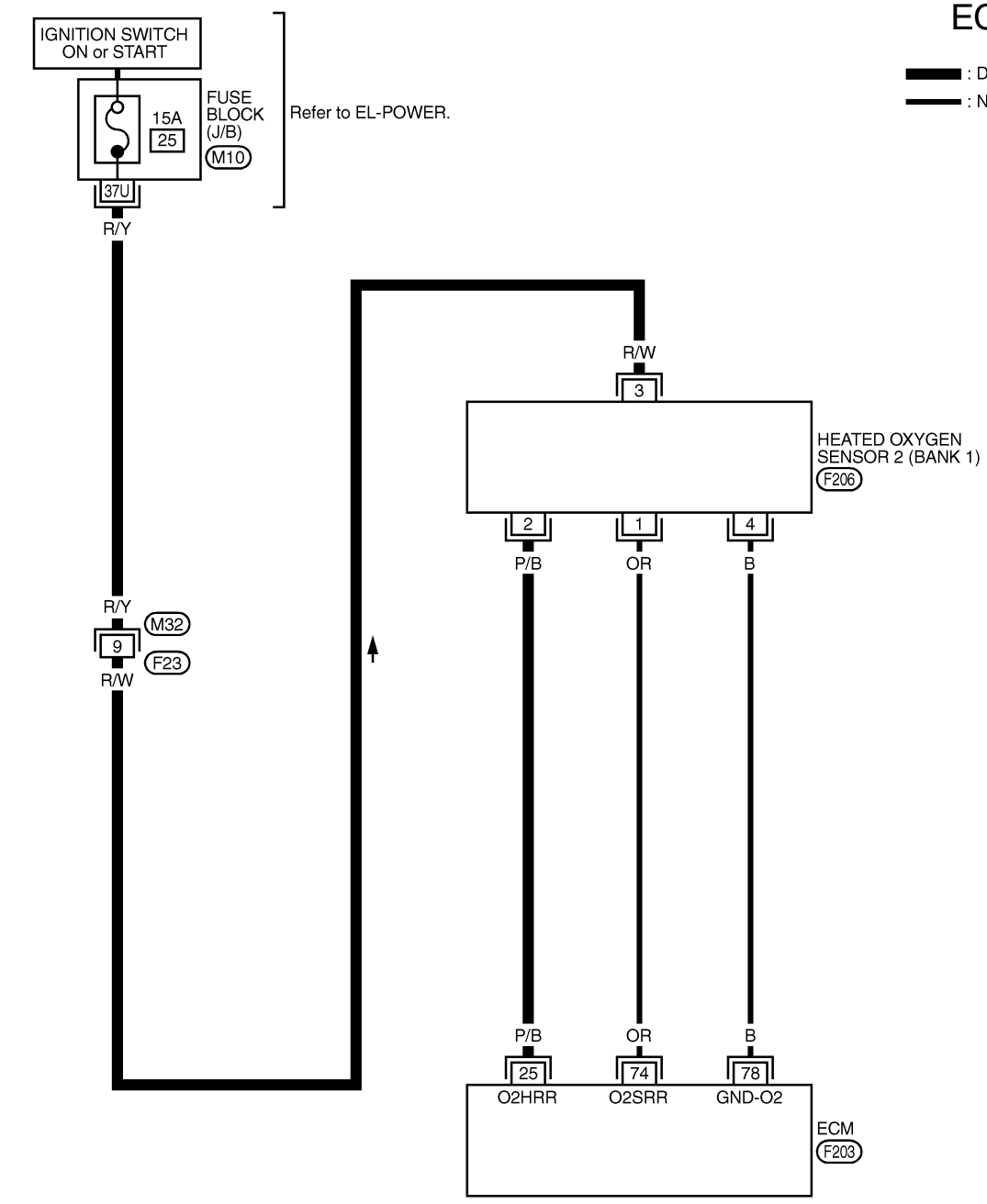
Wiring Diagram

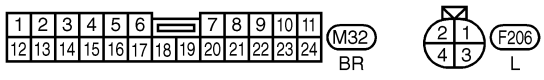
NAEC0838

BANK 1

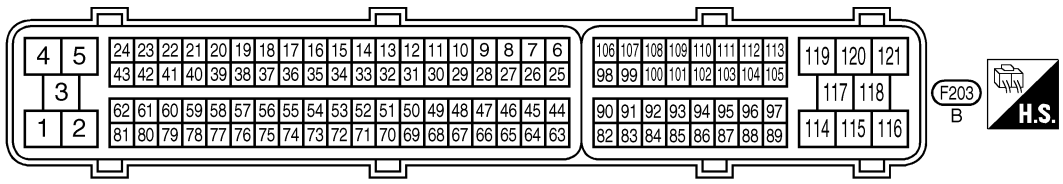
NAEC0838S01

EC-O2H2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



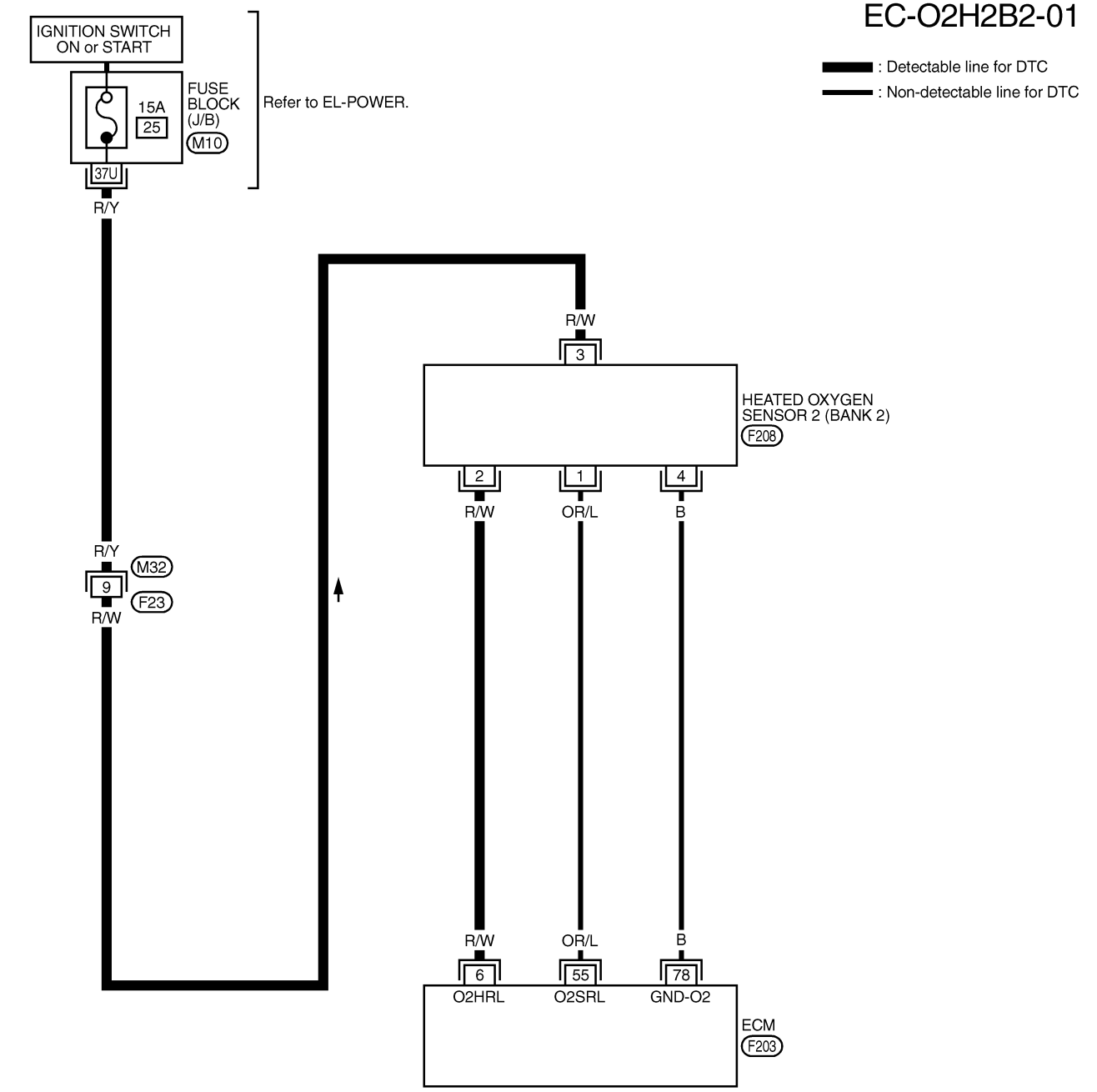
MEC080E

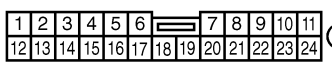
Wiring Diagram (Cont'd)

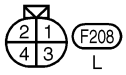
BANK 2

NAEC0838S02

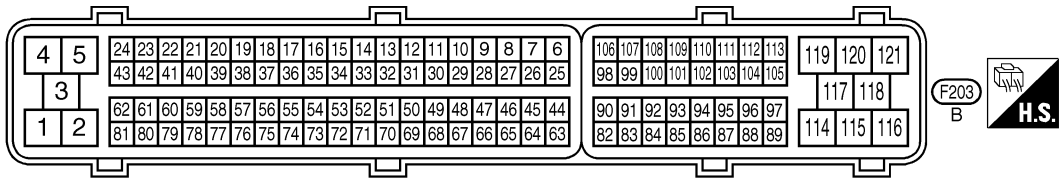
EC-O2H2B2-01







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



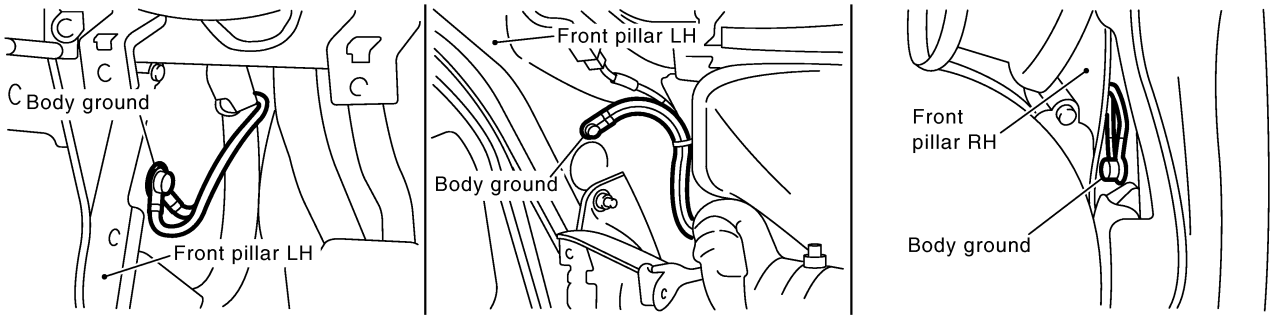
MEC081E

Diagnostic Procedure

NAEC0839

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



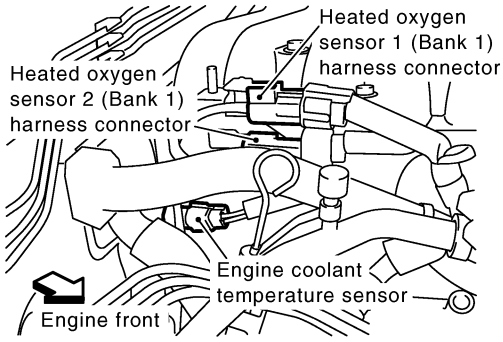
SEC997D

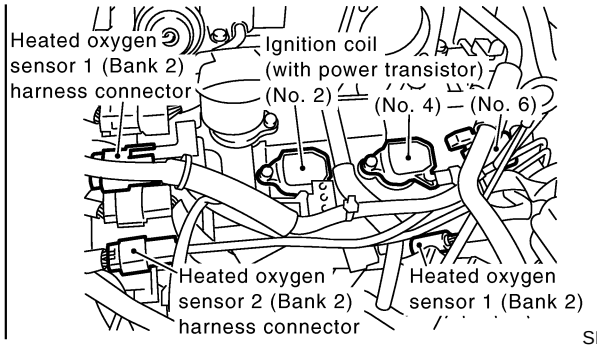
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK HO2S2 POWER SUPPLY CIRCUIT

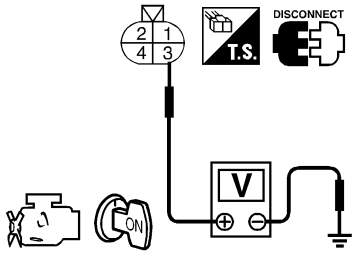
1. Disconnect heated oxygen sensor 2 harness connector.





SEC999D

2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 and ground.



Voltage: Battery voltage

SEF314X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 15A fuse ● Harness for open or short between heated oxygen sensor 2 and fuse	
▶	Repair harness or connectors.

4	CHECK HO2S2 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	25	2	Bank 1
P0057, P0058	6	2	Bank 2

MTBL1351

Continuity should exist.

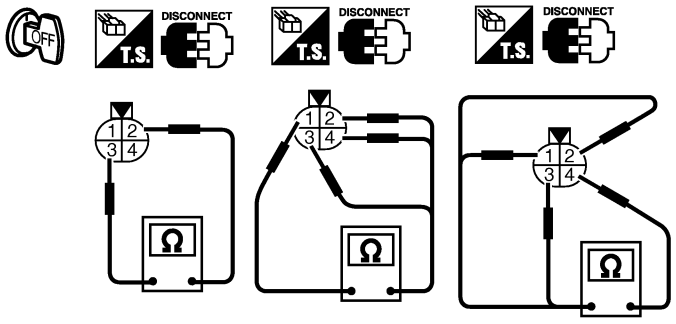
4. Also check harness for short to ground and short to power.

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

Check the resistance between HO2S2 terminals as follows.



Terminal No.	Resistance
2 and 3	Approximately 11Ω at 23°C (73°F)
1 and 2, 3, 4	∞ Ω
4 and 1, 2, 3	(Continuity should not exist.)

SEF315XF

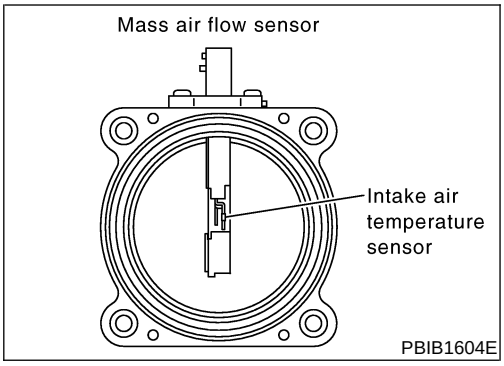
CAUTION:

- **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.**

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1385

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to 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-II Reference Value in Data Monitor Mode

NAEC1386

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● See “TROUBLE DIAGNOSIS — SPECIFICATION VALUE”, EC-151.		
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

ECM Terminals and Reference Value

NAEC1387

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	OR	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.1V
67	B/P	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	L/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	B/W B/W	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1388

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition		Possible Cause
P0101 0101	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
		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

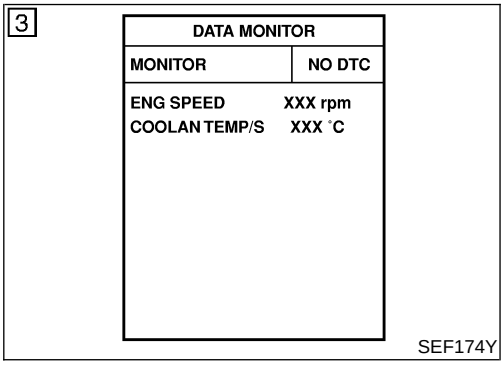
DTC Confirmation Procedure

NAEC1389

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

NAEC1389S01

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.

With CONSULT-II

NAEC1389S0101

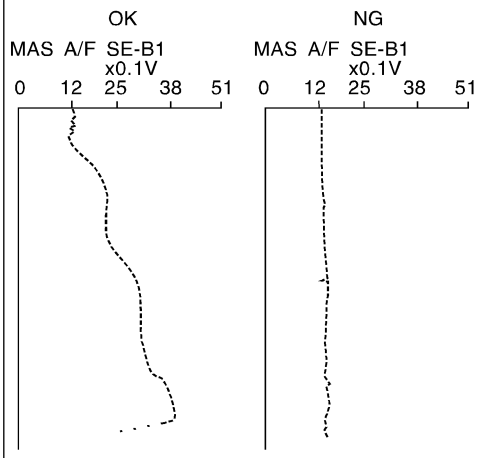
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and warm it up to normal operating temperature.
4) Run engine for at least 10 seconds at idle speed.
5) If DTC is detected, go to “Diagnostic Procedure”, EC-191.

With GST

NAEC1389S0102

Follow the procedure “With CONSULT-II” above.

6



SEF243Y

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL SEN 1	XXX V
THRTL SEN 2	XXX V

PBIB0199E

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

PROCEDURE FOR MALFUNCTION B

NAEC1389S02

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

NAEC1389S0201

1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-191.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-191.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

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

8) If DTC is detected, go to "Diagnostic Procedure", EC-191.

Overall Function Check

NAEC1390

PROCEDURE FOR MALFUNCTION B

NAEC1390S01

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a DTC might not be confirmed.

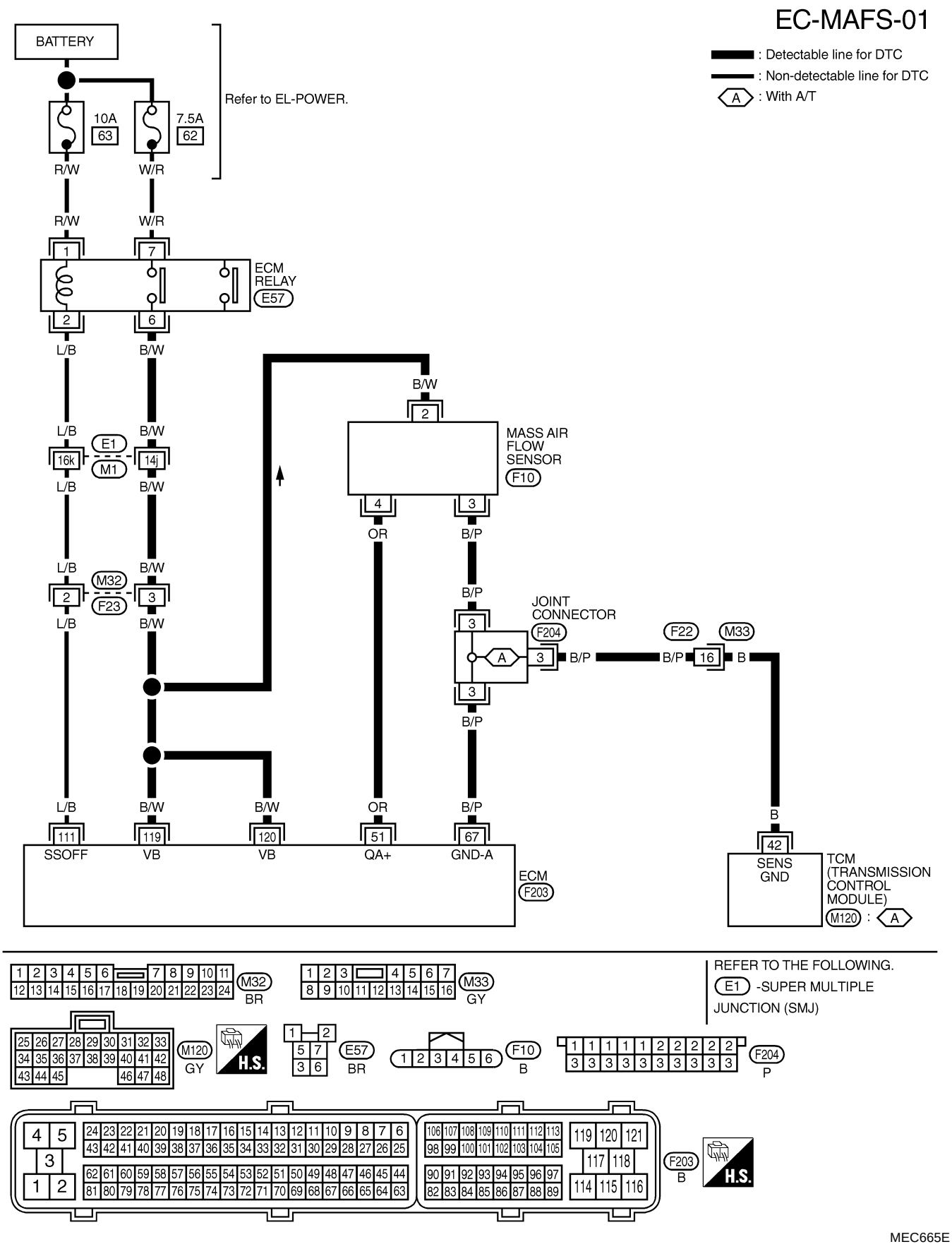
With GST

NAEC1390S0101

1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
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 "Diagnostic Procedure", EC-191.

Wiring Diagram

NAEC1391



MEC665E

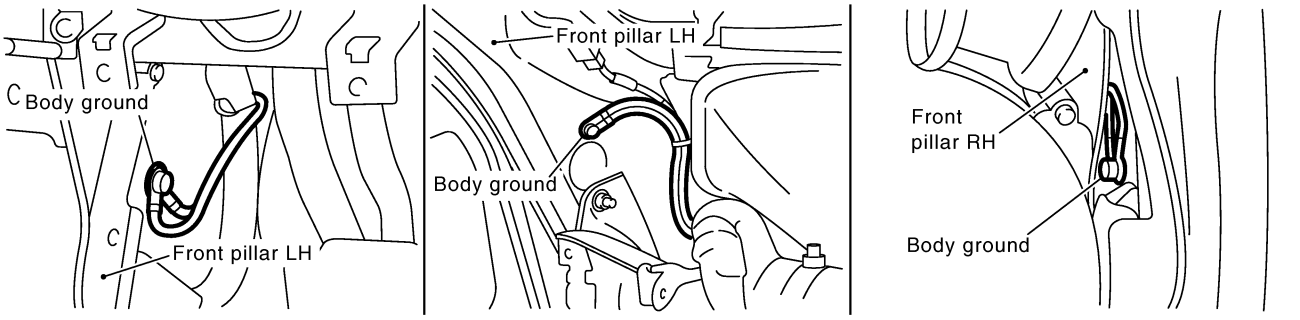
Diagnostic Procedure

NAEC1392

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 collector		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	CHECK GROUND CONNECTIONS	
1. Turn ignition switch OFF. 2. Loosen and retighten three ground screws on the body. Refer to “Ground Inspection”, EC-165.		

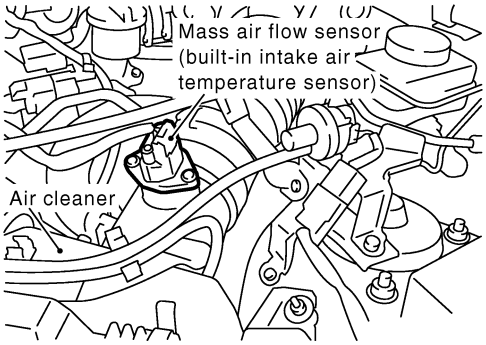


OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace ground connections.

Diagnostic Procedure (Cont'd)

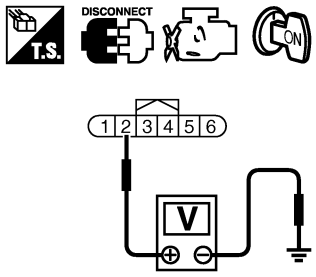
4	CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.



SEF960YA

2. Turn ignition switch ON.
3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.



PBIB1168E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E1, M1
- Harness connector M32, F23
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for short to ground and short to power.

OK or NG

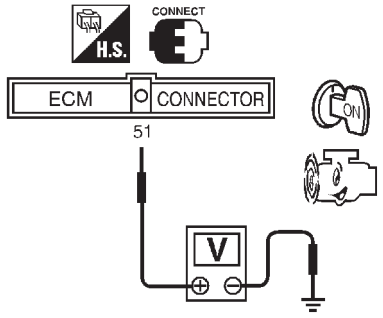
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F22, M33 ● Joint connector ● Harness for open or short between mass air flow sensor and ECM ● Harness for open or short between mass air flow sensor and TCM	
▶	Repair open circuit or short to gorund or short to power in harness or connectors.

8	CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



SEF100V

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.3 to Approx. 3.7

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

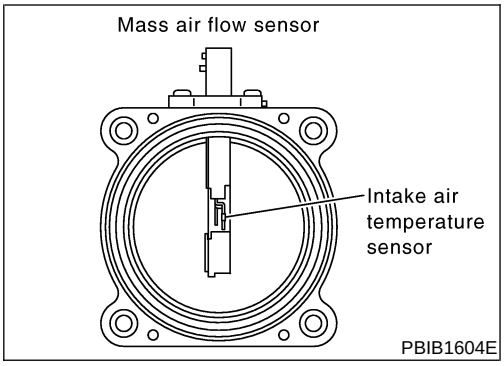
MTBL1806

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK ▶	GO TO 10.
NG ▶	Replace mass air flow sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1395

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to 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-II Reference Value in Data Monitor Mode

NAEC1396

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● See “TROUBLE DIAGNOSIS — SPECIFICATION VALUE”, EC-151.		
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

ECM Terminals and Reference Value

NAEC1397

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	OR	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.1V
67	B/P	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	L/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	B/W B/W	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

=NAEC1398

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	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

FAIL-SAFE MODE

NAEC1398S01

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

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

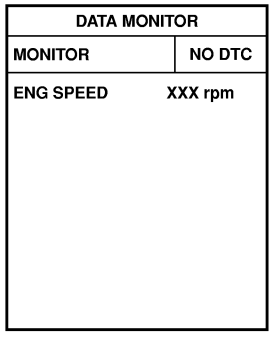
DTC Confirmation Procedure

NAEC1399

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.

2



SEF058Y

PROCEDURE FOR DTC P0103

NAEC1399S01

With CONSULT-II

NAEC1399S0101

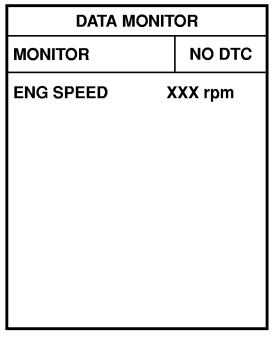
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-197.

With GST

NAEC1399S0102

Follow the procedure “With CONSULT-II” above.

3



SEF058Y

PROCEDURE FOR DTC P0102

NAEC1399S02

With CONSULT-II

NAEC1399S0201

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-197.

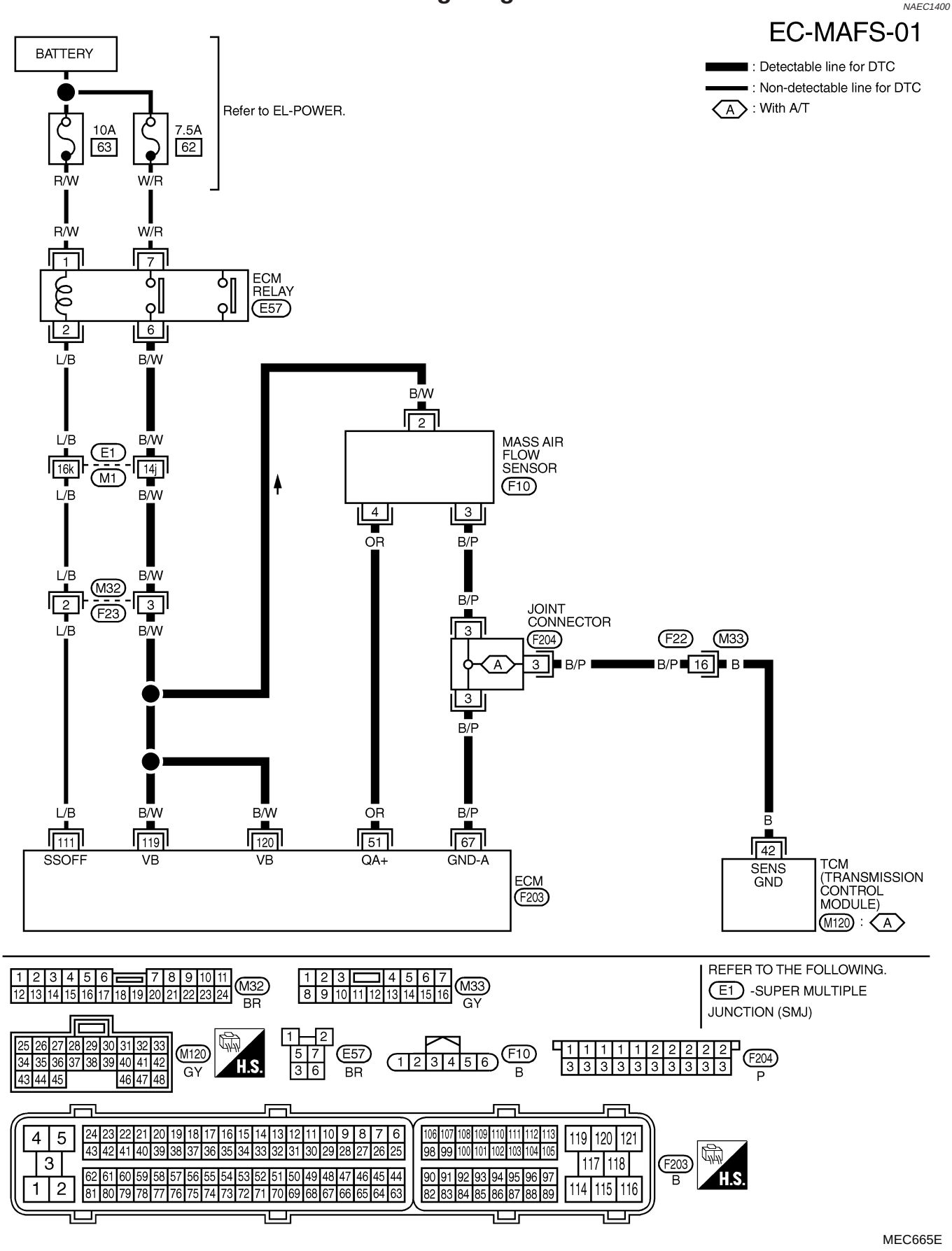
With GST

NAEC1399S0202

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NAEC1400



MEC665E

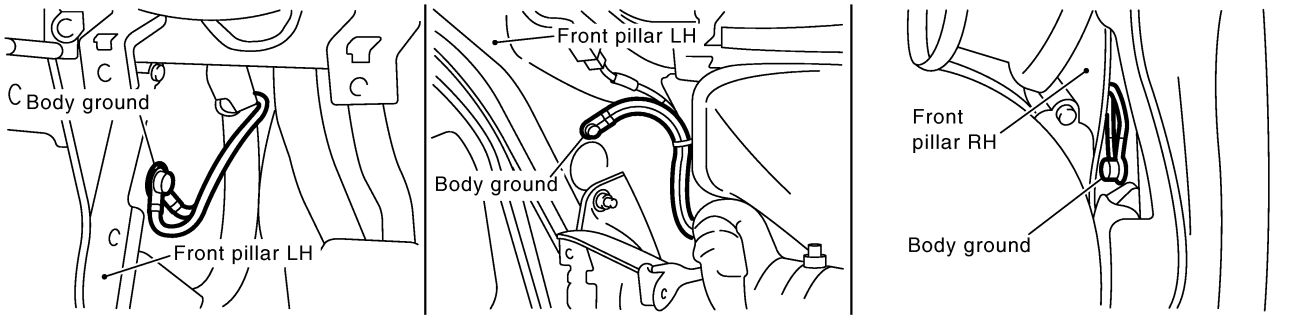
Diagnostic Procedure

NAEC1401

1	INSPECTION START	
Which malfunction (P0102 or P0103) is duplicated?		
P0102 or P0103		
P0103	▶	GO TO 3.
P0102	▶	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 collector		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	CHECK GROUND CONNECTIONS	
1. Turn ignition switch OFF. 2. Loosen and retighten three ground screws on the body. Refer to “Ground Inspection”, EC-165.		

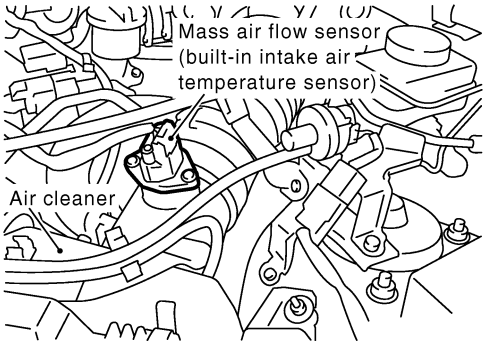


OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace ground connections.

Diagnostic Procedure (Cont'd)

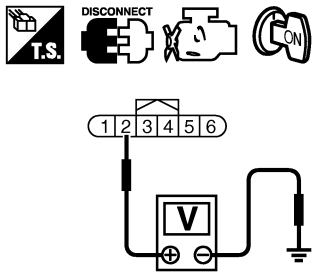
4	CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.



SEF960YA

2. Turn ignition switch ON.
3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.



PBIB1168E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E1, M1
- Harness connector M32, F23
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector
4. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for short to ground and short to power.

OK or NG

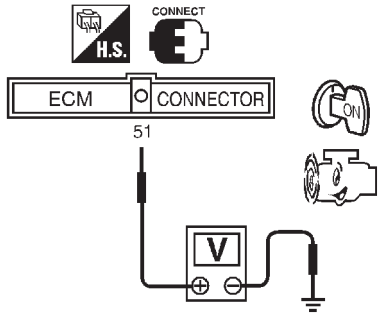
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connector F22, M33 ● Joint connector ● Harness for open or short between mass air flow sensor and ECM ● Harness for open or short between mass air flow sensor and TCM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



SEF100V

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.3 to Approx. 3.7

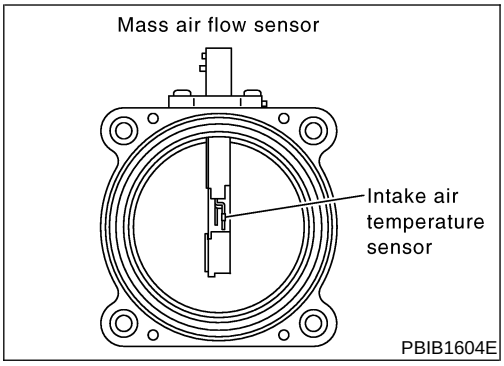
*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

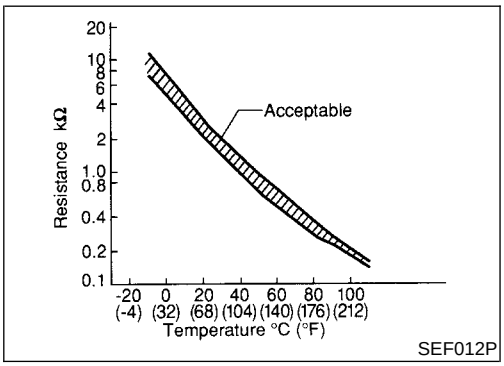
MTBL1806

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC1404

The intake air temperature sensor is mounted to the air duct housing. 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)	3.32	1.9 - 2.1

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC1405

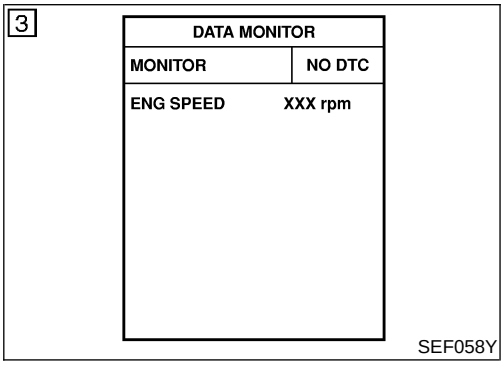
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake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

DTC Confirmation Procedure

NAEC1406

NOTE:

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



WITH CONSULT-II

NAEC1406S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-202.

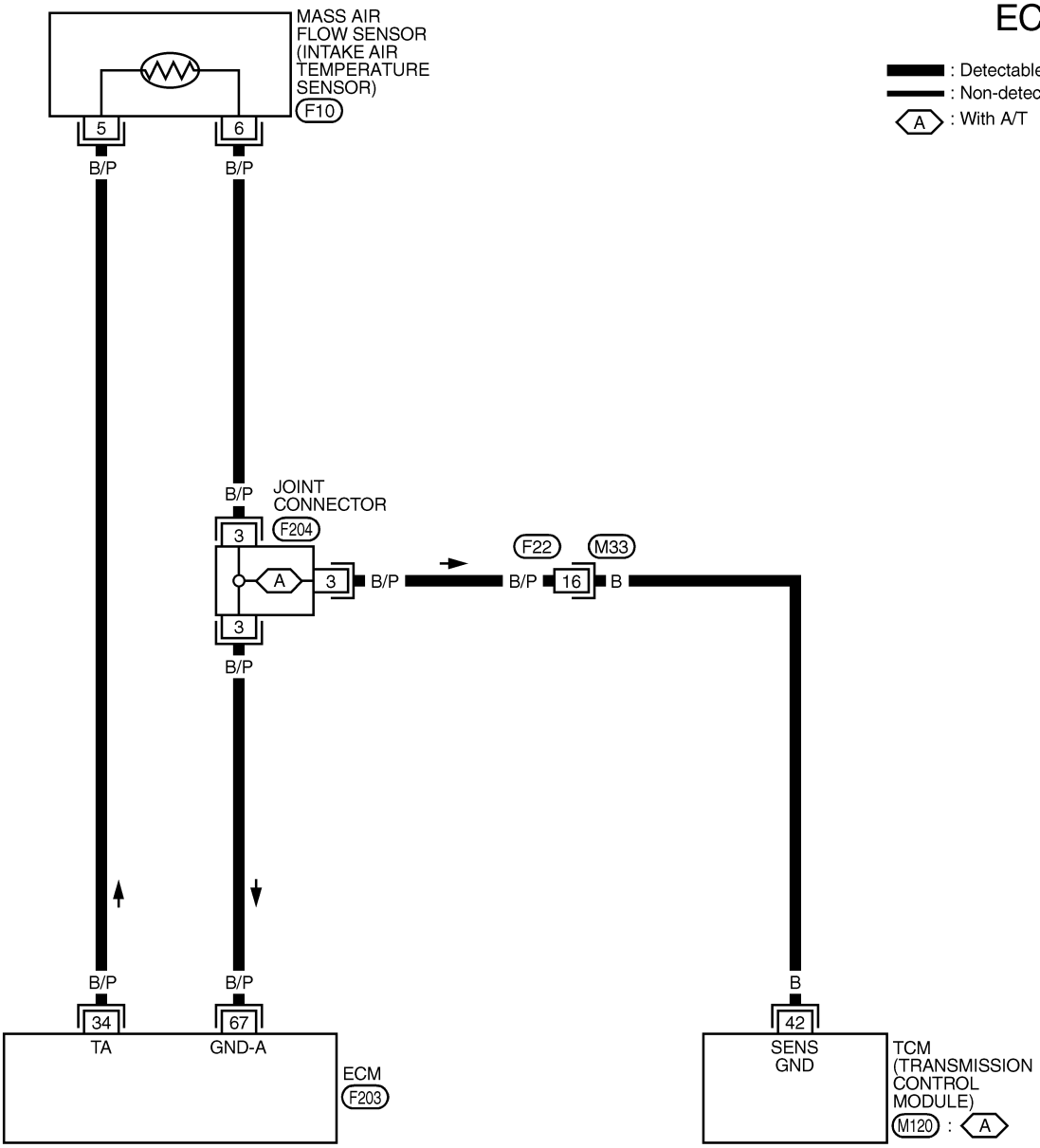
WITH GST

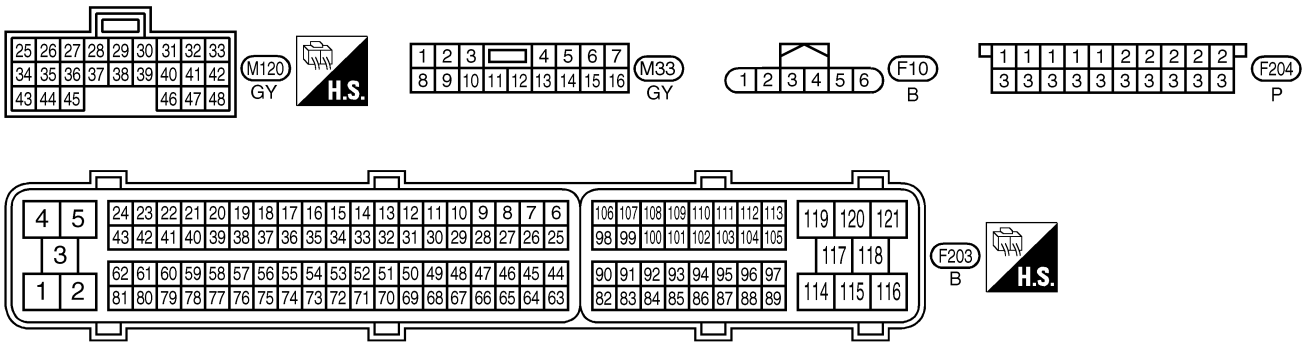
NAEC1406S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC1407





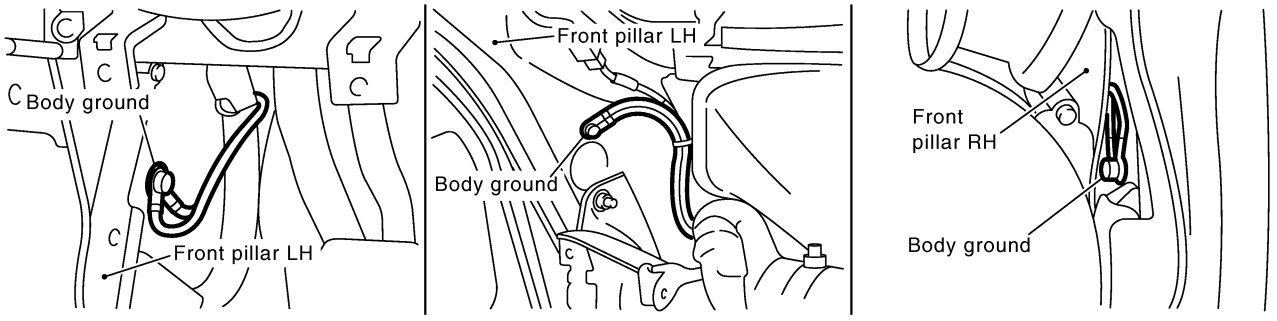
MEC666E

Diagnostic Procedure

NAEC1408

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



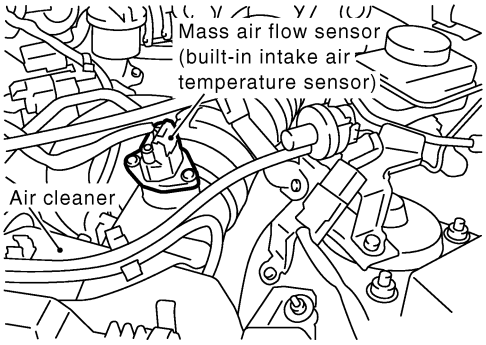
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

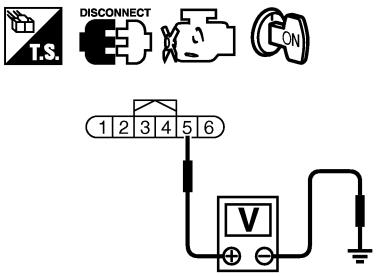
2	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (built-in intake air temperature sensor) harness connector.



SEF960YA

2. Turn ignition switch ON.
3. Check voltage between terminal 5 and ground.



PBIB1169E

Voltage: Approximately 5V

OK or NG

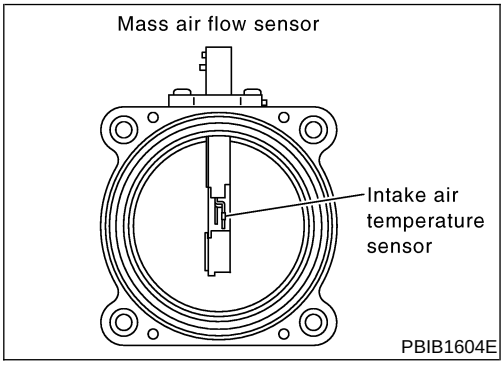
OK	▶	GO TO 3.
NG	▶	Repair harness or connectors.

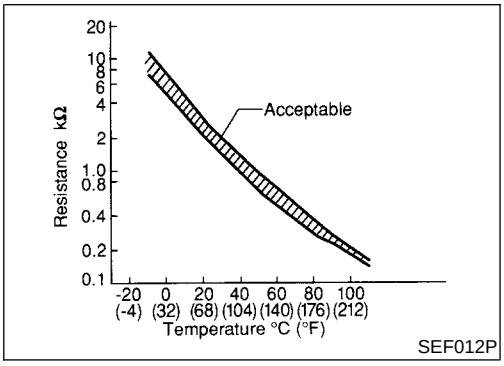
3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Disconnect TCM harness connector. 4. Check harness continuity between MAF sensor terminal 6 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram. **Continuity 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 F22, M33 ● Joint connector ● Harness for open or short between mass air flow sensor and ECM ● Harness for open or short between mass air flow sensor and TCM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR	
Refer to EC-203, "Component Inspection".		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace mass air flow sensor (with intake air temperature sensor).

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**





Component Inspection

INTAKE AIR TEMPERATURE SENSOR

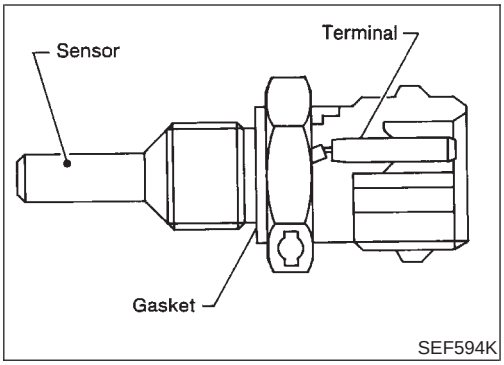
NAEC1409

NAEC1409S01

1. Check resistance between intake air temperature sensor terminals 1 and 3 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

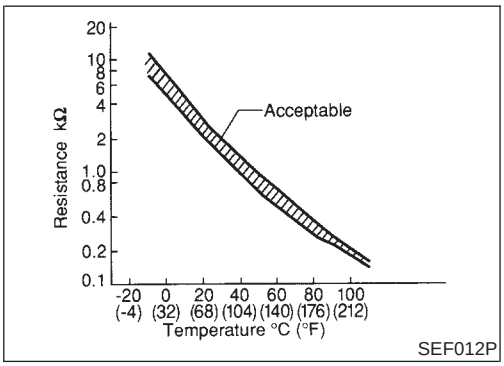
2. If NG, replace mass air flow sensor (with intake air temperature sensor).



Component Description

NAEC0857

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
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0858

These self-diagnoses have the one trip detection logic.

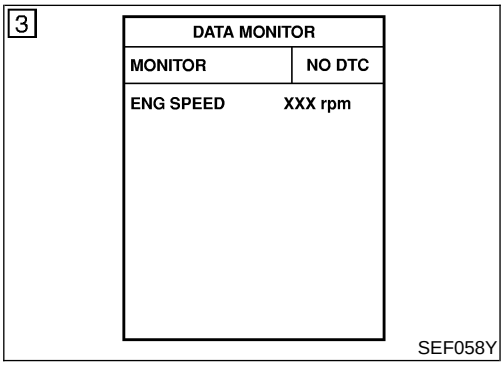
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

NAEC0858S01

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature is activated, the cooling fan operates while engine is running.	



DTC Confirmation Procedure

NAEC0859

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

WITH CONSULT-II

NAEC0859S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-207.

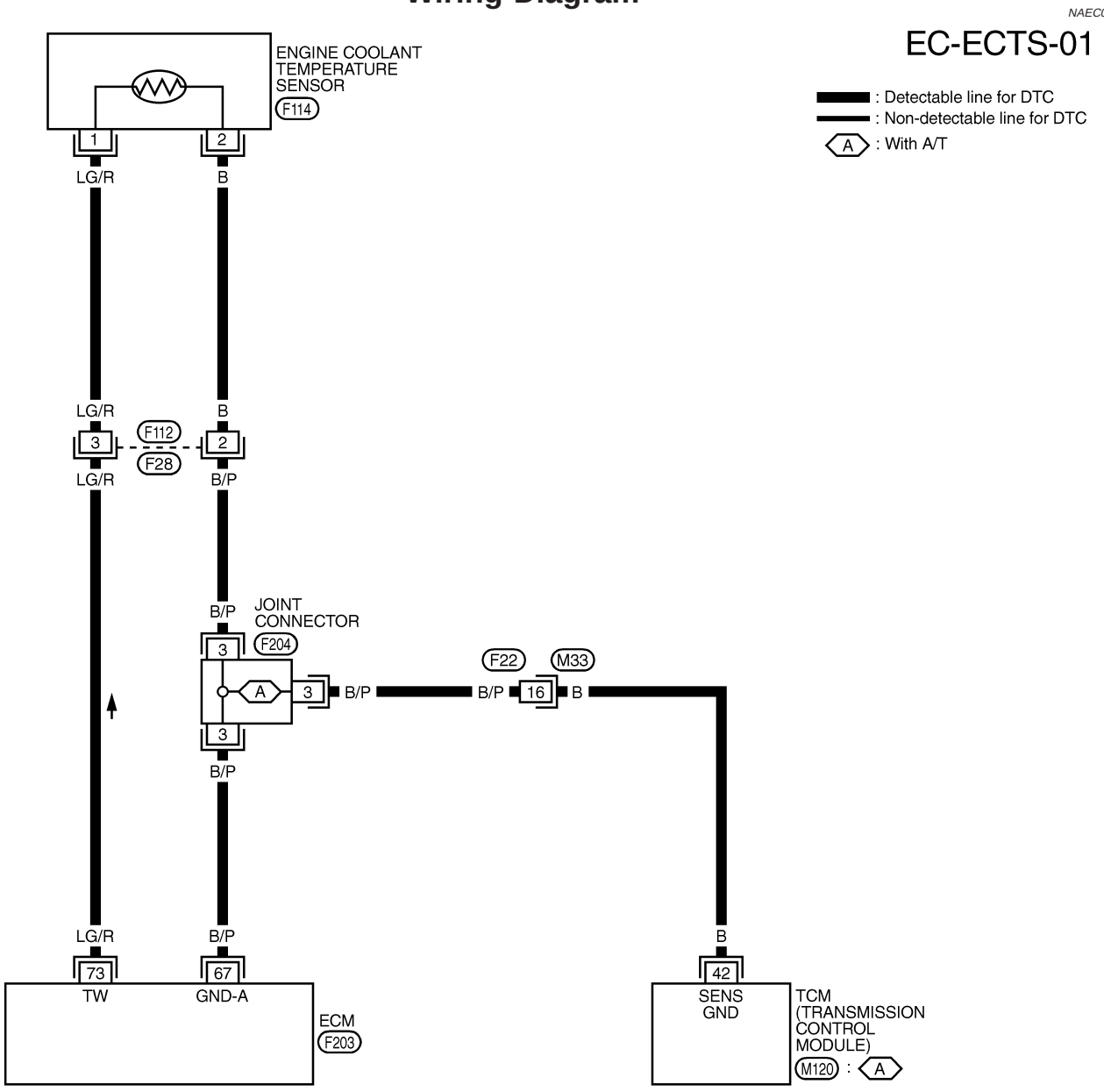
WITH GST

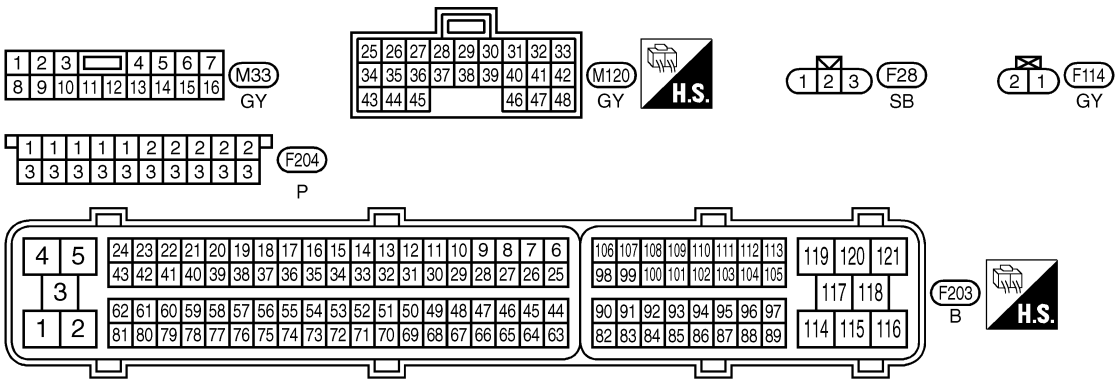
NAEC0859S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NAEC0860





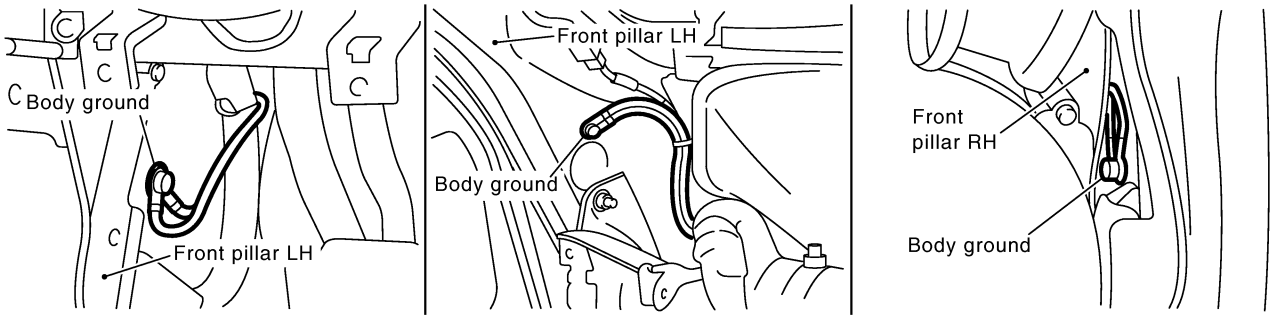
MEC084E

Diagnostic Procedure

NAEC0861

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



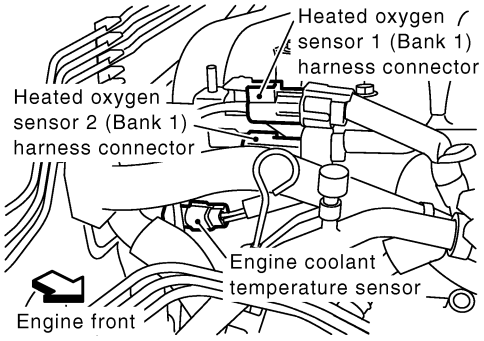
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

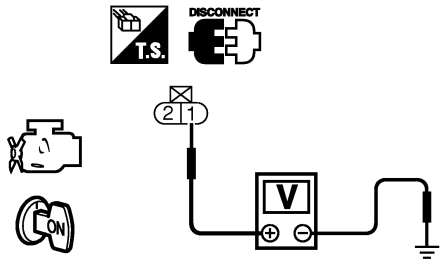
2	CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor connector.



SEC426D

2. Turn ignition switch ON.
3. Check voltage between ECT sensor connector terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEC106D

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

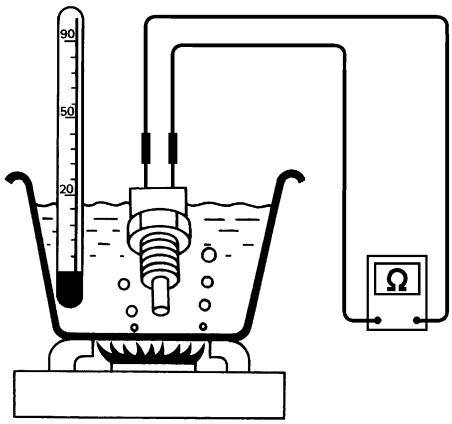
Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F112, F28 ● Harness for open or short between ECM and engine coolant temperature sensor	
▶	Repair harness or connectors.

4	CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND CIRCUIT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Disconnect TCM harness connector. 4. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67, TCM terminal 42. 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 6.
NG ▶	GO TO 5.

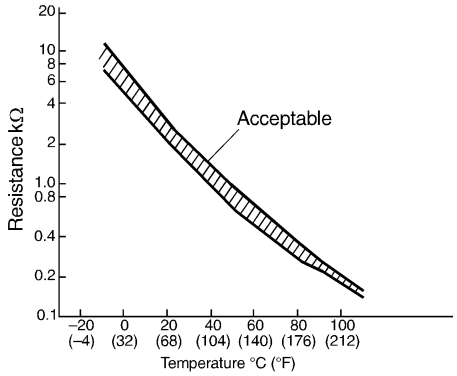
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F112, F28 ● Joint connector F204 ● Harness for open between ECM and engine coolant temperature sensor ● Harness for open between TCM and engine coolant temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK ENGINE COOLANT TEMPERATURE SENSOR
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

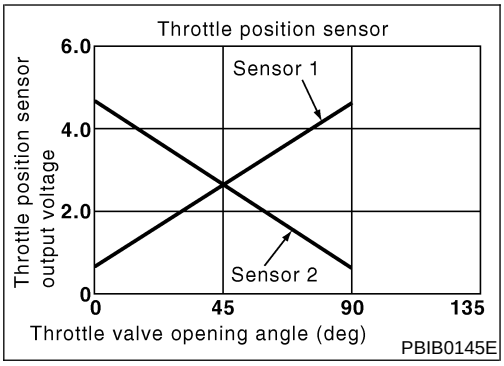


SEF304X

OK or NG

OK ▶	GO TO 7.
NG ▶	Replace engine coolant temperature sensor.

7	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

=NAEC1194

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

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC1195

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T model) 1st (M/T model)	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.

ECM Terminals and Reference Value

NAEC1201

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
50	BR	Throttle position sensor 1	**[Ignition switch ON]** • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully released	More than 0.36V
			[Ignition switch ON] • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully depressed	Less than 4.75V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66	BR/Y	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	BR/W	Throttle position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch ON] ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V

On Board Diagnosis Logic

NAEC1196

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) ● Accelerator pedal position sensor
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

NAEC1196S01

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

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NAEC1197

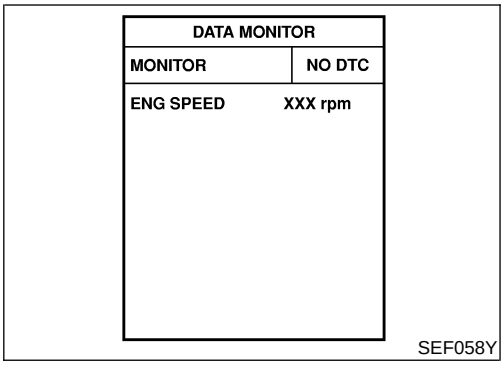
NOTE:

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.

DTC Confirmation Procedure (Cont'd)



With CONSULT-II

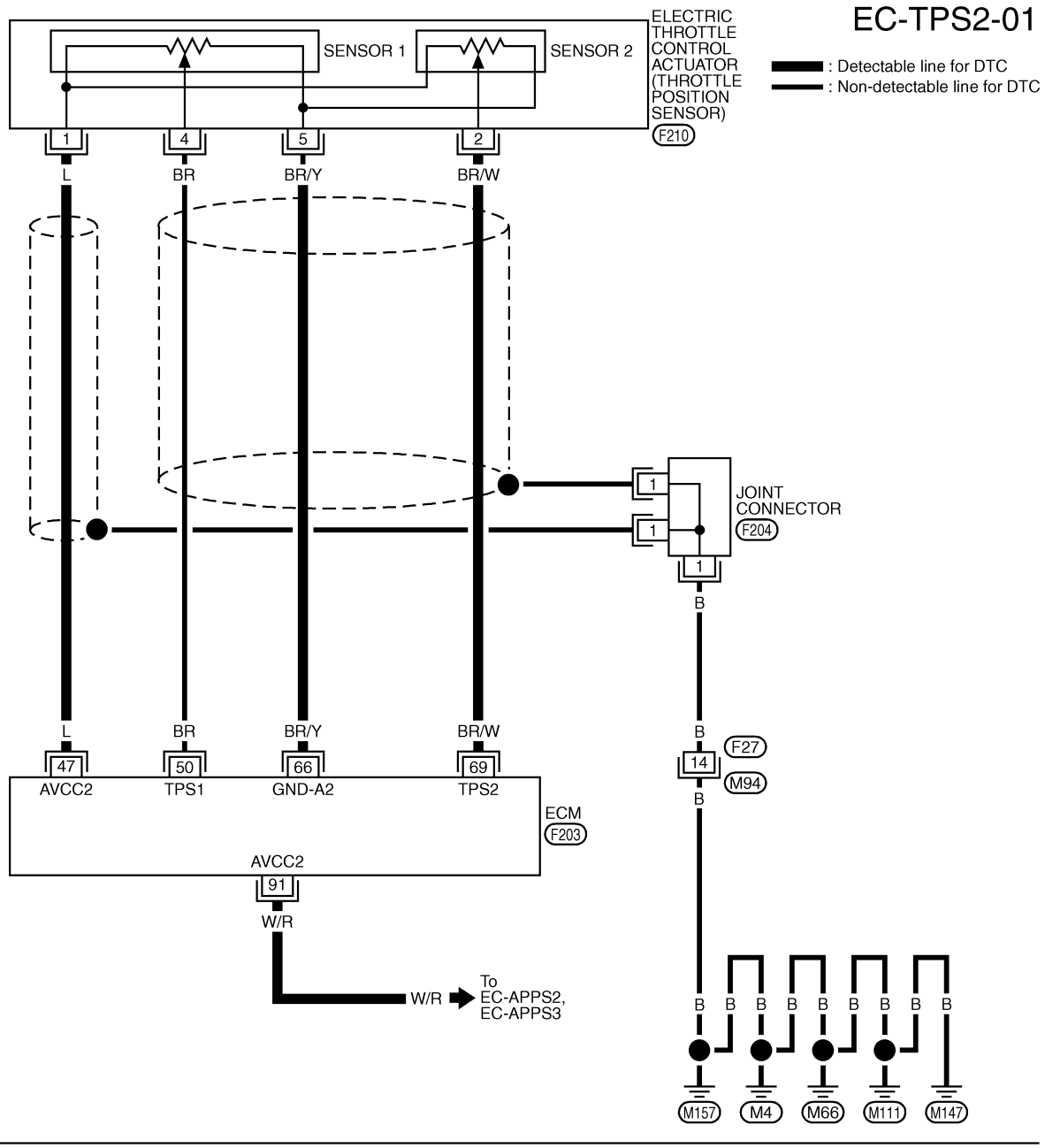
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for 1 second.
4) If DTC is detected, go to "Diagnostic Procedure", EC-214.

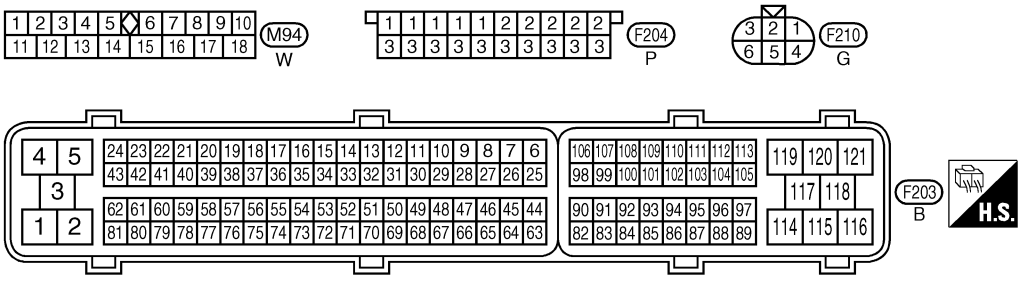
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC1198





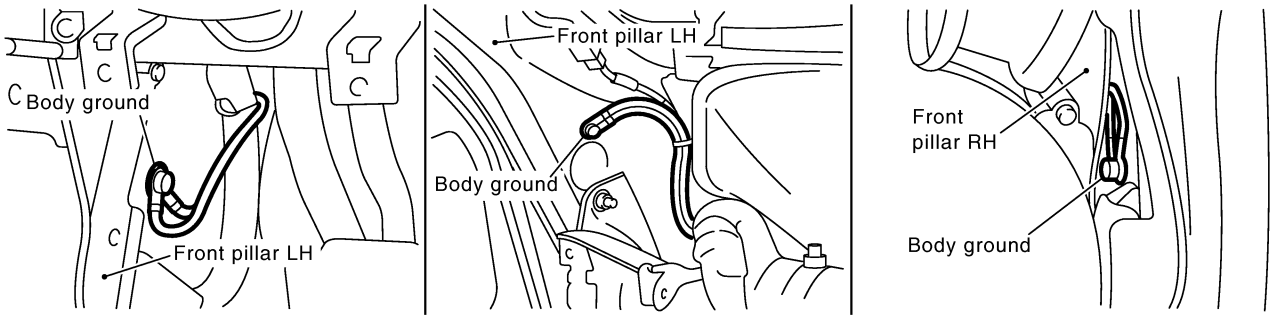
MEC744E

Diagnostic Procedure

NAEC1199

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



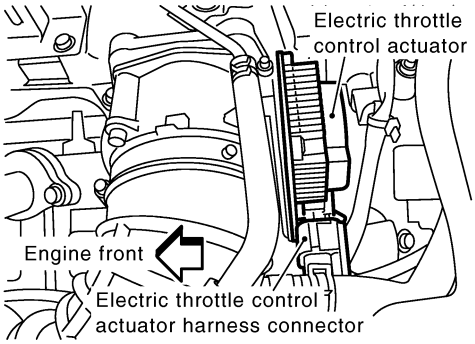
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

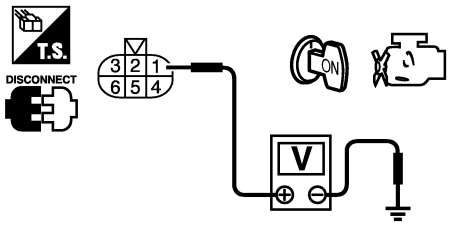
2	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



SEC433D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace open circuit.

4	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.
- ECM terminal 47 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-693.
- ECM terminal 91 and APP sensor terminal 10. Refer to "Wiring Diagram", EC-685.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair short to ground or short to power in harness or connectors.

5	CHECK APP SENSOR

Refer to "Component Inspection", EC-689.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.
3. Perform "Throttle Valve Closed Position Learning", EC-73.
4. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

7	CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

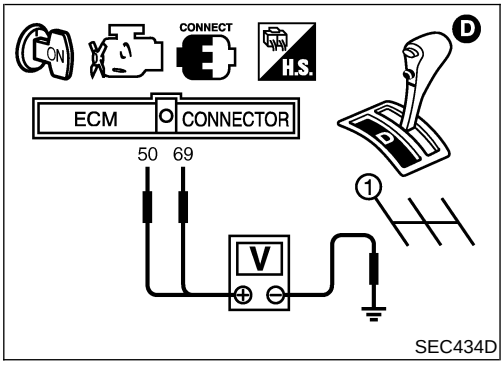
Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 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	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR	
Refer to "Component Inspection", EC-216. **OK or NG**		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-73. 3. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



Component Inspection

NAEC1200

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1), 69 (TP sensor 2) and ground under the following conditions.

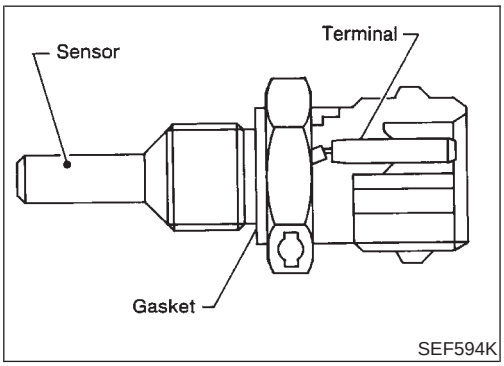
Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-73.
8. Perform "Idle Air Volume Learning", EC-73.

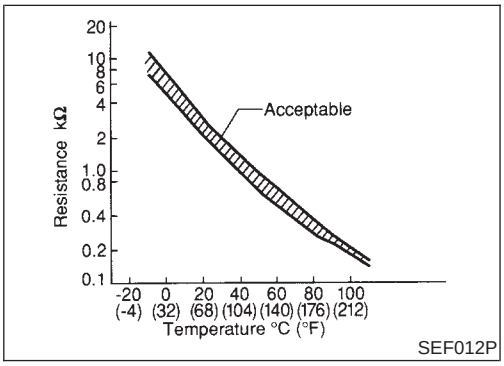
Description

NAEC0869

NOTE:
If DTC P0125 is displayed with P0117, P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-204.



SEF594K



SEF012P

COMPONENT DESCRIPTION

NAEC0869S01

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
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

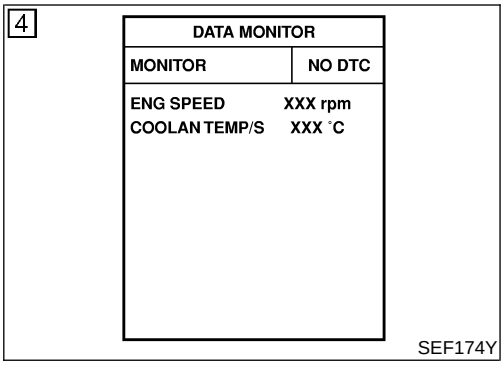
*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.

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

On Board Diagnosis Logic

NAEC0870

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

NAEC0871

CAUTION:

Be careful not to overheat engine.

NOTE:

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

WITH CONSULT-II

NAEC0871S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) 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.
4) Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-218.

WITH GST

NAEC0871S02

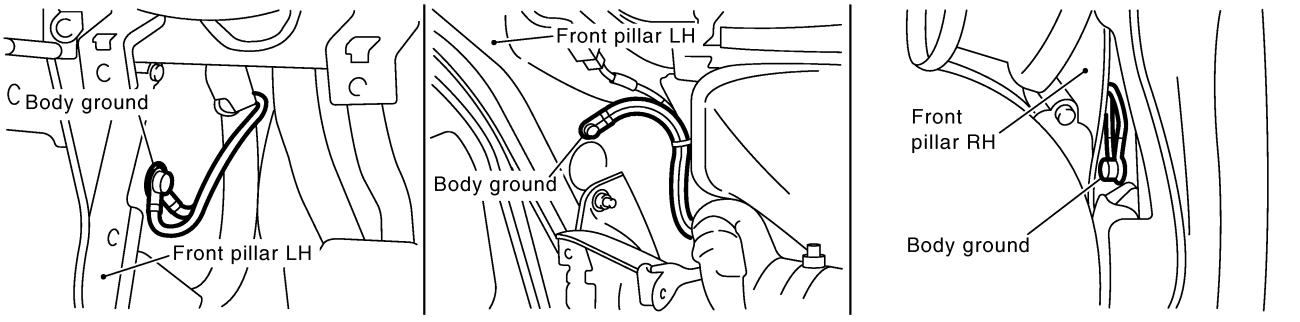
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

NAEC0872

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.

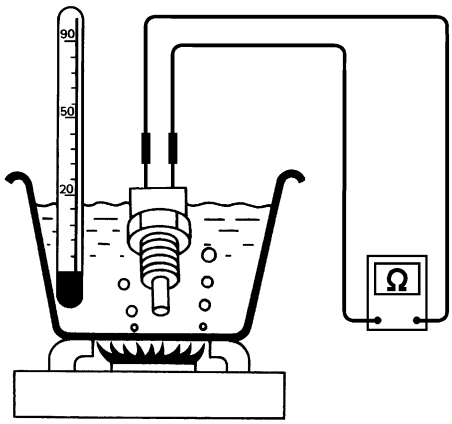


OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

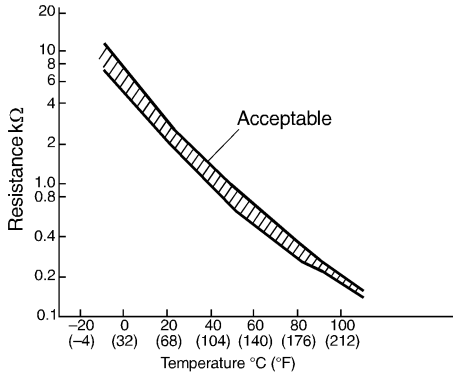
2	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor connector 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



SEF304X

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace engine coolant temperature sensor.

3	CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

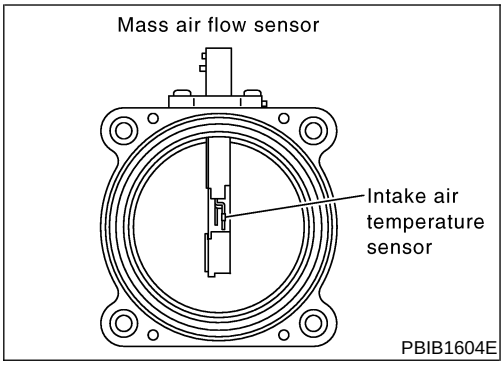
OK or NG

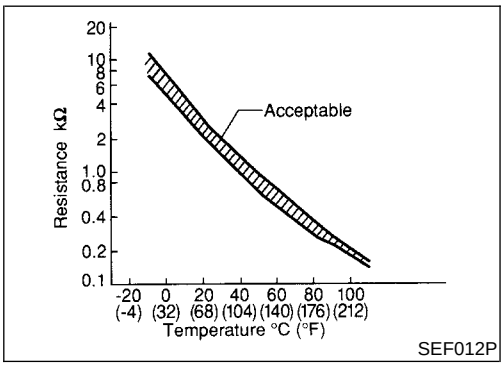
OK	▶	GO TO 4.
NG	▶	Repair or replace thermostat. Refer to LC-19, "Thermostat".

4	CHECK INTERMITTENT INCIDENT

- Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.
- Refer to wiring diagram, EC-206.

	▶	**INSPECTION END**





Component Description

NAEC0767

The intake air temperature sensor is mounted to the air duct housing. 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)	3.32	1.9 - 2.1

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0768

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

NAEC0770

NOTE:

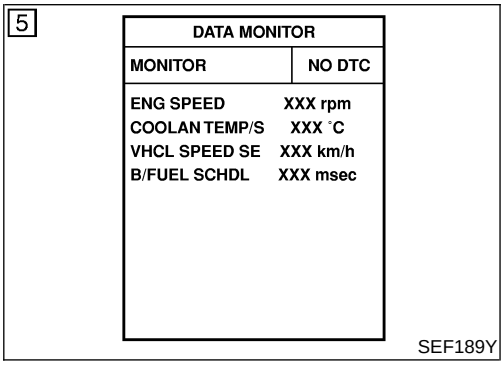
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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



WITH CONSULT-II

NAEC0770S03

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-II.

c) Check the engine coolant temperature.

d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

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

2) Turn ignition switch ON.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine.
5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-221.

WITH GST

NAEC0770S04

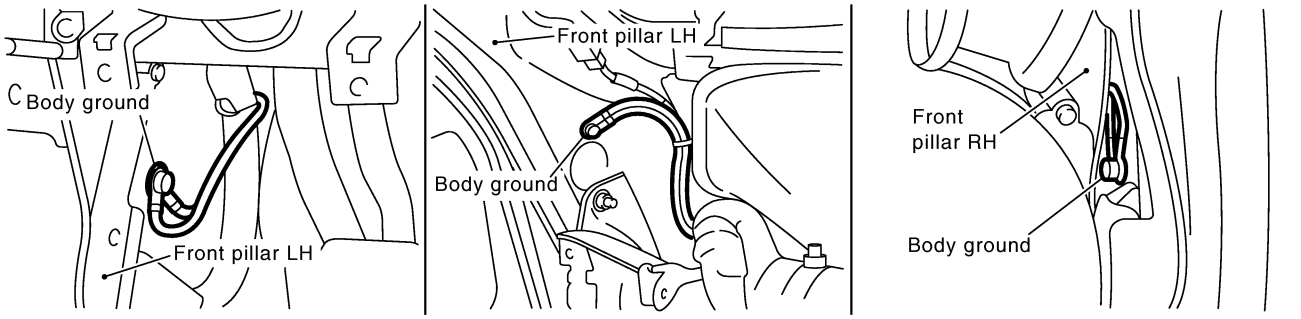
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC0772

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to "Ground Inspection", EC-165.



OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-203.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace mass air flow sensor (with intake air temperature sensor).

3	CHECK INTERMITTENT INCIDENT

- Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.
- Refer to wiring diagram, EC-201.

	▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC1202

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 open stuck.

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

NAEC1203

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

TESTING CONDITION:

- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 65°C (149°F).**

WITH CONSULT-II

NAEC1203S01

1) Replace thermostat with new one. Refer to LC-19, “Thermostat”. Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2) Turn ignition switch ON.
3) Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4) Check that the “COOLAN TEMP/S” is above 60°C (140°F).
   If it is below 65°C (149°F), go to following step.
   If it is above 65°C (149°F), cool down the engine to less than 65°C (149°F), then retry from step 1.
5) Drive vehicle for 10 consecutive minutes under the following conditions.

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

   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-223.

WITH GST

NAEC1203S02

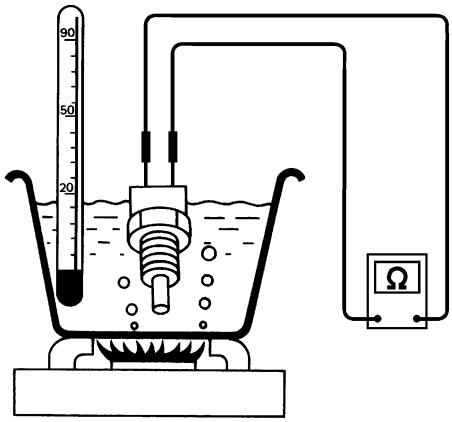
1) Follow the prodedure “WITH CONSULT-II” above.

Diagnostic Procedure

NAEC1204

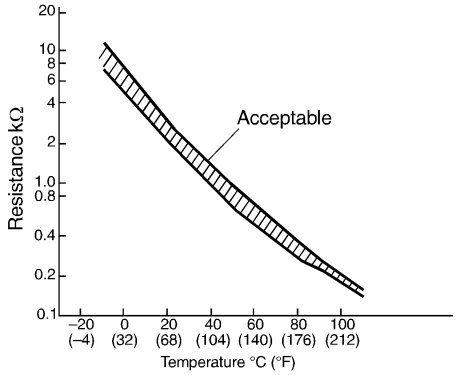
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



<Reference data>

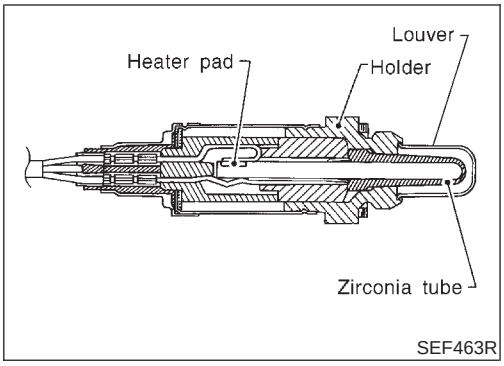
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

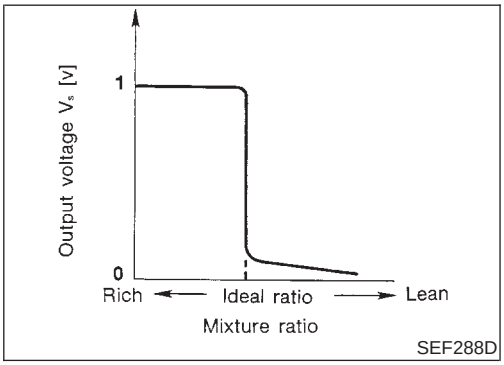
OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.



Component Description

NAEC0873

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NAEC0874

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

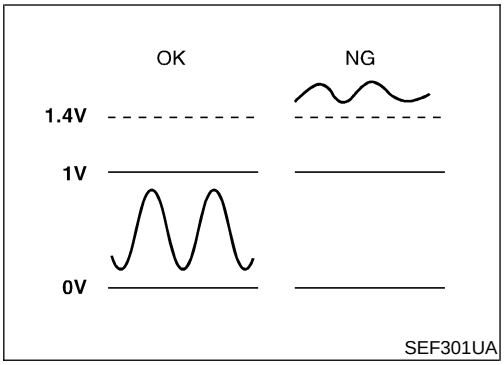
NAEC0875

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

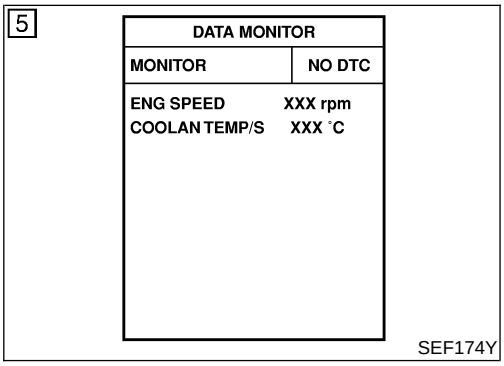


On Board Diagnosis Logic

NAEC0876

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0132 0132 (Bank 1)	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1
P0152 0152 (Bank 2)			



DTC Confirmation Procedure

NAEC0877

NOTE:

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

WITH CONSULT-II

NAEC0877S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Restart engine and let it idle for 2 minutes.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-228.

WITH GST

NAEC0877S02

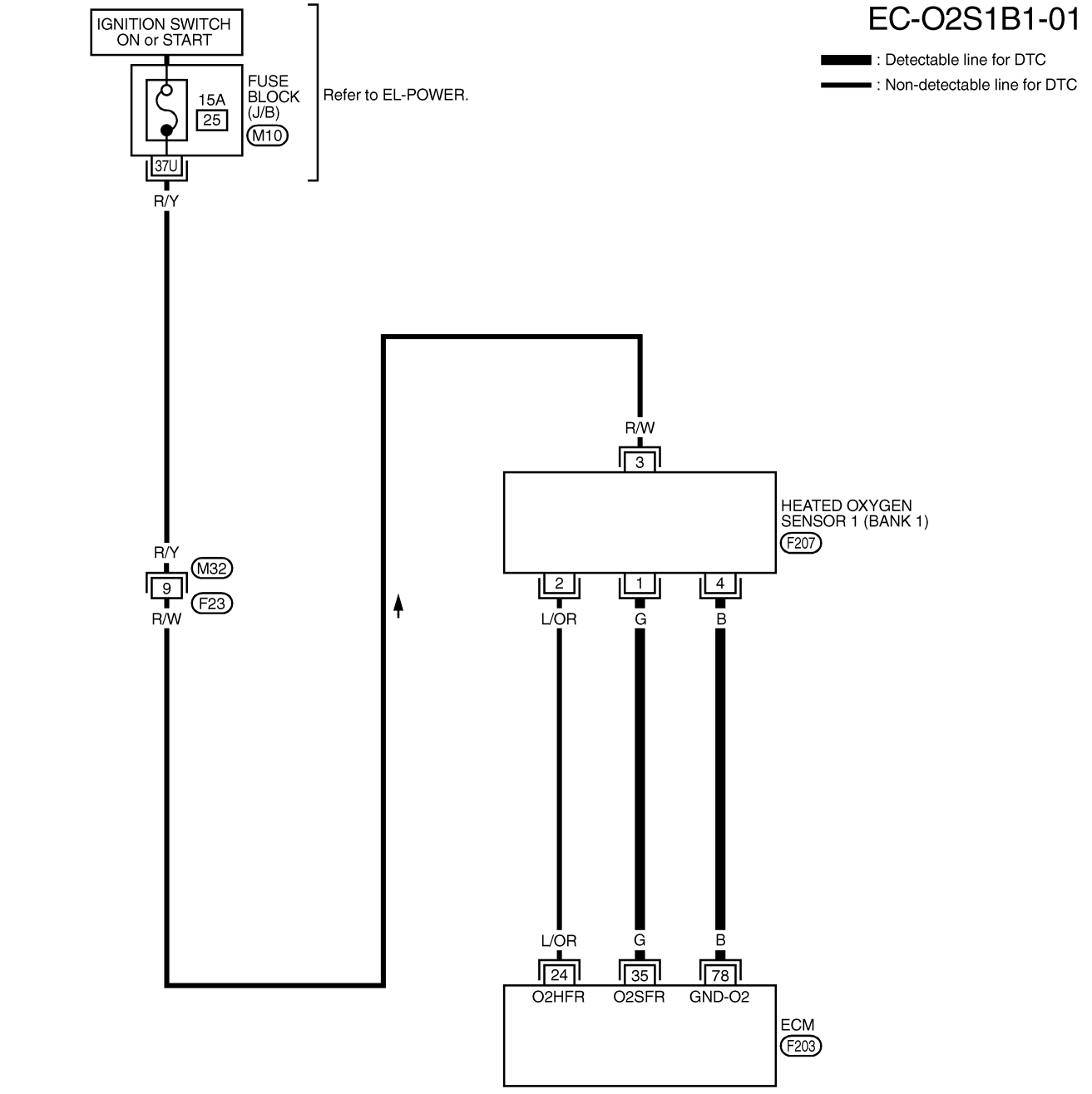
Follow the procedure “With CONSULST-II” above.

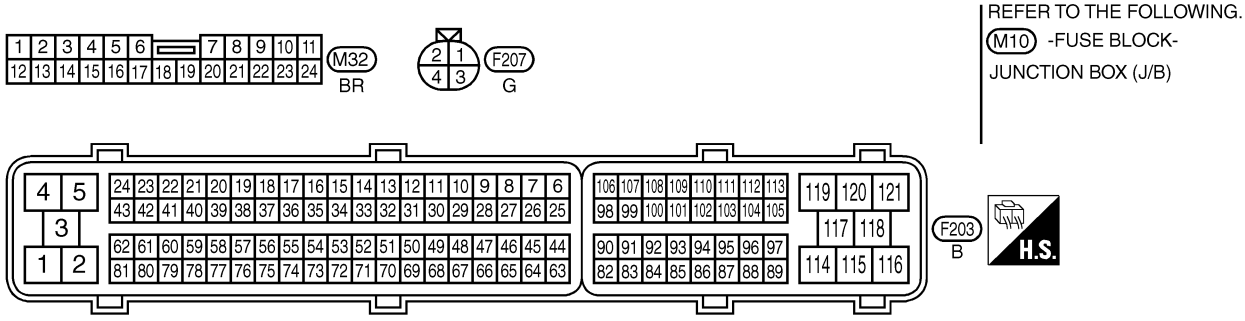
Wiring Diagram

NAEC0878

BANK 1

NAEC0878S01

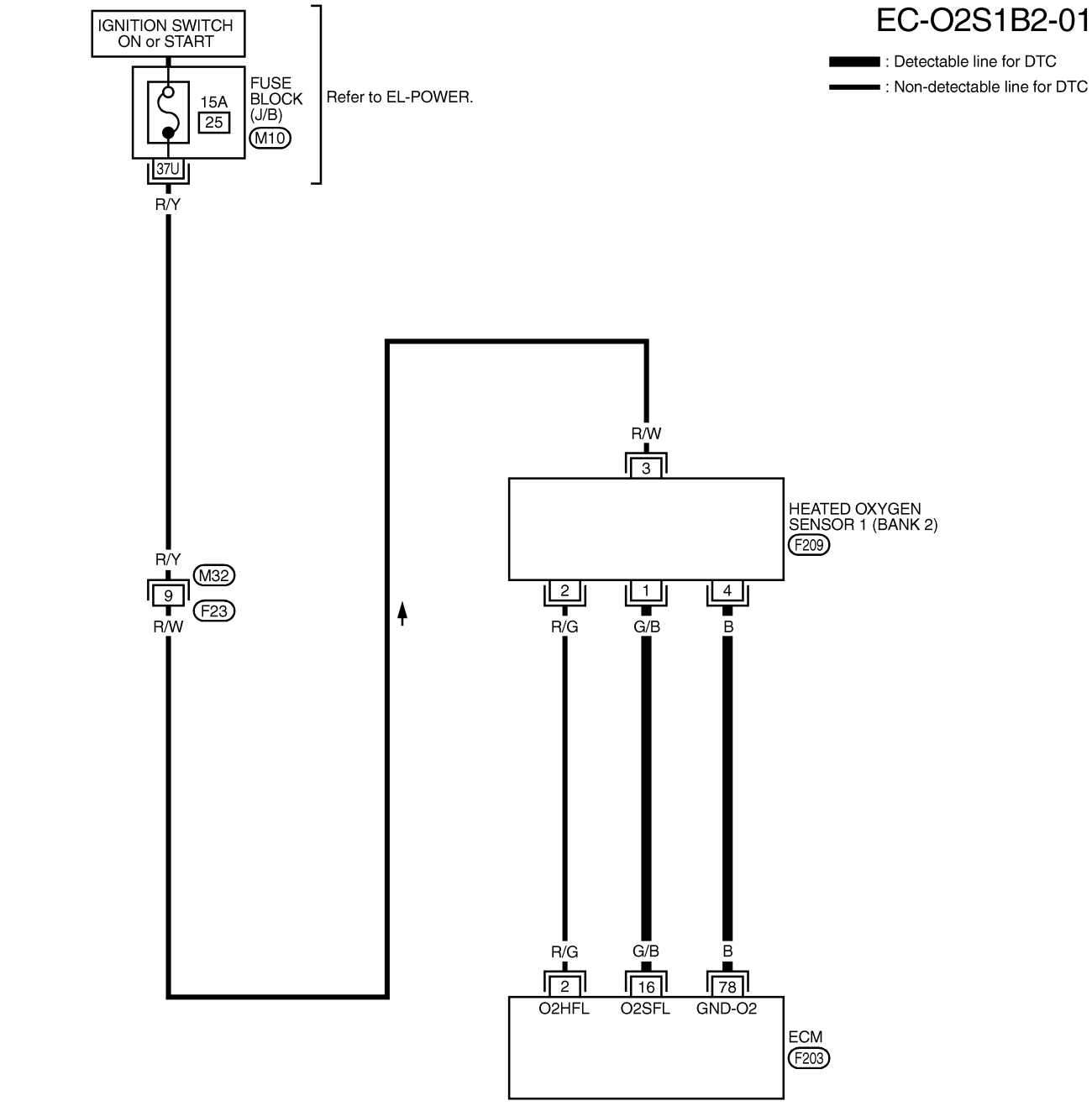


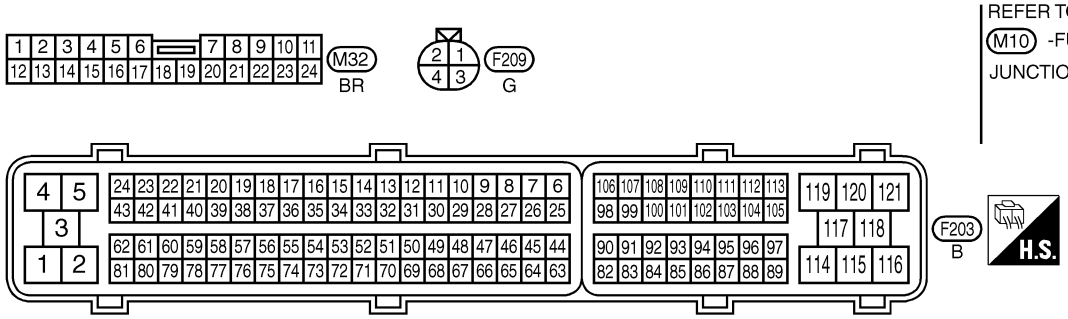


MEC087E

BANK 2

NAEC0878S02





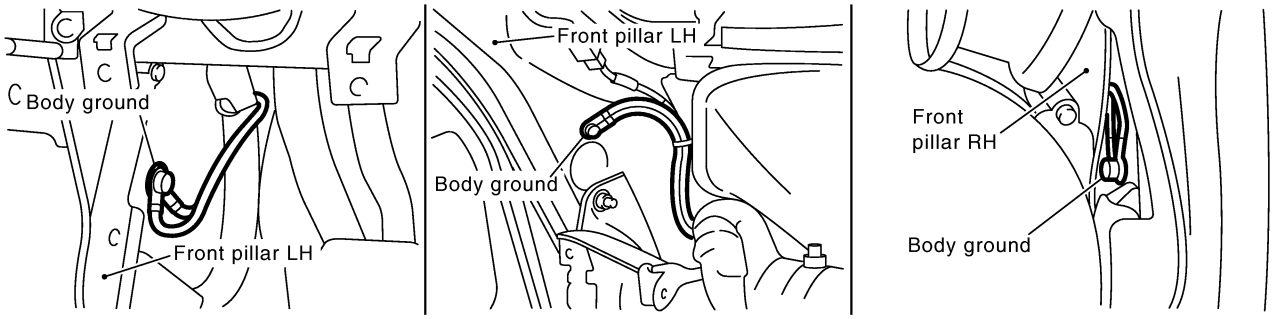
MEC088E

Diagnostic Procedure

NAEC0879

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



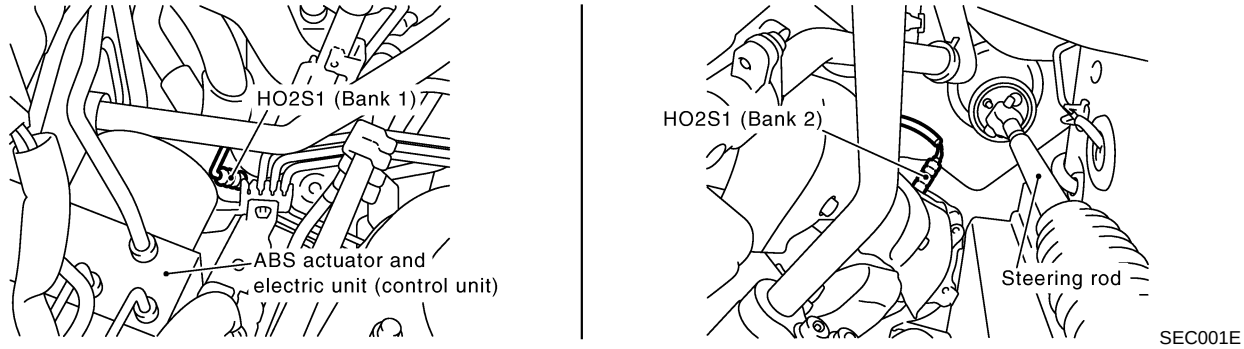
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.



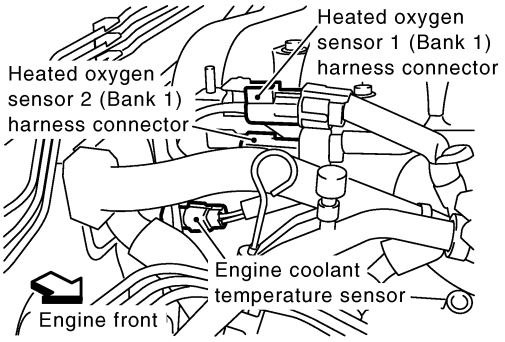
SEC001E

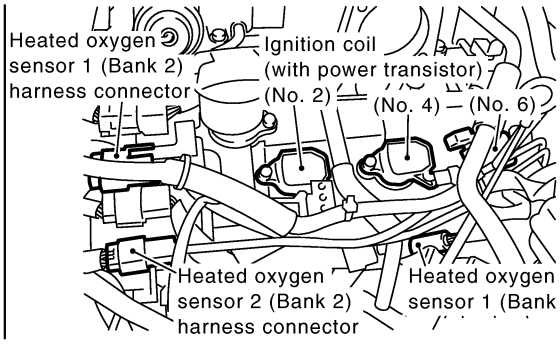
Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.





SEC999D

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	1	Bank 1
P0152	16	1	Bank 2

MTBL1354

   Continuity should exist.
2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	1	Bank 1
P0152	16	1	Bank 2

MTBL1354

   Continuity should not exist.
3. 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.

Diagnostic Procedure (Cont'd)

5	CHECK HO2S1 CONNECTOR FOR WATER	
1. Disconnect heated oxygen sensor 1 harness connector. 2. Check connectors for water. **Water should not exist.** **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

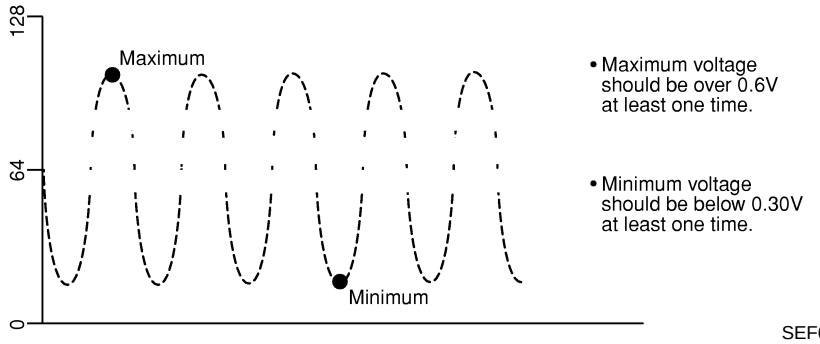
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

OK or NG

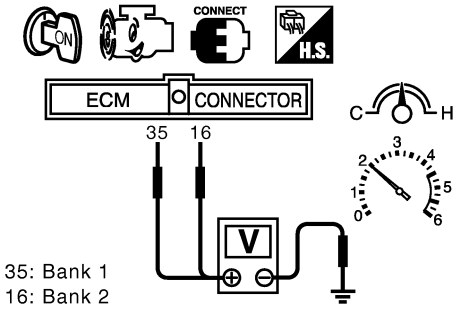
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

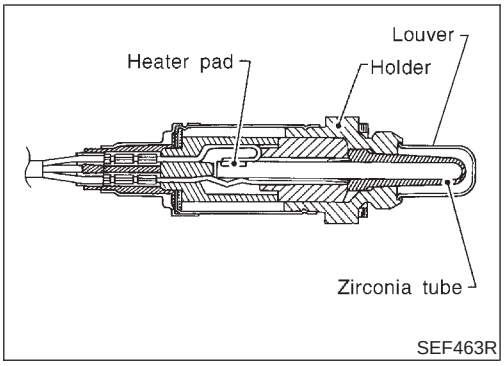
CAUTION:

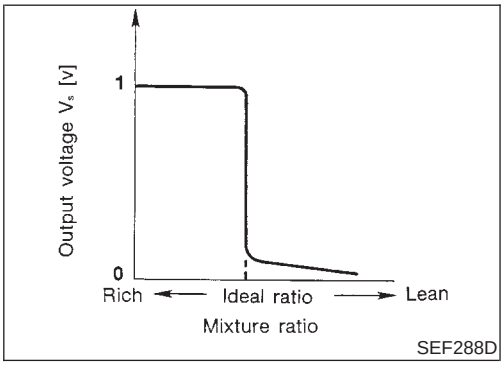
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC0880

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0881

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

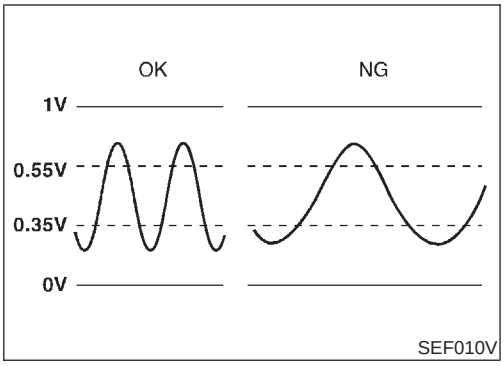
NAEC0882

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)



On Board Diagnosis Logic

NAEC0883

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 cycling time index] is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0133 0133 (Bank 1)	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Fuel pressure • Injector • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor
P0153 0153 (Bank 2)			

DTC Confirmation Procedure

NAEC0884

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 at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

6

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6

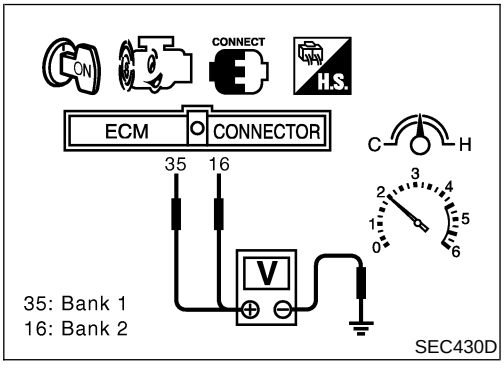
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133
COMPLETED

SEF658Y



SEC430D

WITH CONSULT-II

NAEC0884S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 10 seconds.
3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P0133/ P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,600 - 3,100 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	5 - 12 msec
Selector lever	Suitable position

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 "Diagnostic Procedure", EC-238.

Overall Function Check

NAEC0885

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

WITH GST

NAEC0885S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

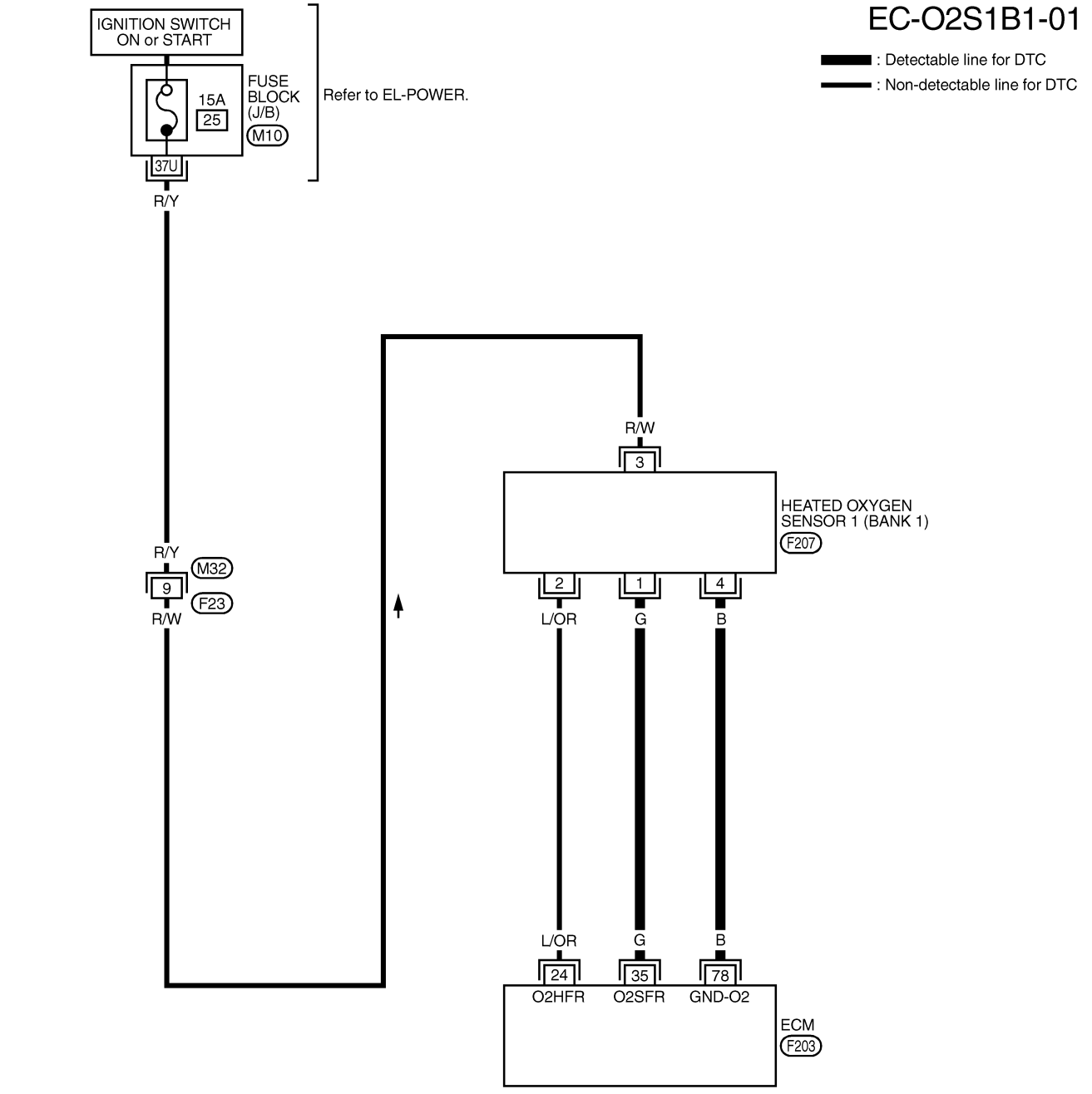
4) If NG, go to "Diagnostic Procedure", EC-238.

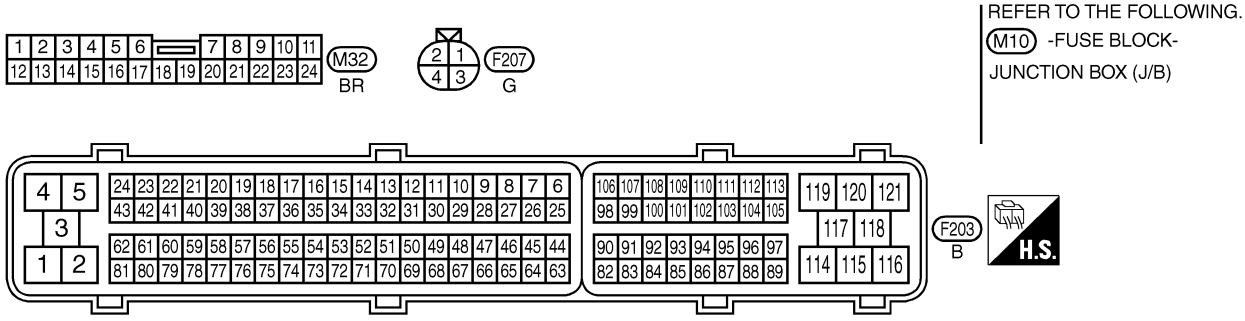
Wiring Diagram

NAEC0886

BANK 1

NAEC0886S01

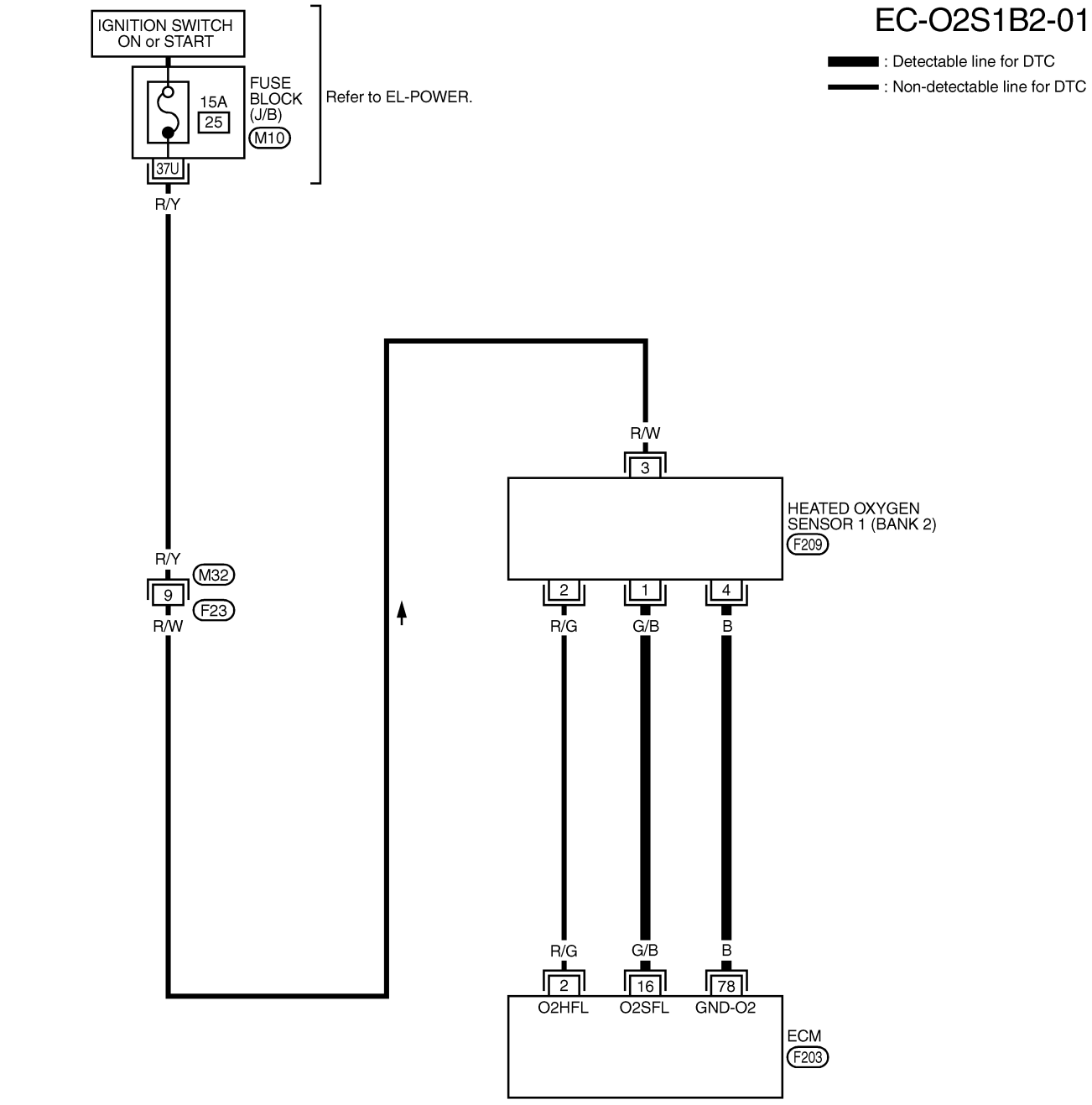


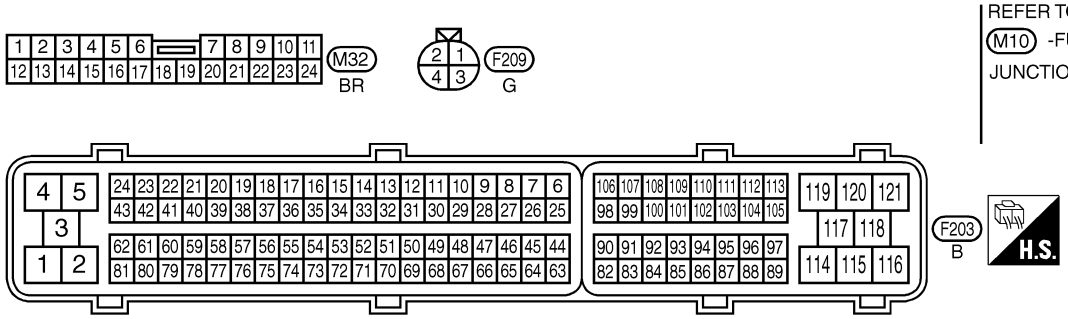


MEC087E

BANK 2

NAEC0886S02





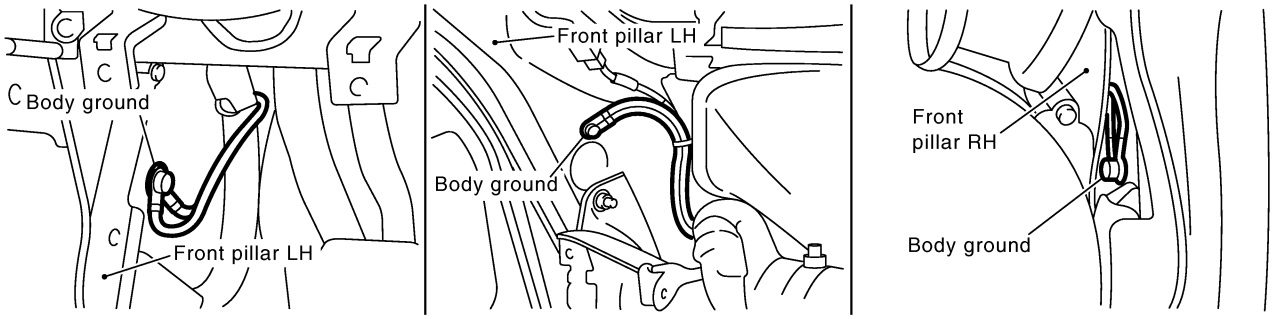
MEC088E

Diagnostic Procedure

NAEC0887

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



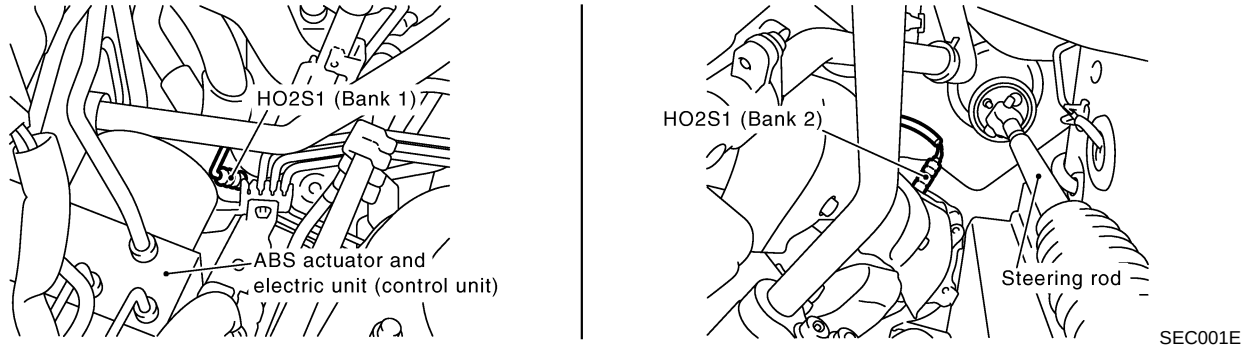
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.



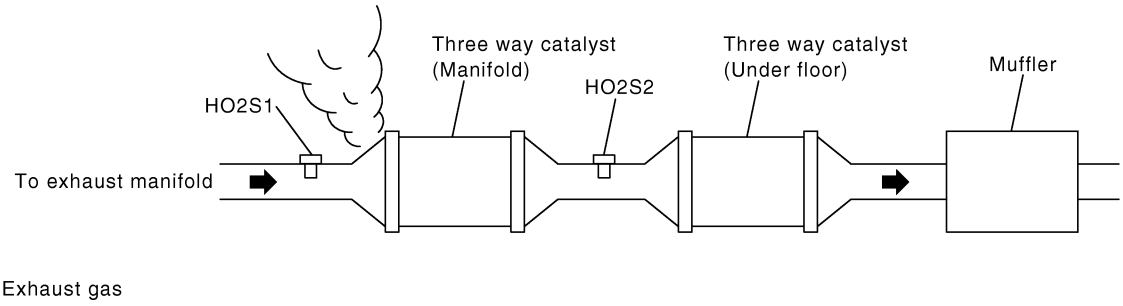
SEC001E

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



SEC502D

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

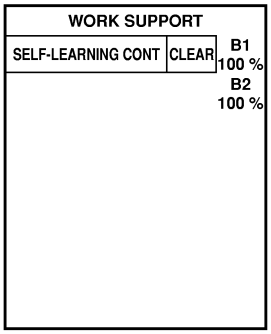
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

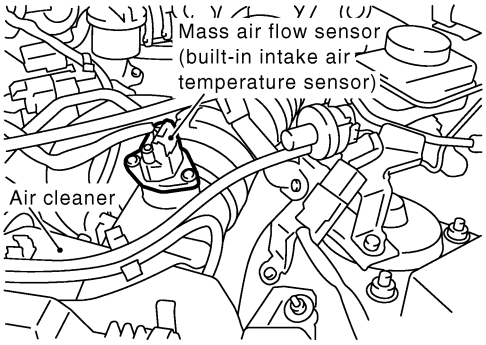


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

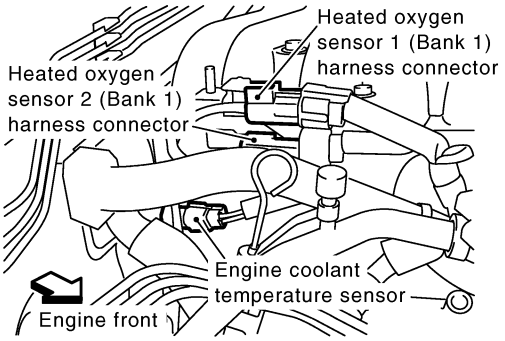
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

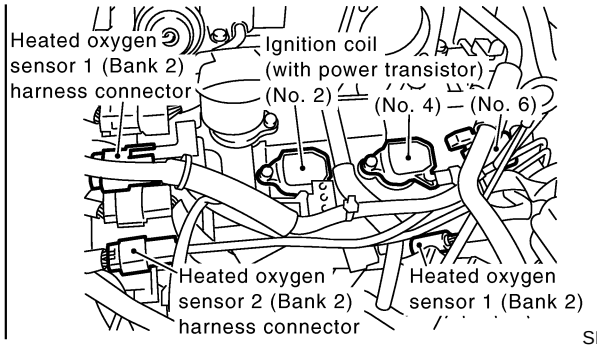
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-273, 282.
No	▶	GO TO 6.

6	CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.





SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	35	1	Bank 1
P0153	16	1	Bank 2

MTBL1356

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	35	1	Bank 1
P0153	16	1	Bank 2

MTBL1356

Continuity should not exist.

3. Also check harness for short to power.

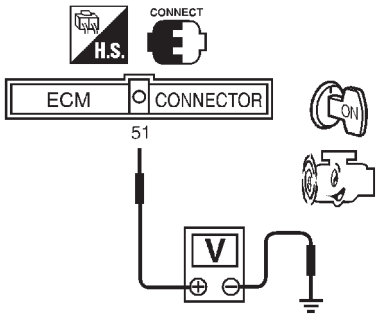
OK or NG

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

Diagnostic Procedure (Cont'd)

8	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



SEF100V

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.3 to Approx. 3.7

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

MTBL1844

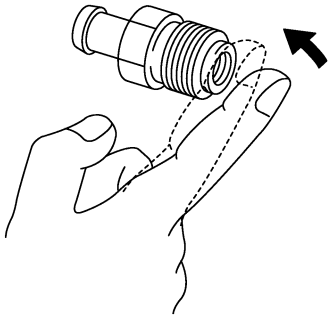
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK PCV VALVE

1. Install all removed parts.
2. Start engine and let it idle.
3. Remove PCV valve ventilation hose from PCV valve.
4. Make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



PBIB1589E

OK or NG

OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	Replace PCV valve.

10	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L-R

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L-R

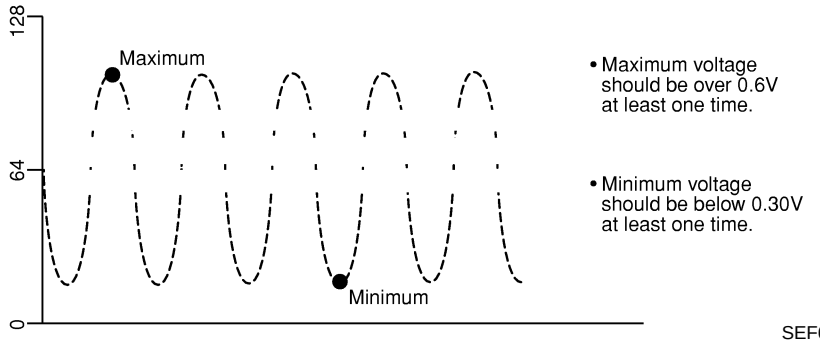
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

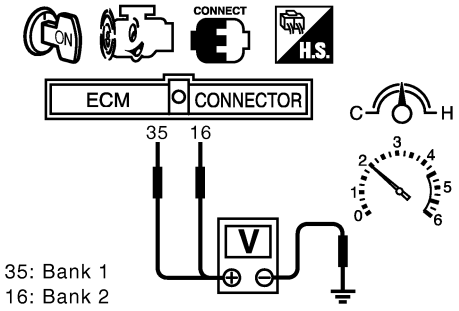
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

11	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

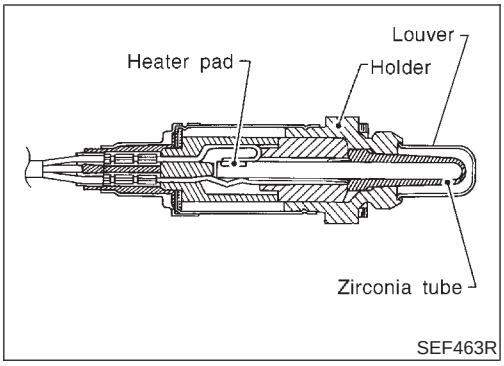
CAUTION:

- **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.**

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

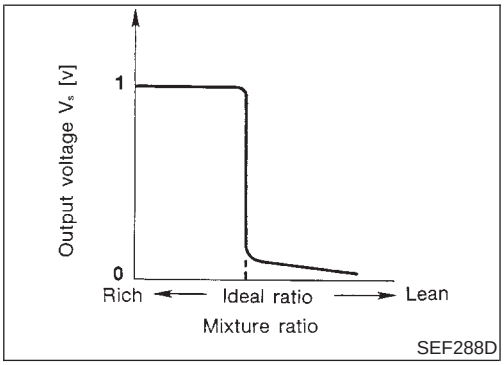
12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC0888

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NAEC0889

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

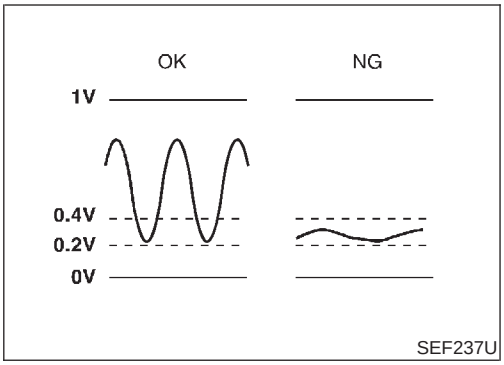
NAEC0890

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)



On Board Diagnosis Logic

NAEC0891

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0134 0134 (Bank 1)	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1
P0154 0154 (Bank 2)			

5

HO2S1 (B1) P0134	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0544E

5

HO2S1 (B1) P0134	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0545E

5

HO2S1 (B1) P0134
COMPLETED

SEC750C

DTC Confirmation Procedure

NAEC0892

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:

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

WITH CONSULT-II

NAEC0892S01

1) Start engine and warm it up to normal operating temperature.
2) Select “HO2S1 (B1)/(B2) P0134/P0154” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3) Touch “START”.
4) Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.

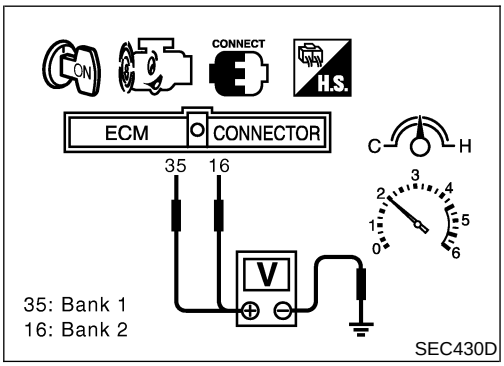
5) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 2,800 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	3.0 - 14 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

6) Make sure that “OK” is displayed after touching “SELF-DIAG

RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-251.
During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

NAEC0893

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

WITH GST

NAEC0893S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 to 0.4V.

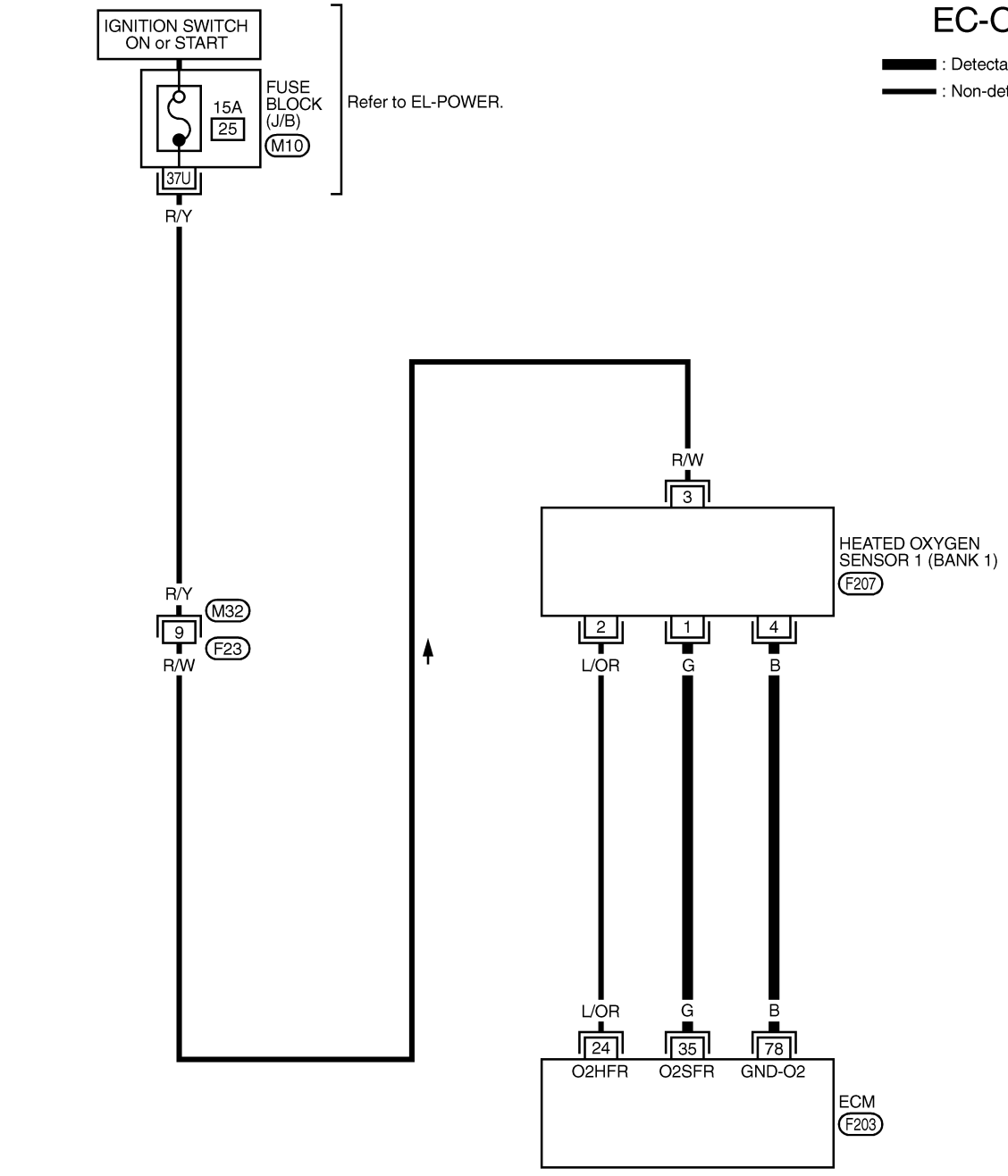
4) If NG, go to "Diagnostic Procedure", EC-251.

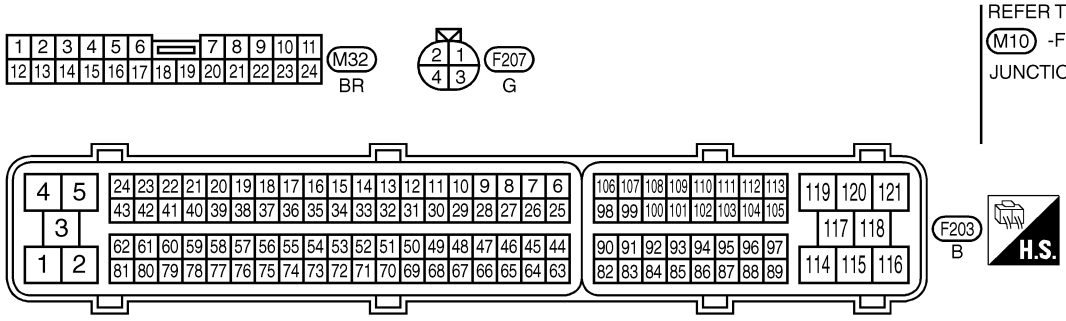
Wiring Diagram

=NAEC0894

NAEC0894S01

BANK 1



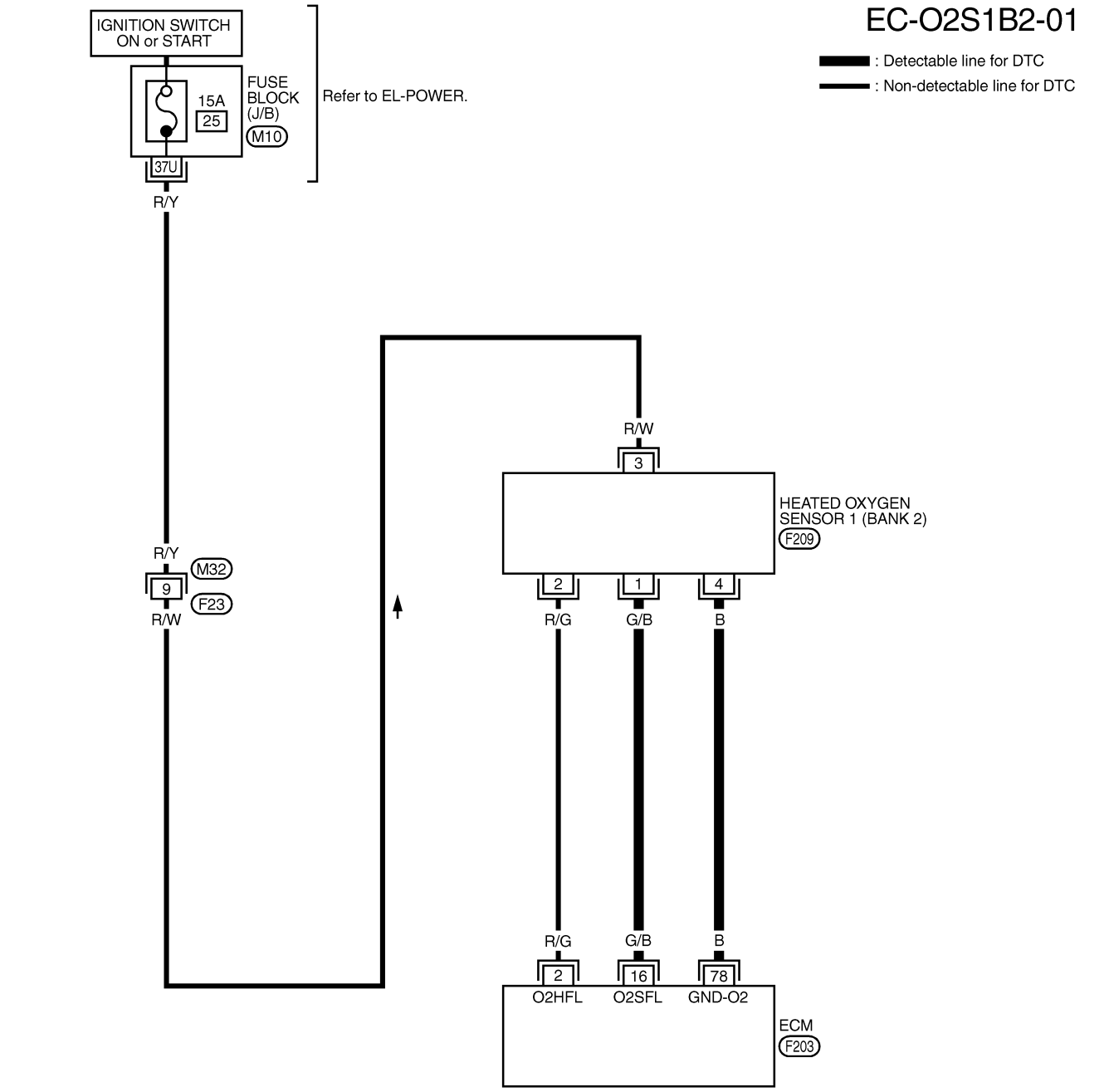


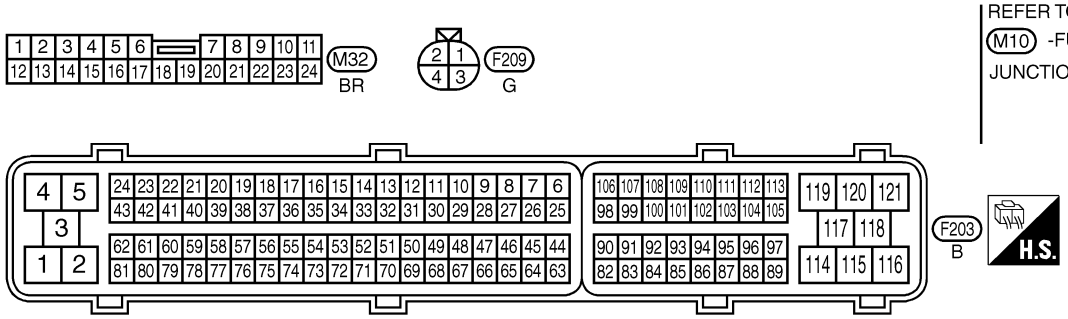
MEC087E

Wiring Diagram (Cont'd)

BANK 2

NAEC0894S02





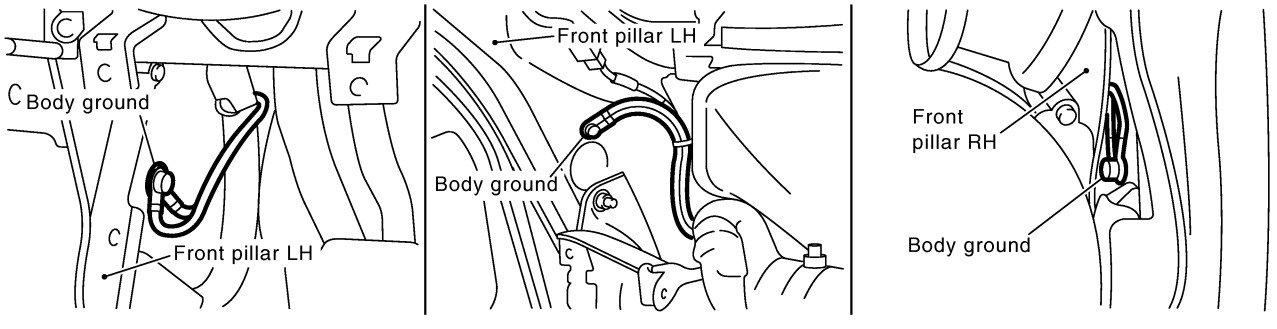
MEC088E

Diagnostic Procedure

NAEC0895

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



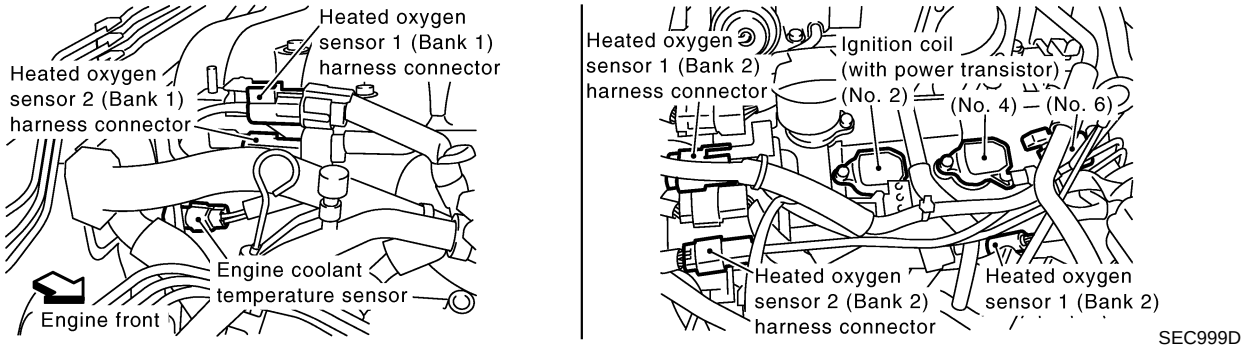
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.



SEC999D

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   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.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	1	Bank 1
P0154	16	1	Bank 2

MTBL1358

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	1	Bank 1
P0154	16	1	Bank 2

MTBL1358

Continuity should not exist.

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

OK or NG

OK (With CONSULT-II) ▶	GO TO 4.
OK (Without CONSULT-II) ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

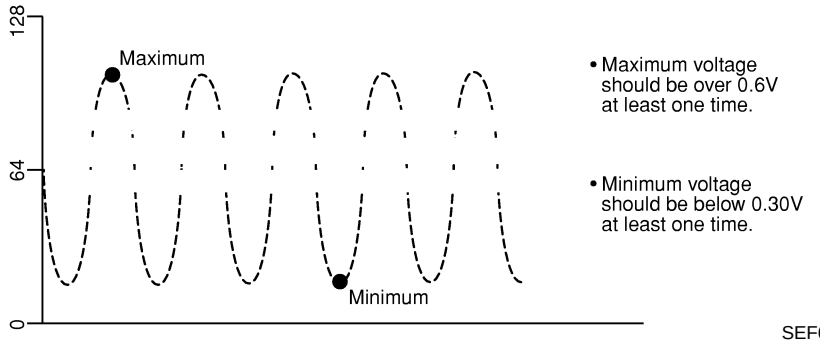
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

OK or NG

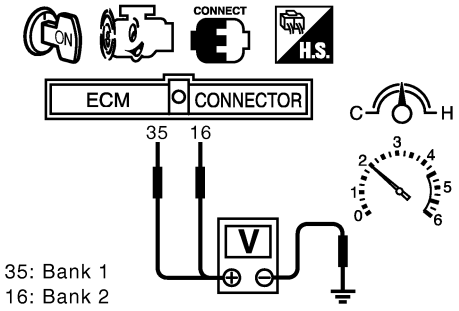
OK	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

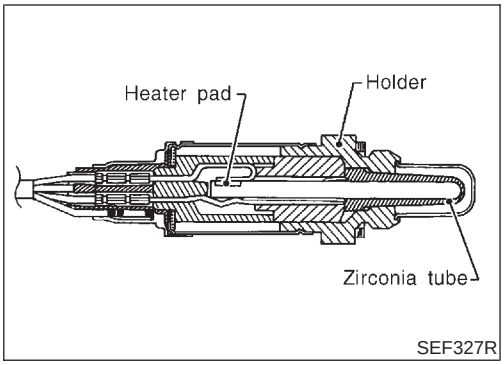
CAUTION:

- **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.**

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC0896

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0897

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

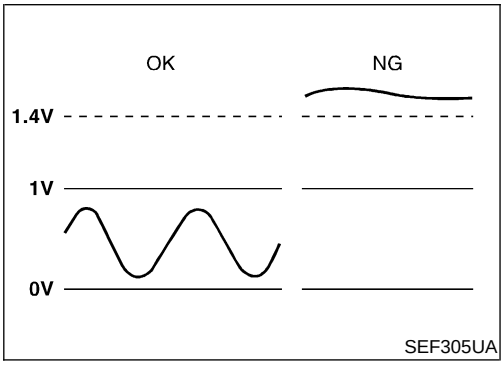
NAEC0898

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V



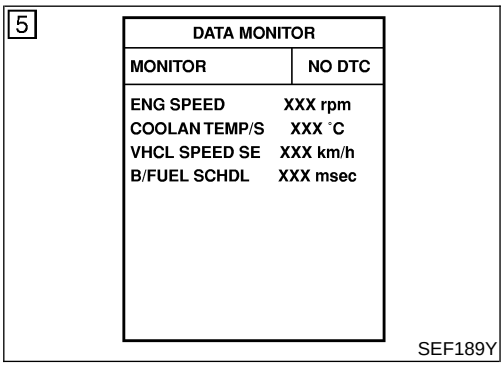
On Board Diagnosis Logic

NAEC0899

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. 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.

On Board Diagnosis Logic (Cont'd)

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	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)			



DTC Confirmation Procedure

NAEC0900

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.

WITH CONSULT-II

NAEC0900S01

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to the normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5) Let engine idle for 2 minutes.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-259.

WITH GST

NAEC0900S02

Follow the procedure "With CONSULST-II" above.

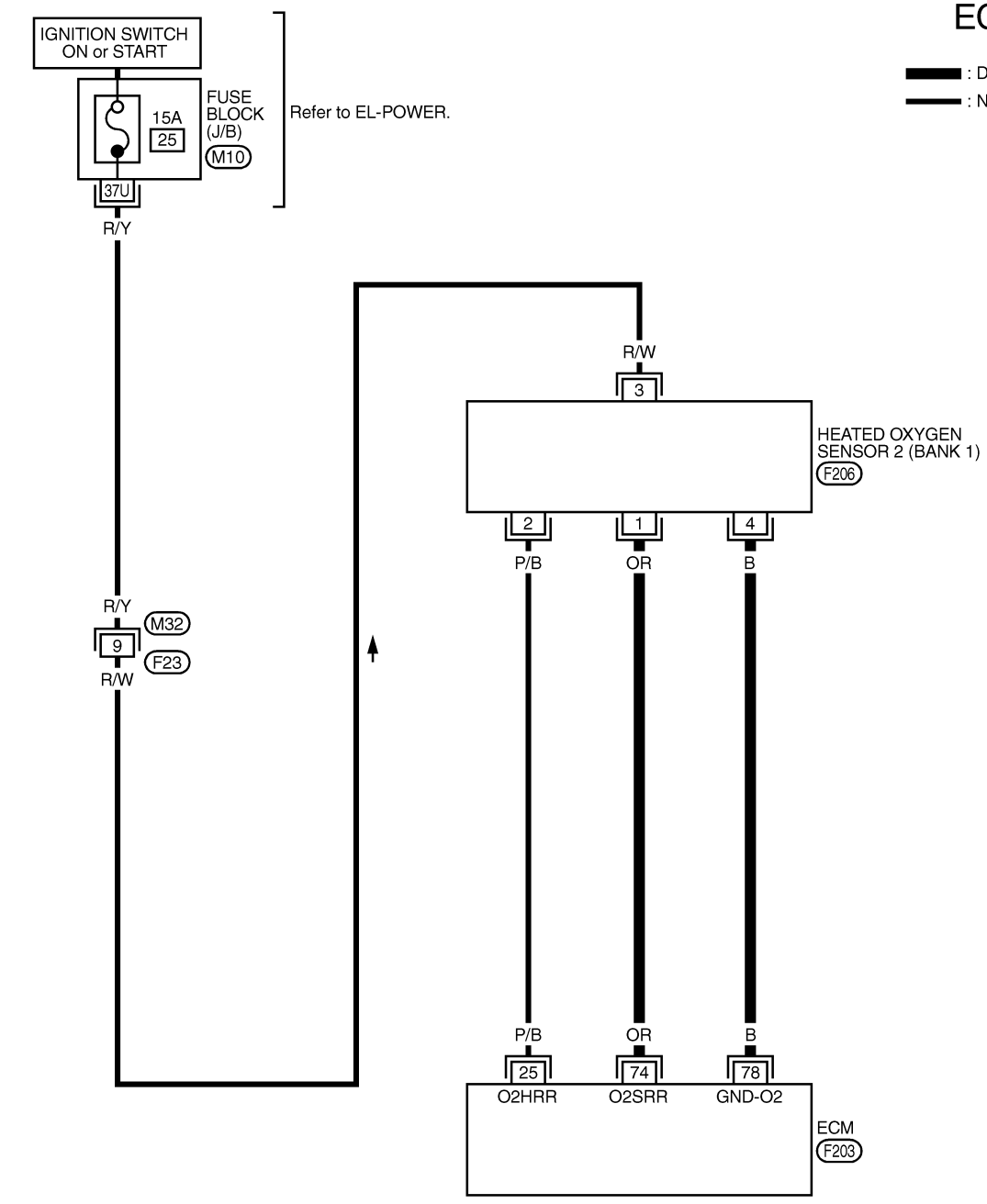
Wiring Diagram

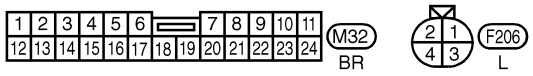
NAEC0902

BANK 1

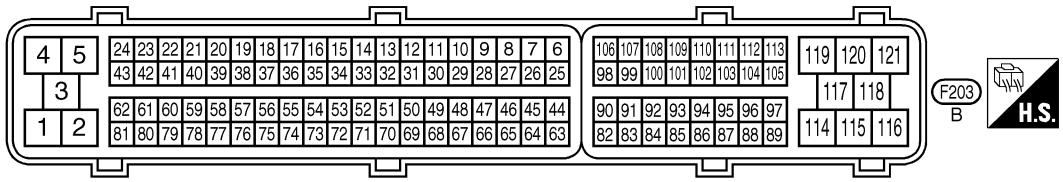
NAEC0902S01

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



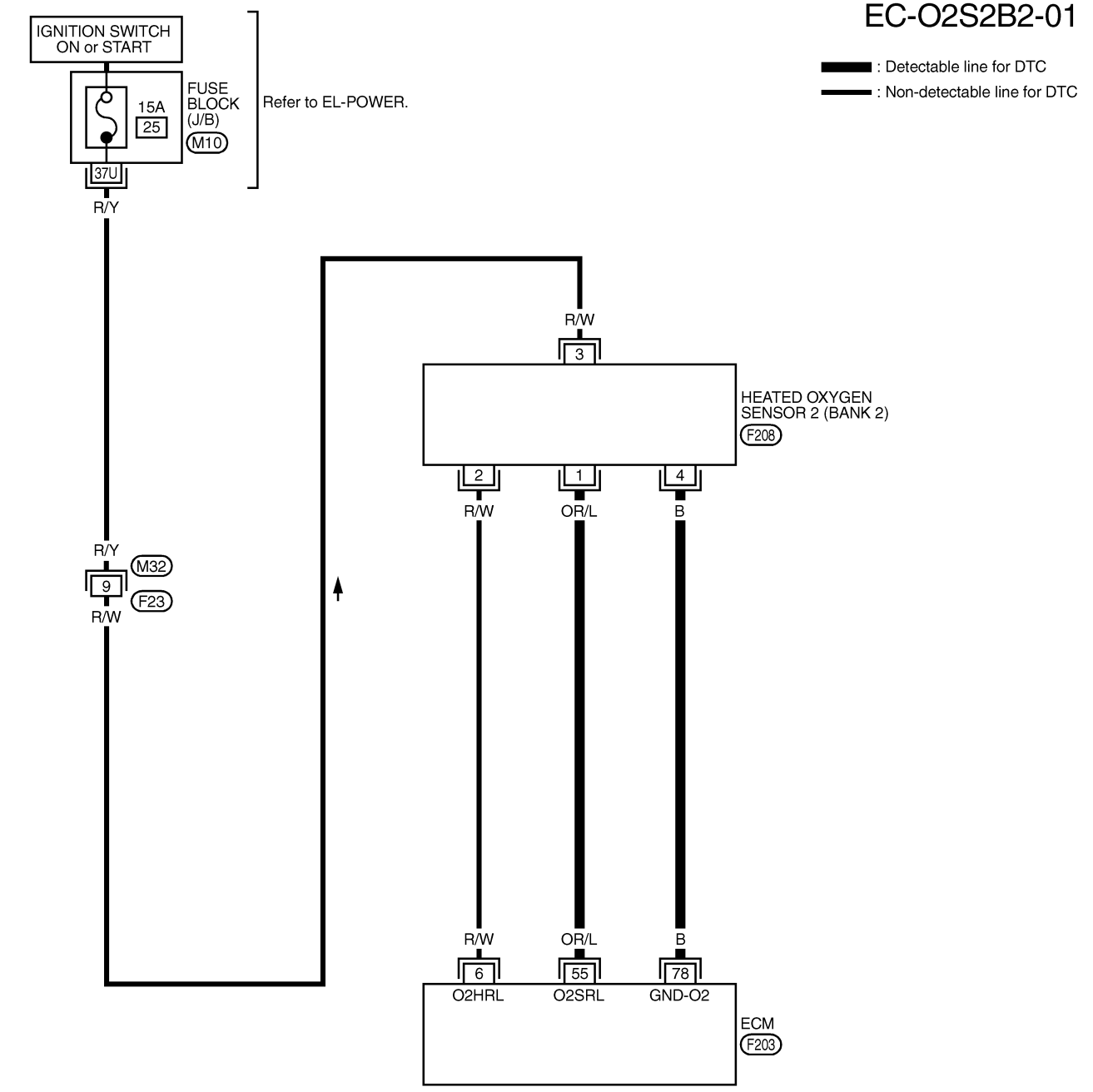
MEC089E

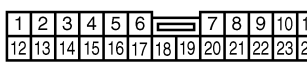
Wiring Diagram (Cont'd)

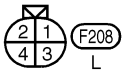
BANK 2

NAEC0902S02

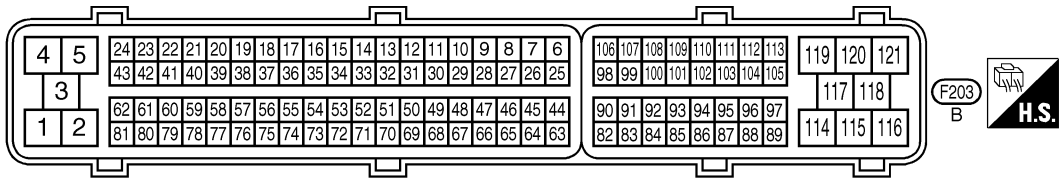
EC-O2S2B2-01







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



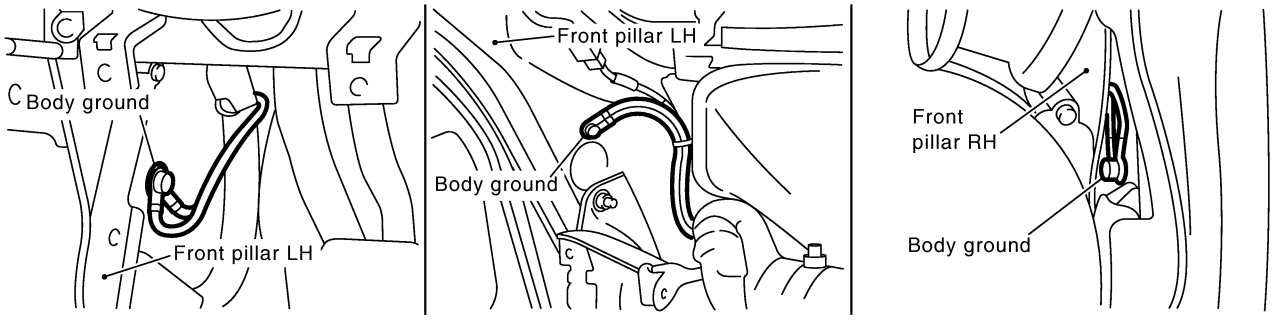
MEC090E

Diagnostic Procedure

NAEC0903

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



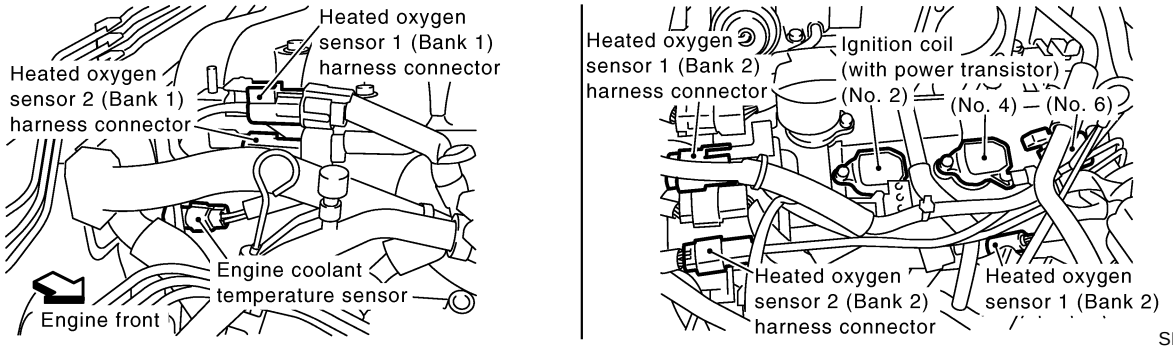
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.



SEC999D

3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   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.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	Bank 1
P0158	55	1	Bank 2

MTBL1360

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	Bank 1
P0158	55	1	Bank 2

MTBL1360

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 CONNECTORS FOR WATER

Check heated oxygen sensor 2 connector and harness connector for water.

Water should not exist.

OK or NG

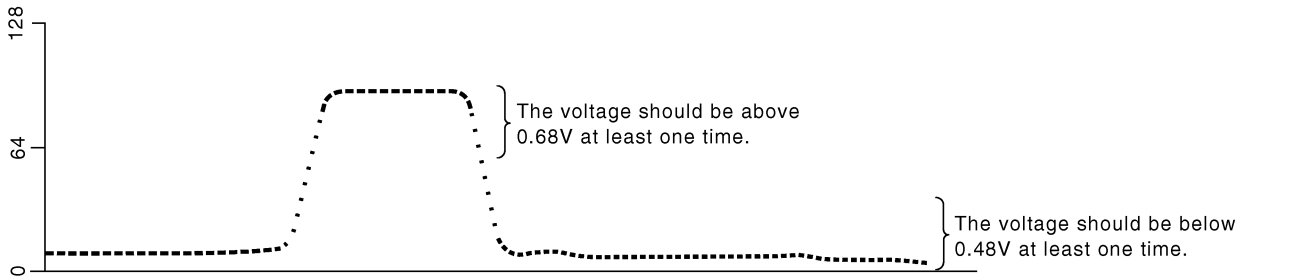
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972YA

"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V 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.**

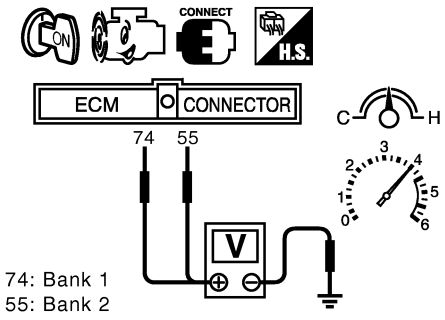
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

6	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 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.)



SEC432D

The voltage should be above 0.68V at least once during this procedure.

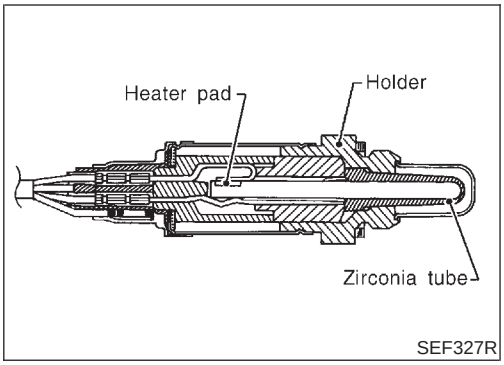
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2-II	
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T). **The voltage should go below 0.48V at least once during this procedure.** **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.**		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



Component Description

NAEC0904

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0905

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

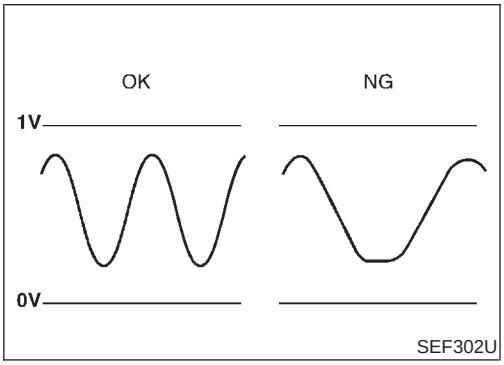
NAEC0906

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V



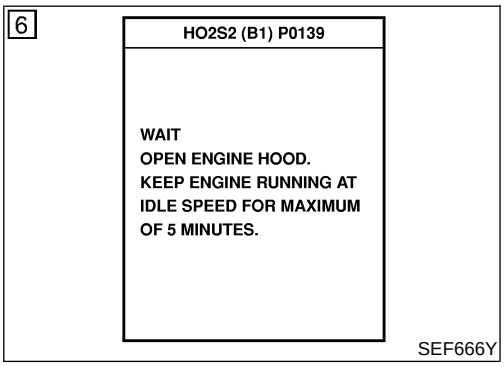
On Board Diagnosis Logic

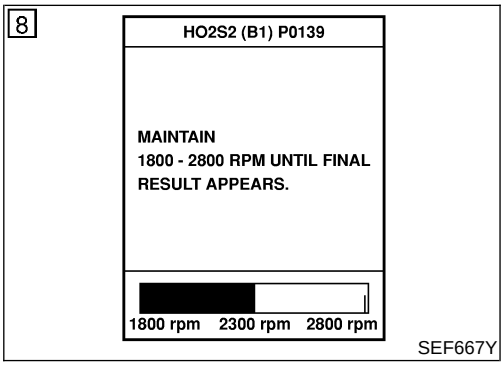
NAEC0907

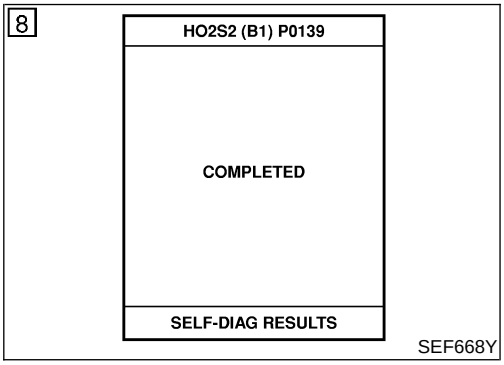
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

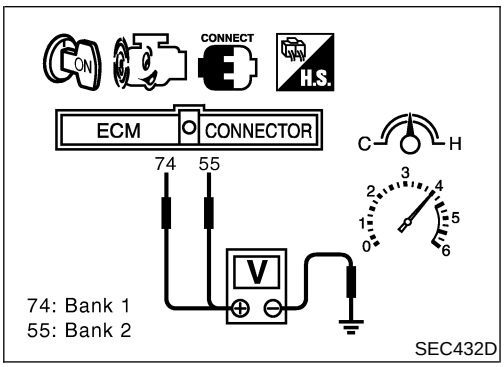
On Board Diagnosis Logic (Cont'd)

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 • Injector • Intake air leaks
P0159 0159 (Bank 2)			









DTC Confirmation Procedure

NAEC0908

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:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NAEC0908S01

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) Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-268, "Diagnostic 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) Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
d) When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NAEC0909

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

WITH GST

NAEC0909S01

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 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 signal) and ground.
6) Check the voltage when racing 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 0.06V 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 3rd gear position (M/T), D position with "OD" OFF (A/T).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8) If NG, go to "Diagnostic Procedure", EC-268.

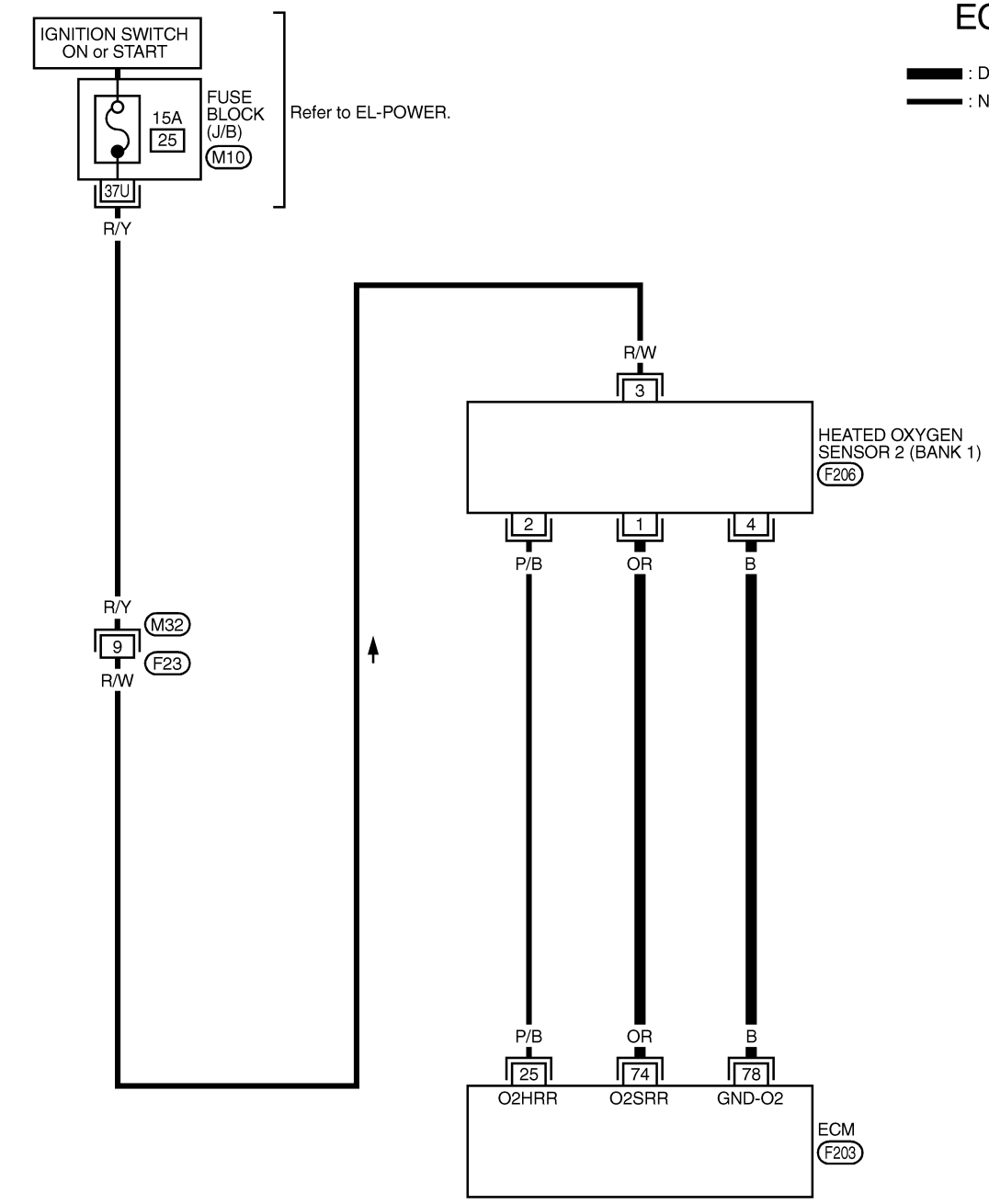
Wiring Diagram

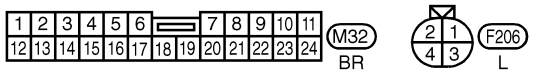
=NAEC0910

NAEC0910S01

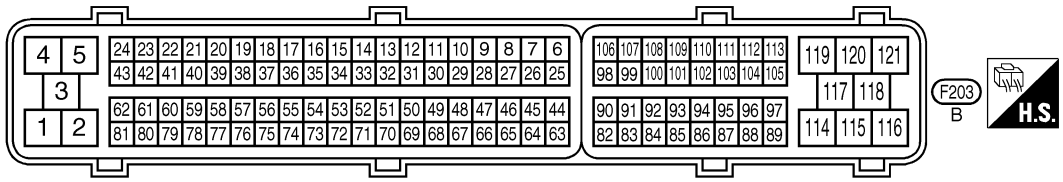
BANK 1

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

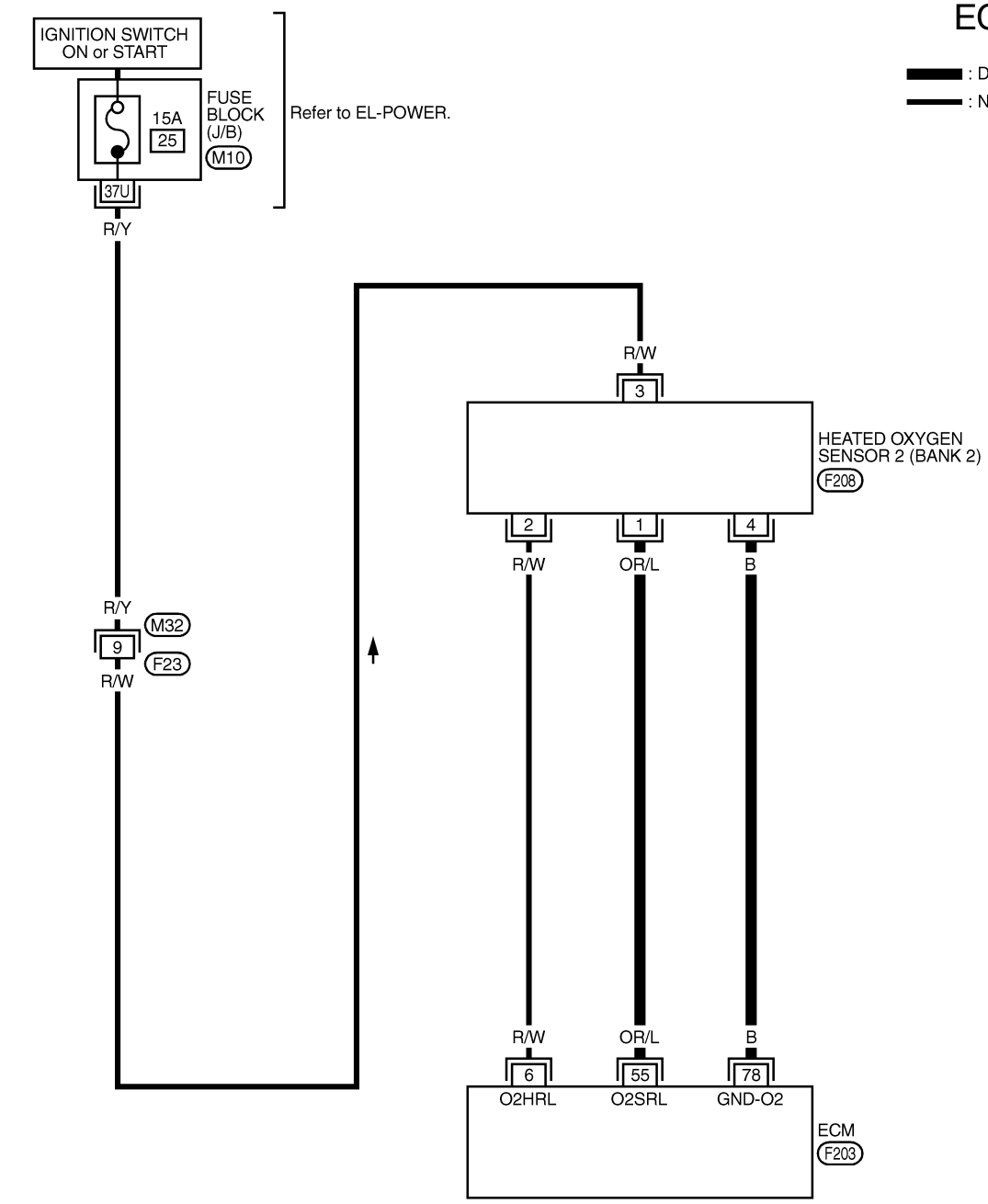


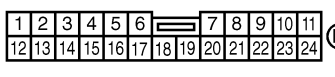
MEC089E

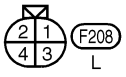
BANK 2

NAEC0910S02

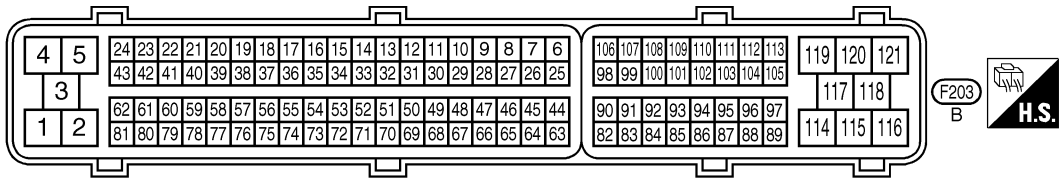
EC-O2S2B2-01







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



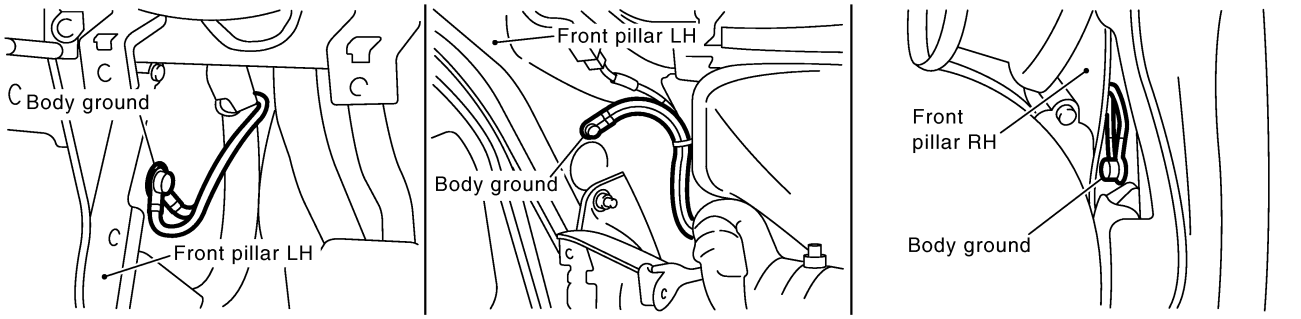
MEC090E

Diagnostic Procedure

NAEC0911

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

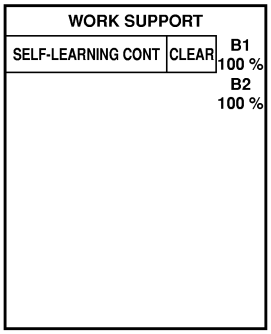
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

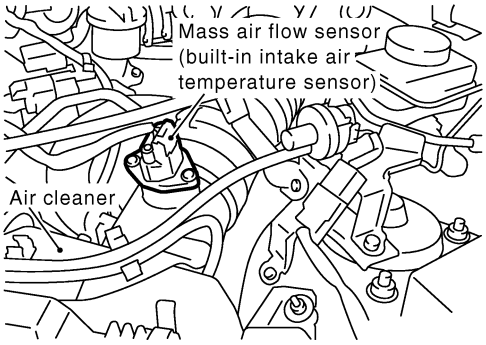


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
7. Make sure DTC No. 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?

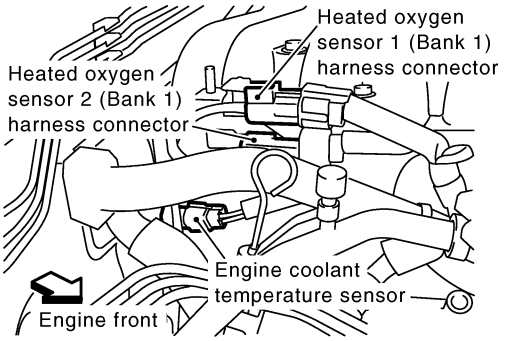
Yes or No

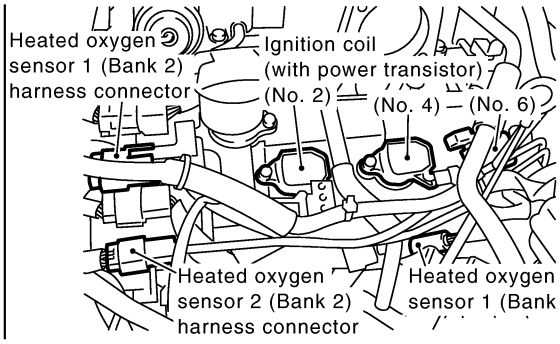
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-273, 282.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.





SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   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	74	1	Bank 1
P0159	55	1	Bank 2

MTBL1362

   Continuity should exist.
2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	74	1	Bank 1
P0159	55	1	Bank 2

MTBL1362

   Continuity should not exist.
3. Also check harness for short to ground and short to power.

OK or NG

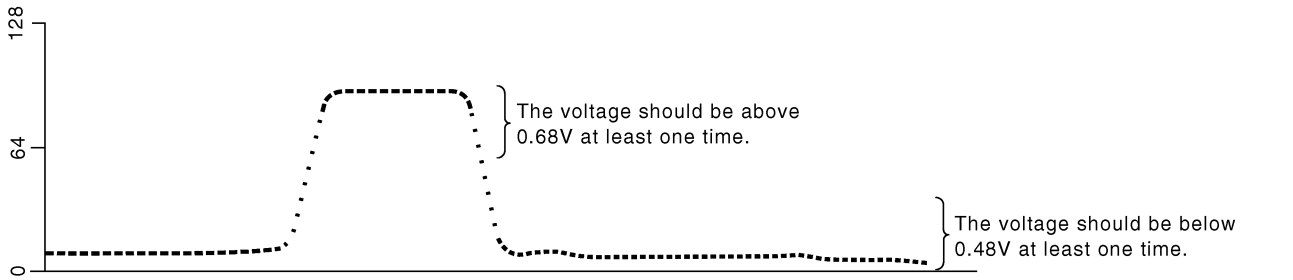
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972YA

"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V 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.**

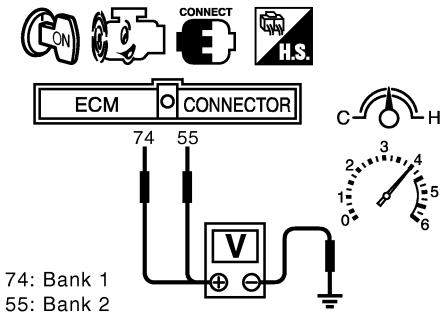
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

6	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 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.)



SEC432D

The voltage should be above 0.68V at least once during this procedure.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2-II	
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T). **The voltage should go below 0.48V at least once during this procedure.** **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.**		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**

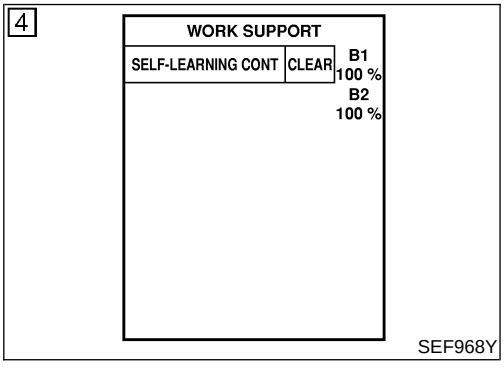
On Board Diagnosis Logic

NAEC0912

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 heated oxygen 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
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	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 • Heated oxygen sensor 1 • 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

NAEC0913

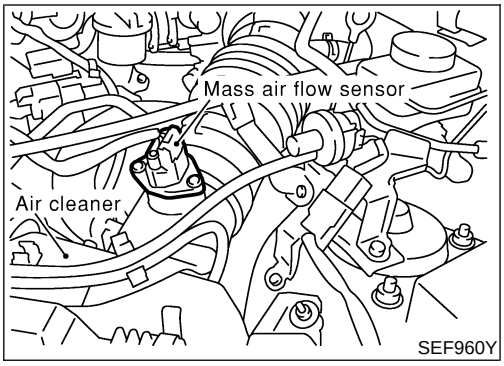
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0913S01

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-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR”.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-277.
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 “Diagnostic Procedure”, EC-277. If engine does not start, check exhaust and intake air leak visually.

DTC Confirmation Procedure (Cont'd)



WITH GST

NAEC0913S02

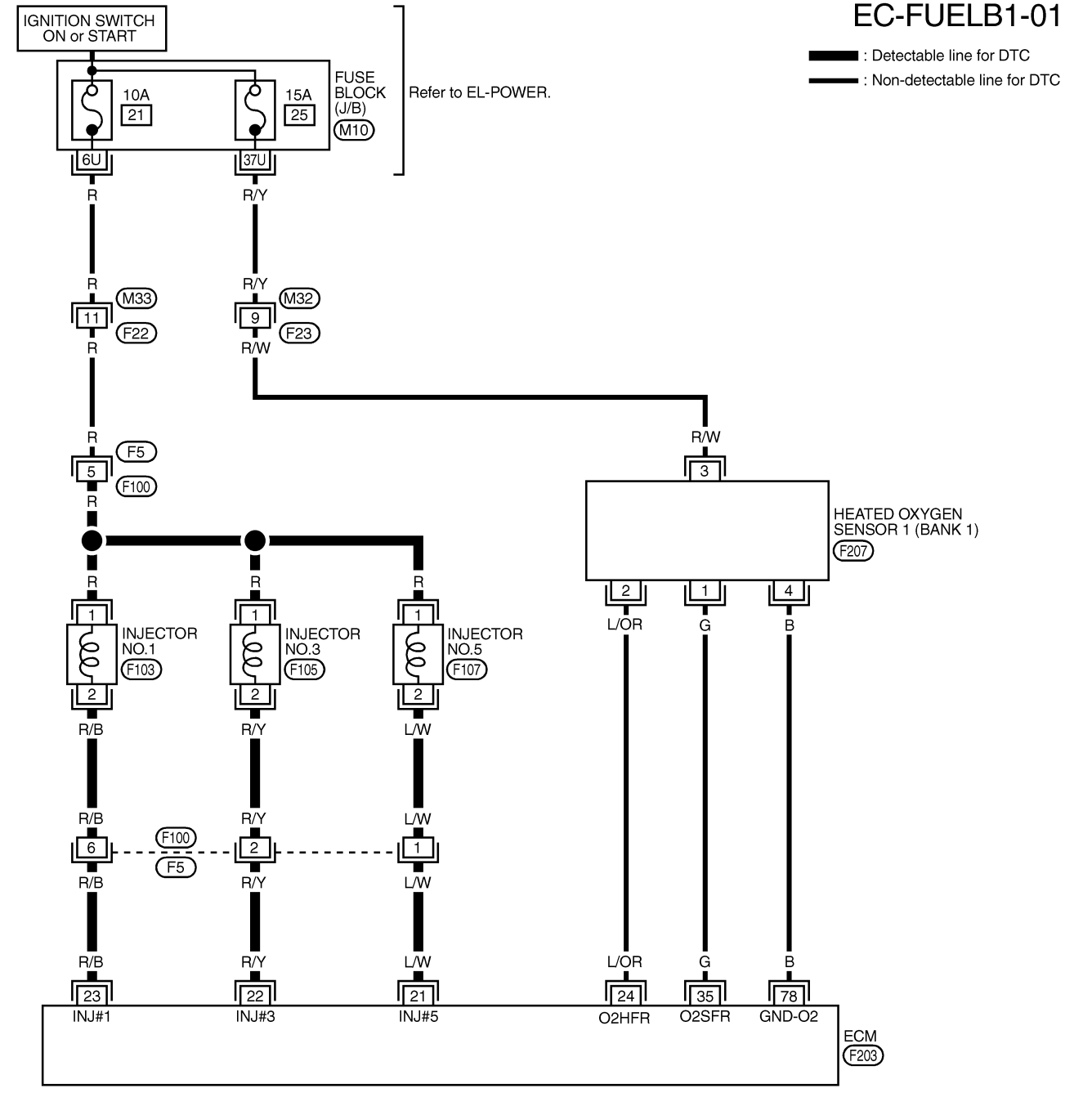
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select MODE 3 with GST. Make sure DTC P0102 is detected.
6) Select MODE 4 with GST and erase the DTC P0102.
7) Start engine again and let it idle for at least 10 minutes.
8) Select MODE 7 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-277.
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 "Diagnostic Procedure", EC-277. If engine does not start, check exhaust and intake air leak visually.

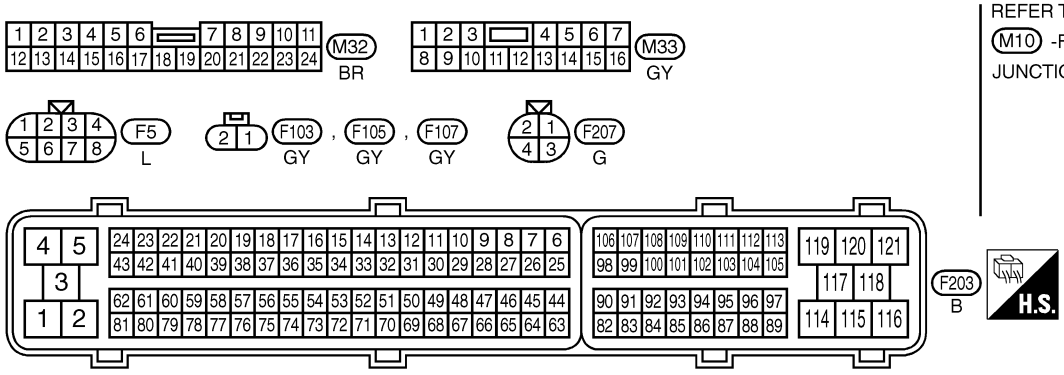
Wiring Diagram

NAEC0914

BANK 1

NAEC0914S01





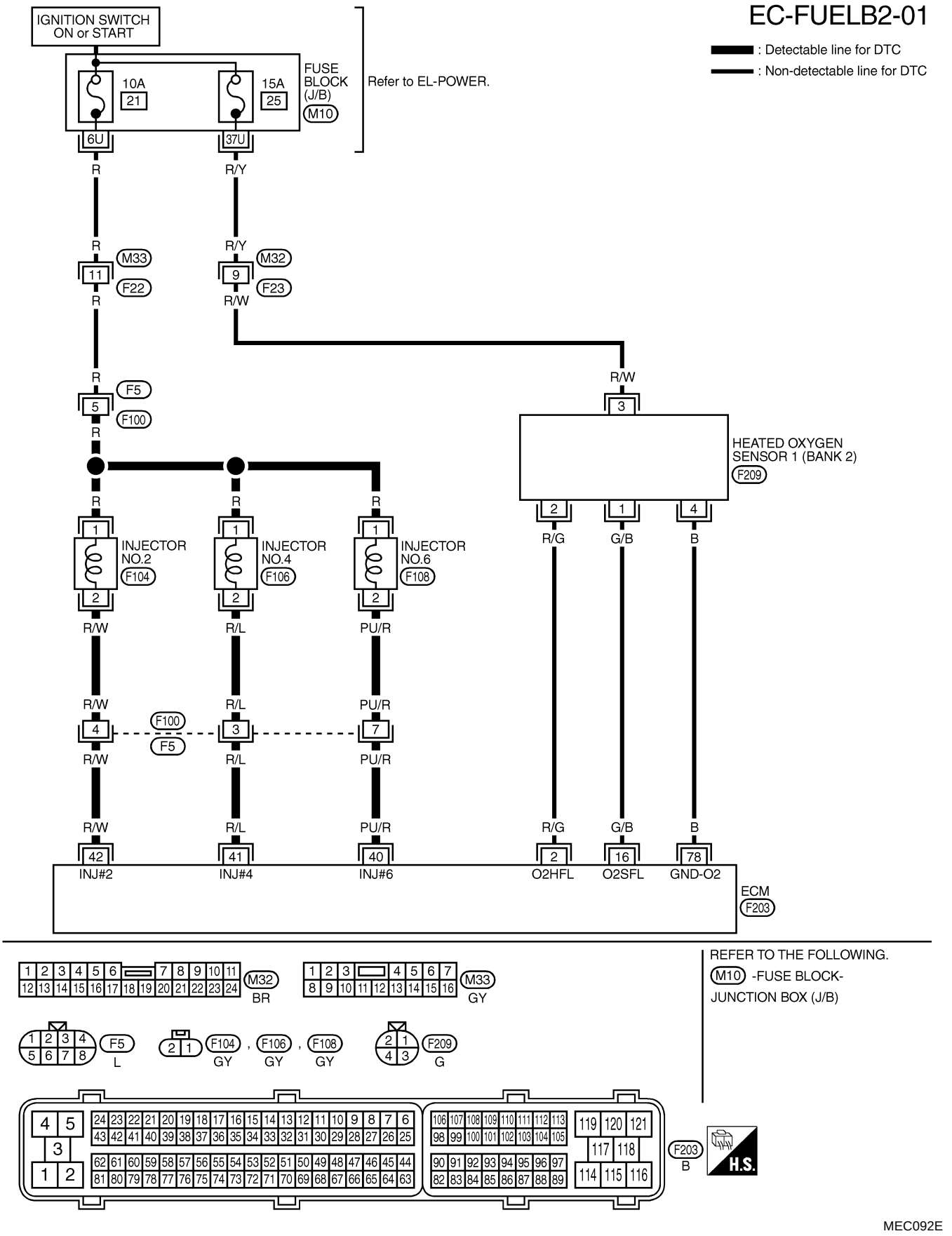
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC091E

Wiring Diagram (Cont'd)

BANK 2

NAEC0914S02



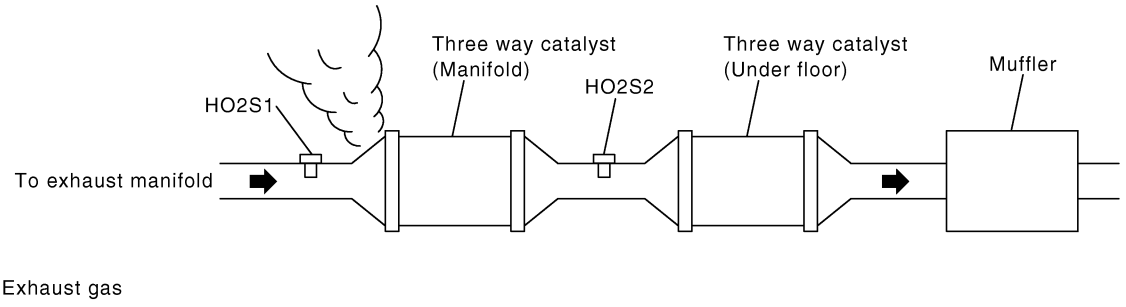
MEC092E

Diagnostic Procedure

NAEC0915

1	CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



: Exhaust gas

SEC502D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

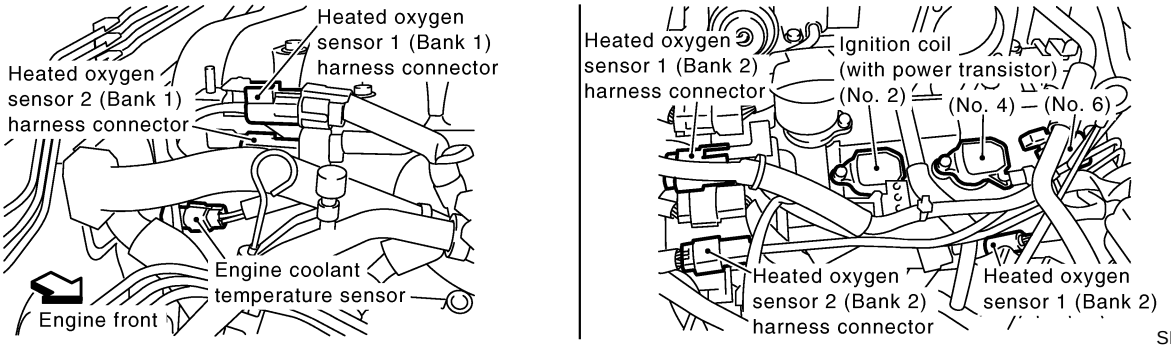
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.



SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	35	1	Bank 1
P0174	16	1	Bank 2

MTBL1364

Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	35	1	Bank 1
P0174	16	1	Bank 2

MTBL1364

Continuity should not exist.

6. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   Continuity should exist.
7. 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 FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-56.
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-56.

At idling:
When fuel pressure regulator valve vacuum hose is connected.
235 kPa (2.4 kg/cm^2, 34 psi)
When fuel pressure regulator valve vacuum hose is disconnected.
294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-729.) ● Fuel pressure regulator (Refer to EC-57.) ● Fuel lines (Refer to MA-17, "Checking Fuel Lines".) ● Fuel filter for clogging	
▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **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. Check mass air flow sensor signal in MODE 1 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-194.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

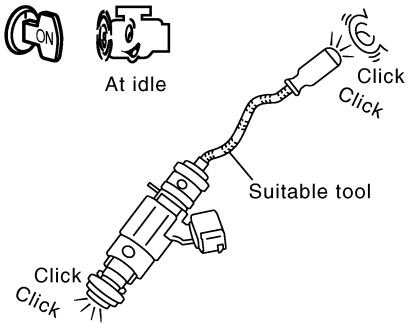
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



PBIB1725E

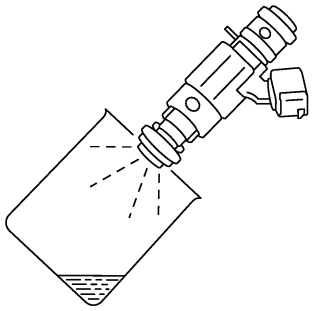
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-724.

8	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect injector harness connectors.
4. Remove injector gallery assembly. Refer to EC-58.
   Keep fuel hose and all injectors connected to injector gallery.
5. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from injectors on bank 2.



PBIB1726E

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

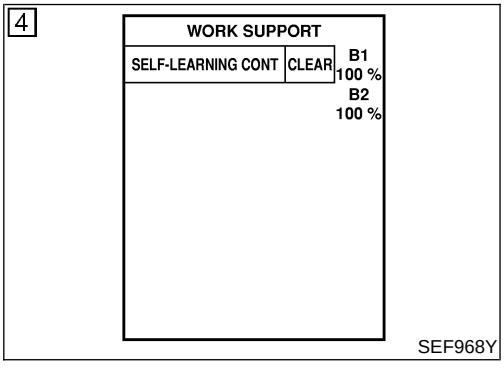
On Board Diagnosis Logic

NAEC0916

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 heated oxygen 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
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injector

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0172 0172 (Bank 1)	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.)	• Heated oxygen sensor 1 • Injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor
P0175 0175 (Bank 2)			



DTC Confirmation Procedure

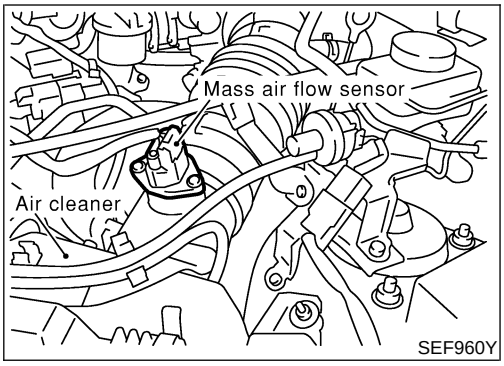
NAEC0917

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

WITH CONSULT-II

NAEC0917S01

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-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR”.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-286.
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 “Diagnostic Procedure”, EC-286. If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

NAEC0917S02

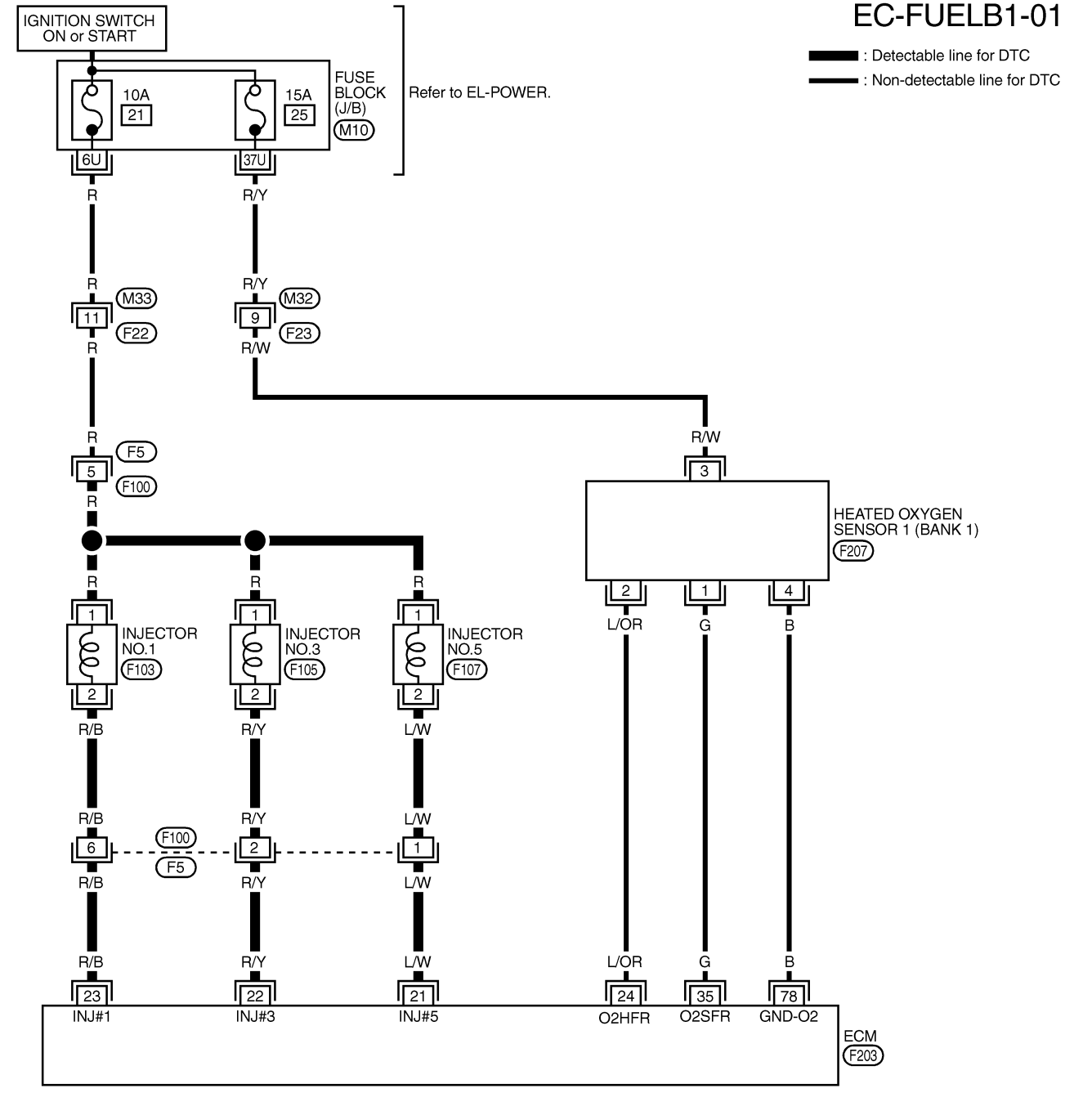
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select MODE 3 with GST. Make sure DTC P0102 is detected.
6) Select MODE 4 with GST and erase the DTC P0102.
7) Start engine again and let it idle for at least 10 minutes.
8) Select MODE 7 with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-286.
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 "Diagnostic Procedure", EC-286. If engine does not start, remove ignition plugs and check for fouling, etc.

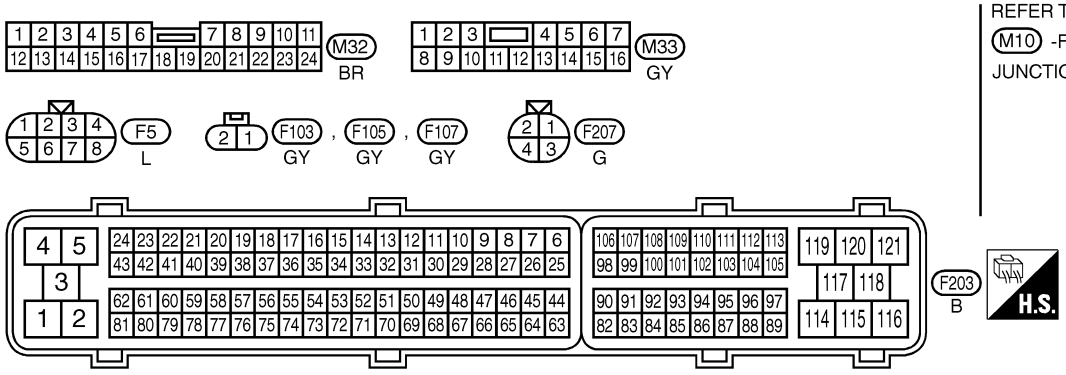
Wiring Diagram

NAEC0918

BANK 1

NAEC0918S01



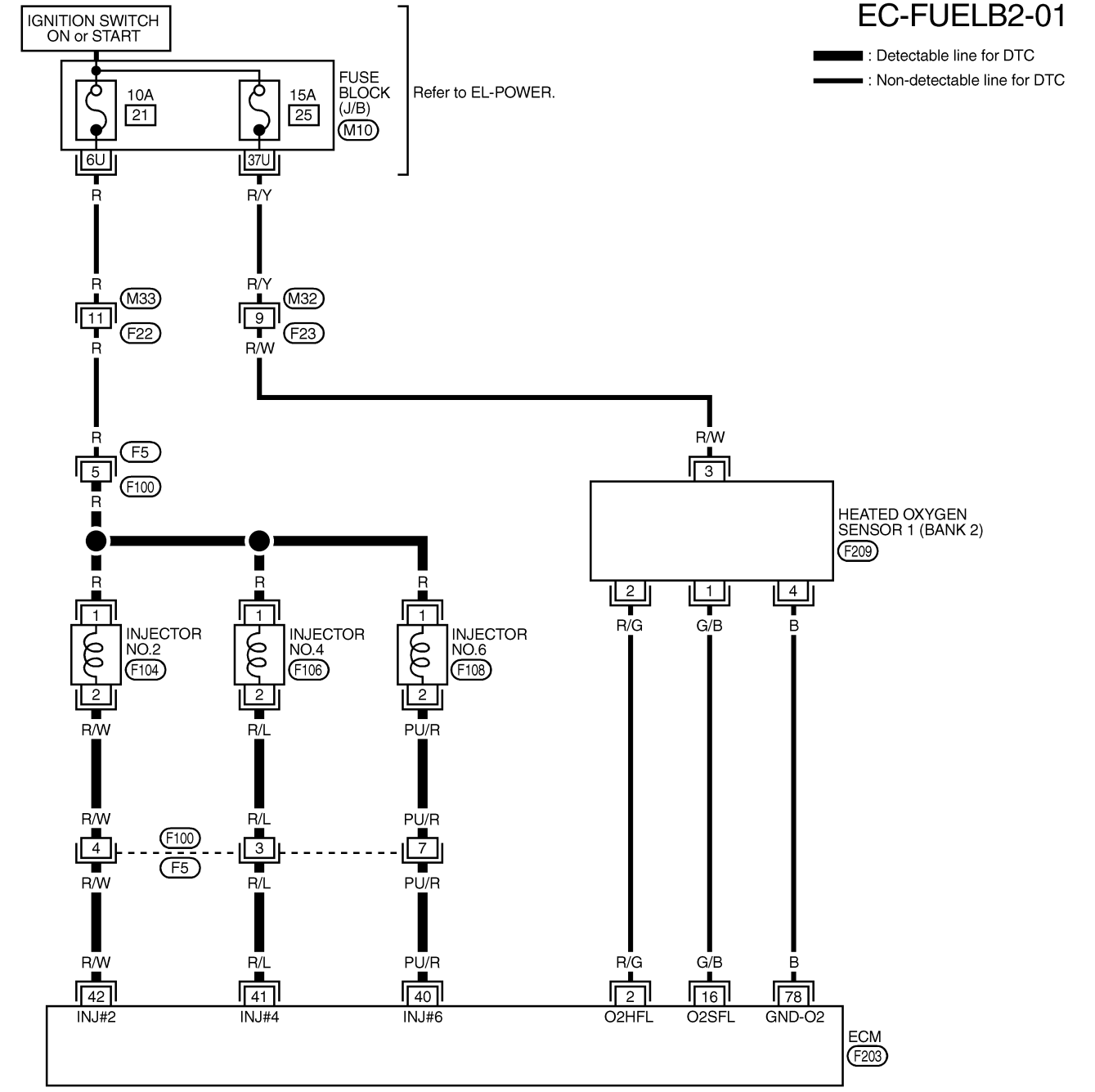


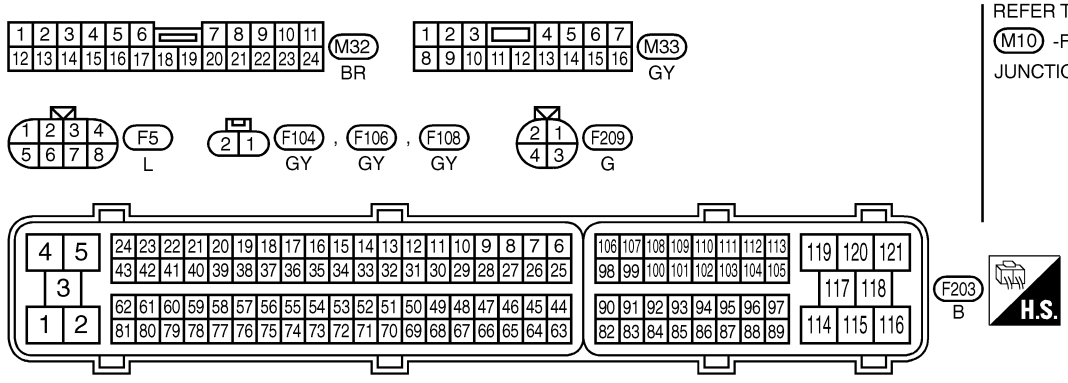
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC091E

BANK 2

NAEC0918S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

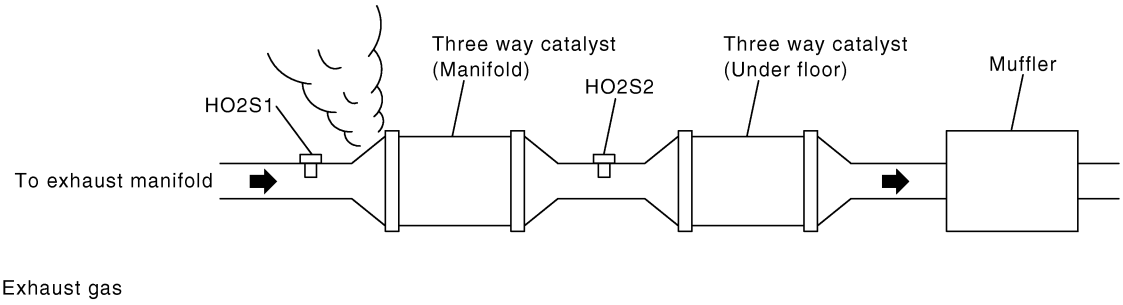
MEC092E

Diagnostic Procedure

NAEC0919

1	CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



SEC502D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

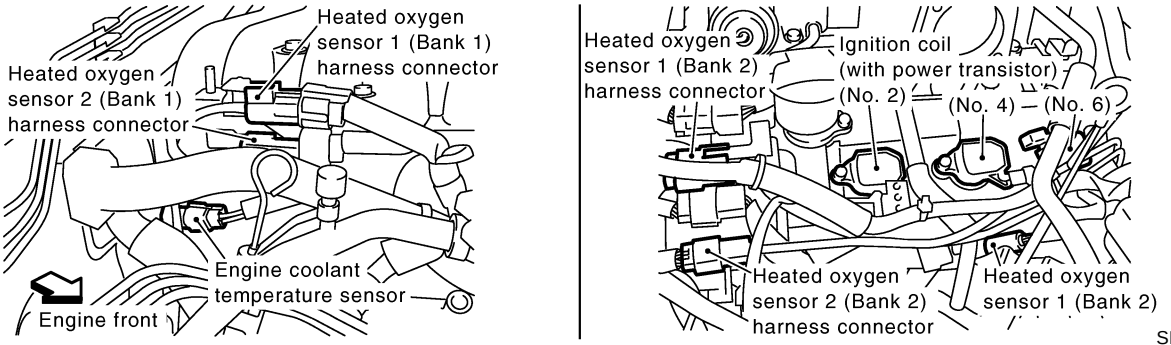
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3 **CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.



SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	35	1	Bank 1
P0175	16	1	Bank 2

MTBL1366

Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	35	1	Bank 1
P0175	16	1	Bank 2

MTBL1366

Continuity should not exist.

6. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   Continuity should exist.
7. 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 FUEL PRESSURE**

1. Release fuel pressure to zero. Refer to EC-56.
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-56.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-729.) ● Fuel pressure regulator (Refer to EC-57.)	
▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **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. Check mass air flow sensor signal in MODE 1 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-194.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

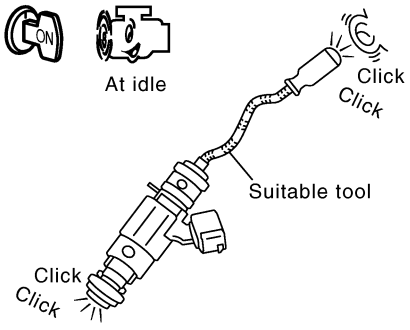
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



PBIB1725E

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-724.

8	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-58.
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

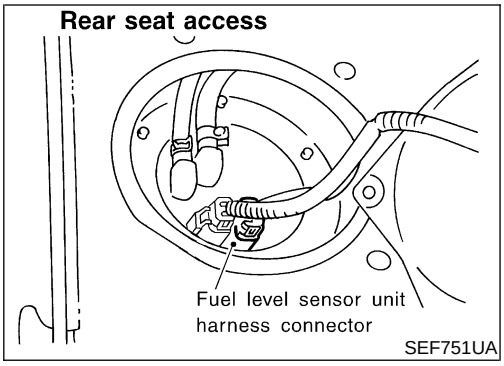
OK or NG

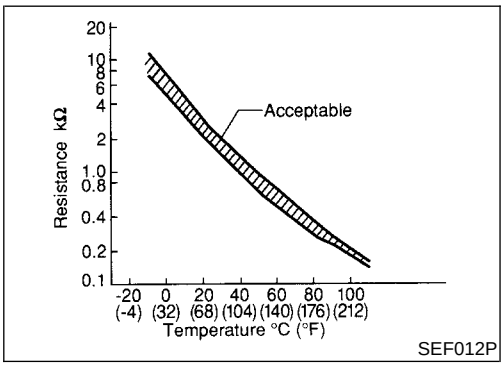
OK (Does not drip.)	▶	GO TO 9.
NG (Drips.)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

▶ **INSPECTION END**





Component Description

NAEC0773

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>

Fuel temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0774

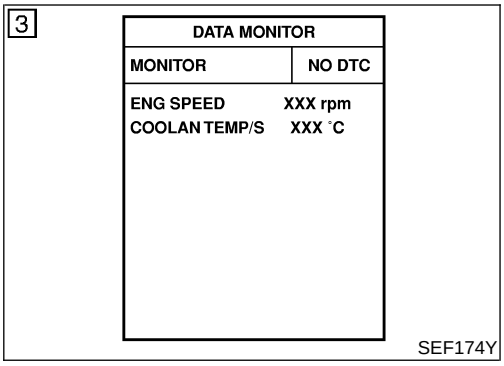
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0181 0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor

DTC Confirmation Procedure

NAEC0776

NOTE:

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



WITH CONSULT-II

NAEC0776S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to "Diagnostic Procedure", EC-291.
   If the result is OK, go to following step.
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) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-291.

WITH GST

NAEC0776S02

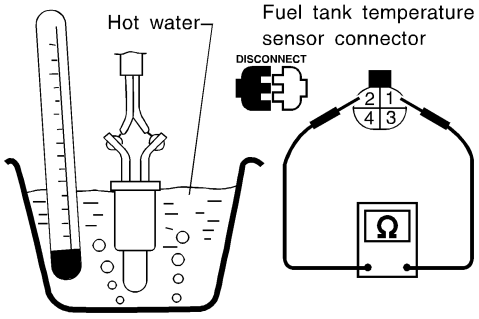
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC0778

1	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

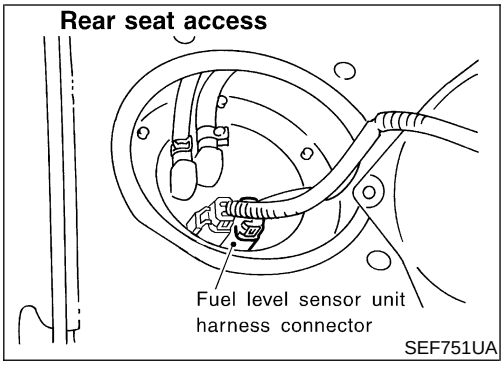
SEF974Y

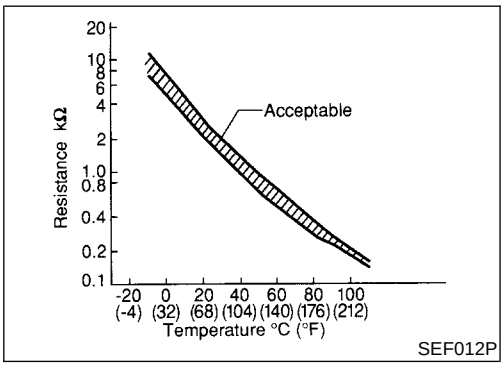
OK or NG

OK	▶	GO TO 2.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

2	CHECK INTERMITTENT INCIDENT
• Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. • Refer to wiring diagram, EC-295.	
▶	**INSPECTION END**





Component Description

NAEC0920

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>

Fuel temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0921

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.) • Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

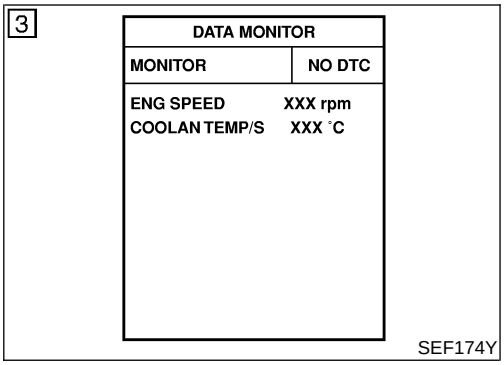
DTC Confirmation Procedure

NAEC0922

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 Confirmation Procedure (Cont'd)



WITH CONSULT-II

NAEC0922S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to "Diagnostic Procedure", EC-296.
   If the result is OK, go to following step.
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) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-296.

WITH GST

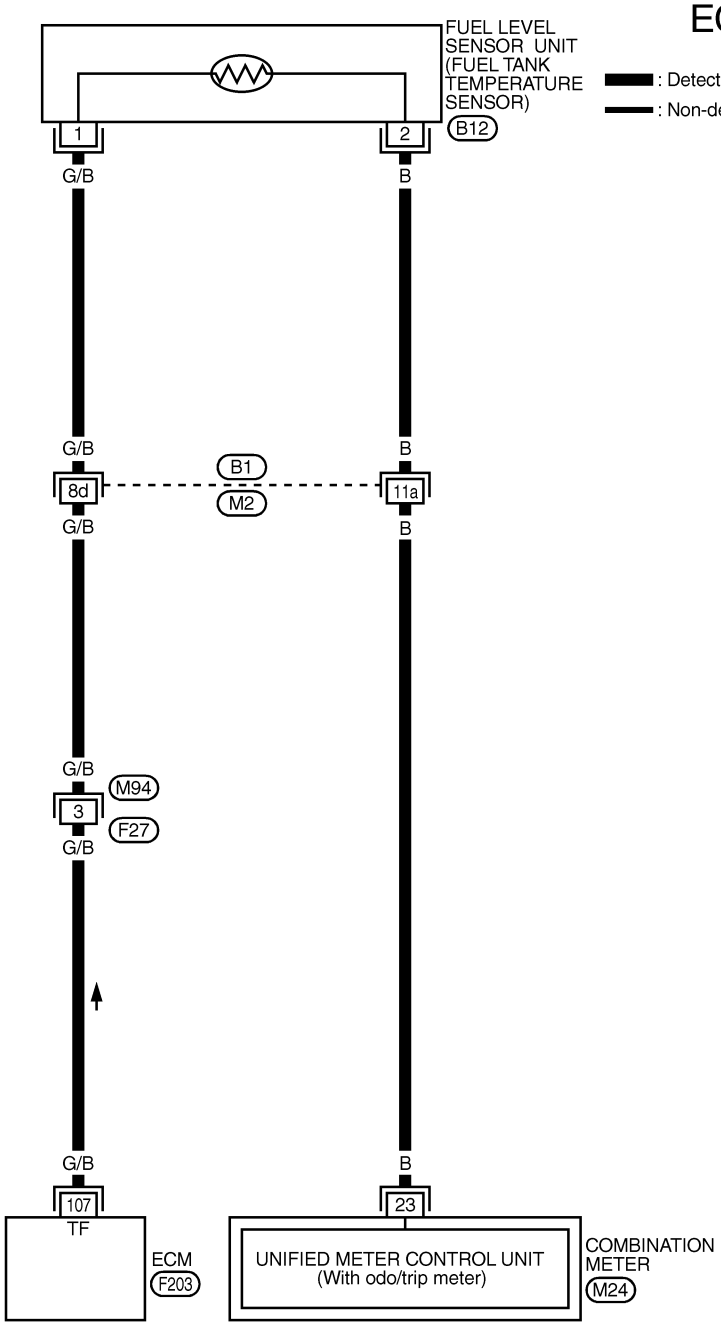
NAEC0922S02

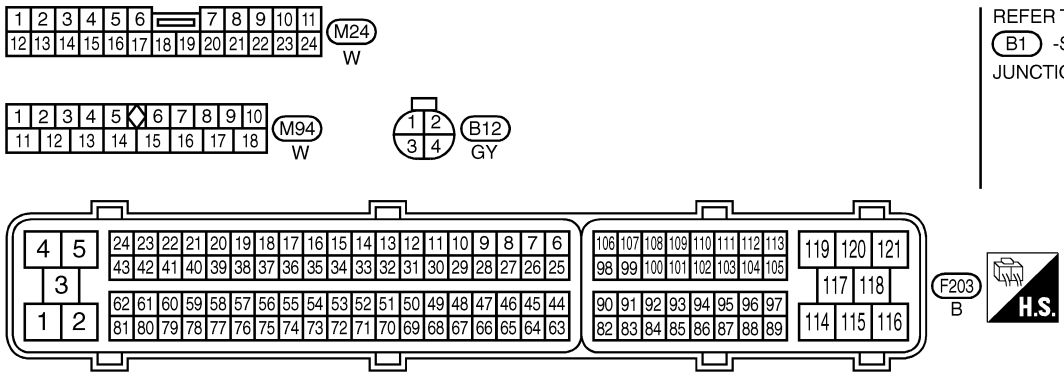
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC0923

EC-FTTS-01





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

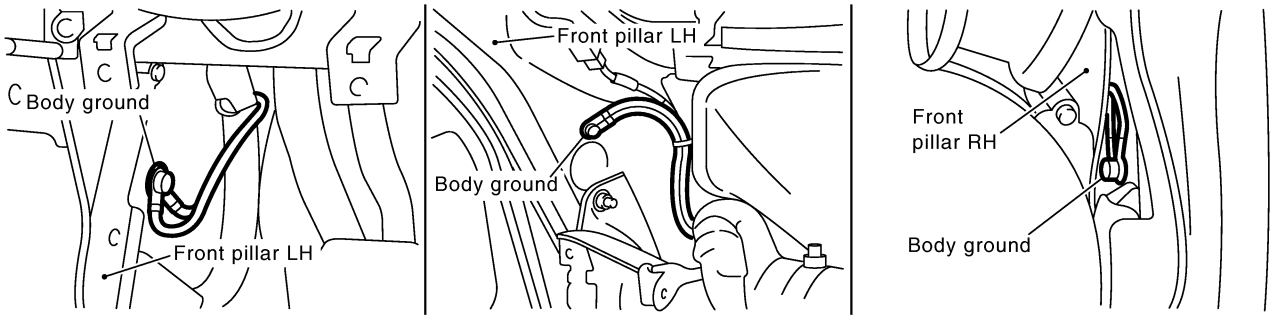
MEC093E

Diagnostic Procedure

NAEC0924

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



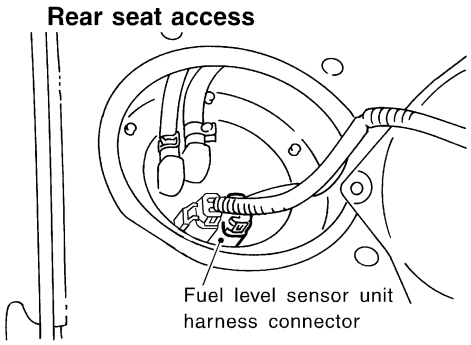
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

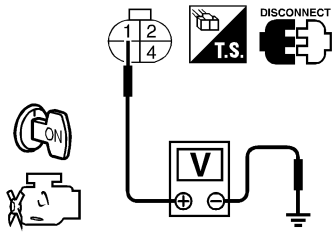
2	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.



SEF751UA

3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF973Y

OK or NG

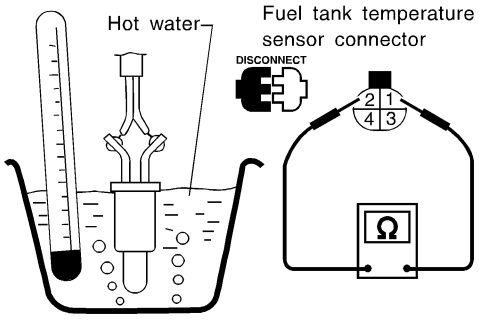
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between ECM and fuel level sensor unit	
▶	Repair harness or connector.

4	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect combination meter harness connector. 3. Check harness continuity between fuel level sensor unit terminal 2 and combination meter terminal 23. 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 B1, M2 ● Harness for open or short between combination meter and fuel level sensor unit	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

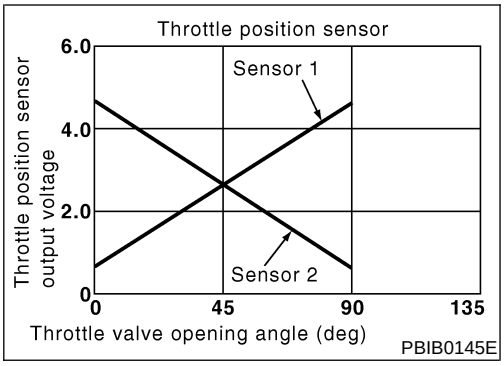
6	CHECK FUEL TANK TEMPERATURE SENSOR	
1. Remove fuel level sensor unit. 2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace fuel level sensor unit.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEF974Y

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1205

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

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC1206

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

ECM Terminals and Reference Value

NAEC1212

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
50	BR	Throttle position sensor 1	**[Ignition switch ON]** • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully released	More than 0.36V
			[Ignition switch ON] • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully depressed	Less than 4.75V
66	BR/Y	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	BR/W	Throttle position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch ON] ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V

On Board Diagnosis Logic

NAEC1207

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

NAEC1207S01

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

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NAEC1208

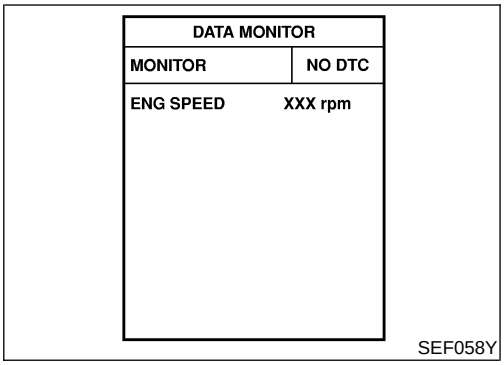
NOTE:

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.

DTC Confirmation Procedure (Cont'd)



With CONSULT-II

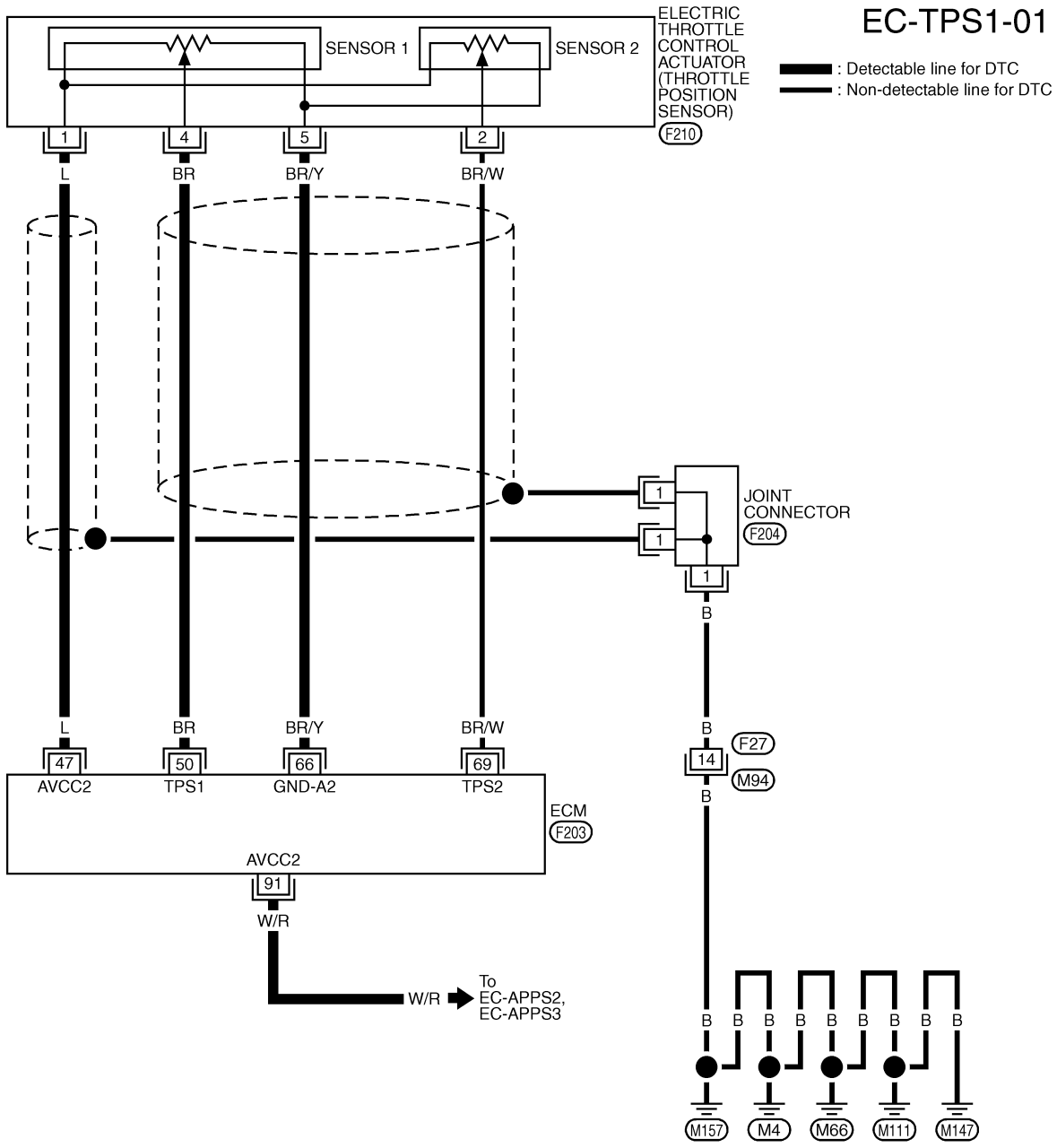
1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to "Diagnostic Procedure", EC-302.

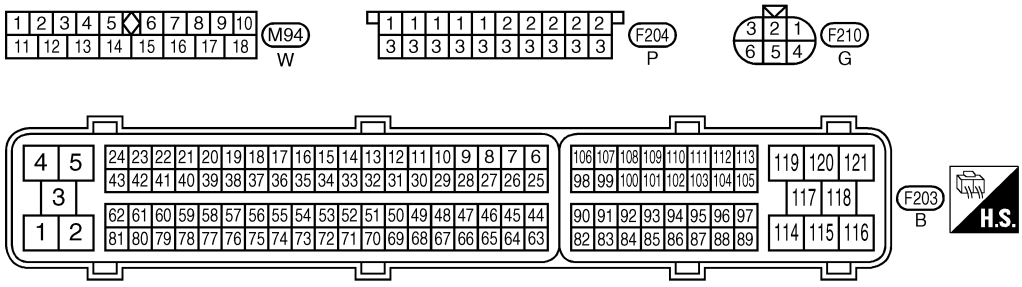
With GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NAEC1209





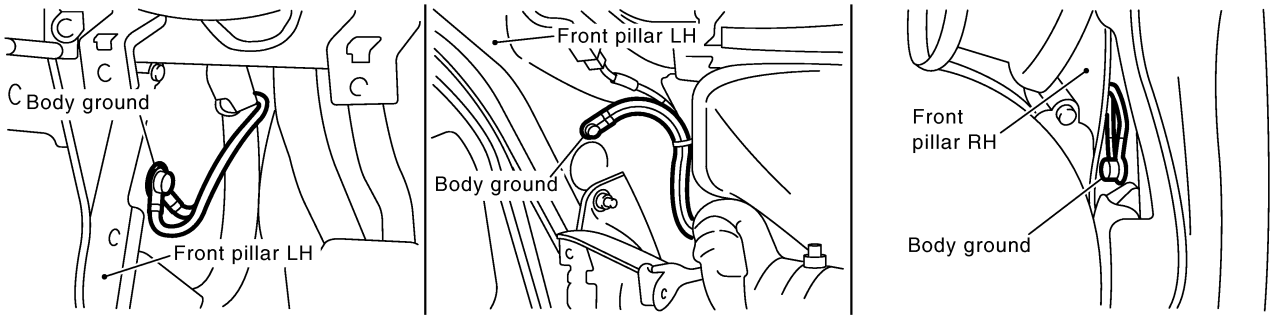
MEC745E

Diagnostic Procedure

NAEC1210

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



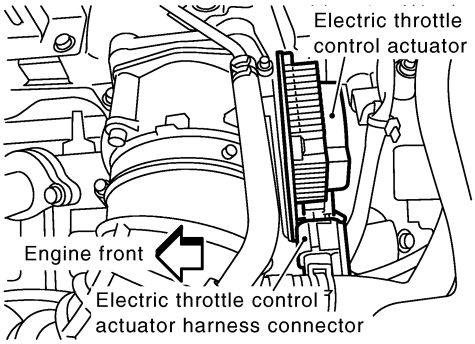
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

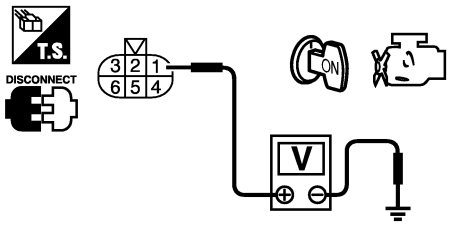
2	CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



SEC433D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace open circuit.

4	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.
- ECM terminal 47 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-693.
- ECM terminal 91 and APP sensor terminal 10. Refer to "Wiring Diagram", EC-685.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair short to ground or short to power in harness or connectors.

5	CHECK APP SENSOR

Refer to "Component Inspection", EC-689.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.
3. Perform "Throttle Valve Closed Position Learning", EC-73.
4. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

7	CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

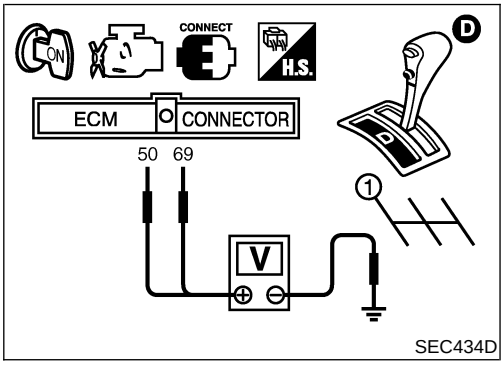
Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 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 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-304.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	GO TO 10.

10	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-73. 3. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Inspection

NAEC1211

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or "1st" position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1), 69 (TP sensor 2) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-73.
8. Perform "Idle Air Volume Learning", EC-73.

On Board Diagnosis Logic

NAEC0929

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	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 first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
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 second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The injector circuit is open or shorted • Injector • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Drive plate or flywheel • Heated oxygen sensor 1 • Incorrect PCV hose connection
P0301 0301	No. 1 cylinder misfire detected		
P0302 0302	No. 2 cylinder misfire detected		
P0303 0303	No. 3 cylinder misfire detected		
P0304 0304	No. 4 cylinder misfire detected		
P0305 0305	No. 5 cylinder misfire detected		
P0306 0306	No. 6 cylinder misfire detected		

4

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

SEF213Y

DTC Confirmation Procedure

NAEC0930

CAUTION:

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

NOTE:

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

WITH CONSULT-II

NAEC0930S01

1) Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Restart engine and let it idle for about 15 minutes.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-307.

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

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

Engine speed	Engine speed in the freeze frame data ±400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ±10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

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

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

WITH GST

NAEC0930S02

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NAEC0931

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak. 3. Check PCV hose connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3 PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.

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

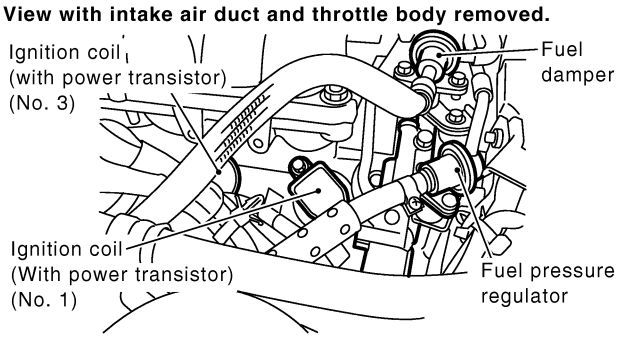
PBIB0133E

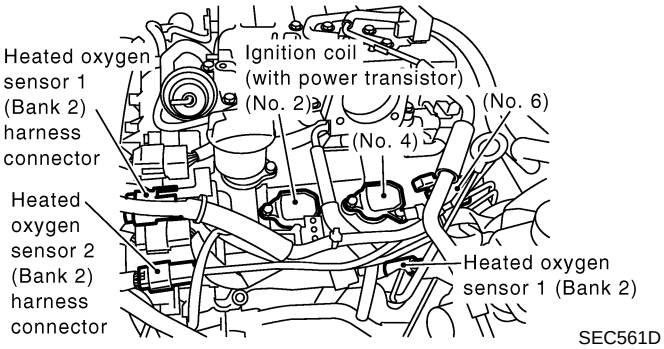
2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

View with intake air duct and throttle body removed.





SEC561D

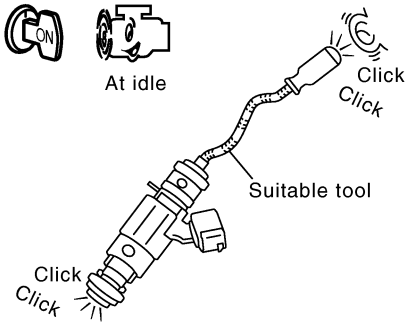
Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK INJECTOR

Does each injector make an operating sound at idle?



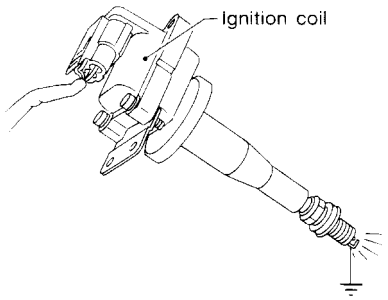
PBIB1725E

Yes or No

Yes	▶	GO TO 5.
No	▶	Check injector(s) and circuit(s). Refer to EC-724.

5	CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Remove ignition coil assembly from rocker cover.
3. Connect a known-good spark plug to the ignition coil assembly.
4. Disconnect all injector harness connectors.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.



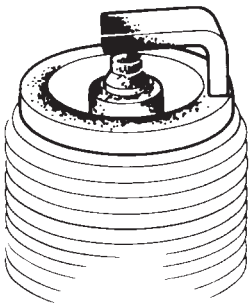
SEF575Q

OK or NG

OK	▶	GO TO 6.
NG	▶	Check ignition coil, power transistor and their circuits. Refer to "IGNITION SIGNAL", EC-714.

6	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-32, "ENGINE MAINTENANCE".

7	CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Measurement of Compression Pressure".

Standard:

1,275 kPa (13.0 kg/cm^2, 185 psi)/300 rpm

Minimum:

981 kPa (10.0 kg/cm^2, 142 psi)/300 rpm

Difference between each cylinder:

98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 8.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8	CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-56.
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-56.

At idling:

With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-729.)
- Fuel pressure regulator (Refer to EC-57.)
- Fuel lines (Refer to MA-17, "Checking Fuel Lines".)
- Fuel filter for clogging

	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

10	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-123.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL1368

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Follow the "Basic Inspection".

11	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L-R

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L-R

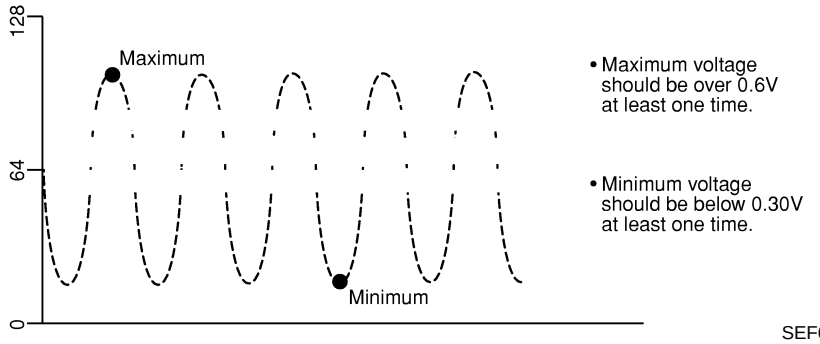
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

OK or NG

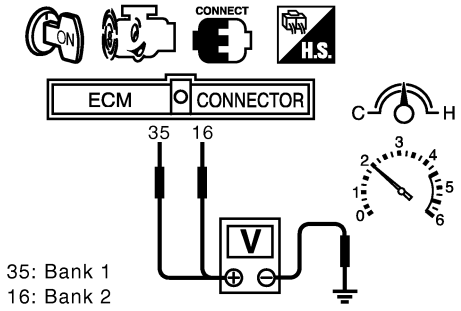
OK	▶	GO TO 13.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

13	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in MODE 1 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 14.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-194.

14	CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in "Symptom Matrix Chart", EC-131.

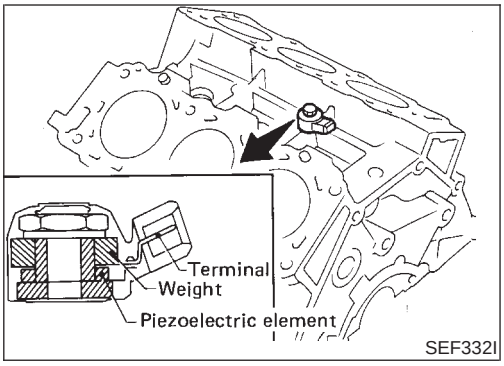
OK or NG

OK	▶	GO TO 15.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

15	ERASE THE 1ST TRIP DTC
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-91. Some tests may cause a 1st trip DTC to be set.	
▶	GO TO 16.

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC0932

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.

ECM Terminals and Reference Value

NAEC0933

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.

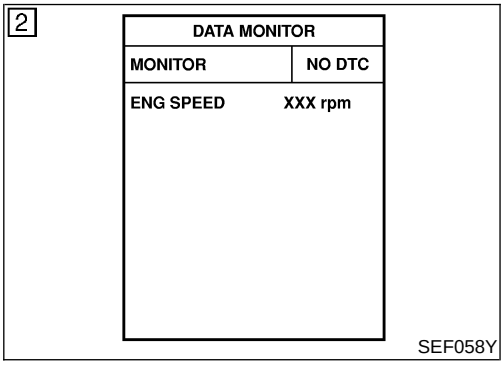
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

NAEC0934

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0327 0327	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
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	



DTC Confirmation Procedure

NAEC0935

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

NAEC0935S01

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II
2) Start engine and run it for at least 5 seconds at idle speed.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-316.

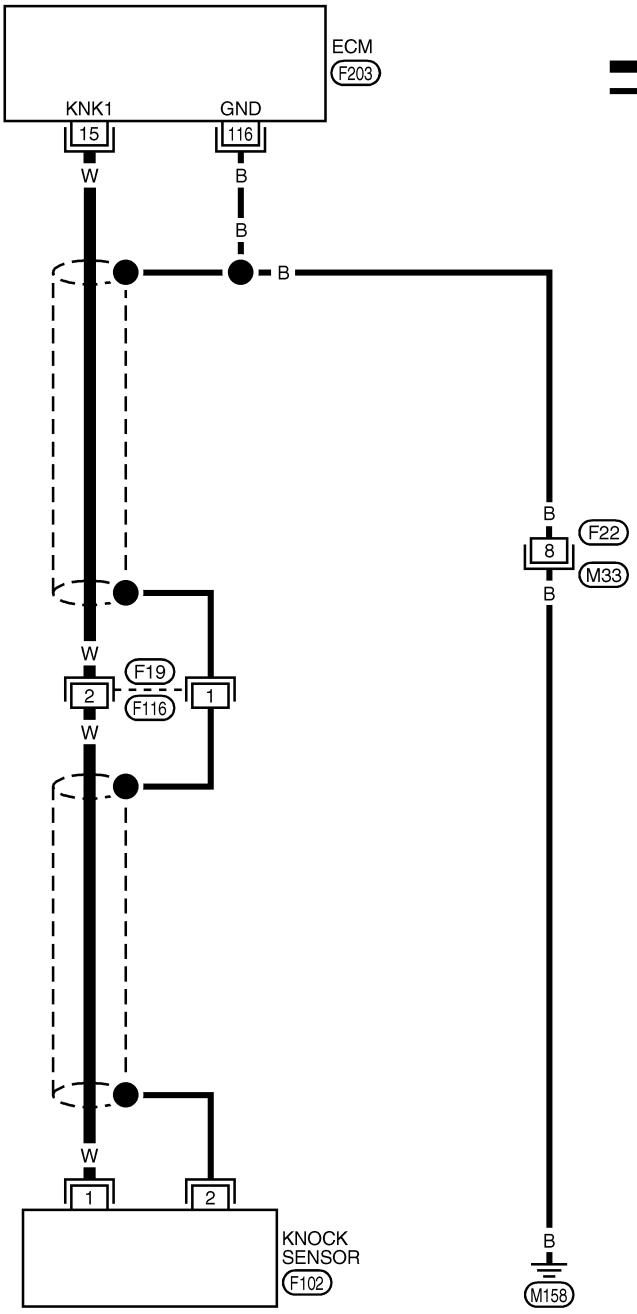
WITH GST

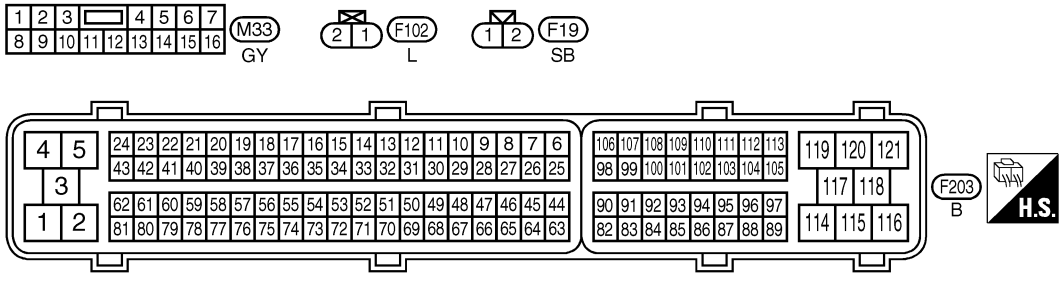
NAEC0935S03

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NAEC0936





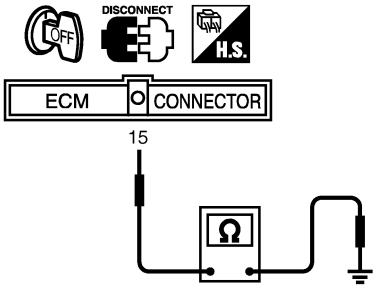
MEC094E

Diagnostic Procedure

NAEC0937

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 15 and ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.



SEC438D

Resistance:
Approximately 500 - 620 kΩ [at 25°C (77°F)]

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor 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 F19, F116
- Harness for open or short between ECM and knock sensor

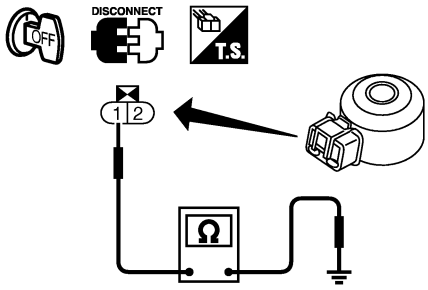
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.



SEC439D

Resistance: 500 - 620 kΩ [at 25°C (77°F)]

CAUTION:

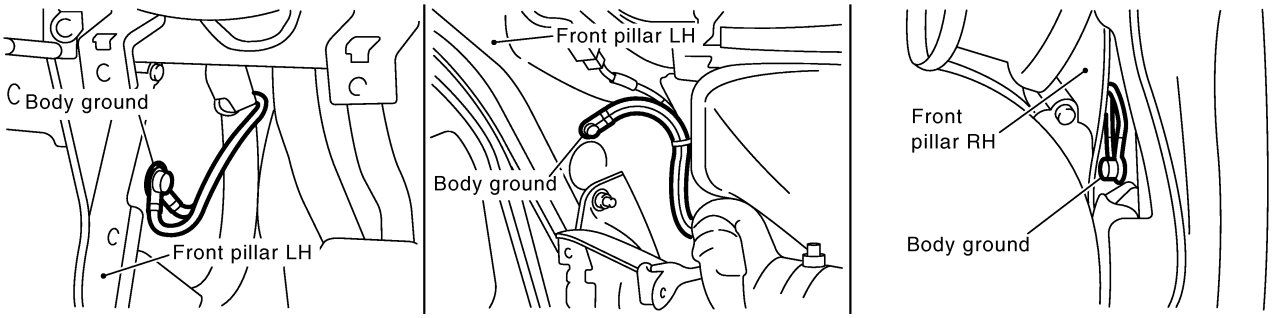
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



SEC997D

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace ground connections.

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to power.

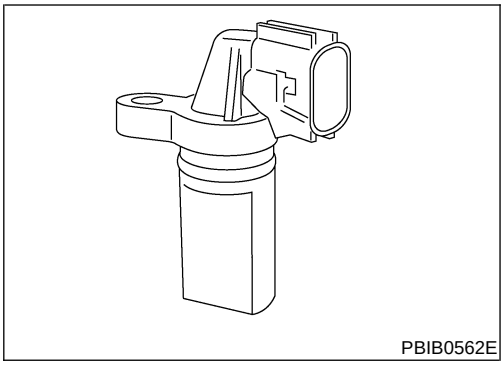
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F19, F116 ● Harness connectors F22, M33 ● Harness for open between harness connector knock sensor and ground	
▶	Repair open circuit or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**


PBIB0562E

Component Description

NAEC1213

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.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1214

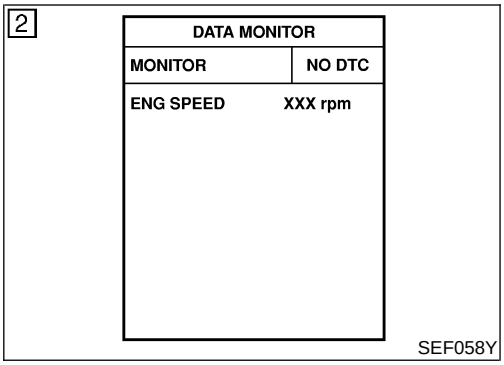
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

NAEC1215

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 signal (POS) is not in the normal pattern during engine running.	• Harness or connectors [The crankshaft position sensor (POS) circuit is open or shorted.] • Crankshaft position sensor (POS) • Signal plate



DTC Confirmation Procedure

=NAEC1216

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.

With CONSULT-II

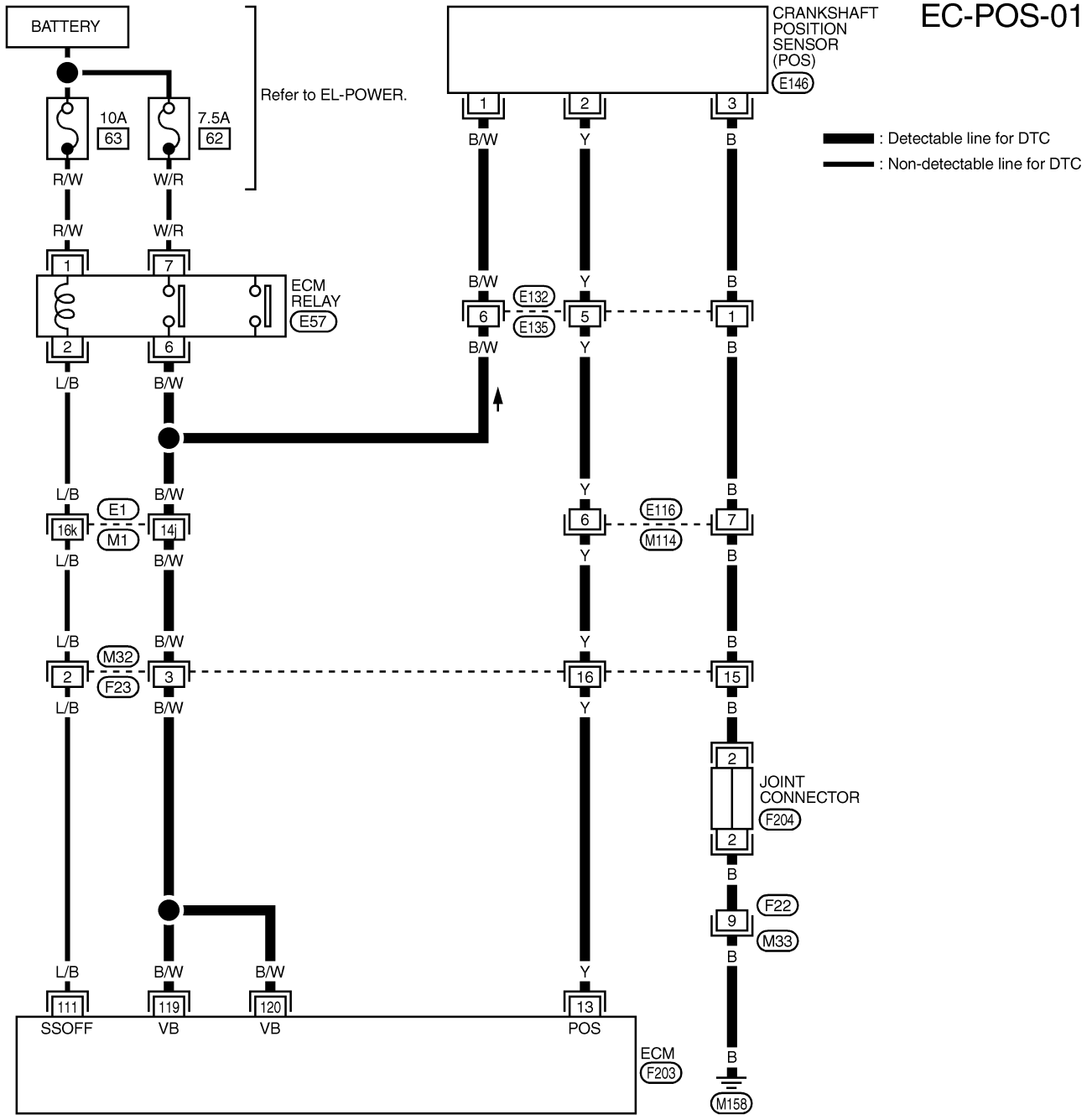
1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-322.
   If 1st trip DTC is not detected, go to next step.
4) Maintaining engine speed at more than 1,000 rpm for at least 5 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-322

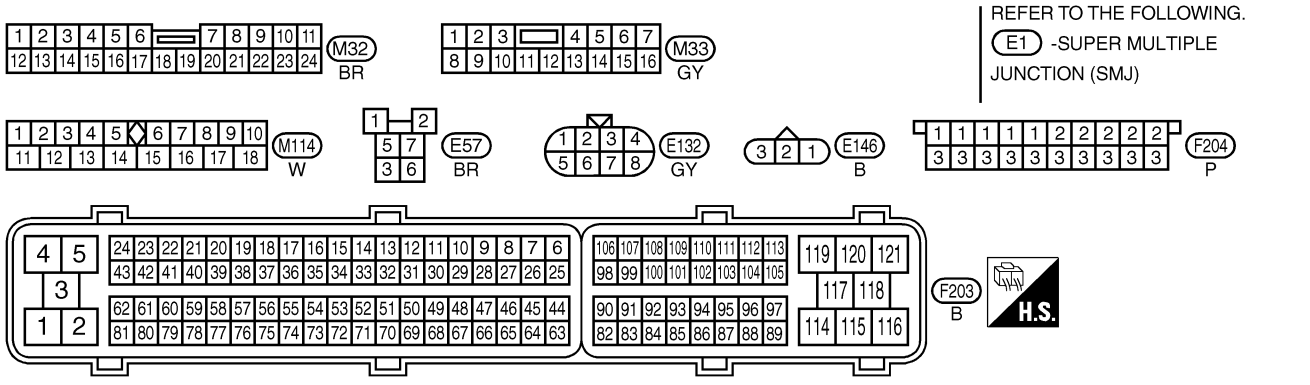
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NAEC1217





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

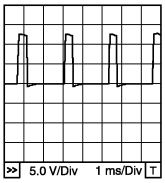
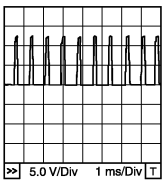
MEC095E

Wiring Diagram (Cont'd)

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed	Approximately 1.6V★  PBIB1041E
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 1.5V★  PBIB1042E

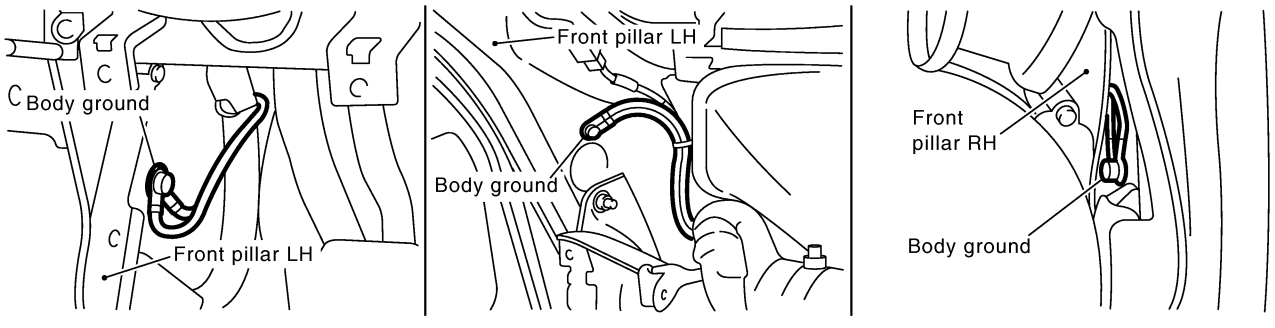
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

NAEC1218

1 CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



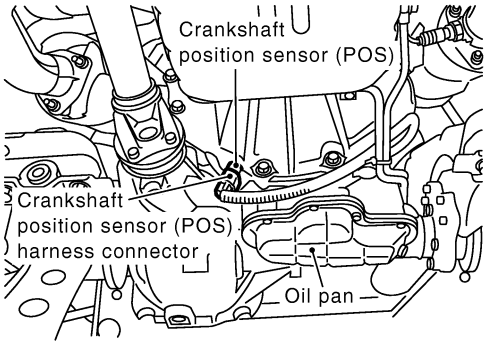
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

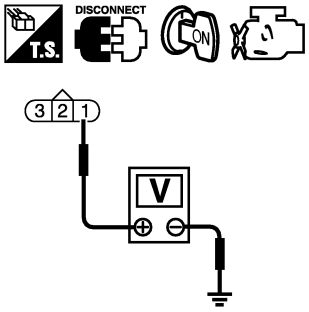
2	CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

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



SEC440D

2. Turn ignition switch ON.
3. Check voltage between crankshaft position sensor (POS) terminal 1 and ground with CONSULT-II or tester.



PBIB0664E

Voltage: Battery voltage

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 E132, E135
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between ECM relay and crankshaft position sensor (POS)
- Harness for open or short between ECM and crankshaft position sensor (POS)

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

4	CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between crankshaft position sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Joint connector F204 ● Harness connectors F22, M33 ● Harness for open between crankshaft position sensor (POS) and ground	
▶	Repair open circuit or short to power in harness or connectors.

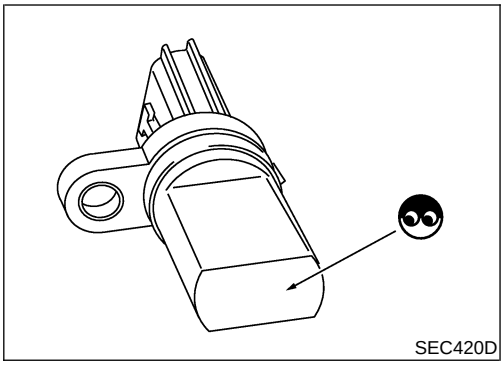
6	CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 13 and crankshaft position sensor (POS) terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

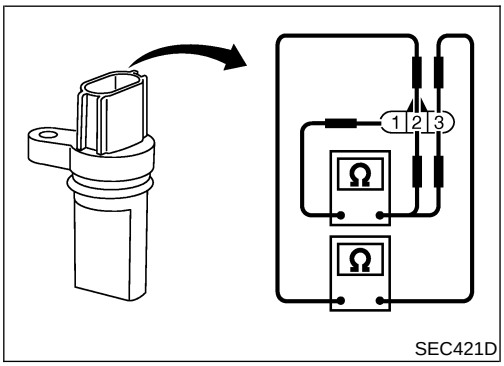
7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK CRANKSHAFT POSITION SENSOR (POS)
Refer to "Component Inspection", EC-325.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace crankshaft position sensor (POS).

9	CHECK GEAR TOOTH
Visually check for chipping signal plate gear tooth.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Replace the signal plate.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**


SEC420D



SEC421D

Component Inspection

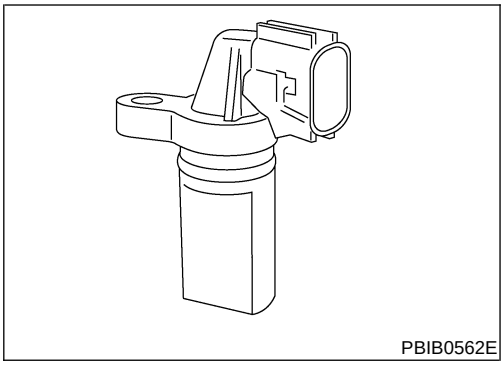
NAEC1219

CRANKSHAFT POSITION SENSOR (POS)

NAEC1219S01

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


PBIB0562E

Component Description

NAEC1220

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The crankshaft position sensor (POS) 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.

On Board Diagnosis Logic

NAEC1221

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0340 0340 (Bank 1) P0345 0345 (Bank 2)	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 [The camshaft position sensor (PHASE) circuit is open or shorted.] • Camshaft position sensor (PHASE) • Camshaft (Intake) • Starter motor (Refer to SC section.) • Starting system circuit (Refer to SC section.) • Dead (Weak) battery

DTC Confirmation Procedure

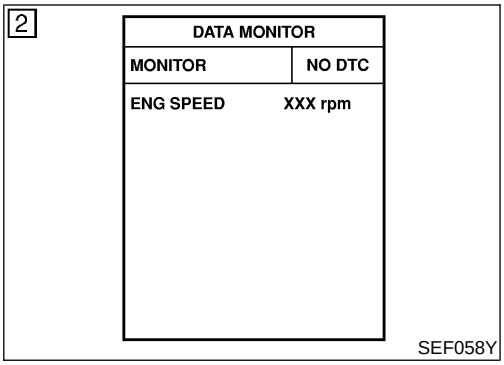
NAEC1222

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.



WITH CONSULT-II

NAEC1222S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-330. If 1st trip DTC is not detected, go to next step.
5) Maintaining engine speed at more than 1,000 rpm for at least 5 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-330.

WITH GST

NAEC1222S02

Follow the procedure "With CONSULT-II" above.

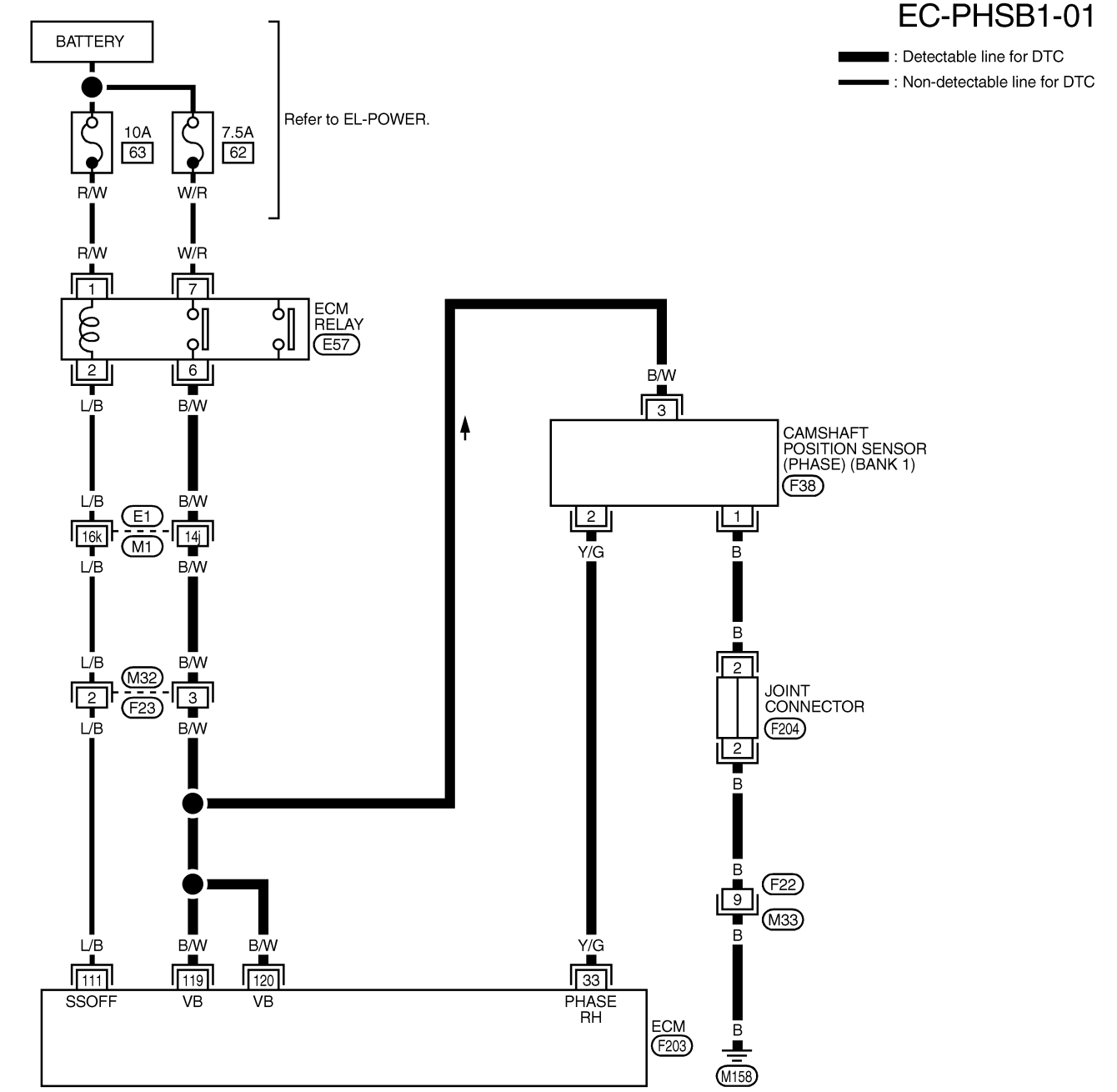
Wiring Diagram

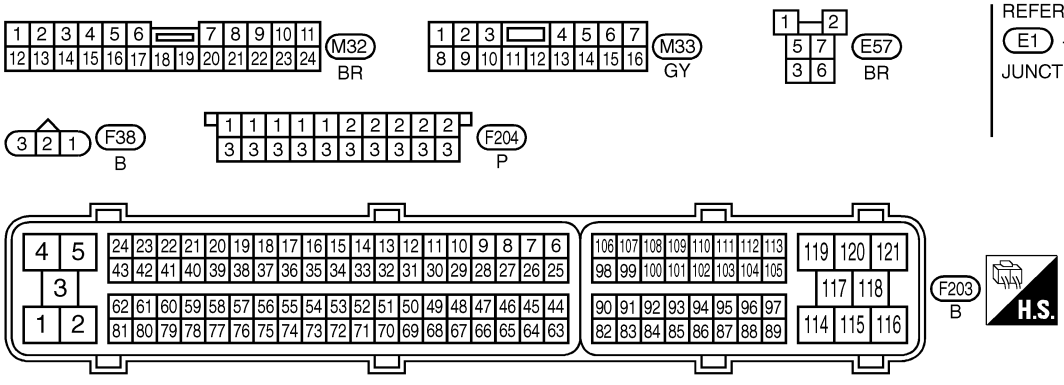
NAEC1223

NAEC1223S01

BANK 1

EC-PHSB1-01



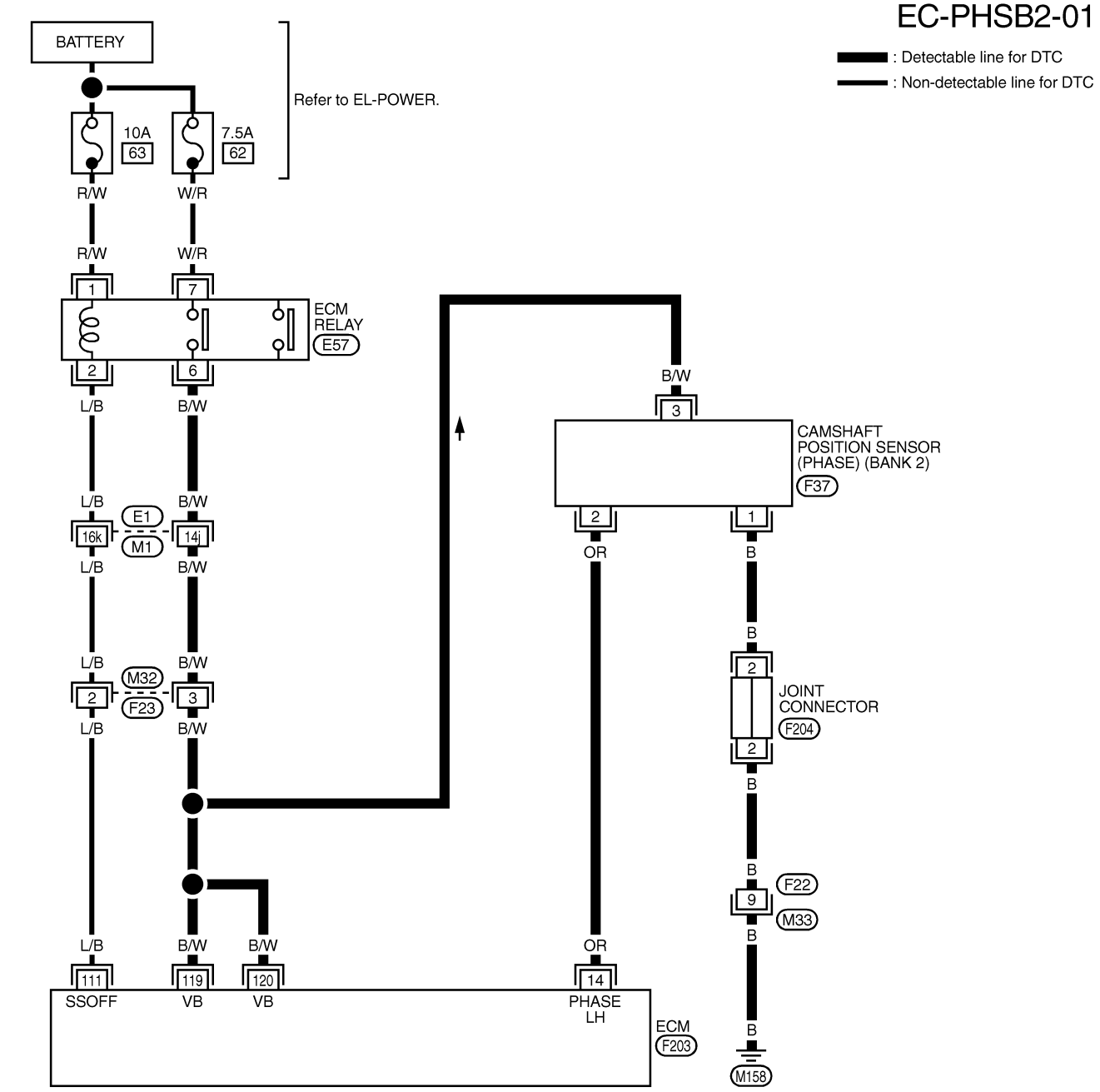


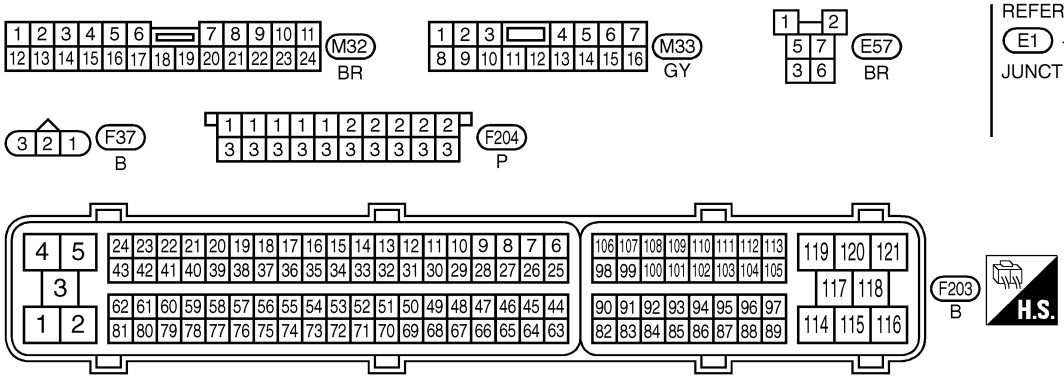
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC102E

BANK 2

NAEC1223S02





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

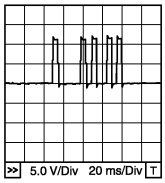
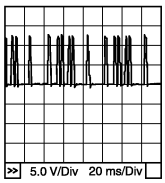
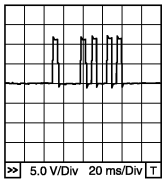
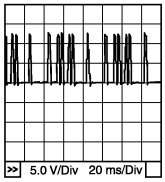
MEC103E

Wiring Diagram (Cont'd)

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	Y/G	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB1040E
14	OR	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB1040E

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

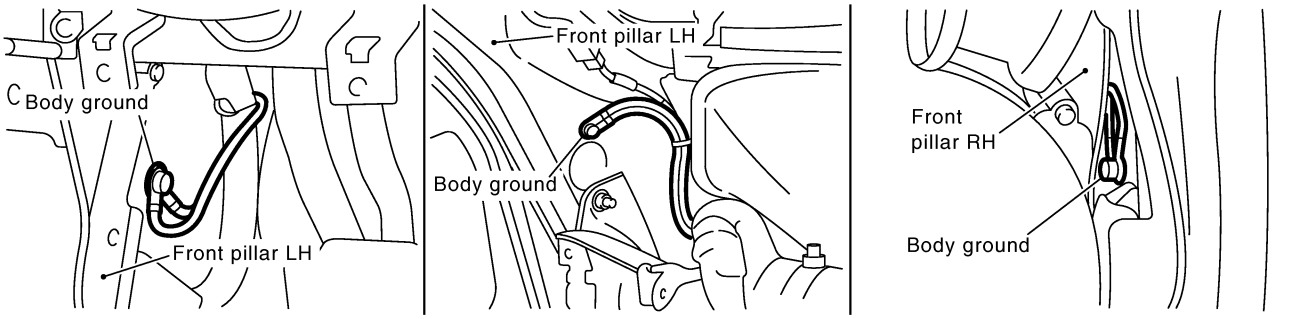
Diagnostic Procedure

NAEC1224

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-10, "STARTING SYSTEM".)

2	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



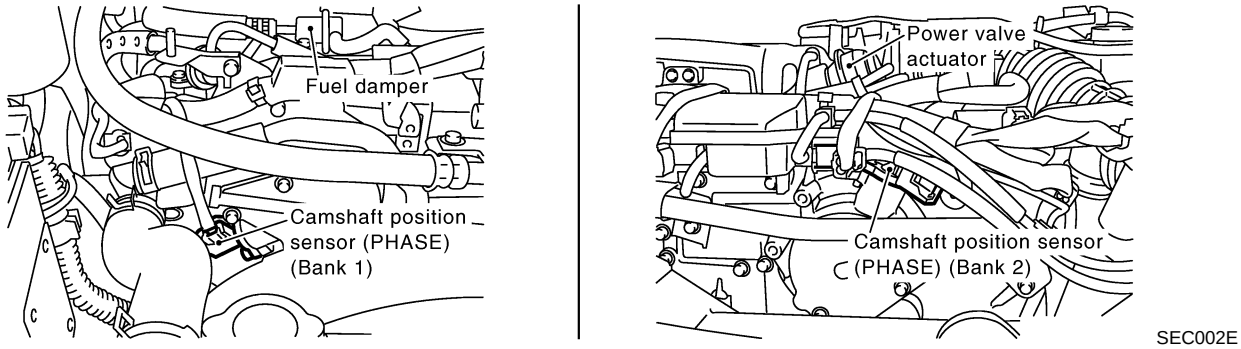
SEC997D

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace ground connections.

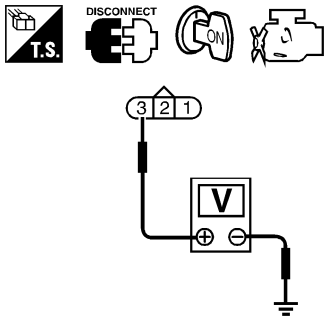
3	CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect CMP sensor (PHASE) harness connector (bank 1) or (bank 2).



SEC002E

2. Turn ignition switch ON.
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.



SEF479Y

Voltage: Battery voltage

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness for open or short between ECM and camshaft position sensor (PHASE) ● Harness for open or short between ECM relay and camshaft position sensor (PHASE)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

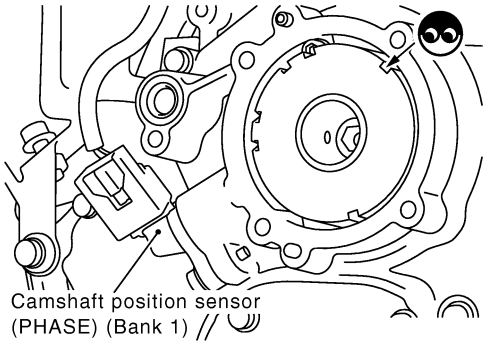
5	CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check CMP sensor (PHASE) terminal 1 and ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 7.
NG ▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector F204 ● Harness connectors F22, M33 ● Harness for open between camshaft position sensor (PHASE) and ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 33 and CMP sensor (PHASE) (Bank 1) terminal 2. 3. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) (Bank 2) 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 8.
NG ▶	Repair harness or connectors.

8	CHECK CAMSHAFT POSITION SENSOR (PHASE)
Refer to "Component Inspection", EC-333. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Replace camshaft position sensor (PHASE).

9	CHECK CAMSHAFT (INTAKE)	
Visually check for chipped signal plate at camshaft.		

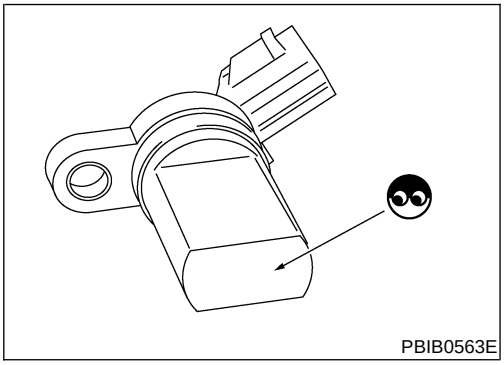


SEC578D

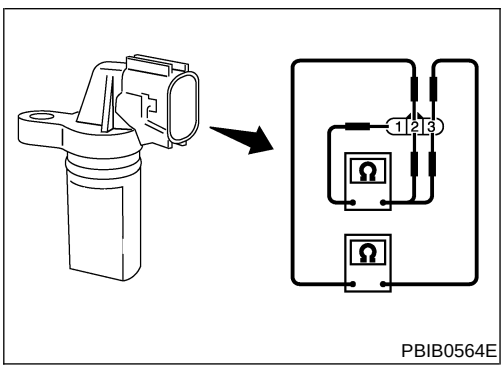
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace camshaft.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



PBIB0563E



PBIB0564E

Component Inspection

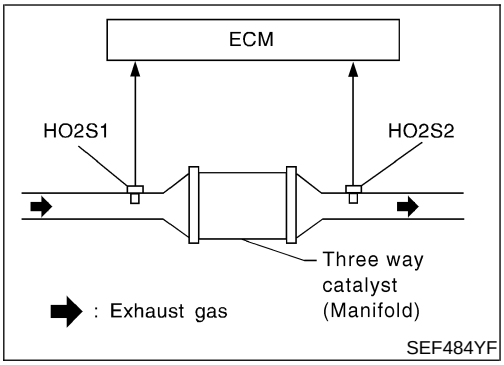
NAEC1225

CAMSHAFT POSITION SENSOR (PHASE)

NAEC1225S01

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown inthe figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (−)	Except 0 or ∞
1 (+) - 3 (−)	
2 (+) - 3 (−)	



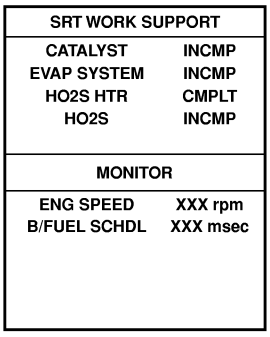
SEF484YF

On Board Diagnosis Logic

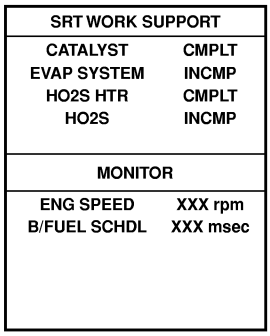
NAEC0951

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

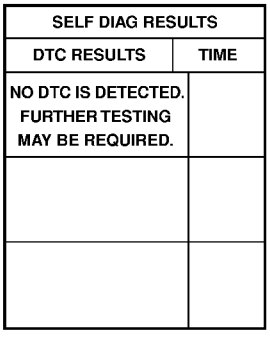
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0420 0420 (Bank 1)	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Injector • Injector leaks • Spark plug • Improper ignition timing
P0430 0430 (Bank 2)			



SEC138D



SEC139D



SEF560X

DTC Confirmation Procedure

NAEC0952

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

WITH CONSULT-II

NAEC0952S01

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) 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) Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
7) 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 “COMPLT”, go to step 10.
8) Wait 5 seconds at idle.
9) 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”, perform the following.

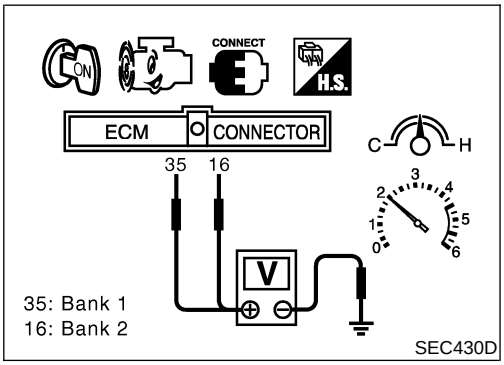
a) Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b) Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c) Start engine and warm it up while monitoring “COOLAN

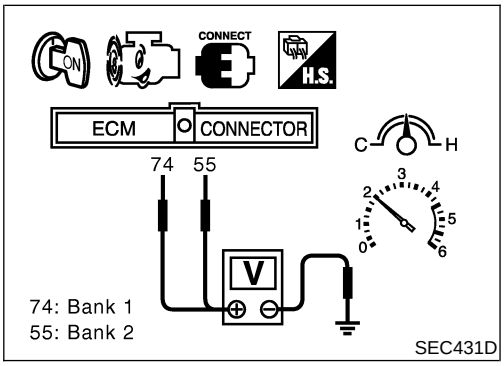
TEMP/S" indication on CONSULT-II.

d) When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

10) Select "SELF-DIAG RESULTS" mode with CONSULT-II.

11) Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-335.





Overall Function Check

NAEC0953

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

NAEC0953S01

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 voltmeters probes between ECM terminals 35 [heated oxygen sensor 1 bank 1 signal], 16 [heated oxygen sensor 1 bank 2 signal] and ground, and ECM terminals 74 [heated oxygen sensor 2 bank 1 signal], 55 [heated oxygen sensor 2 bank 2 signal] and ground.
6) Keep engine speed at 2,000 rpm constant under no load.
7) Make sure that the voltage switching frequency (high & low) between ECM terminals 74 and ground, or 55 and ground is very less than that of ECM terminals 35 and ground, or 16 and ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-335.

NOTE:
If the voltage at terminal 16 or 35 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-233.)

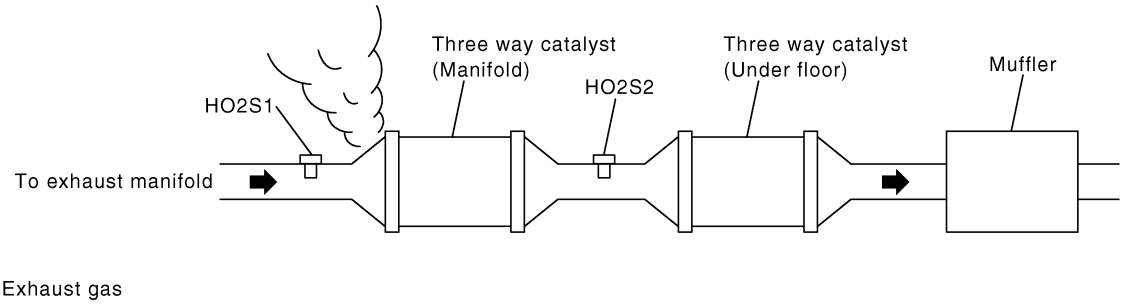
Diagnostic Procedure

NAEC0954

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



SEC502D

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 "Basic Inspection", EC-123.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

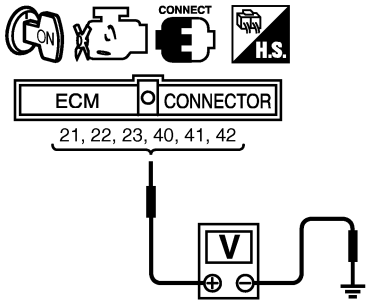
MTBL1368

OK or NG

OK	▶	GO TO 5.
NG	▶	Follow the "Basic Inspection".

5	CHECK INJECTORS

1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42 and ground with CONSULT-II or tester.
   Refer to WIRING DIAGRAM for Injectors, EC-725.



SEC516D

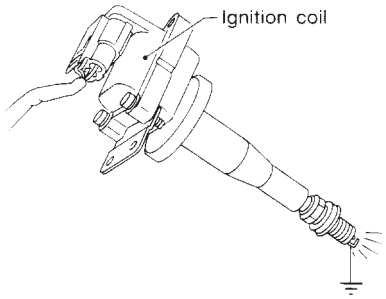
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-726.

6	CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Remove ignition coil assembly from rocker cover.
3. Connect a known-good spark plug to the ignition coil assembly.
4. Disconnect all injector harness connectors.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.



SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Check ignition coil with power transistor and their circuit. Refer to EC-714.

Diagnostic Procedure (Cont'd)

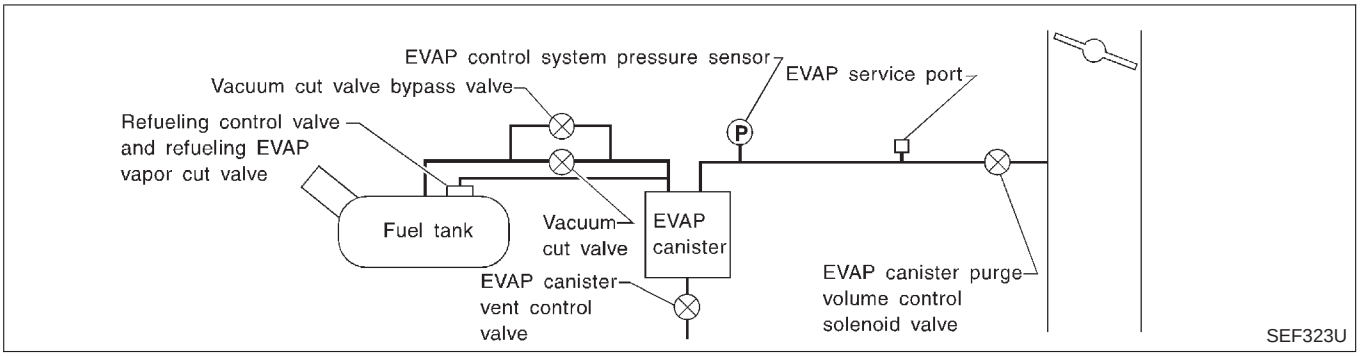
7	CHECK INJECTOR	
1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Reconnect injector harness connectors. 5. Turn ignition switch ON. Make sure fuel does not drip from injector.		
OK or NG		
OK (Does not drip.)	▶	GO TO 8.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace three way catalyst (manifold).

System Description

NAEC0955

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



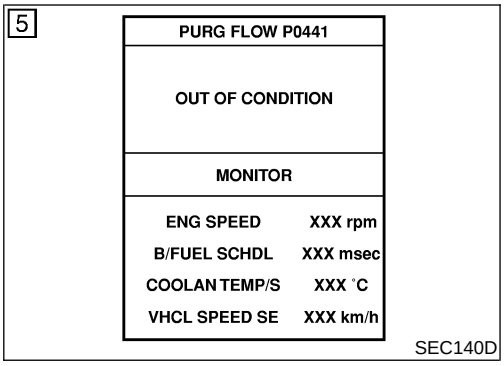
In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow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

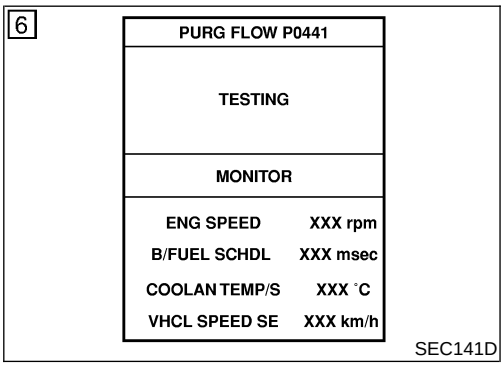
On Board Diagnosis Logic

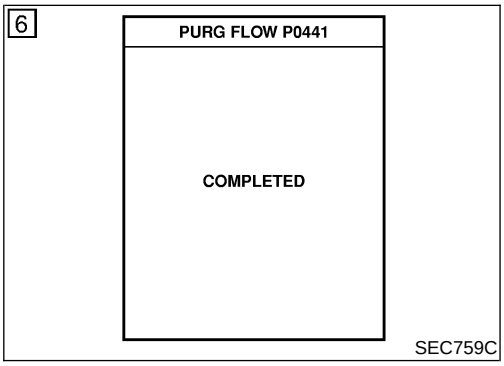
NAEC0956

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

NAEC0957

CAUTION:
Always drive vehicle at a safe speed.

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

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

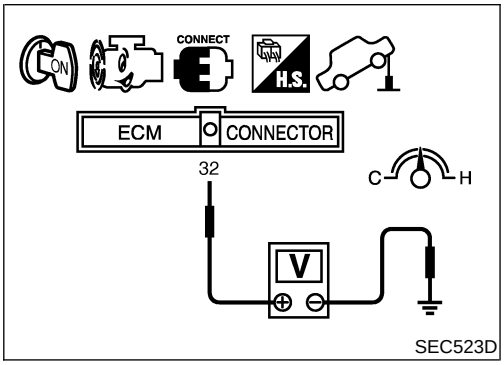
NAEC0957S01

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 70 seconds.
4) Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5) Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 10 msec
Engine coolant temperature	More than 20°C (68°F)

If “TESTING” is not changed for a long time, retry from step 2.

7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-342.



Overall Function Check

NAEC0958

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

NAEC0958S01

1) Lift up drive wheels.
2) Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3) Turn ignition switch OFF, wait at least 10 seconds.
4) Start engine and wait at least 70 seconds.

5) Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
6) Check EVAP control system pressure sensor value at idle speed and note it.
7) Establish and maintain the following conditions for at least 1 minute.

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

8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9) If NG, go to "Diagnostic Procedure", EC-342.

Diagnostic Procedure

=NAEC0959

1	CHECK EVAP CANISTER

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

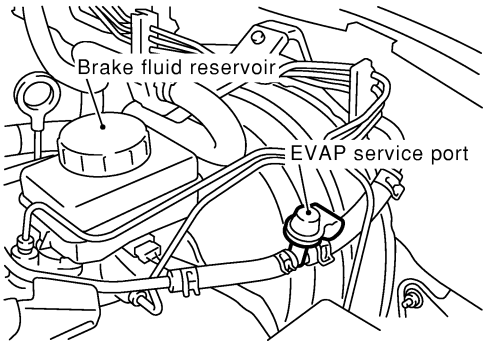
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF983Y

2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

PURG VOL CONT/V	VACUUM
100%	Should exist
0%	Should not exist

MTBL1805

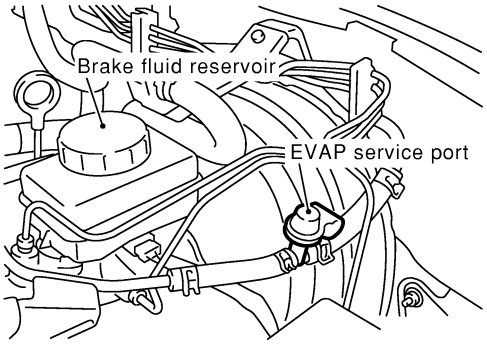
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

3	CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF983Y

4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.
   Vacuum should exist.
6. Release the accelerator pedal fully and let idle.
   Vacuum should not 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 "EVAPORATIVE EMISSION LINE DRAWING", EC-42.

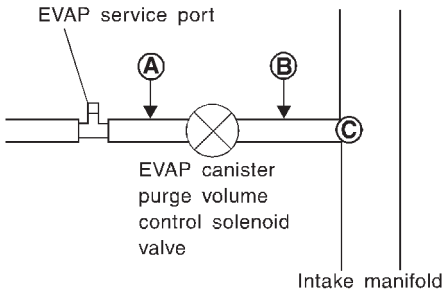
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

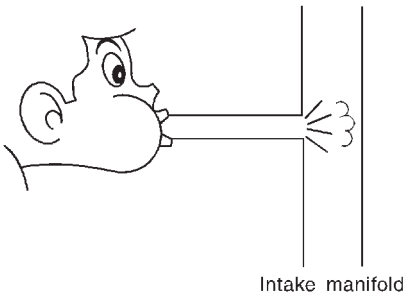
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

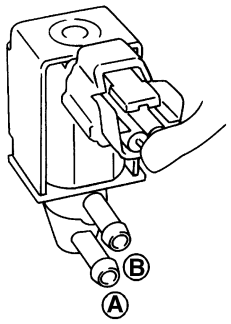
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

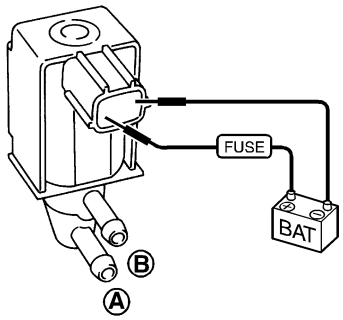


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

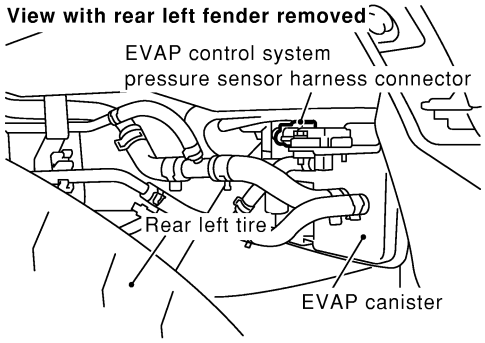
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEC931C

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to "DTC Confirmation Procedure" for DTC P0452, EC-378 and P0453, EC-384.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

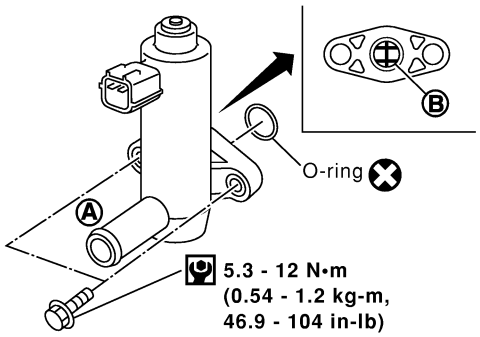
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean the rubber tube using an air blower.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

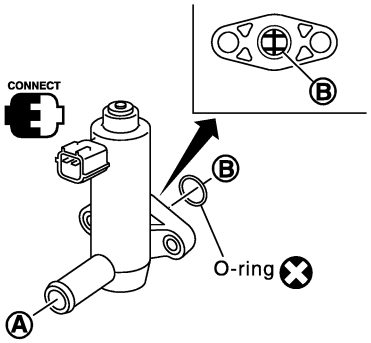
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



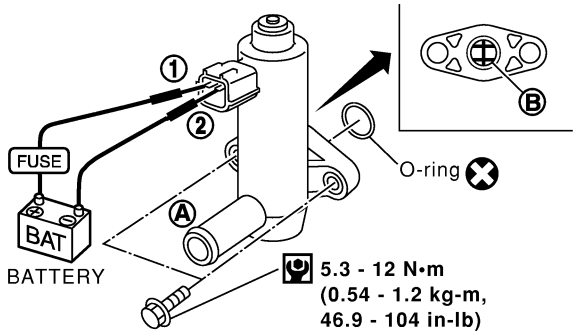
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace it.

Diagnostic Procedure (Cont'd)

16	**CLEAN EVAP PURGE LINE**
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 17.

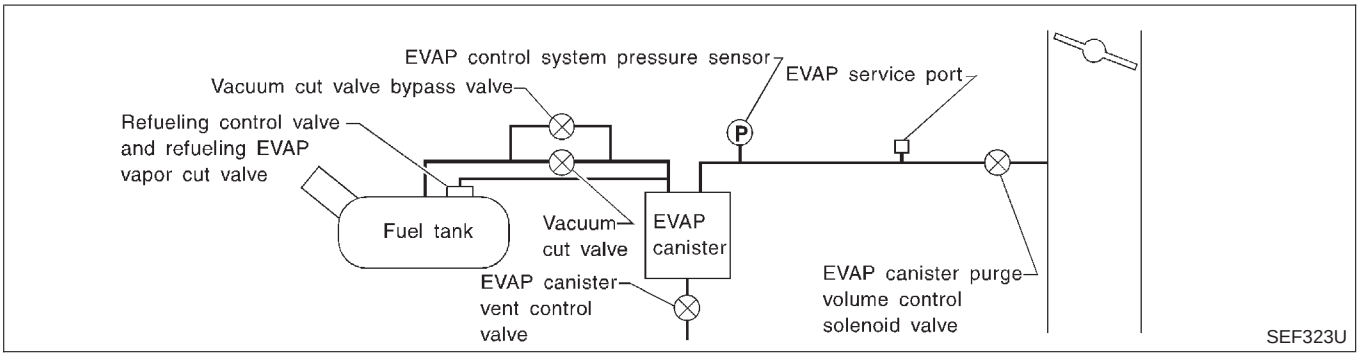
17	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0960

NOTE:
If DTC P0442 is displayed with P1448, first perform trouble diagnosis for DTC P1448. (See EC-602.)

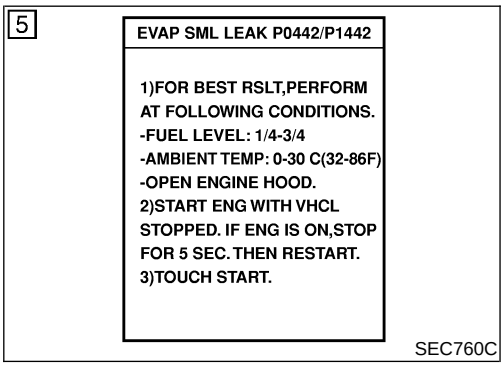
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



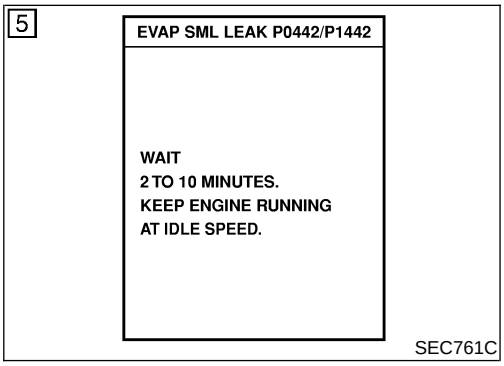
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel 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 • Blocked or bent rubber tube to EVAP control system pressure sensor • 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. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling control valve • ORVR system leaks

CAUTION:

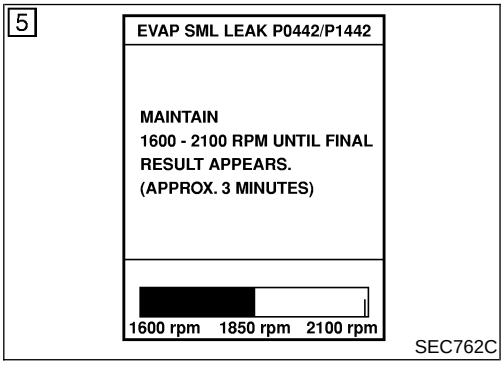
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



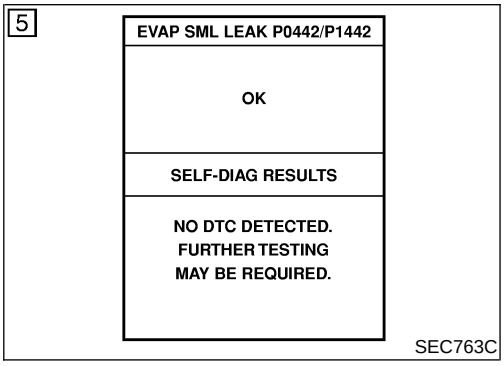
SEC760C



SEC761C



SEC762C



SEC763C

DTC Confirmation Procedure

NAEC0961

NOTE:

- **If DTC P0442 is displayed with P1448, first perform trouble diagnosis for DTC P1448 (See EC-602).**
- 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 procedure.**

WITH CONSULT-II

NAEC0961S01

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5) Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-123.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-351.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NAEC0961S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-84 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-84.
3) Stop vehicle.
4) Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5) Select "MODE 7" with GST.

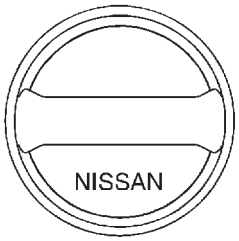
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", EC-351.
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0441, EC-342.

Diagnostic Procedure

NAEC0962

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

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	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

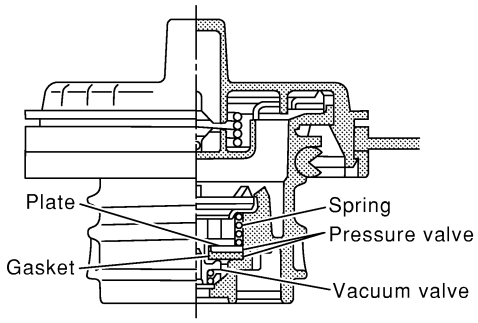
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

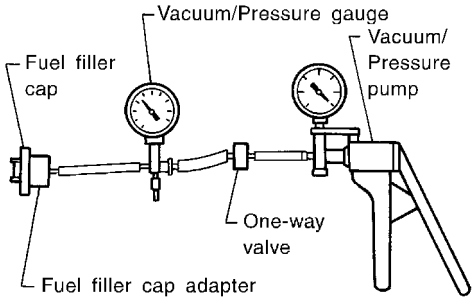
Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

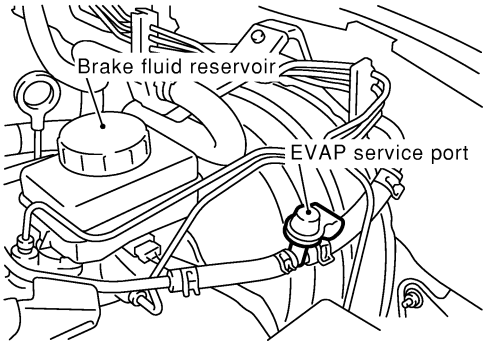
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

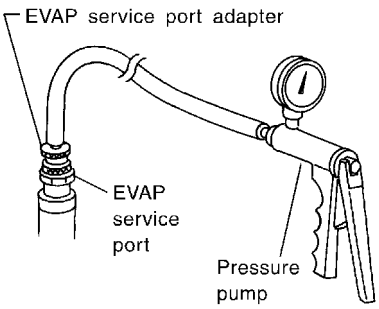
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

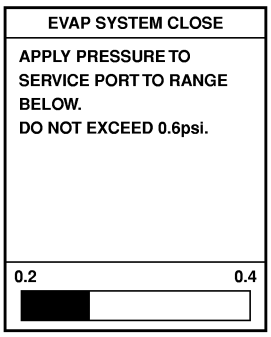
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II	▶	GO TO 6.
Without CONSULT-II	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

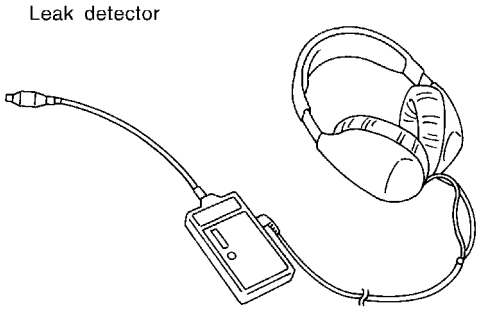
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

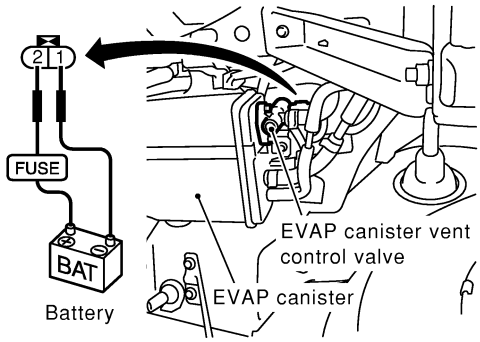
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

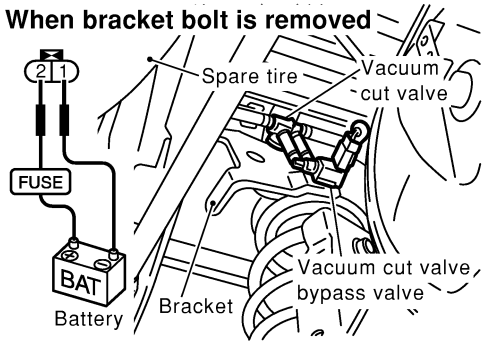
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



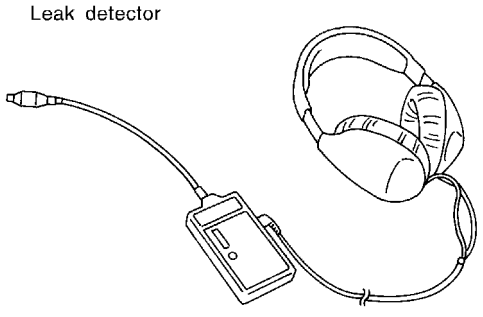
SEC930C

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEC932C

4. 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.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

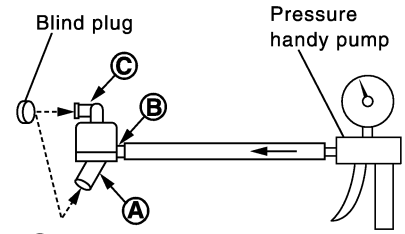
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* A : Bottom hole (To atmosphere)
B : Emergency tube (From EVAP canister)
C : Inlet port (To member)

PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

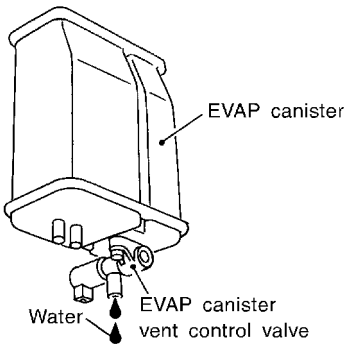
Refer to "DTC Confirmation Procedure", EC-372.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-32.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

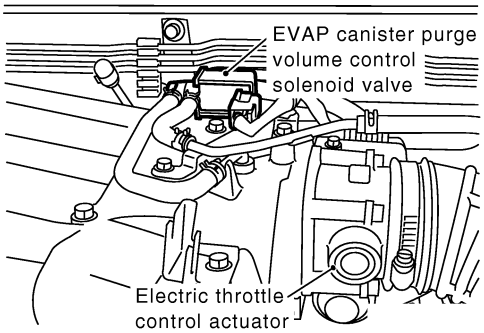
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

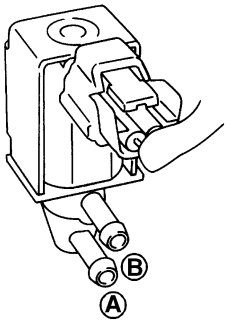
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D

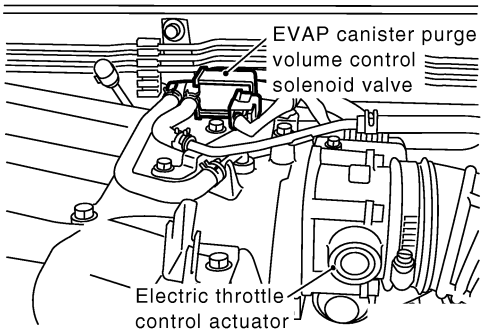


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

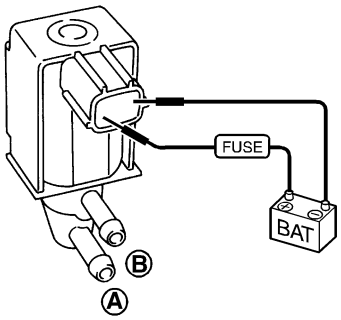
SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

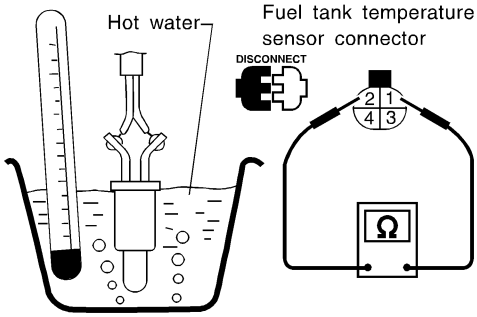
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

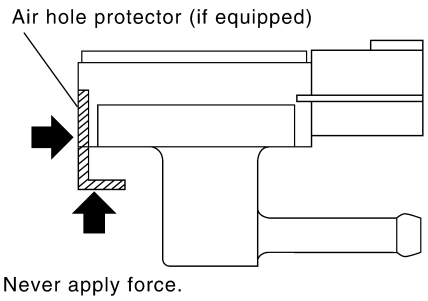
SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

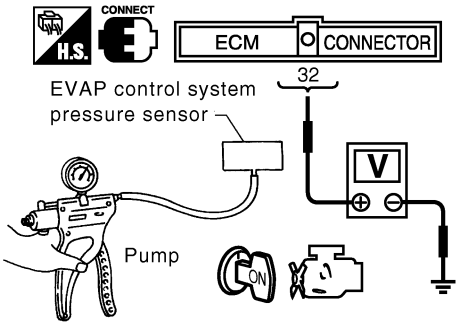
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-38.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

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

	▶	GO TO 22.

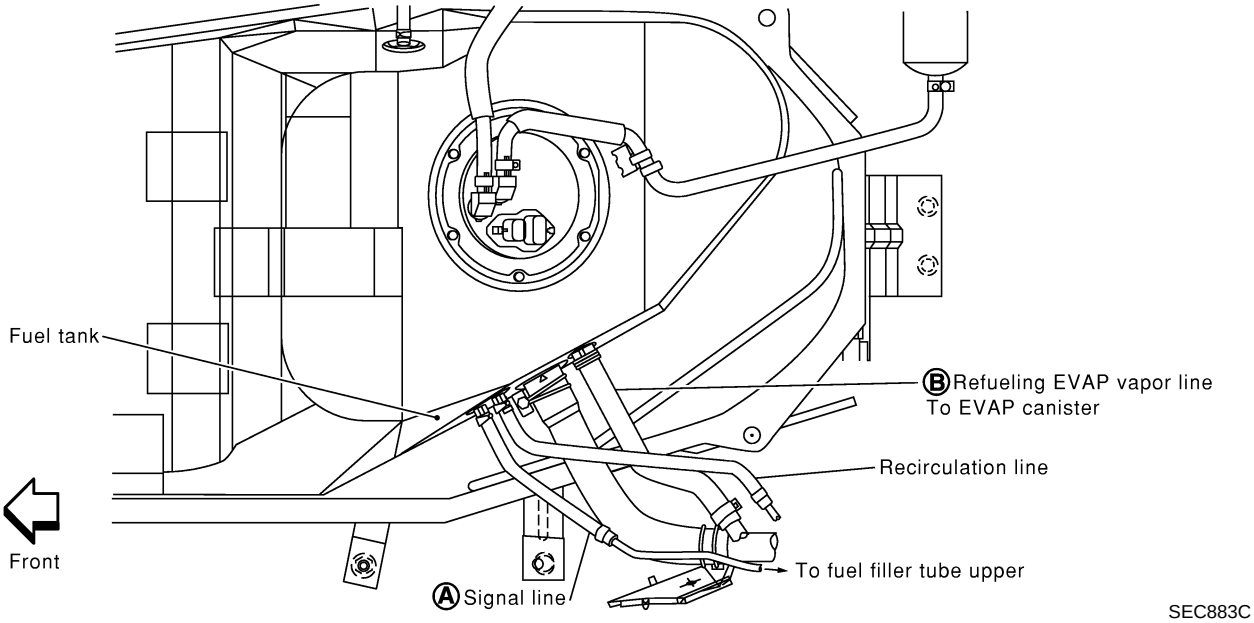
Diagnostic Procedure (Cont'd)

22	CHECK REFUELING EVAP VAPOR LINE	
• Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE	
• Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

24 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



OK or NG		
OK	▶	GO TO 25.
NG	▶	Replace or refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-125, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Description

NAEC0963

SYSTEM DESCRIPTION

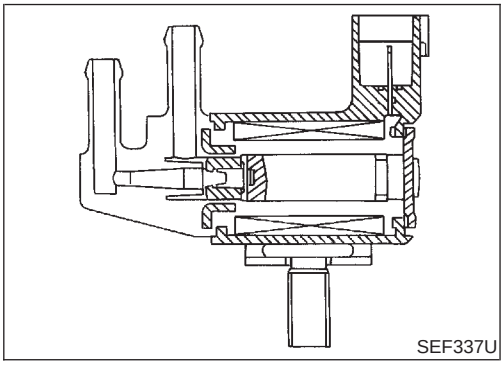
NAEC0963S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2 and piston position	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed signal*1	Vehicle speed		

*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.

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.


SEF337U

COMPONENT DESCRIPTION

NAEC0963S02

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC0964

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

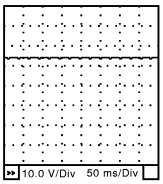
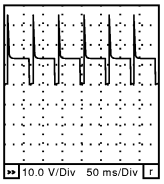
ECM Terminals and Reference Value

NAEC0965

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

CAUTION:

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

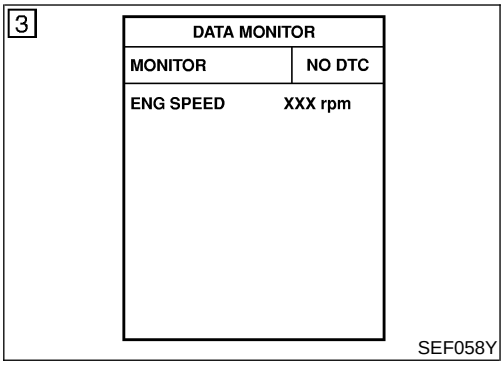
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)★  SEC991C

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

On Board Diagnosis Logic

NAEC0966

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 sensor 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 sensor circuit is shorted.) ● EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NAEC0967

NOTE:

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

TESTING CONDITION:

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

WITH CONSULT-II

NAEC0967S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 13 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-368.

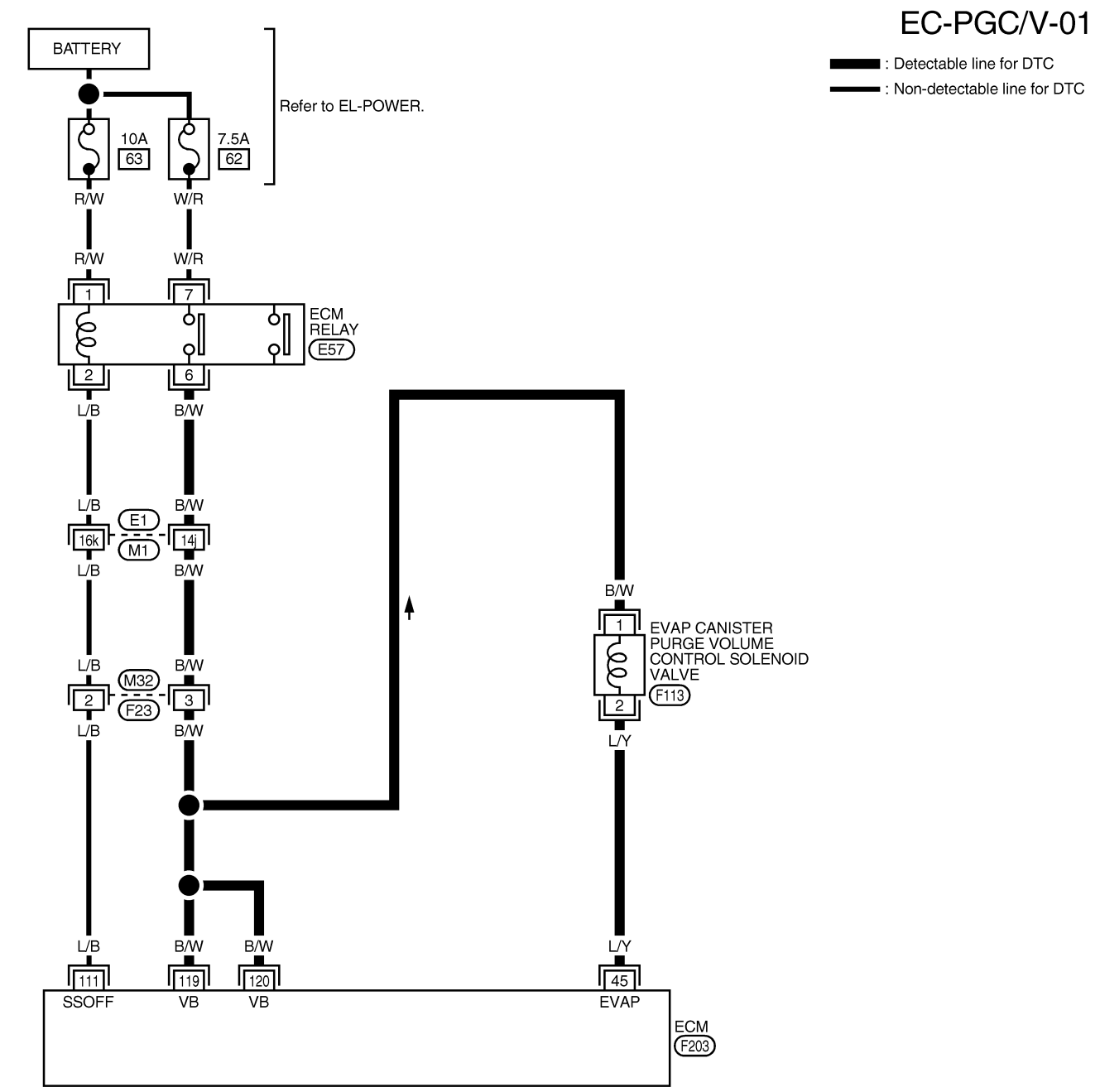
WITH GST

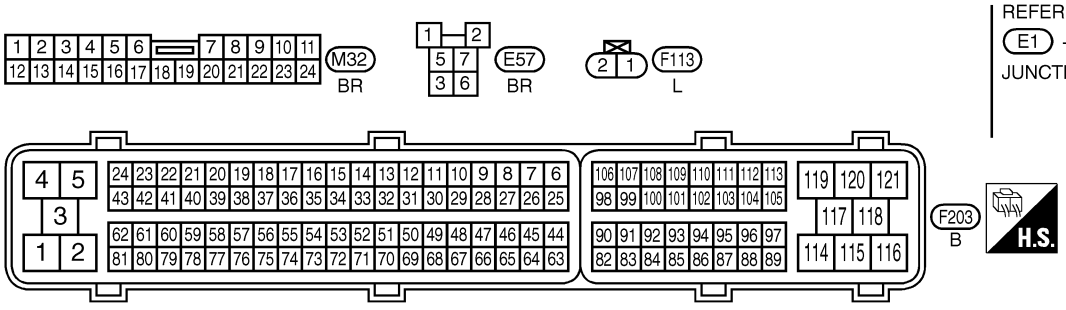
NAEC0967S02

Follow the proocedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0968





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

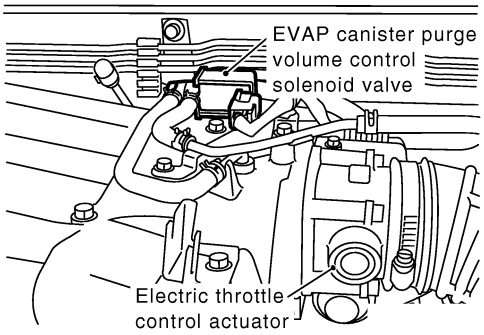
MEC096E

Diagnostic Procedure

NAEC0969

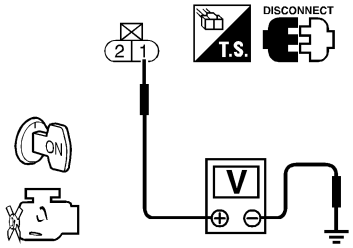
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEC524D

3. Turn ignition switch ON.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF988Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay

	▶	Repair open circuit or short to ground and 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 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground and short to power in harness or connetors.

4	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

OK or NG

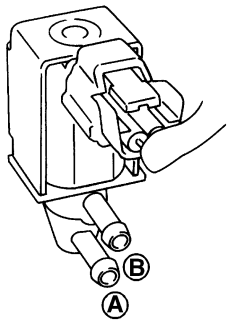
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

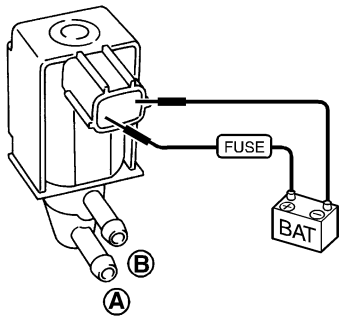


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



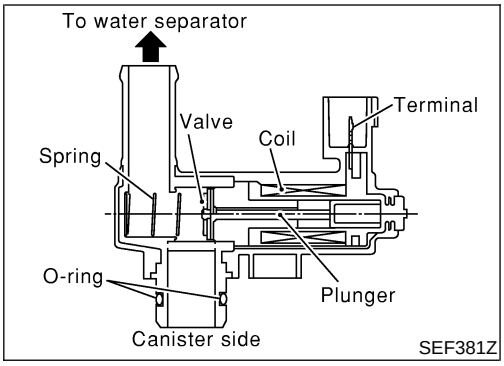
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

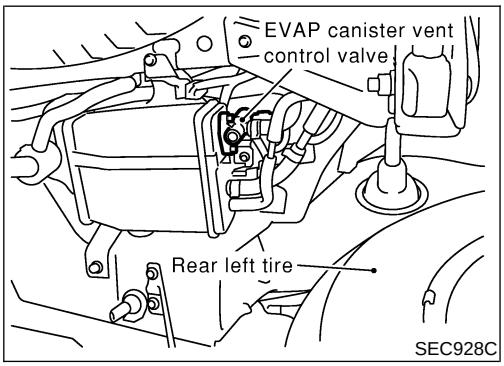
SEF335X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC0970

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 (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0971

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0972

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	G/R	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0973

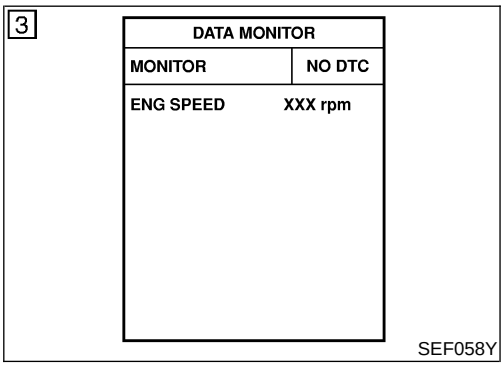
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC Confirmation Procedure

NAEC0974

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

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



WITH CONSULT-II

NAEC0974S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-374.

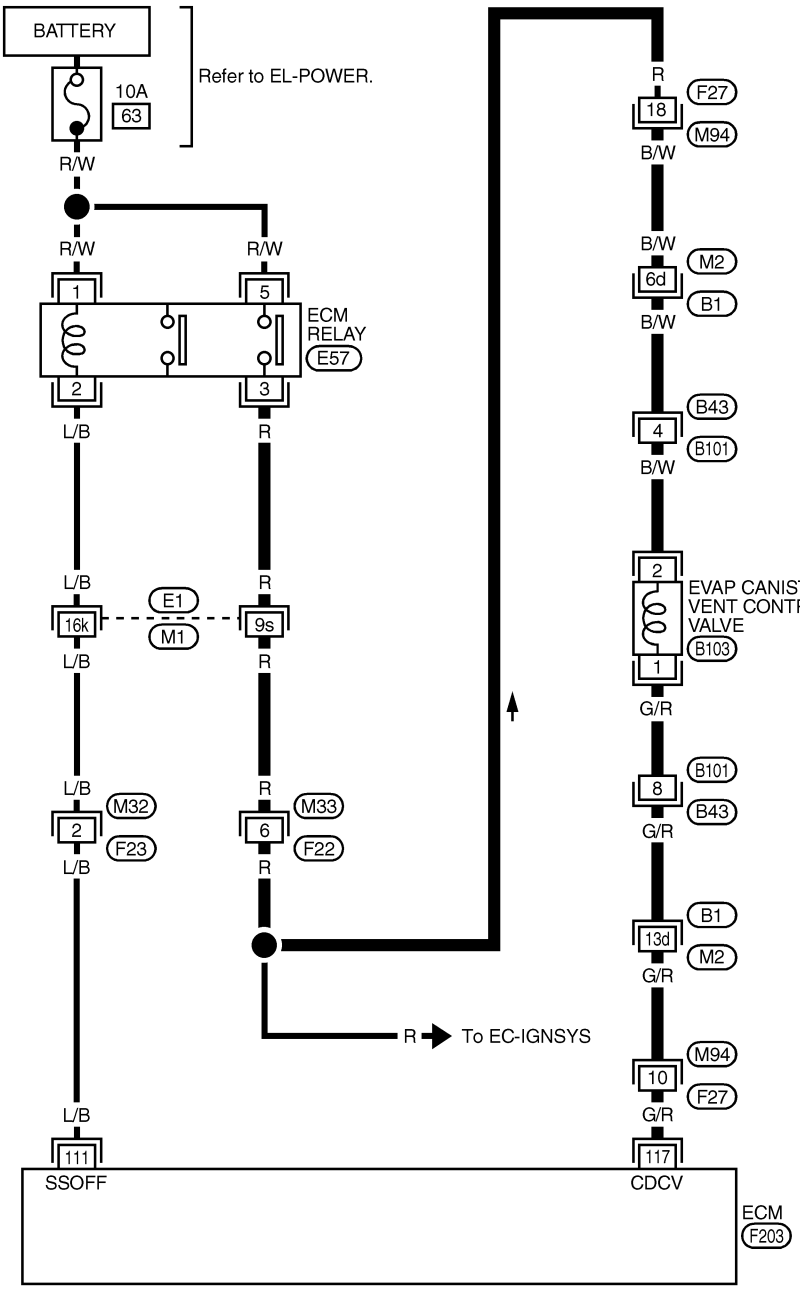
WITH GST

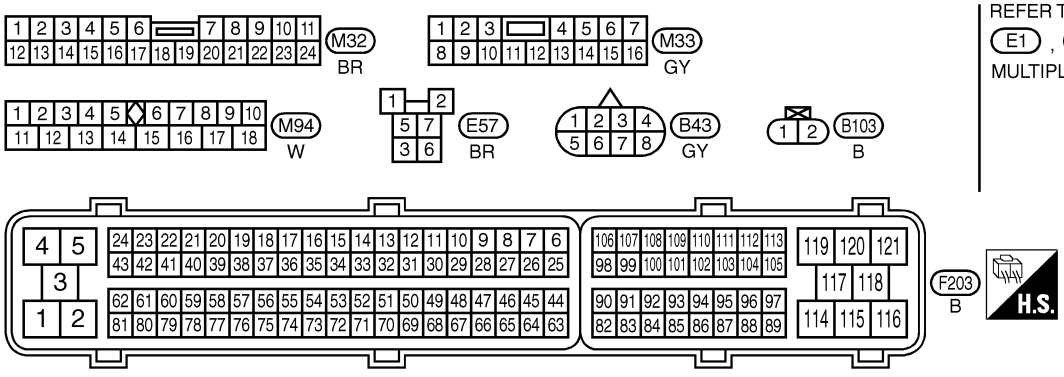
NAEC0974S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0975





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC097E

Diagnostic Procedure

NAEC0976

1	INSPECTION START
1. Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V

PBIB0151E

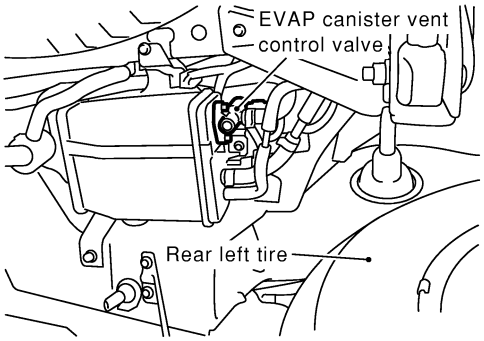
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

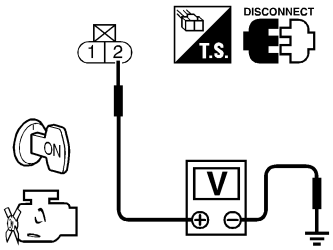
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



SEC928C

3. Turn ignition switch ON.
4. Check voltage between EVAP canister vent control valve terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF990Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness connectors F27, M94
- Harness connectors M2, B1
- Harness connectors B43, M101
- Harness for open or short between EVAP canister vent control valve and ECM relay

	▶	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 117 and EVAP canister vent control 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

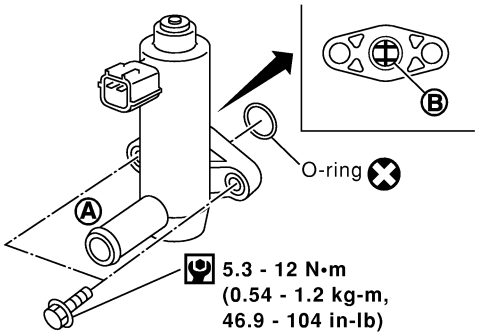
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between EVAP canister vent control valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Clean the rubber tube using an air blower.

8	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.	



SEF376Z

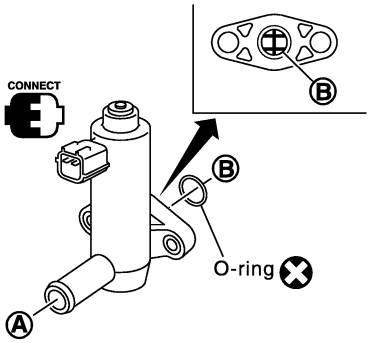
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



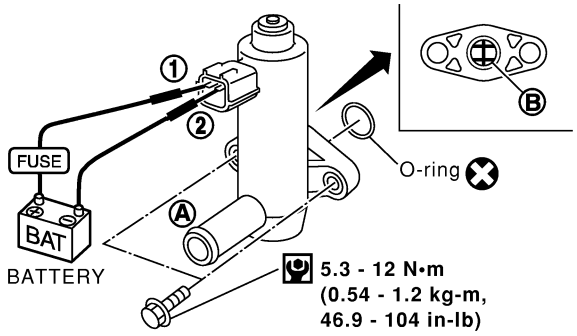
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

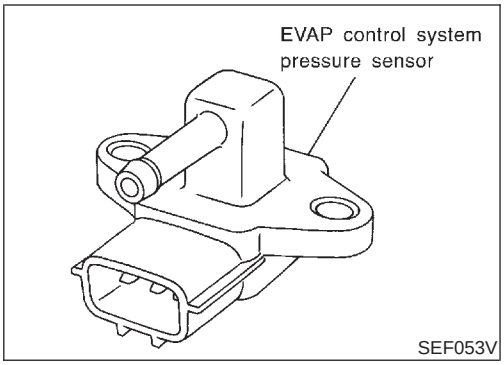
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

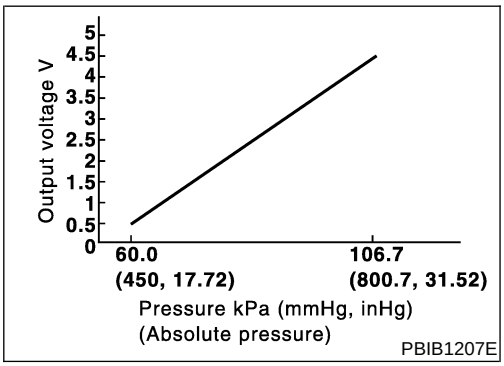
11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC0779

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



CONSULT-II Reference Value in Data Monitor Mode

NAEC0780

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	1.8 - 4.8V

ECM Terminals and Reference Value

NAEC0781

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L/G	EVAP control system pressure sensor	**[Ignition switch ON]**	1.8 - 4.8V
48	P/B	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
67	B/P	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0782

NOTE:

If DTC P0452 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-562.

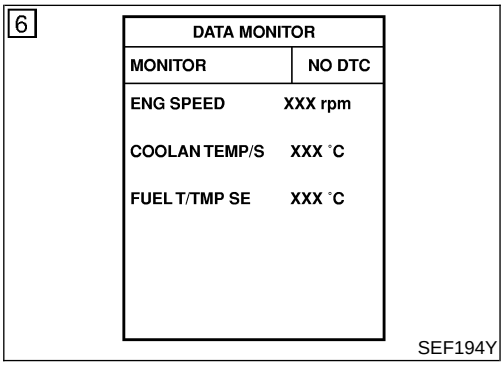
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • EVAP control system pressure sensor

DTC Confirmation Procedure

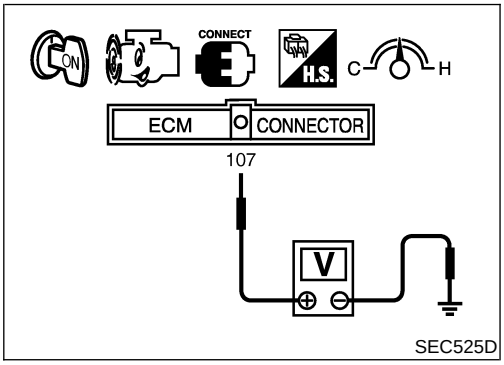
NAEC0784

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.



SEF194Y



SEC525D

WITH CONSULT-II

NAEC0784S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "FUEL T/TEMP SE" is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-381.
   If 1st trip DTC is not detected, go to next step.
8) Stop engine and install EVAP service port adapter and pressure pump to EVAP service port securely.
9) Pressurize the EVAP line using pressure pump.
10) Confirm the pressure does not go up.
11) If pressure go up, go to "Diagnostic Procedure", EC-381.

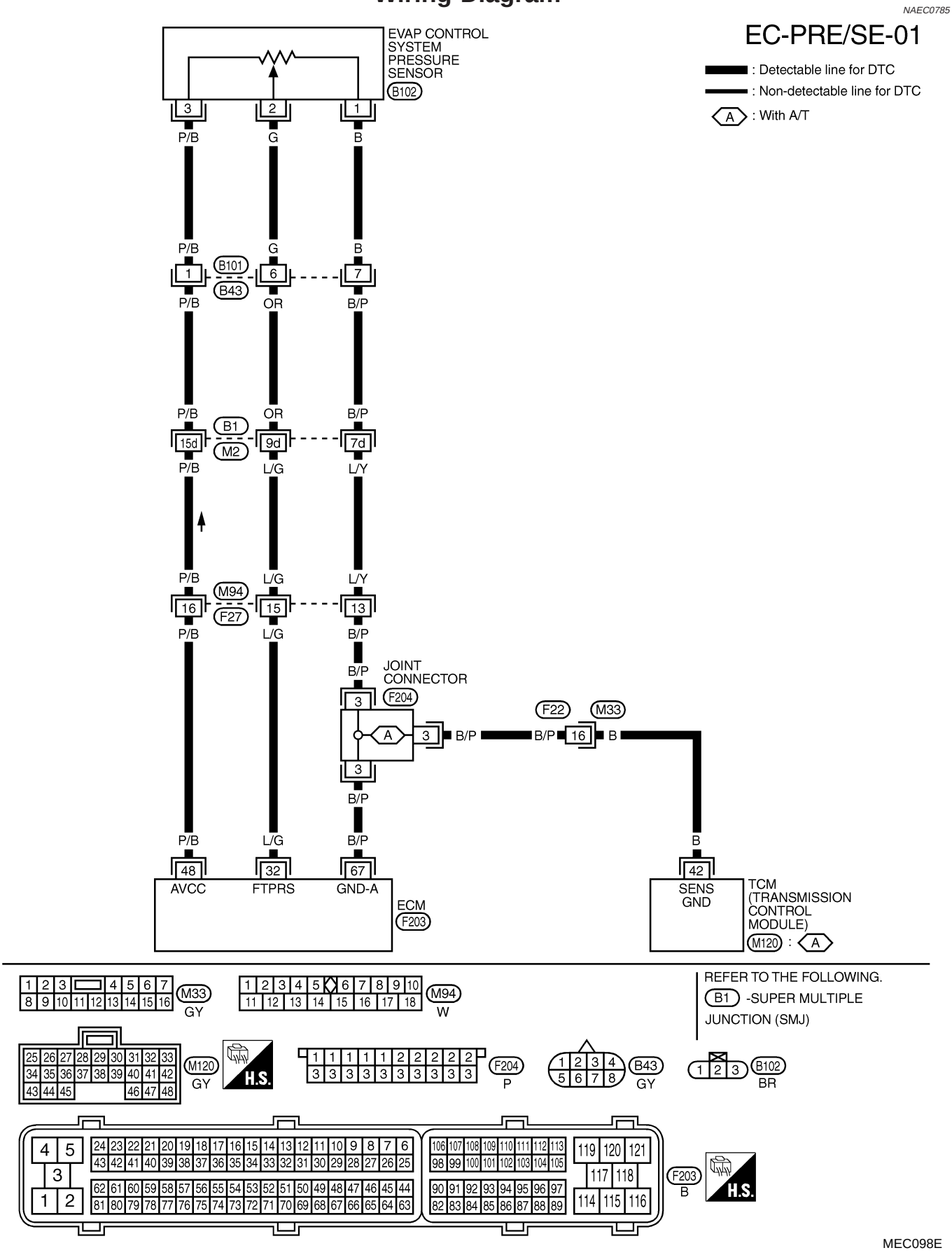
WITH GST

NAEC0784S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-381.

Wiring Diagram

NAEC0785



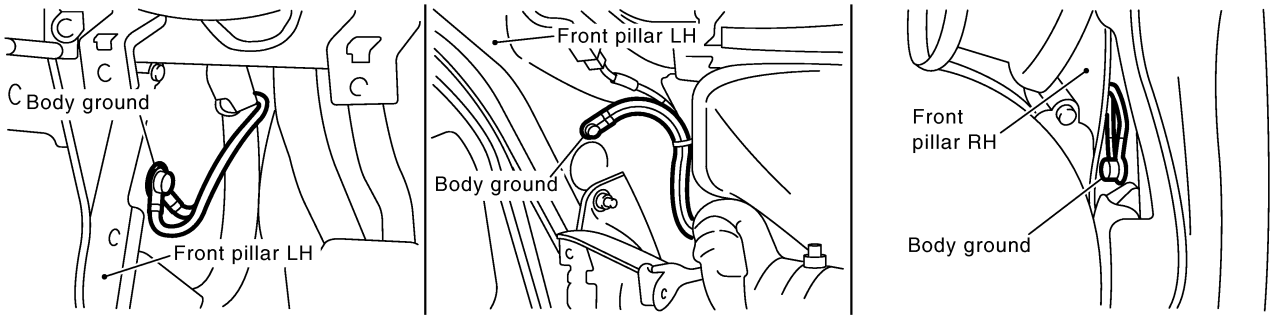
MEC098E

Diagnostic Procedure

NAEC0786

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK CONNECTOR

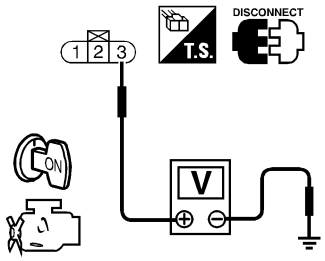
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF992Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM	
▶	Repair harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Disconnect TCM harness connector. 4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 6.

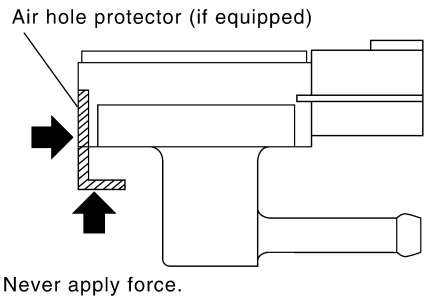
6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness connectors F22, M23 ● Joint connector F204 ● Harness for open between EVAP control system pressure sensor and ECM ● Harness for open between EVAP control system pressure sensor and TCM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

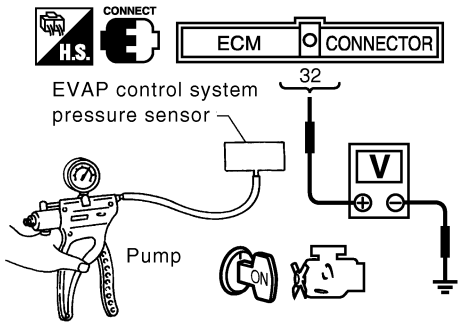
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

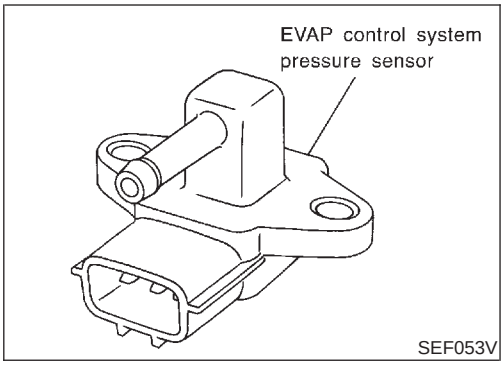
SEC422D

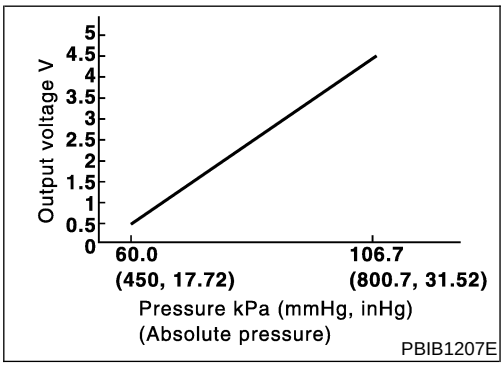
CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC0977

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC0978

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	1.8 - 4.8V

ECM Terminals and Reference Value

NAEC0979

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L/G	EVAP control system pressure sensor	**[Ignition switch ON]**	1.8 - 4.8V
48	P/B	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
67	B/P	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0980

NOTE:
If DTC P0453 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-562.

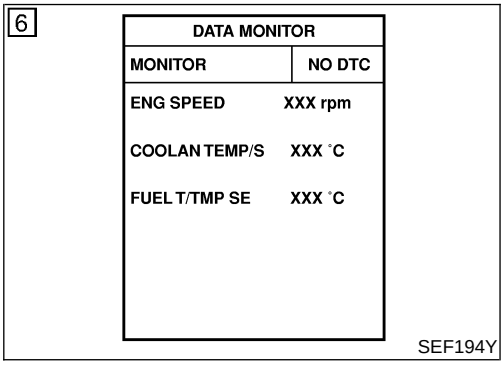
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister • Water separator • Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NAEC0981

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

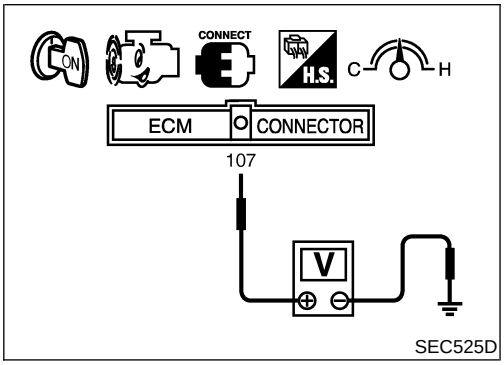
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



WITH CONSULT-II

NAEC0981S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.



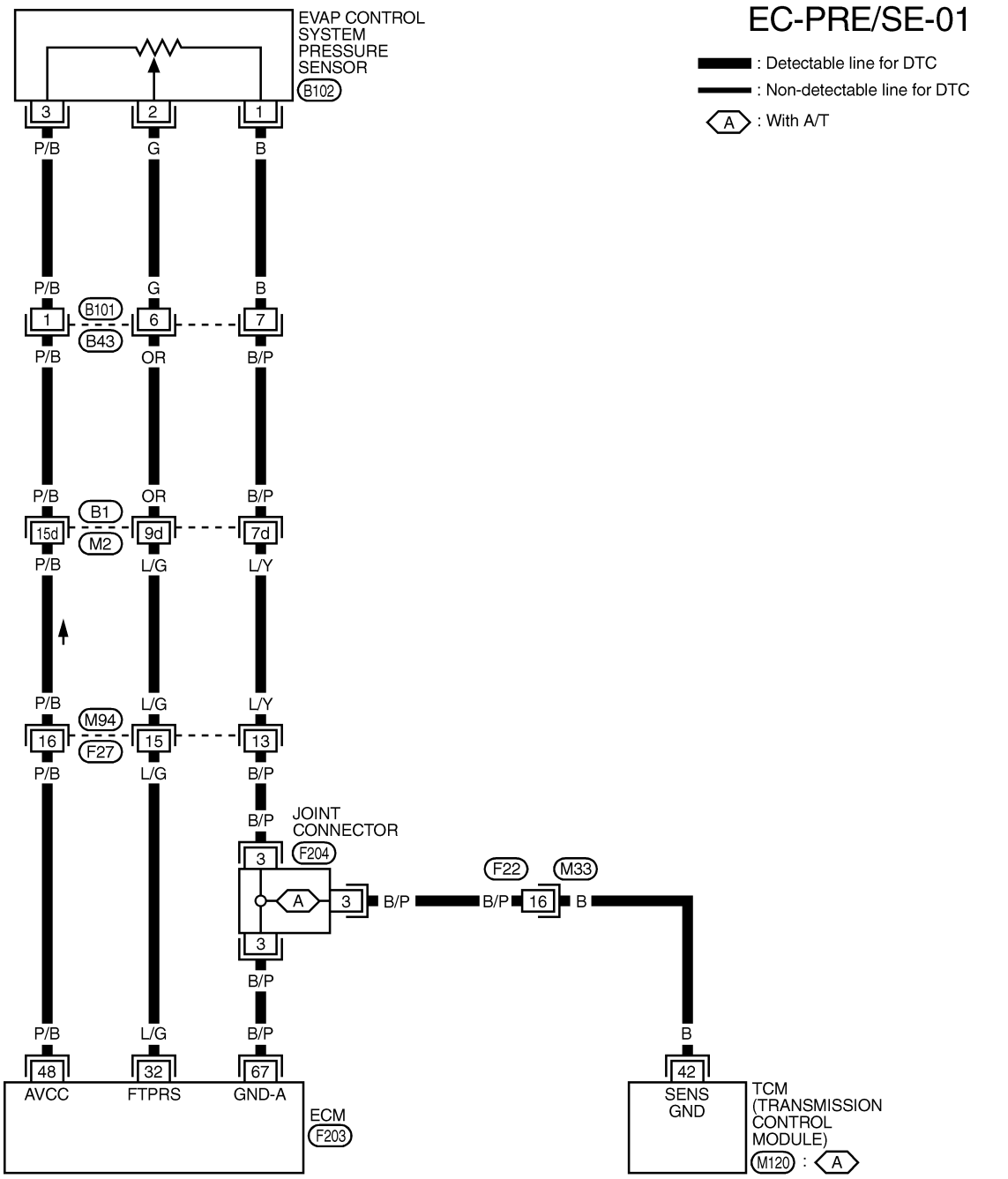
WITH GST

NAEC0981S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select “MODE 7” with GST.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.

Wiring Diagram

NAEC0982



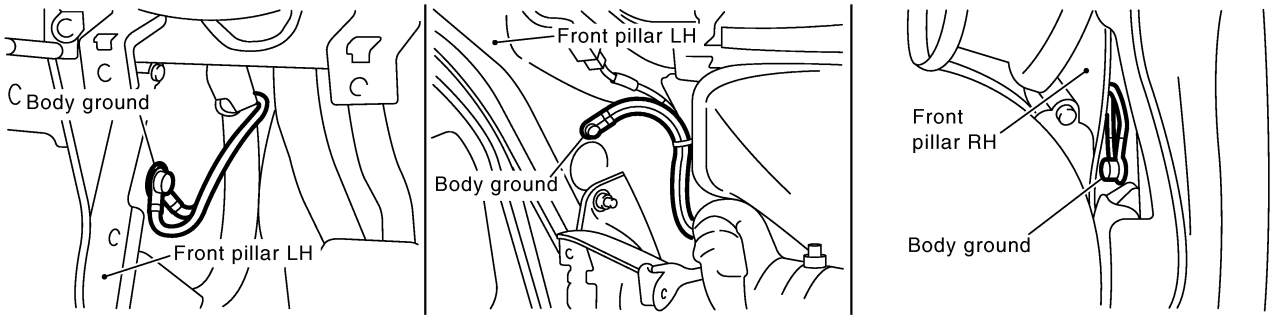
MEC098E

Diagnostic Procedure

NAEC0983

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK CONNECTOR

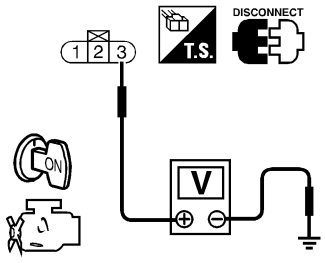
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF992Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

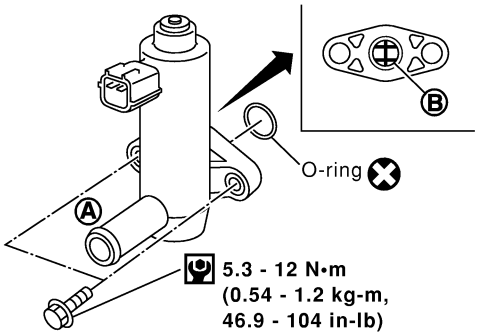
5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Disconnect TCM harness connector. 4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness connectors F22, M33 ● Joint connector F204 ● Harness for open between EVAP control system pressure sensor and ECM ● Harness for open between EVAP control system pressure sensor and TCM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	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 10.
NG	▶	Clean the rubber tube using an air blower.

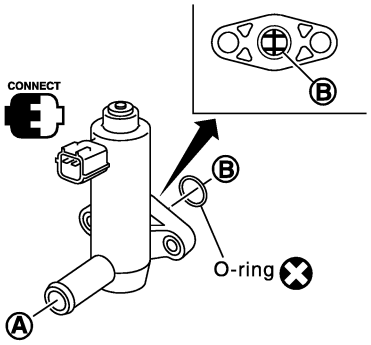
10	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.  SEF376Z **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



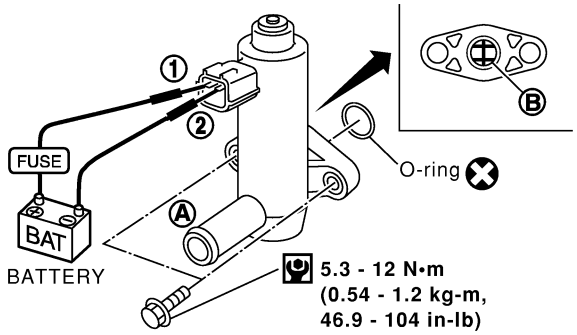
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III

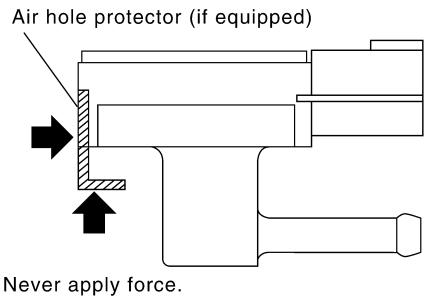
1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

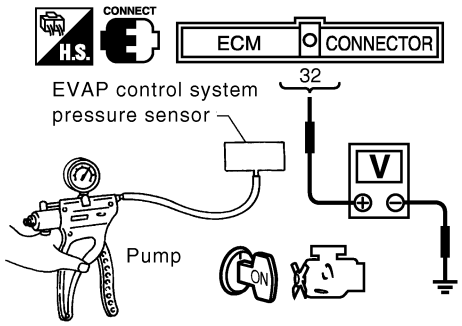
13	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

14	CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

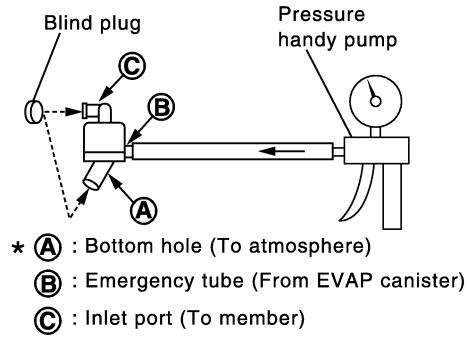
OK or NG

OK	▶	GO TO 15.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

Diagnostic Procedure (Cont'd)

15	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

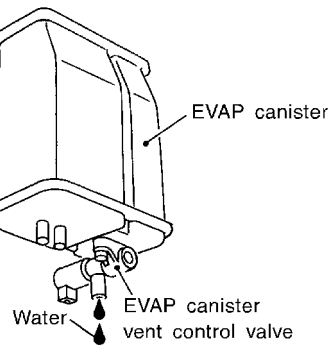
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace water separator.

16	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 17.
No	▶	GO TO 19.

17	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

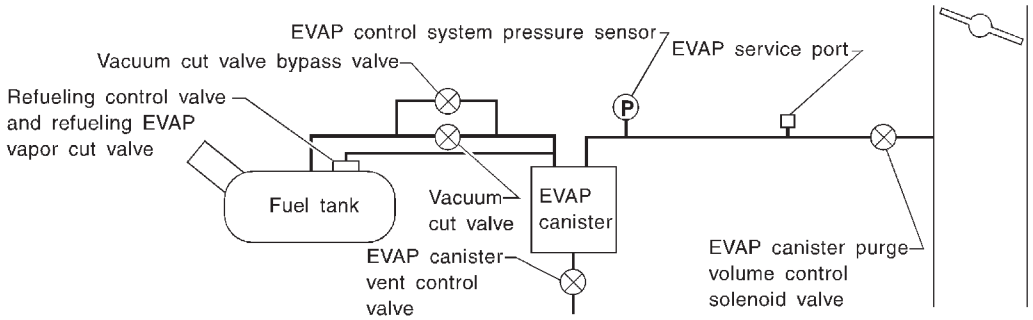
19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0984

NOTE:
If DTC P0455 is displayed with P1448, first perform trouble diagnosis for DTC P1448. (See EC-602.)

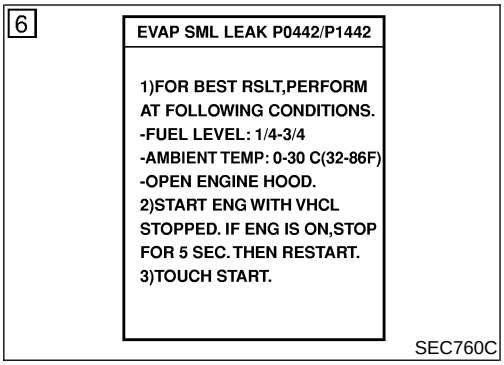
This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.

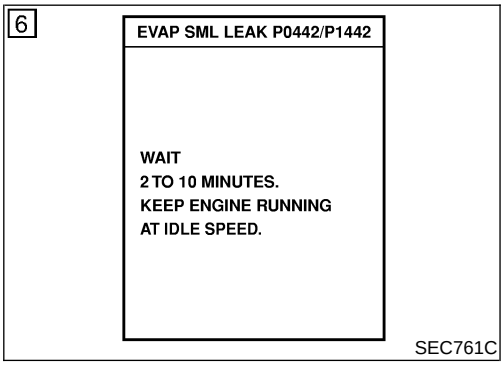


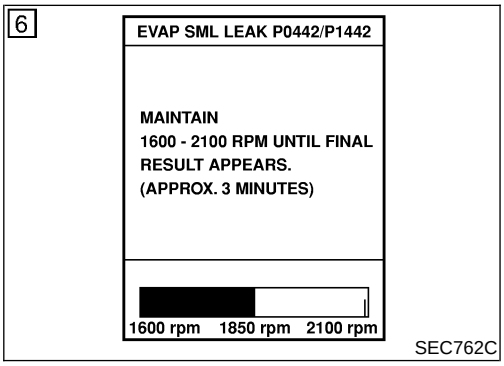
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0455 0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect 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 • Blocked or bent rubber tube to EVAP control system pressure sensor • 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 control valve • ORVR system leaks

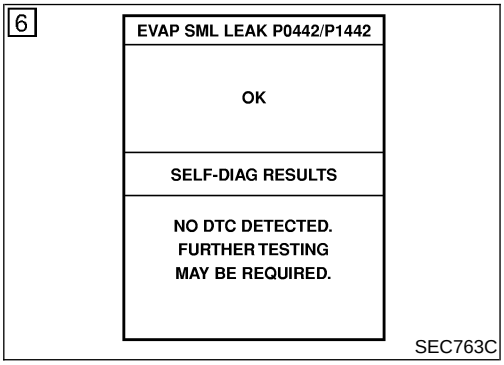
CAUTION:

- **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

NAEC0985

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, first perform trouble diagnosis for DTC P1448. (See EC-602.)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

WITH CONSULT-II

NAEC0985S01

1) Tighten fuel filler cap securely until ratcheting sound is heard.
2) Turn ignition switch ON.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6) Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-123.

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 "Diagnostic Procedure", EC-396.
   If P0442 is displayed, perform "Diagnostic Procedure" for DTC P0442.

WITH GST

NAEC0985S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-84 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-84.
3) Stop vehicle.
4) Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5) Select "MODE 7" with GST.

- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-396.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0442, EC-349.

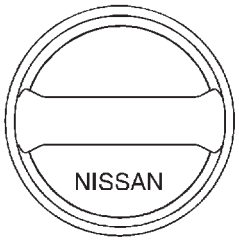
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0441, EC-339.

Diagnostic Procedure

NAEC0986

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

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	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

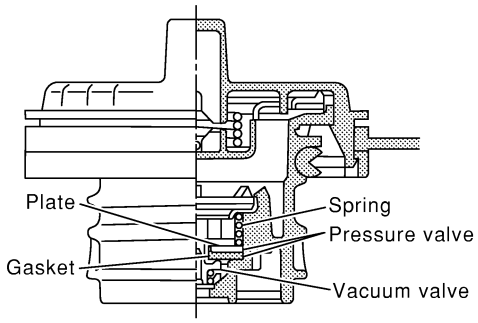
Check for air releasing sound while opening the fuel filler cap.

OK or NG

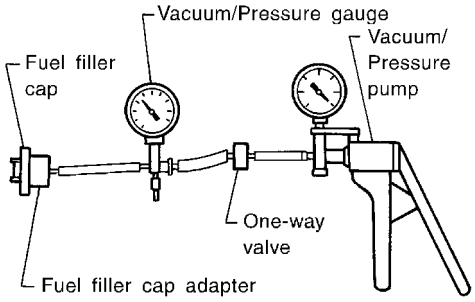
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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

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 "Evaporative Emission System", EC-38.

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, O-RING AND CIRCUIT

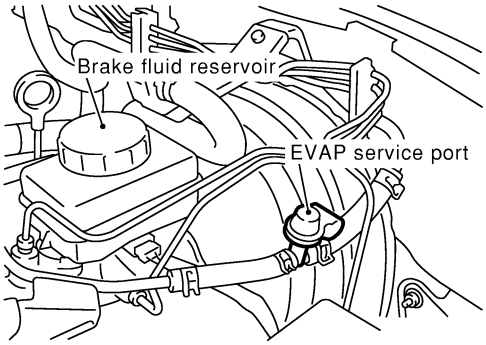
Refer to "DTC Confirmation Procedure", EC-372.

OK or NG

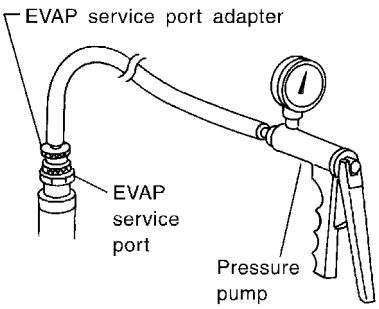
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

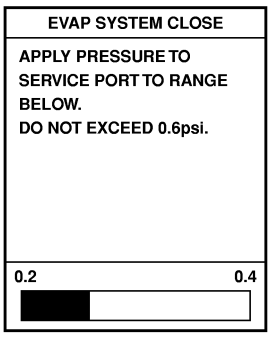
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II	▶	GO TO 9.
Without CONSULT-II	▶	GO TO 10.

9	CHECK FOR EVAP LEAK

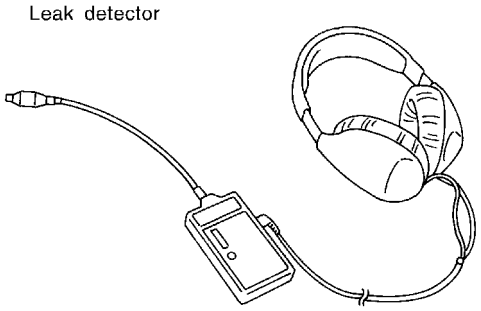
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

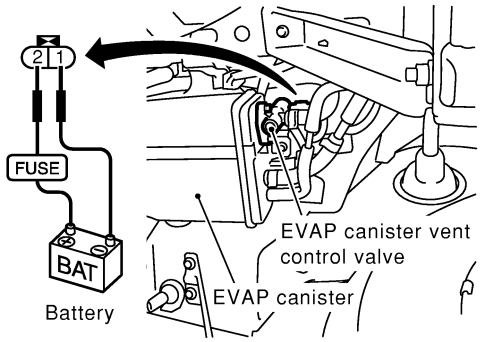
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

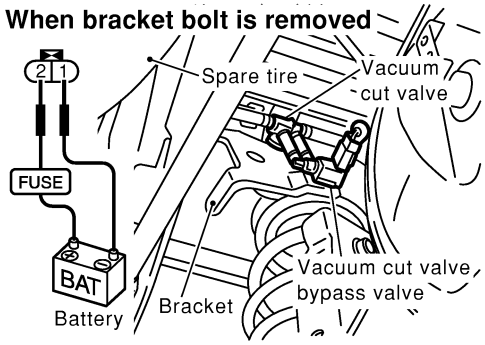
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



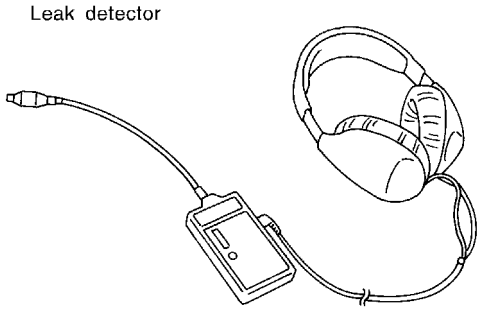
SEC930C

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEC932C

4. 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.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

Vacuum should exist.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-32.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

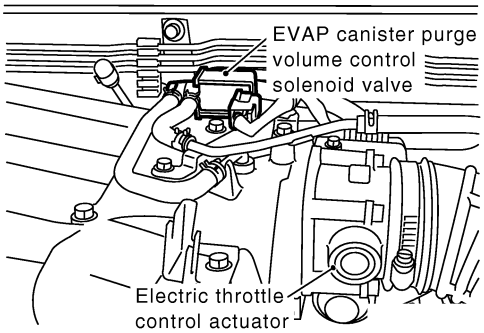
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

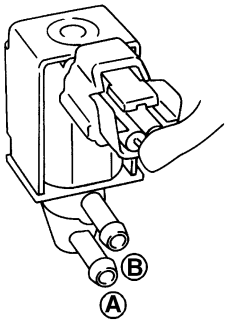
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D

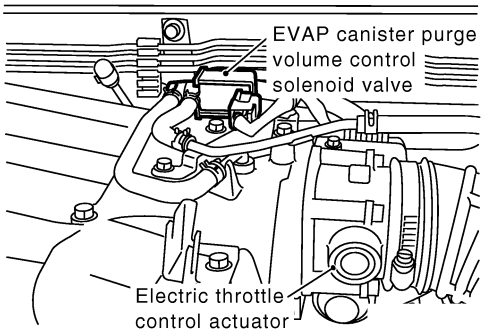


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

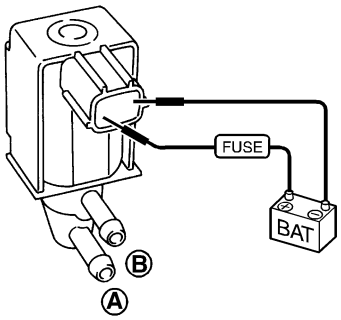
SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

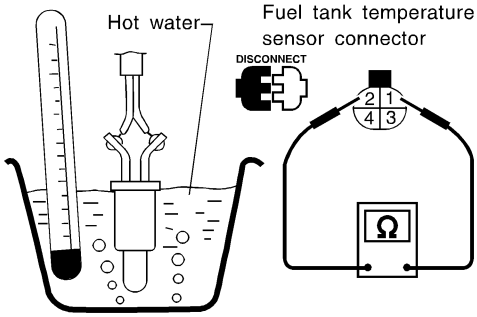
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

16	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

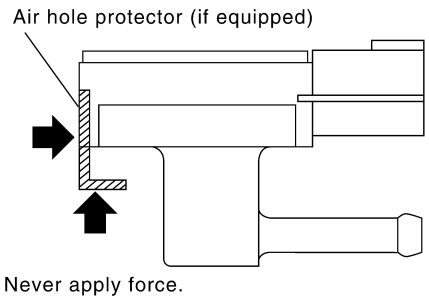
SEF974Y

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel level sensor unit.

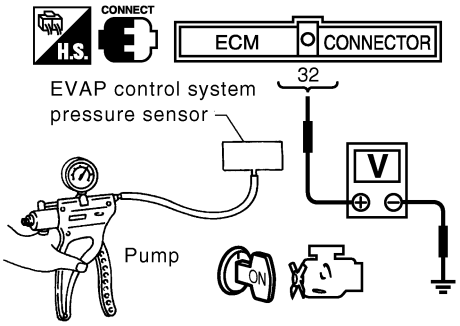
17	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

18	CHECK REFUELING EVAP VAPOR LINE

- Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.

OK or NG

OK	▶	GO TO 19.
NG	▶	Repair or replace hoses and tubes.

19	CHECK SIGNAL LINE AND RECIRCULATION LINE

- Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

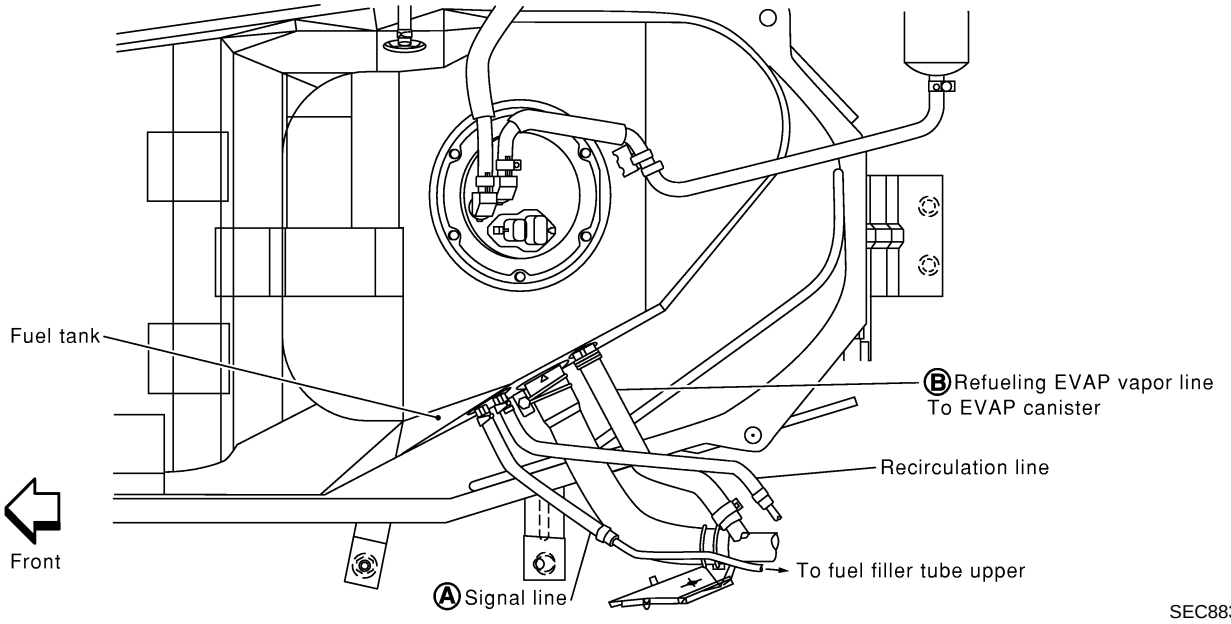
OK or NG

OK	▶	GO TO 20.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

Diagnostic Procedure (Cont'd)

20	CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



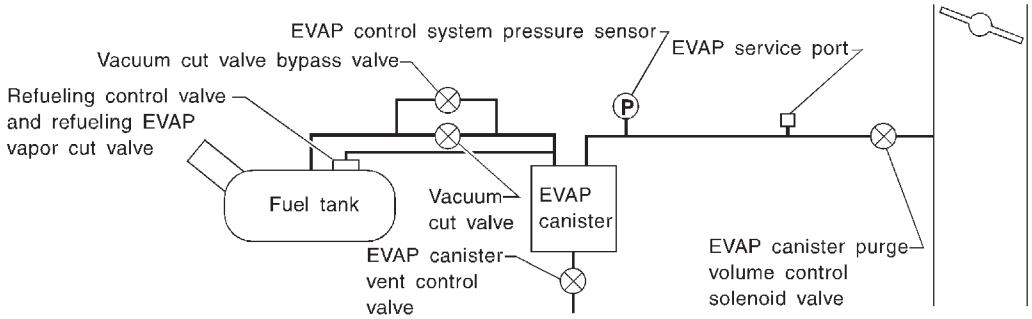
OK or NG

OK	▶	GO TO 21.
NG	▶	Replace or refueling control valve with fuel tank.

21	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0987

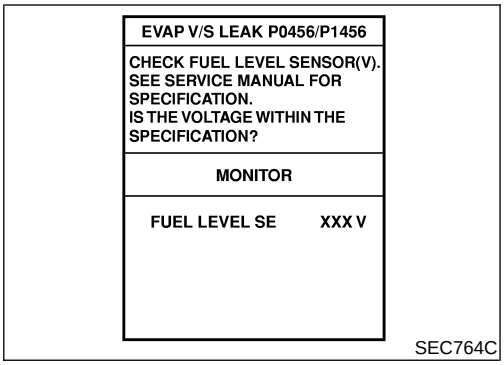


This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold same as a conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be 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.

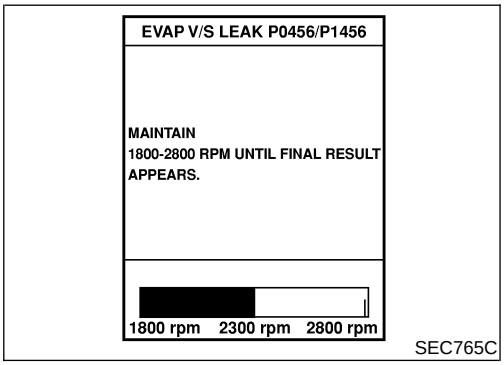
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler 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 • Blocked or bent rubber tube to EVAP control system pressure sensor • 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. • Water separator • EVAP canister saturated with water • EVAP control system pressure sensor • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

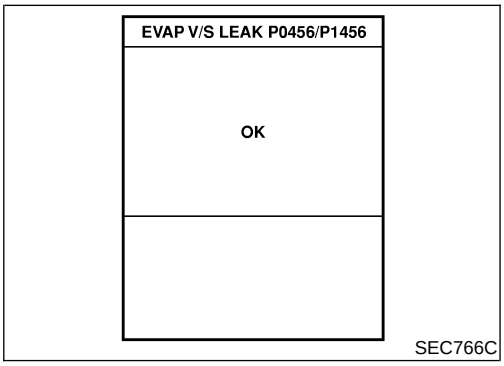
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEC764C



SEC765C



SEC766C

DTC Confirmation Procedure

NAEC0988

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **After repair, make sure that the hoses and clips are installed properly.**

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**

a) **Fuel filler cap is removed.**
b) **Refilled or drained the fuel.**
c) **EVAP component parts is/are removed.**

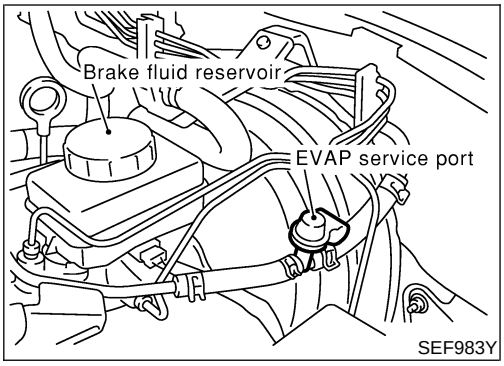
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

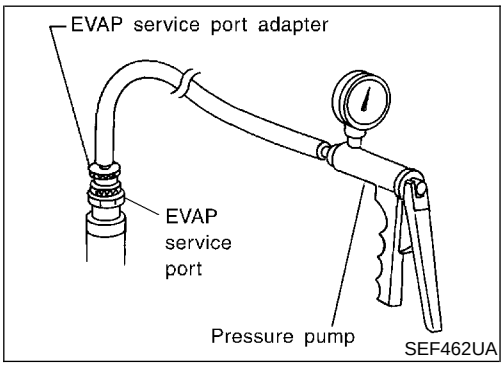
With CONSULT-II

1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   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 5 seconds.
4) Turn ignition switch ON.
5) Select “EVP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.
6) Make sure that “OK” is displayed.
   If “NG” is displayed, refer to “Diagnostic Procedure”, EC-410.

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic inspection”, EC-123.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**





Overall Function Check

NAEC0989

WITH GST

NAEC0989S01

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/cm^2, 0.6 psi).**

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Set the pressure pump and a hose.
3) Also set a vacuum gauge via 3-way connector and a hose.
4) Turn ignition switch ON.
5) Connect GST and select mode 8.
6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
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 diagnostic procedure, EC-410.
   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.

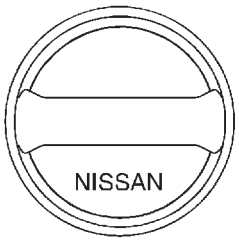
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NAEC0990

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

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	▶	● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

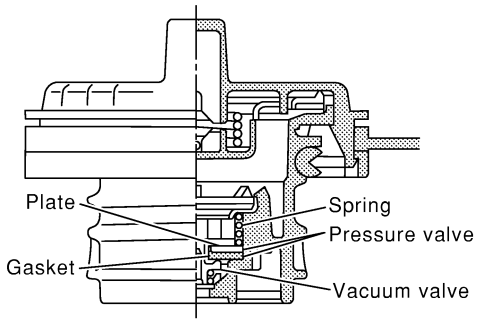
Check for air releasing sound while opening the fuel filler cap.

OK or NG

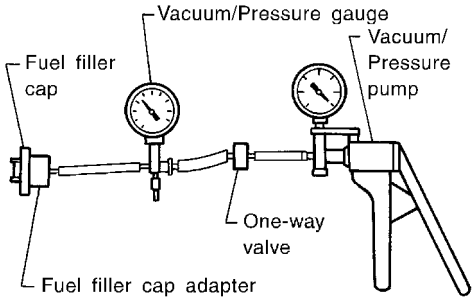
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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

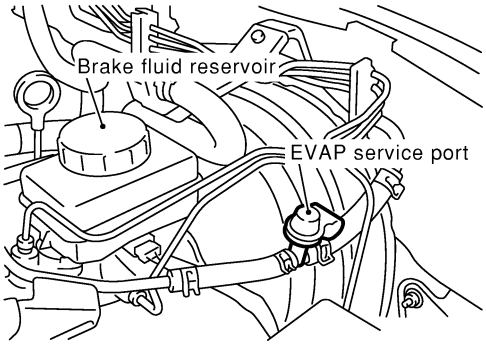
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

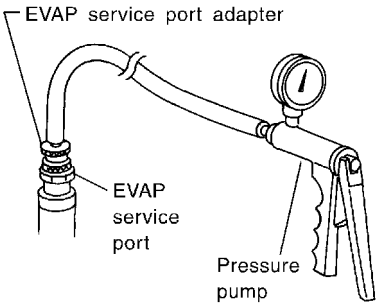
Diagnostic Procedure (Cont'd)

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

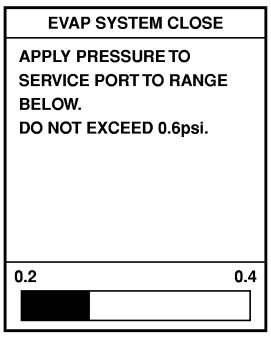
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II	▶	GO TO 6.
Without CONSULT-II	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

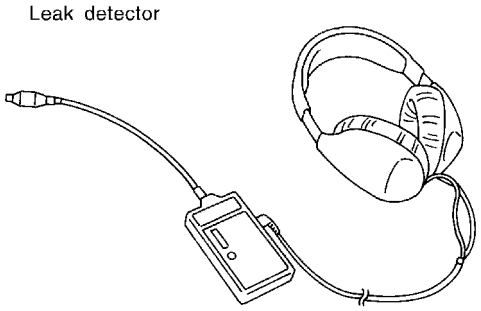
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

OK or NG

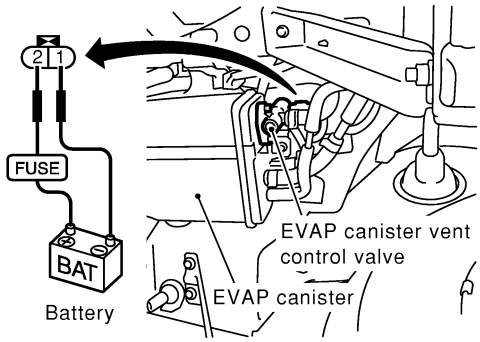
OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

7	CHECK FOR EVAP LEAK

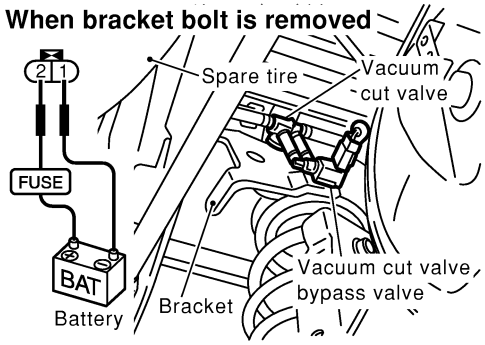
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



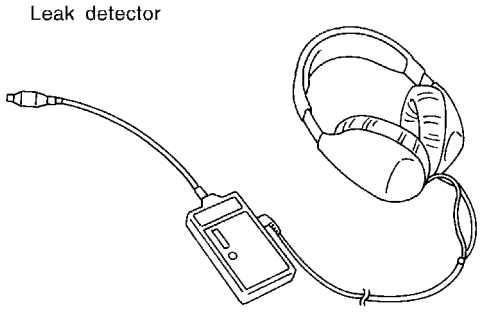
SEC930C

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEC932C

4. 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.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



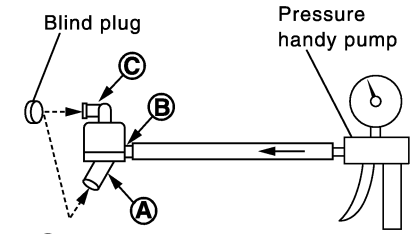
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* A : Bottom hole (To atmosphere)
B : Emergency tube (From EVAP canister)
C : Inlet port (To member)

PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

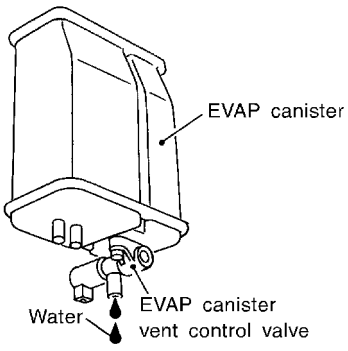
Refer to "DTC Confirmation Procedure", EC-372.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-32.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
With CONSULT-II 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.		

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

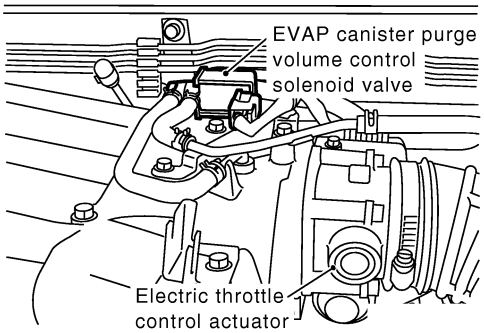
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

Diagnostic Procedure (Cont'd)

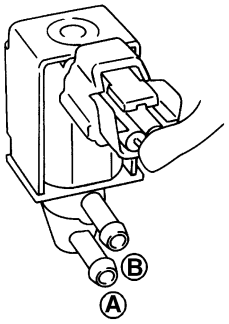
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D

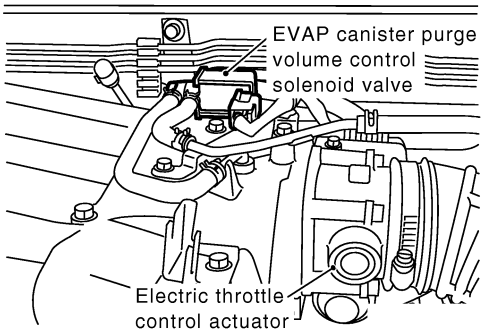


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

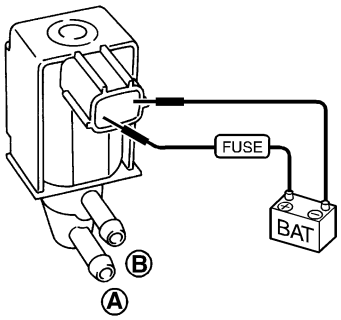
SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

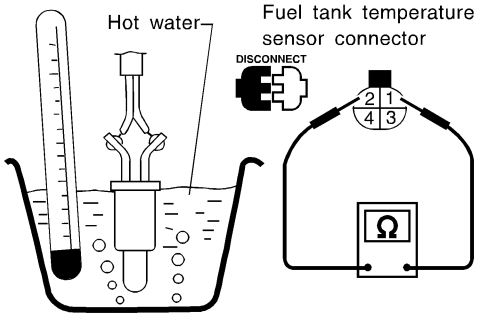
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

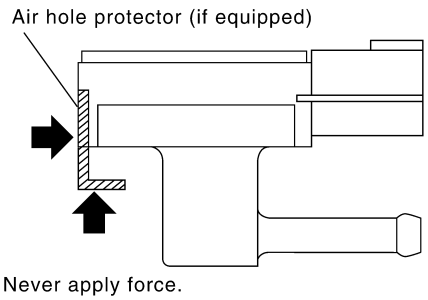
SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

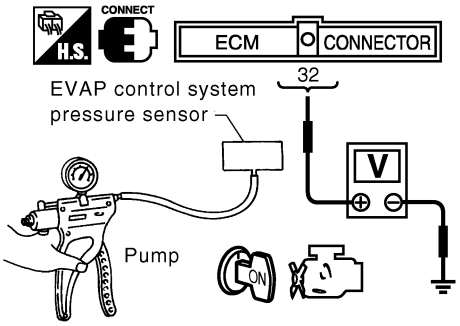
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-38.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

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

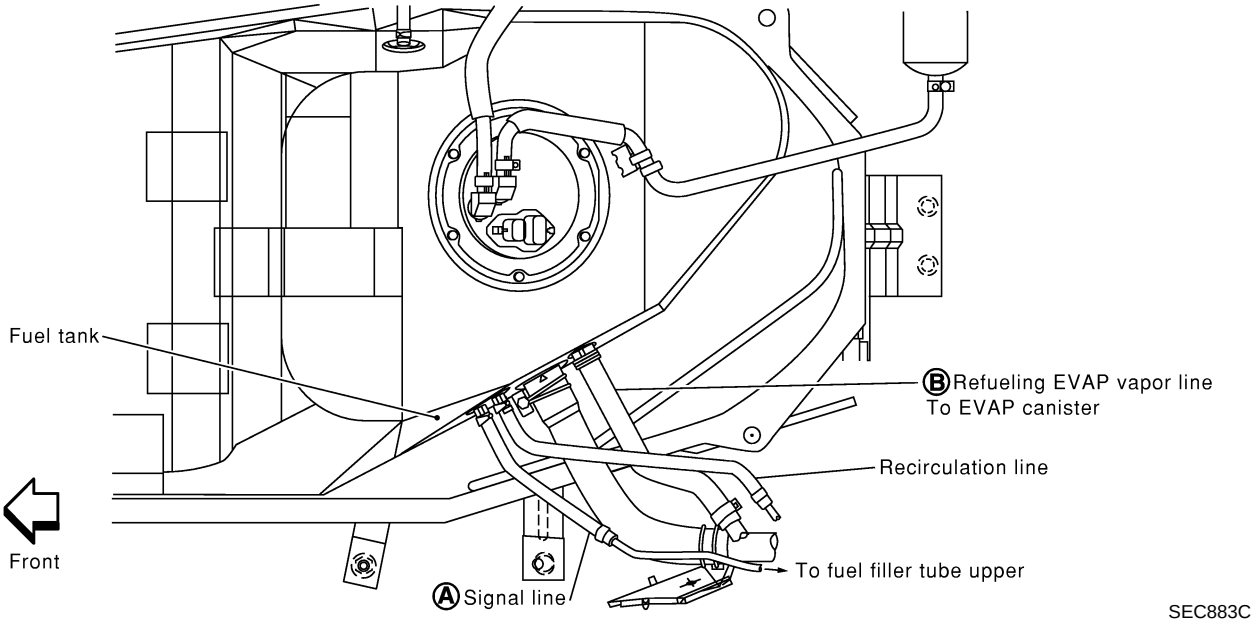
	▶	GO TO 22.

22	CHECK REFUELING EVAP VAPOR LINE	
• Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE	
• Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

24 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.

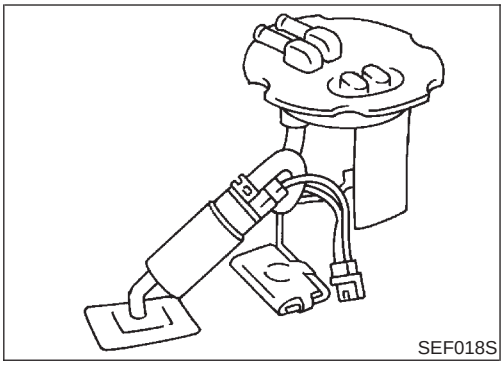


OK or NG		
OK	▶	GO TO 25.
NG	▶	Replace or refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**


SEF018S

Component Description

NAEC0991

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0992

NOTE:

If DTC P0460 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to "DTC U1000, U1001 CAN COMMUNICATION LINE", EC-166.

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.	• Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) • Fuel level sensor

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NAEC0993

NOTE:

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

WITH CONSULT-II

NAEC0993S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait maximum of 2 consecutive minutes.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-424.

WITH GST

NAEC0993S02

Follow the procedure "WITH CONSULT-II" above.

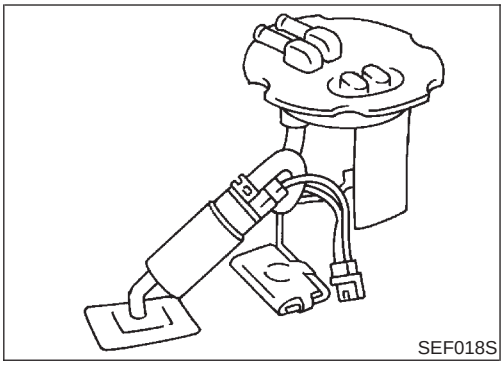
Diagnostic Procedure

=NAEC0995

1	CHECK FUEL GAUGE OPERATION	
Refer to EL-133, “Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode”.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Follow the instruction of “Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode”, Refer to EL-133.

2	CHECK FUEL LEVEL SENSOR AND CIRCUIT	
Refer to EL-139, “INSPECTION/FUEL LEVEL SENSOR”.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace malfunctioning parts.

3	CHECK INTERMITTENT INCIDENT	
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-155.		
	▶	**INSPECTION END**


SEF018S

Component Description

=NAEC0996

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0997

NOTE:
If DTC P0461 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to "DTC U1000, U1001 CAN COMMUNICATION LINE", EC-166.

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 level sensor circuit is open or shorted.) • Fuel level sensor

Overall Function Check

NAEC0998

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 FE-5, "Fuel Tank".

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NAEC0998S01

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (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 "Fuel Pressure Release", EC-56.
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-II.
7) Check "FUEL LEVEL SE" output voltage and note it.
8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10) Check "FUEL LEVEL SE" output voltage and note it.
11) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12) Check "FUEL LEVEL SE" output voltage and note it.
13) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, go to "Diagnostic Procedure", EC-426.

WITH GST

NAEC0998S02

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (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 "Fuel Pressure Release", EC-56.
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 30ℓ (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 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9) Confirm that the fuel gauge indication varies.
10) If NG, go to "Diagnostic Procedure", EC-426.

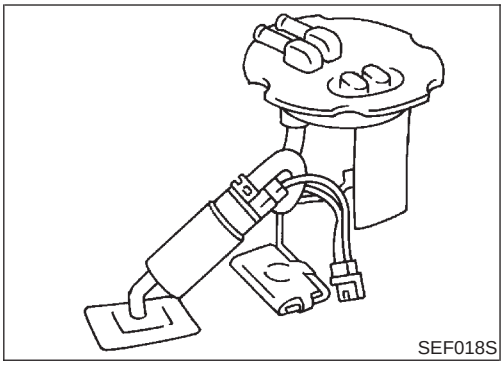
Diagnostic Procedure

NAEC1226

1	CHECK FUEL GAUGE OPERATION	
Refer to EL-133, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode".		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Follow the instruction of "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode". Refer to EL-133.

2	CHECK FUEL LEVEL SENSOR AND CIRCUIT	
Refer to EL-139, "INSPECTION/FUEL LEVEL SENSOR".		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace malfunctioning parts.

3	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**


SEF018S

Component Description

NAEC0999

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC1000

NOTE:
If DTC P0462, P0463 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to "DTC U1000, U1001 CAN COMMUNICATION LINE", EC-166.

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The CAN communication line is open or shorted.) • Harness or connectors (The sensor circuit is open or shorted.) • Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

NAEC1001

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.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NAEC1001S01

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-429.

WITH GST

NAEC1001S02

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

=NAEC1003

1	CHECK FUEL GAUGE OPERATION	
Refer to EL-133, “Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode”.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Follow the instruction of “Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode”. Refer to EL-133.

2	CHECK FUEL LEVEL SENSOR AND CIRCUIT	
Refer to EL-139, “INSPECTION/FUEL LEVEL SENSOR”.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace malfunctioning parts.

3	CHECK INTERMITTENT INCIDENT	
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-155.		
	▶	**INSPECTION END**

Description

=NAEC1004

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166.

The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the combination meter. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

NAEC1006

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 sensor circuit is open or shorted) • Vehicle speed sensor • Combination meter

DTC Confirmation Procedure

NAEC1007

CAUTION:
Always drive vehicle at a safe speed.

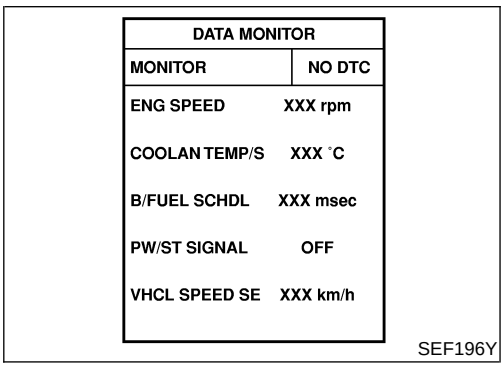
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

NAEC1007S01

1) Start engine.
2) Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to “Diagnostic Procedure”, EC-431.
   If OK, go to following step.
3) Select “DATA MONITOR” mode with CONSULT-II.
4) Warm engine up to normal operating temperature.



SEF196Y

5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,800 rpm (A/T models) More than 2,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More than 5.5 msec
Selector lever	Except P or N position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-431.

Overall Function Check

NAEC1008

Use this procedure to check the overall function of the vehicle speed sensor signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC1008S01

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST. The vehicle speed sensor signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to "Diagnostic Procedure", EC-431.

Diagnostic Procedure

NAEC1010

1	CHECK VEHICLE SPEED SENSOR CIRCUIT	
Refer to EL-134, "Trouble Diagnosis".		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK COMBINATION METER	
Check combination meter function. Refer to EL-126, "COMBINATION METERS".		
	▶	**INSPECTION END**

Description

NAEC1227

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 steadly. 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 and power steering operation, etc.).

On Board Diagnosis Logic

NAEC1228

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is not in the specified range.	• Electric throttle control actuator • Intake air leak

DTC Confirmation Procedure

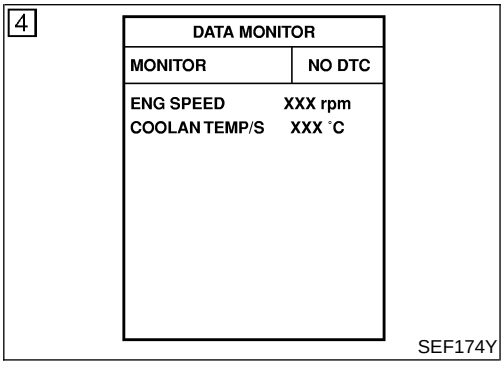
NAEC1229

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 Idle Air Volume Learning before conducting DTC Confirmation Procedure. For the target idle speed, refer to the "Service Data and Specifications (SDS)", EC-758.**

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**



WITH CONSULT-II

NAEC1229S01

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-433.

WITH GST

NAEC1229S02

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1230

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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93. 4. Perform "Accelerator Pedal Released Position Learning", EC-73. 5. Perform "Throttle Valve Closed Position Learning", EC-73. 6. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**

Description

NAEC1231

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 steadly. 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 and power steering operation, etc.).

On Board Diagnosis Logic

NAEC1232

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is not in the specified range.	• Electric throttle control actuator • Intake air leak • PCV system

DTC Confirmation Procedure

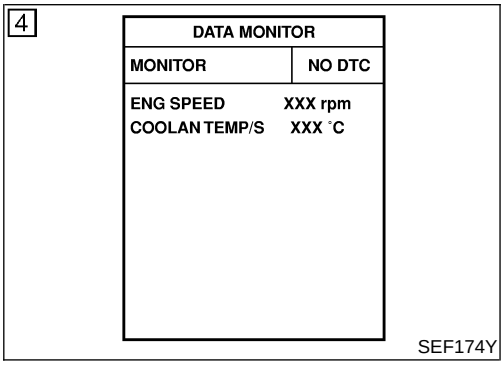
NAEC1233

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 Idle Air Volume Learning before conducting DTC Confirmation Procedure. For the target idle speed, refer to the "Service Data and Specifications (SDS)", EC-758.**

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**



WITH CONSULT-II

NAEC1233S01

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.

WITH GST

NAEC1233S02

Follow the procedure "With CONSULT-II" above.

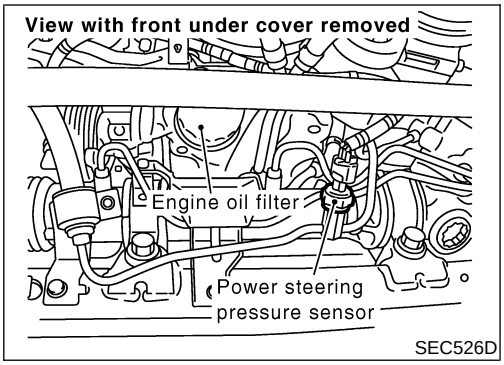
Diagnostic Procedure

NAEC1234

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. 2. Replace ECM. 3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93. 4. Perform "Accelerator Pedal Released Position Learning", EC-73. 5. Perform "Throttle Valve Closed Position Learning", EC-73. 6. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**



Component Description

NAEC1359

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1360

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

On Board Diagnosis Logic

NAEC1361

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-562.

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

NAEC1362

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

With CONSULT-II

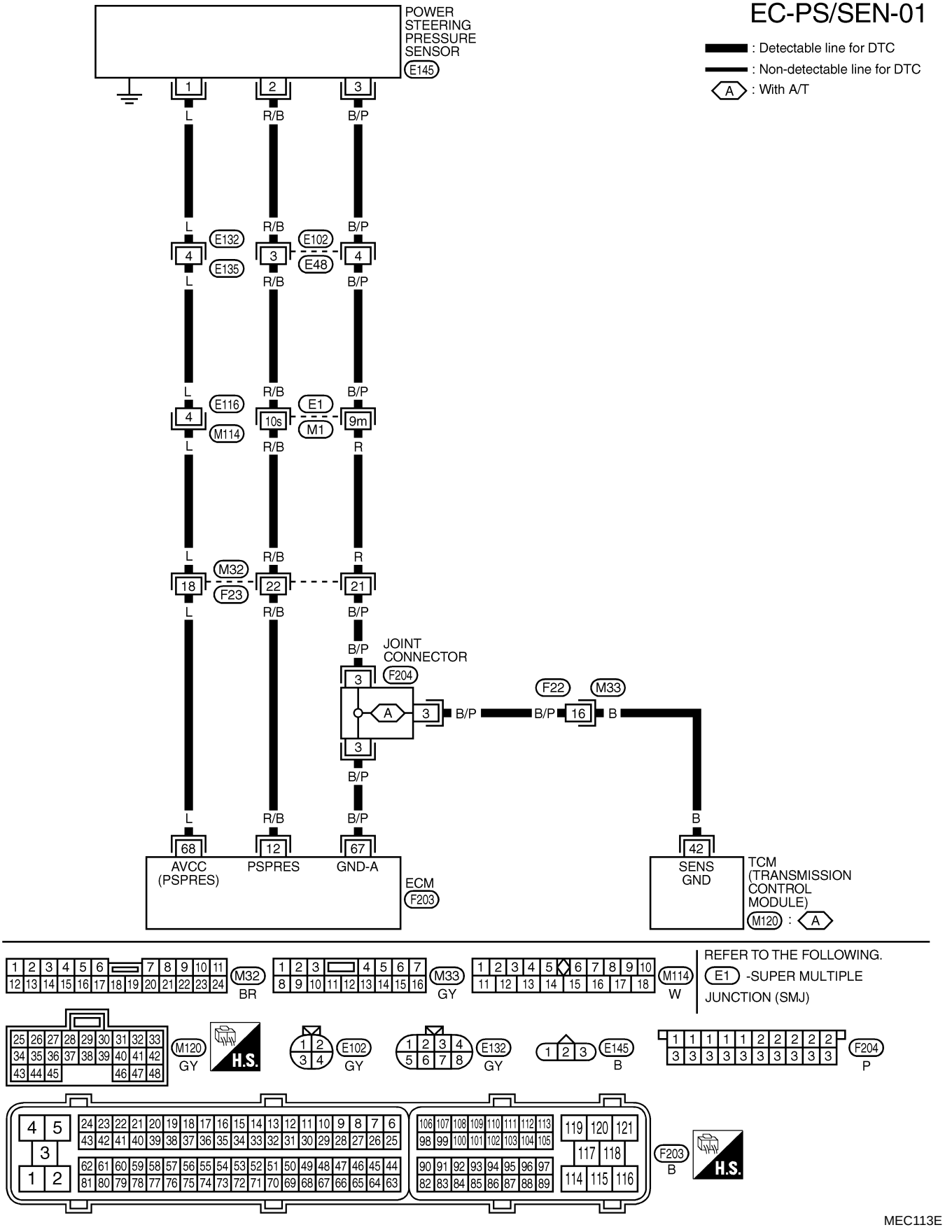
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-438, “Diagnostic Procedure”.

With GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1363



MEC113E

Wiring Diagram (Cont'd)

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

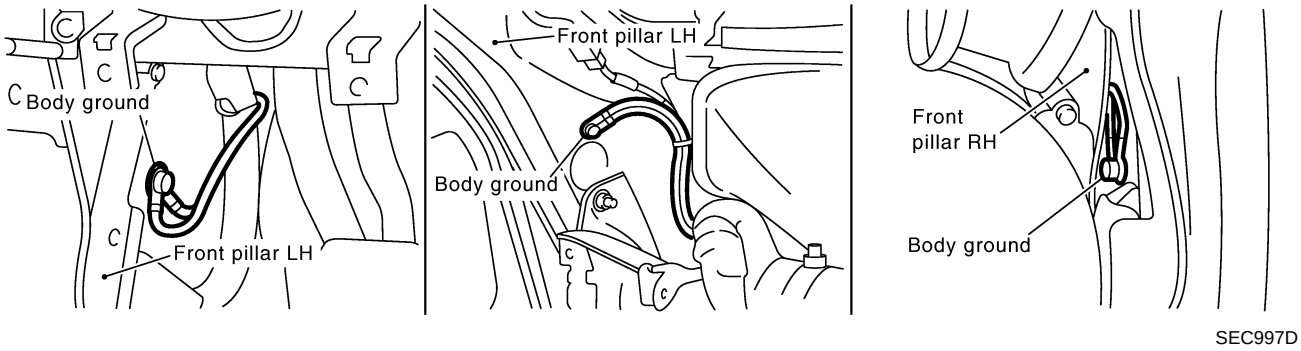
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	R/B	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
67	B/P	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	L	Sensor power supply	**[Ignition switch ON]**	Approximately 5V

Diagnostic Procedure

NAEC1364

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to "Ground Inspection", EC-165.



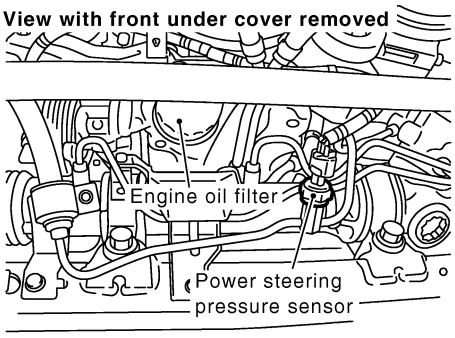
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

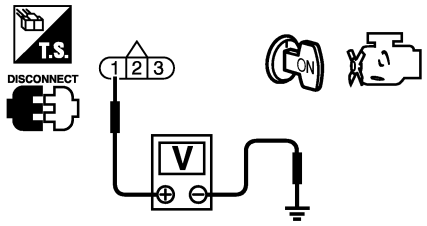
2	CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



SEC526D

3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.



SEC048D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E132, E135
- Harness connectors E116, M114
- Harness connectors M32, F23
- Harness for open or short between ECM and power steering pressure sensor

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

4	CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between PSP sensor terminal 3 and ECM terminal 67, TCM terminal 42.
   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 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

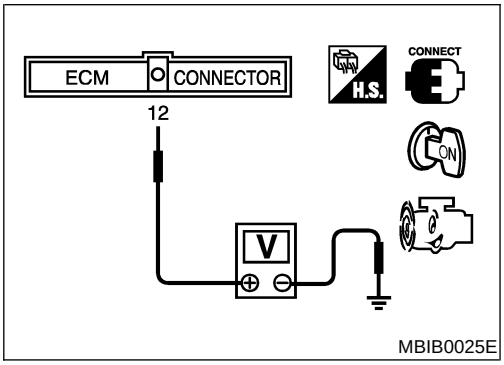
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E102, E48 ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness connectors F22, M33 ● Joint connector F204 ● Harness for open or short between ECM and PSP sensor ● Harness for open or short between TCM and PSP sensor.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 12 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 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E102, E48 ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness for open or short between ECM and power steering pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK PSP SENSOR
Refer to "Component Inspection", EC-440. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Replace PSP sensor.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



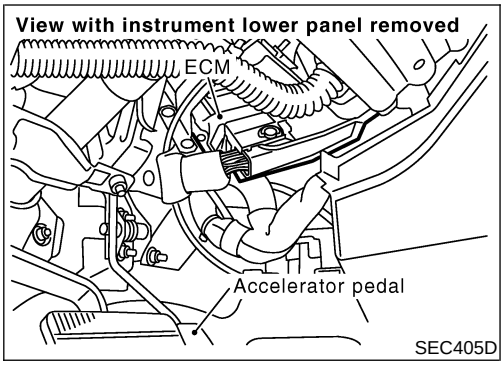
Component Inspection

NAEC1365

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is turned fully.	Approximately 0.5 - 4.0V
Steering wheel is not turned.	Approximately 0.4 - 0.8V



Component Description

NAEC1235

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

On Board Diagnosis Logic

NAEC1236

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.

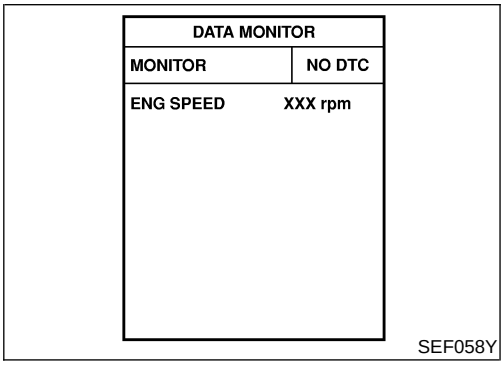
DTC Confirmation Procedure

NAEC1237

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

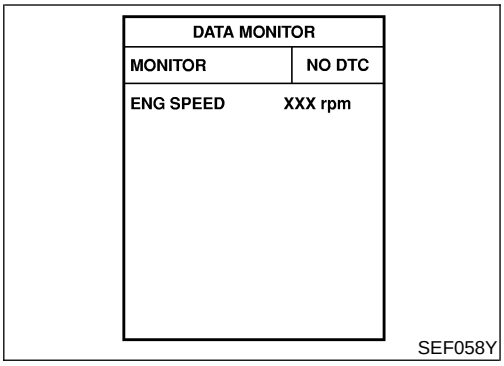
With CONSULT-II

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) If 1st trip DTC is detected, go to EC-442, “Diagnostic Procedure”.

With GST

Follow the procedure “With CONSULT-II” above.

DTC Confirmation Procedure (Cont'd)



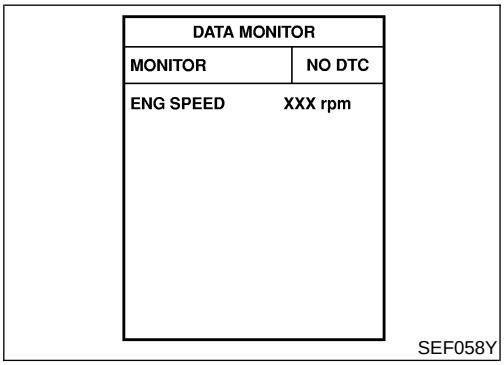
PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1) Turn ignition switch ON and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4) If 1st trip DTC is detected, go to EC-442, "Diagnostic Procedure".

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1) Turn ignition switch ON and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4) Repeat "step 3" 32 times.
5) If 1st trip DTC is detected, go to EC-442, "Diagnostic Procedure".

With GST

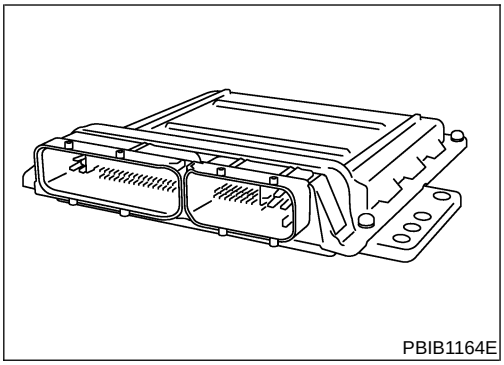
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1238

1	INSPECTION START
With CONSULT-II 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-441. 5. Is the 1st trip DTC P0605 displayed again?	
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-441. 5. 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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93. 3. Perform "Accelerator Pedal Released Position Learning", EC-73. 4. Perform "Throttle Valve Closed Position Learning", EC-73. 5. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**


PBIB1164E

Component Description

NAEC1239

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.

ECM Terminals and Reference Value

NAEC1244

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/R	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1240

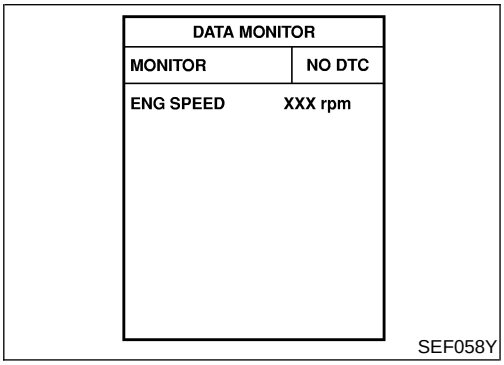
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

NAEC1241

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.



SEF058Y

With CONSULT-II

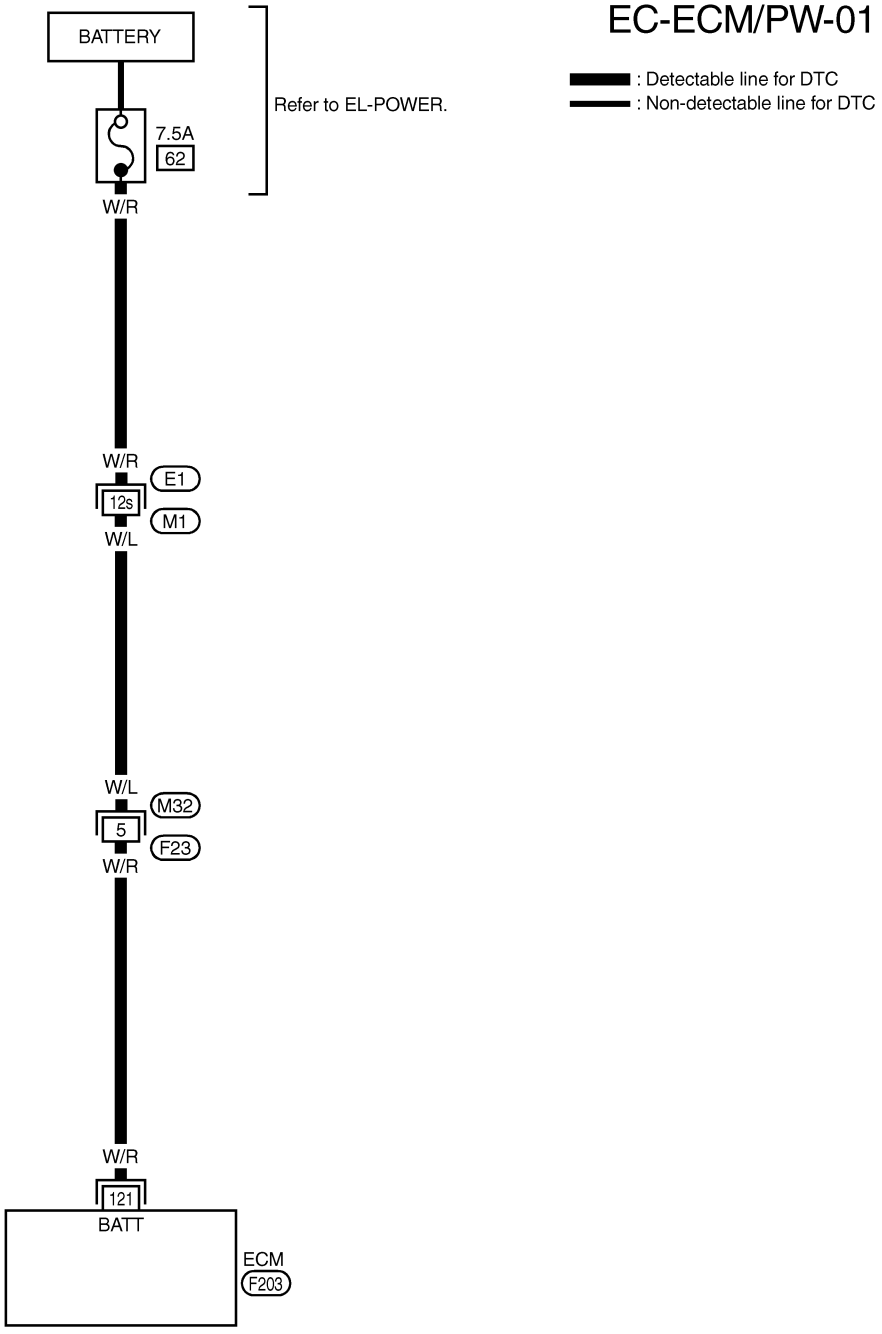
1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-446.

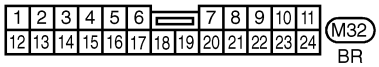
With GST

Follow the procedure "WITH CONSULT-II" above.

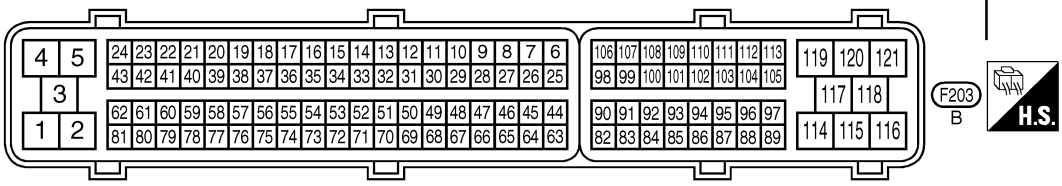
Wiring Diagram

NAEC1242





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)



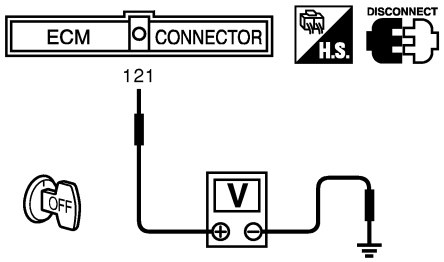
MEC345E

Diagnostic Procedure

NAEC1243

1	CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.



MBIB0026E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- 7.5A fuse
- Harness for open or short between ECM and fuse

	▶	Repair or replace harness or connectors.

3	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-155.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness or connectors.

4	PERFORM DTC CONFIRMATION PROCEDURE
With CONSULT-II 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-443. 5. Is the 1st trip DTC P1065 displayed again?	
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-443. 5. Is the 1st trip DTC P1065 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 "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93. 3. Perform "Accelerator Pedal Released Position Learning", EC-73. 4. Perform "Throttle Valve Closed Position Learning", EC-73. 5. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**

Description

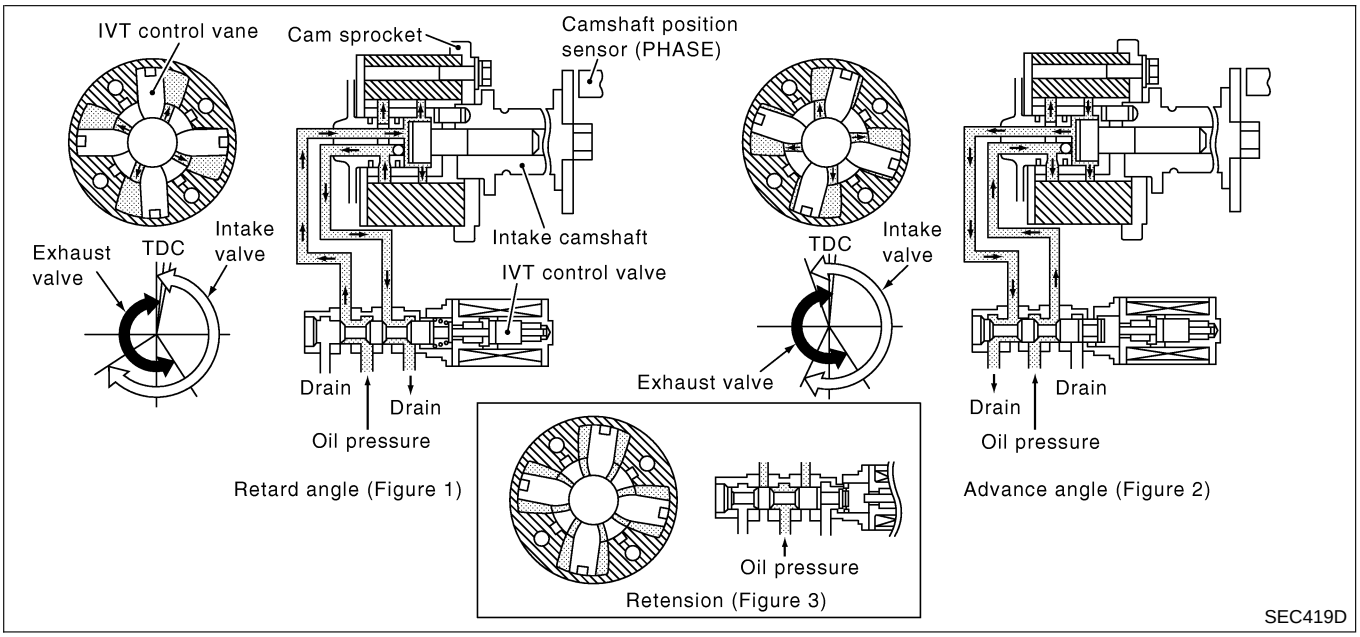
NAEC1371

SYSTEM DESCRIPTION

NAEC1371S01

Sensor	Input signal to ECM function	ECM	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		
Vehicle speed signal*1	Vehicle speed		

*1: 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 camshaft timing control 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-II Reference Value in Data Monitor Mode

NAEC1372

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever N • Quickly depressed accelerator pedal • No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever N • Quickly depressed accelerator pedal • No-load	Idle	0%
		2,000 rpm	Approximately 40%

On Board Diagnosis Logic

=NAEC1373

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1110 1110 (Bank 1)	Intake valve timing control performance	The alignment of the intake valve timing control has been misregistered.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Accumulation of debris to the signal pick-up portion of the camshaft
P1135 1135 (Bank 2)			

FAIL-SAFE MODE

NAEC1373S01

When 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

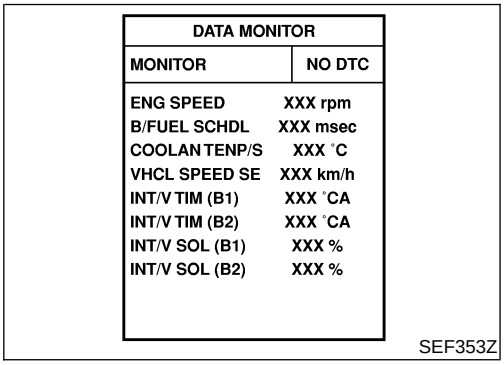
NAEC1374

CAUTION:

Always drive at a safe speed.

NOTE:

- **If DTC P1110 or P1135 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136, EC-451.**
- **If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.**



WITH CONSULT-II

NAEC1374S01

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMPS	More than 60°C (140°F)
Selector lever	1st position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

4) Maintain the following conditions for at least 20 conecutive seconds.

ENG SPEED	Idle
COOLAN TEMPS	More than 60°C (140°F)
Selector lever	P or N position

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-450.

WITH GST

NAEC1374S02

Follow the procedure "With CONSULT-II" above.

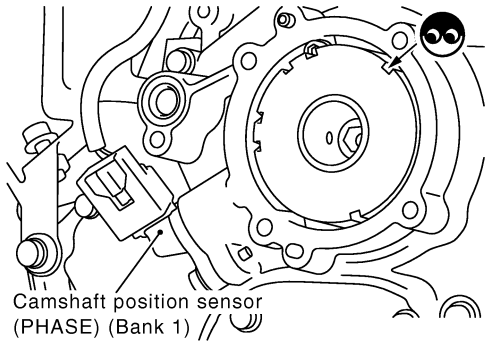
Diagnostic Procedure

NAEC1375

1	CHECK CRANKSHAFT POSITION SENSOR (POS)	
Refer to "Component Inspection", EC-325.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace crankshaft position sensor (POS).

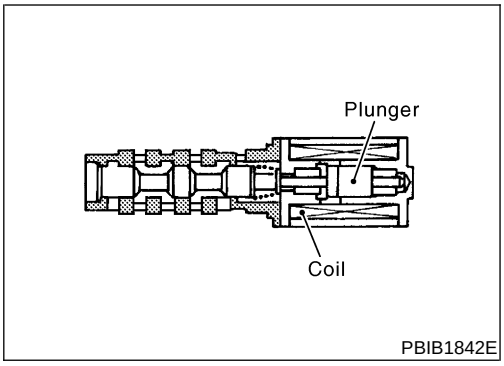
2	CHECK CAMSHAFT POSITION SENSOR (PHASE)	
Refer to "Component Inspection", EC-333.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Replace.

3	CHECK CAMSHAFT (INTAKE)	
Visually check for chipped signal plate at camshaft.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace camshaft.



SEC578D

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155. For Wiring Diagram, refer to EC-321 CKP sensor (POS), and EC-328 for CMP sensor (PHASE).		
OK or NG		
	▶	**INSPECTION END**



Component Description

NAEC1036

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1037

Specification data are reference values.

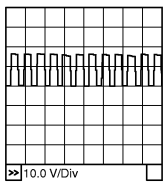
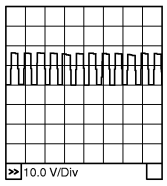
MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever N ● Quickly depressed accelerator pedal ● No-load	Idle	0%
		2,000 rpm	Approximately 40%

ECM Terminals and Reference Value

NAEC1038

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

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

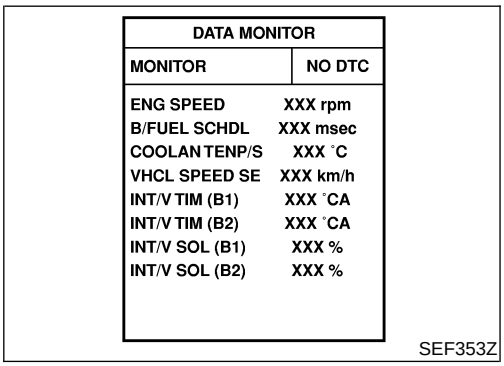
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	P/L	Intake valve timing control solenoid valves (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly.	7 - 8V★  PBIB1790E
11	OR/B	Intake valve timing control solenoid valves (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly.	7 - 8V★  PBIB1790E

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

On Board Diagnosis Logic

NAEC1039

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1111 1111 (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 (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve
P1136 1136 (Bank 2)			



DTC Confirmation Procedure

NAEC1040

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

WITH CONSULT-II

NAEC1040S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-455.

WITH GST

NAEC1040S02

Follow the procedure “With CONSULT-II” above.

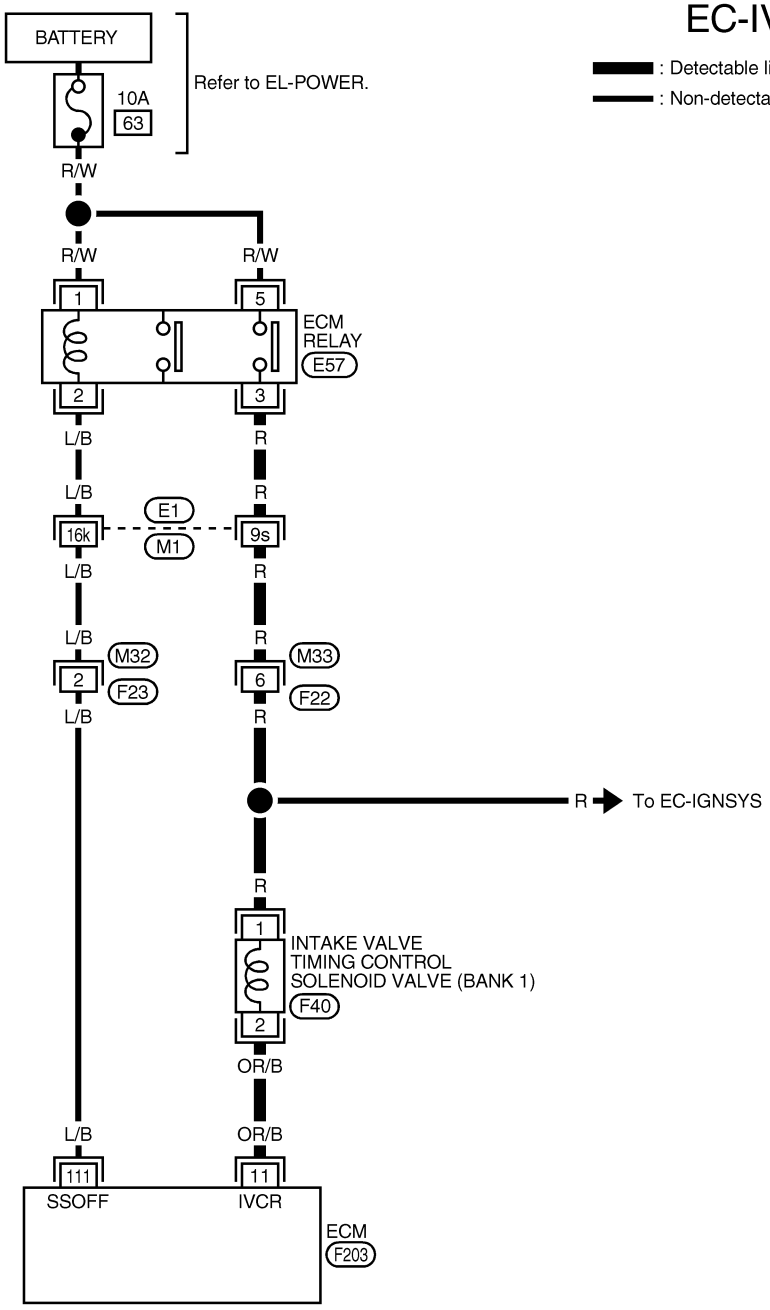
Wiring Diagram

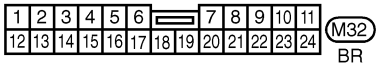
NAEC1041

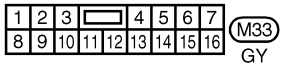
BANK 1

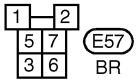
NAEC1041S01

EC-IVCB1-01

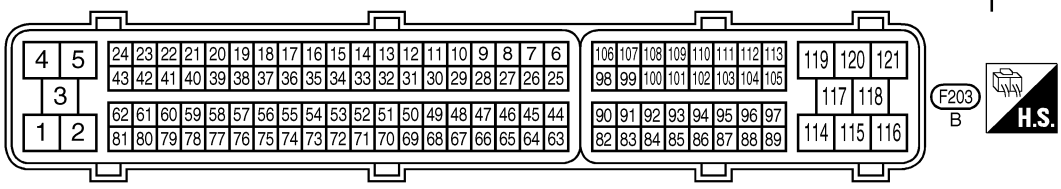








REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

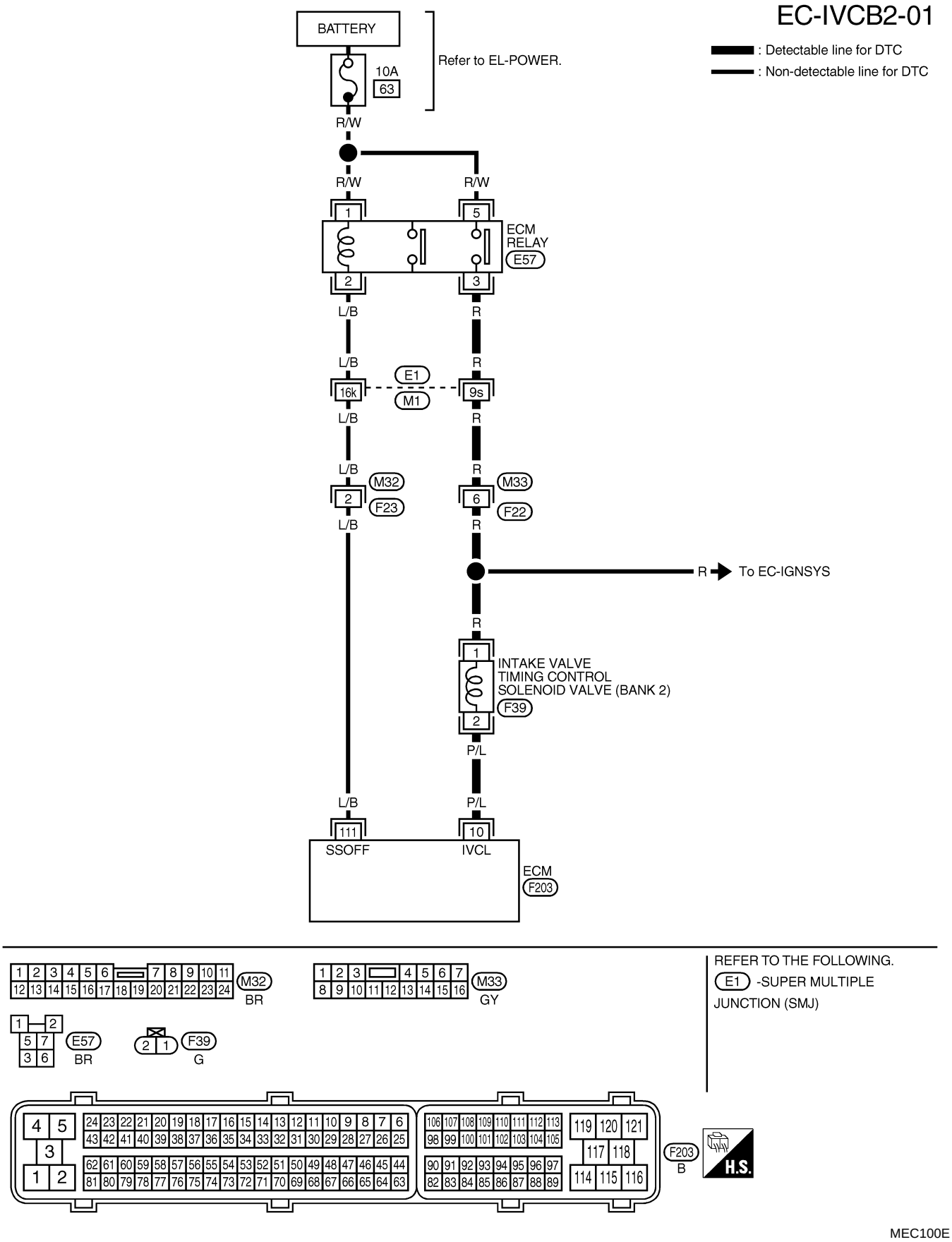


MEC099E

Wiring Diagram (Cont'd)

BANK 2

NAEC1041S02



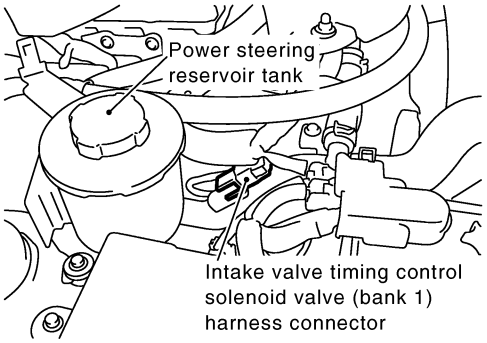
MEC100E

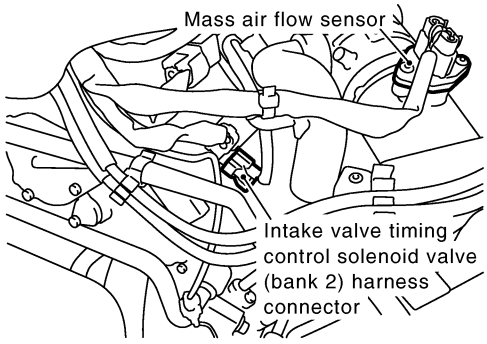
Diagnostic Procedure

NAEC1042

1	INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

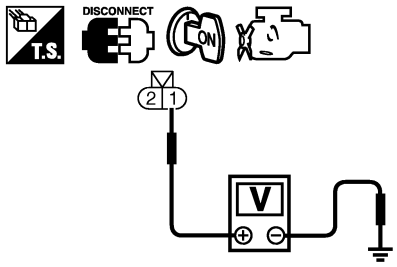
1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.





SEC003E

3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.



SEC556D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTION PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness continuity between intake valve timing control solenoid valve and ECM relay

	▶	Repair harness or connectors.

3	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT CIRCUIT FOR OPEN AND SHORT

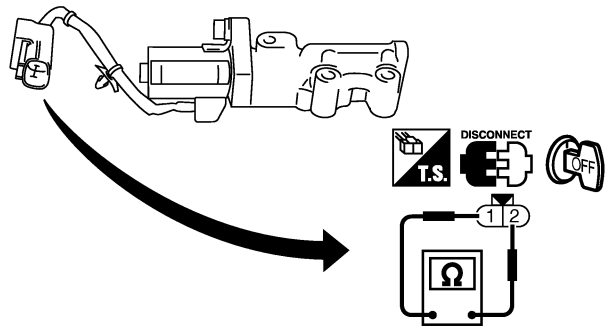
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness connectors continuity between ECM terminal 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground 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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

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



Terminals	Resistance
1 and 2	7.0 - 7.7Ω at 20°C (68°F)
1 or 2 and ground	∞ Ω (Continuity should not exist.)

SEC555D

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair intake valve timing control solenoid valve.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Component Description

NAEC1245

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

NAEC1246

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detects that the throttle valve is stuck open.	

FAIL-SAFE MODE
When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

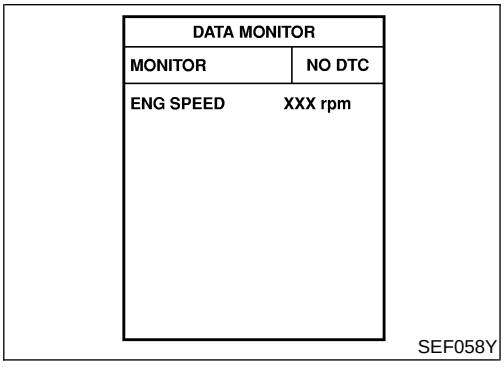
Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

NAEC1247

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.



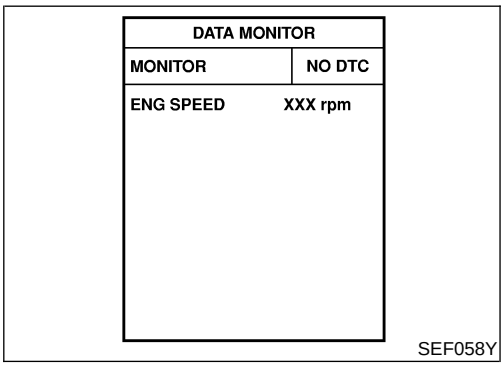
PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1) Turn ignition switch ON and wait at least 1 second.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
4) Shift selector lever to P position (A/T) or Neutral position (M/T).
5) Turn ignition switch OFF and wait at least 10 seconds.
6) Turn ignition switch ON and wait at least 1 second.
7) Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.

8) Shift selector lever to P position (A/T) or Neutral position (M/T).
9) Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10) If DTC is detected, go to "Diagnostic Procedure", EC-458.

With GST
Follow the procedure "WITH CONSULT-II" above.



PROCEDURE FOR MALFUNCTION C

With CONSULT-II
1) Turn ignition switch ON and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
4) Shift selector lever to N or P position.
5) Start engine and let it idle for 3 seconds.
6) If DTC is detected, go to "Diagnostic Procedure", EC-458.

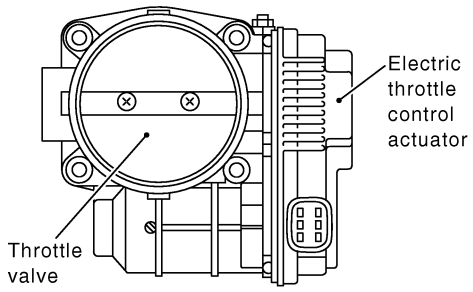
With GST
Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NAEC1248

1	CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.



OK or NG

OK	▶	GO TO 2.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

2	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

Description

NAEC1249

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-457, 467.

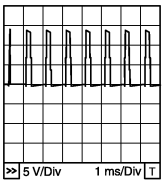
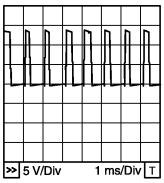
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides the feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

ECM Terminals and Reference Value

NAEC1268

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	OR	Throttle control motor relay power supply	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is fully depressed	0 - 14V★  PBIB1105E
104	L	Throttle control motor relay	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON]	0 - 1.0V

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

On Board Diagnosis Logic

=NAEC1250

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted.) • Electric throttle control actuator

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

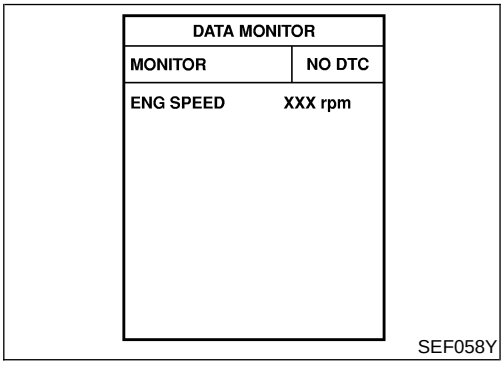
NAEC1251

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.



With CONSULT-II

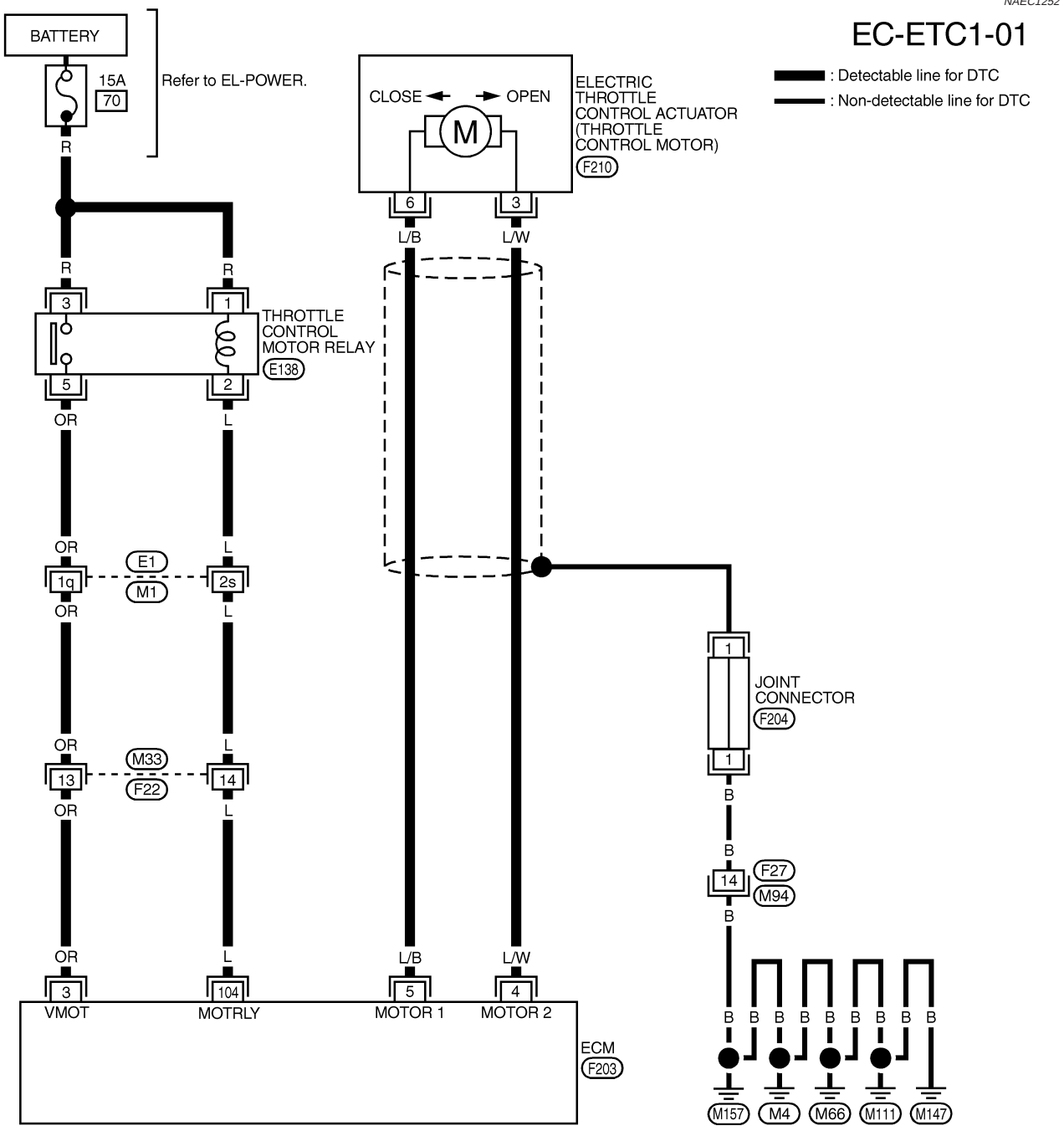
1) Turn ignition switch ON and wait at least 2 seconds.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-462.

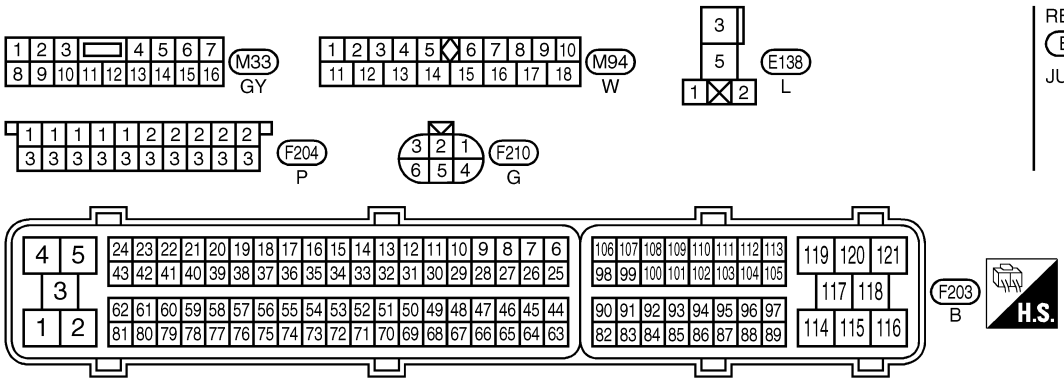
With GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1252





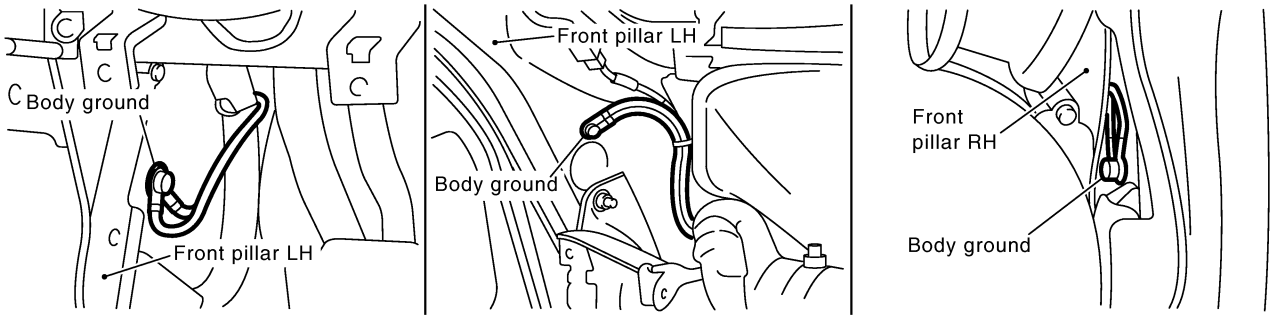
MEC121E

Diagnostic Procedure

NAEC1253

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



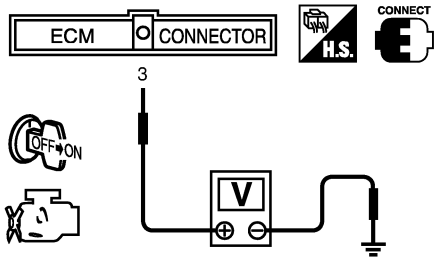
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.



MBIB0028E

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11- 14V)

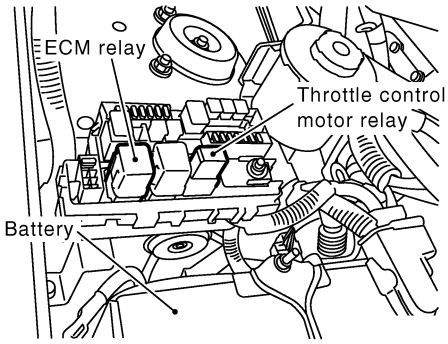
MTBL1168

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 3.

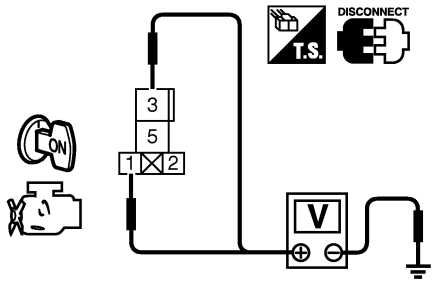
3	CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



SEC425D

3. Check voltage between throttle control motor relay terminals 1, 3 and ground with CONSULT-II or tester.



SEC538D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse
- Harness for open and short between throttle control motor relay and battery

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

5	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 5.
   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.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M11 ● Harness connectors M33, F22 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between ECM terminal 104 and throttle control motor relay 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.

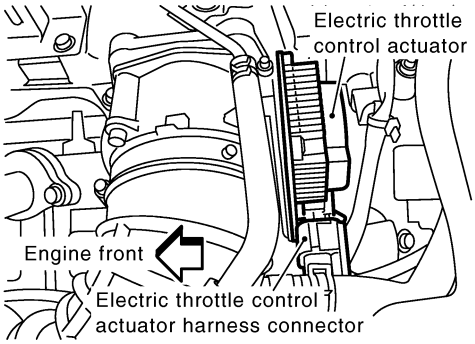
8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE CONTROL MOTOR RELAY	
Refer to "Component Inspection", EC-466.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace throttle control motor relay.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

11 **CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT**

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.



SEC433D

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
3	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

MTBL1377

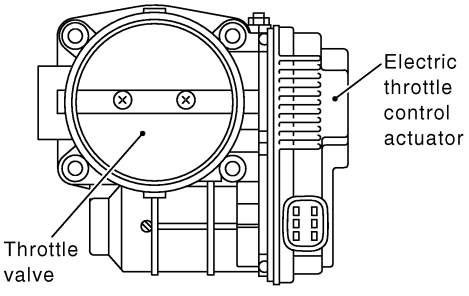
5. Also check harness for short to ground and short to power.

OK or NG

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

12 **CHECK 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.



SEC513D

OK or NG

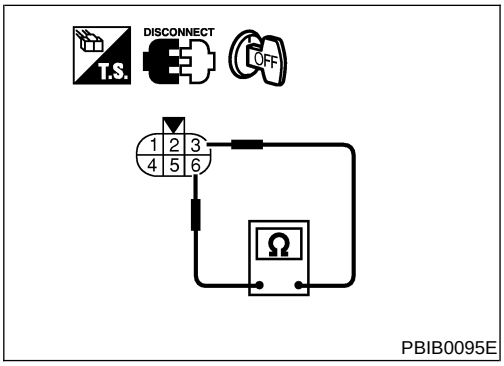
OK	▶	GO TO 13.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

Diagnostic Procedure (Cont'd)

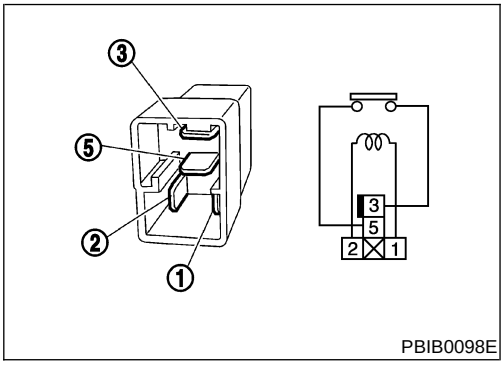
13	CHECK THROTTLE CONTROL MOTOR	
Refer to "Component Inspection", EC-466.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	GO TO 15.

14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Repair or replace harness or connectors.

15	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-73. 3. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**



PBIB0095E



PBIB0098E

Component Inspection

NAEC1254

THROTTLE CONTROL MOTOR

NAEC1254S01

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

   Resistance: Approximately 1 - 15Ω [at 25°C (77°F)]
3. If NG, replace electric throttle control actuator and go to next step.
4. Perform "Throttle Valve Closed Position Learning", EC-73.
5. Perform "Idle Air Volume Learning", EC-73.

THROTTLE CONTROL MOTOR RELAY

NAEC1254S02

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.

Component Description

NAEC1255

Power supply for the Throttle Control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1256

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

ECM Terminals and Reference Value

NAEC1269

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	OR	Throttle control motor relay power supply	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
104	L	Throttle control motor relay	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON]	0 - 1.0V

On Board Diagnosis Logic

NAEC1257

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1124 1124	Throttle control motor relay circuit short	ECM detects that the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects that a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

NAEC1257S01

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

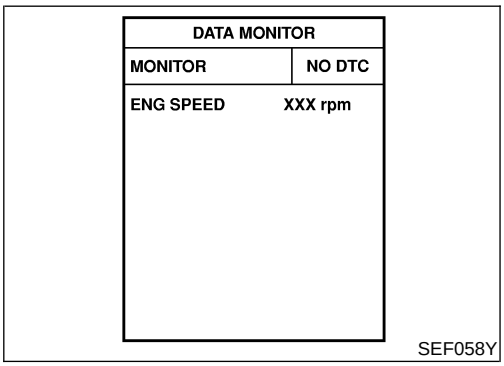
Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NAEC1258

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 P1124
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

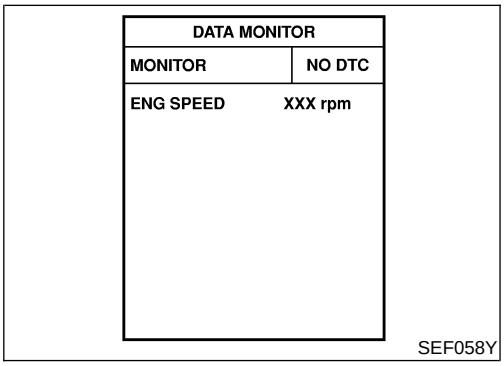


With CONSULT-II

1) Turn ignition switch ON and wait at least 1 second.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) If DTC is detected, go to “Diagnostic Procedure”, EC-470.

With GST

Follow the procedure “With CONSULT-II” above.



PROCEDURE FOR DTC P1126

With CONSULT-II

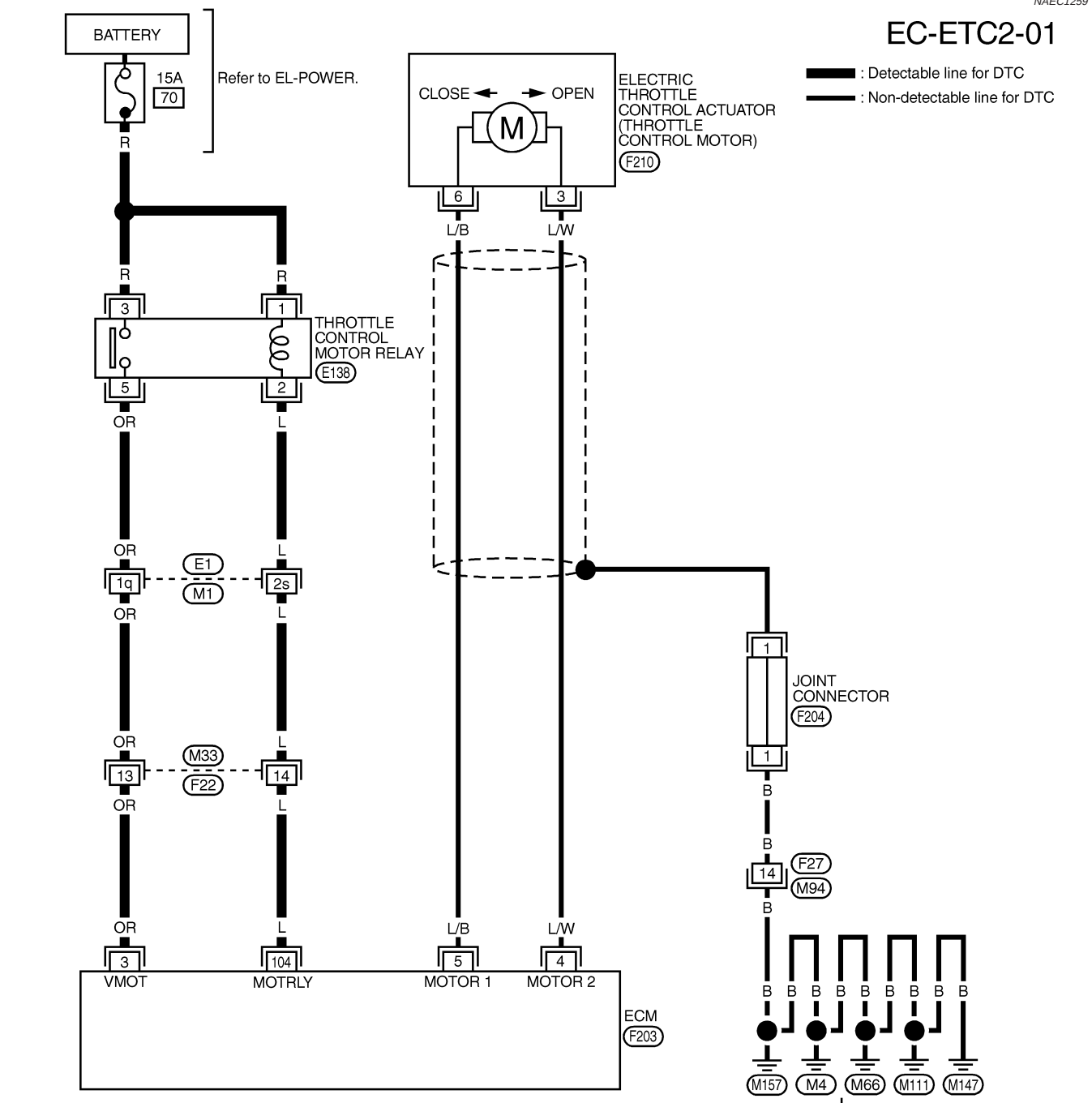
1) Turn ignition switch ON and wait at least 2 seconds.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-470.

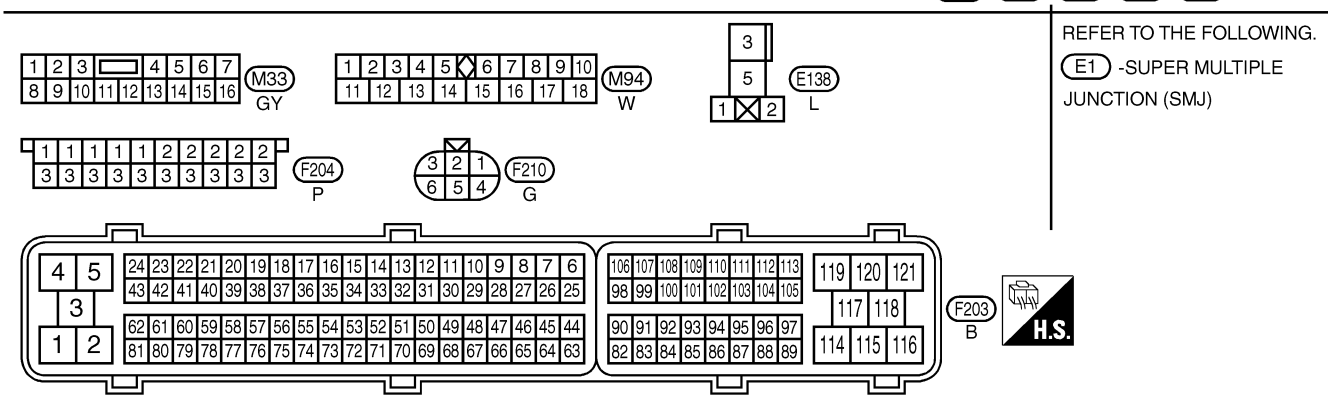
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NAEC1259





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

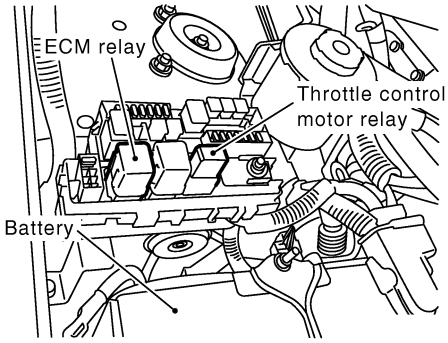
MEC122E

Diagnostic Procedure

NAEC1260

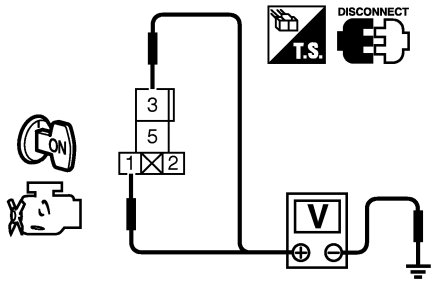
1	CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



SEC425D

3. Check voltage between throttle control motor relay terminals 1, 3 and ground with CONSULT-II or tester.



SEC538D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse
- Harness for open and short between throttle control motor relay and battery

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

3	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 5.
   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.

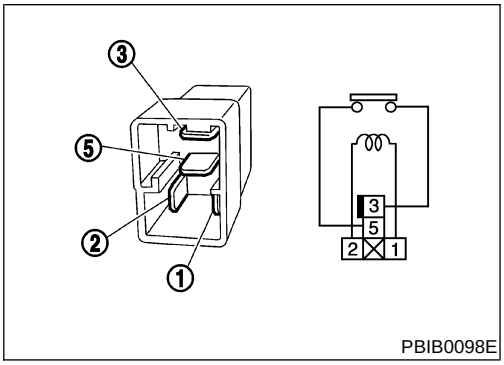
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 104 and throttle control motor relay 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 7.
NG ▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK THROTTLE CONTROL MOTOR RELAY
Refer to "Component Inspection", EC-471.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace throttle control motor relay.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



PBIB0098E

Component Inspection

NAEC1261

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.

Component Description

NAEC1262

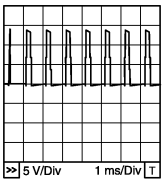
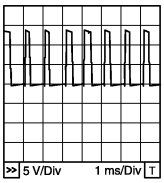
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle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

ECM Terminals and Reference Value

NAEC1270

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/W	Throttle control motor (Close)	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal is fully depressed	0 - 14V★  PBIB1105E

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

On Board Diagnosis Logic

NAEC1263

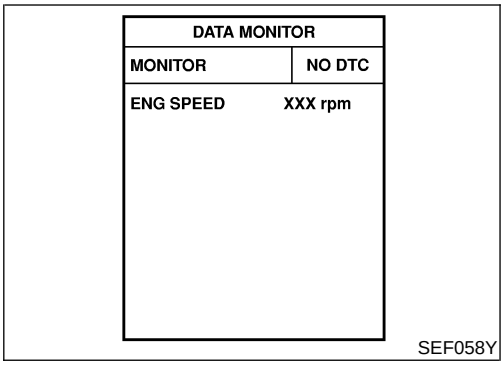
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

DTC Confirmation Procedure

NAEC1264

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



With CONSULT-II

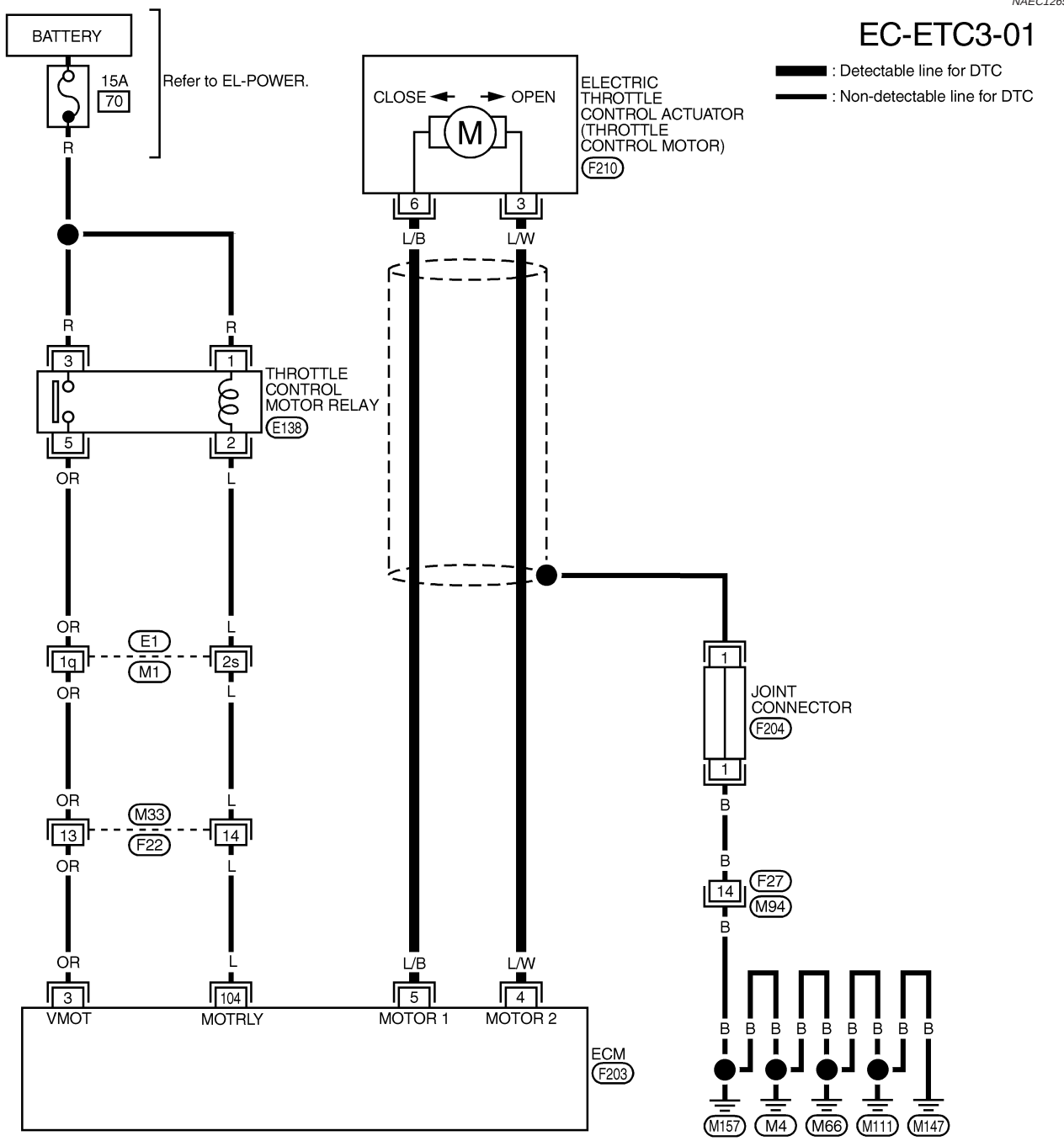
1) Turn ignition switch ON and wait at least 2 seconds.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-475.

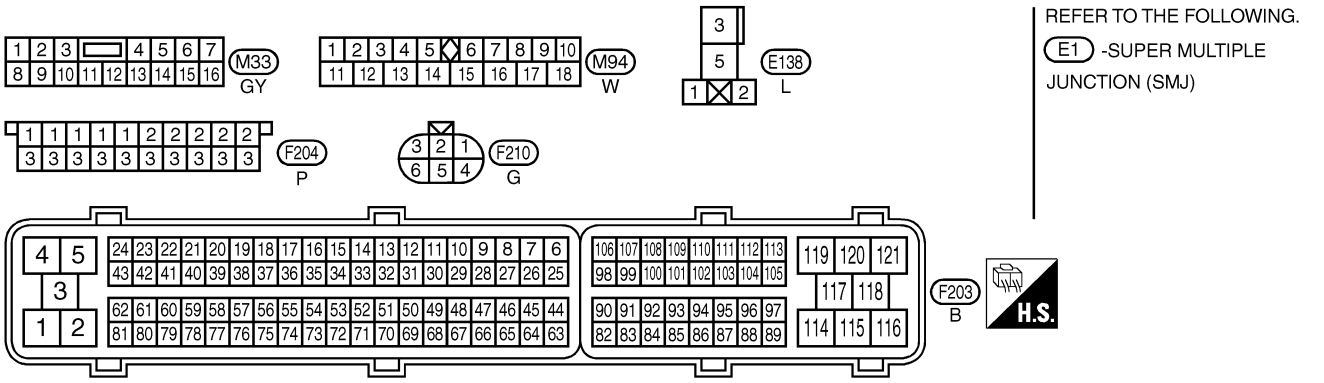
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC1265





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

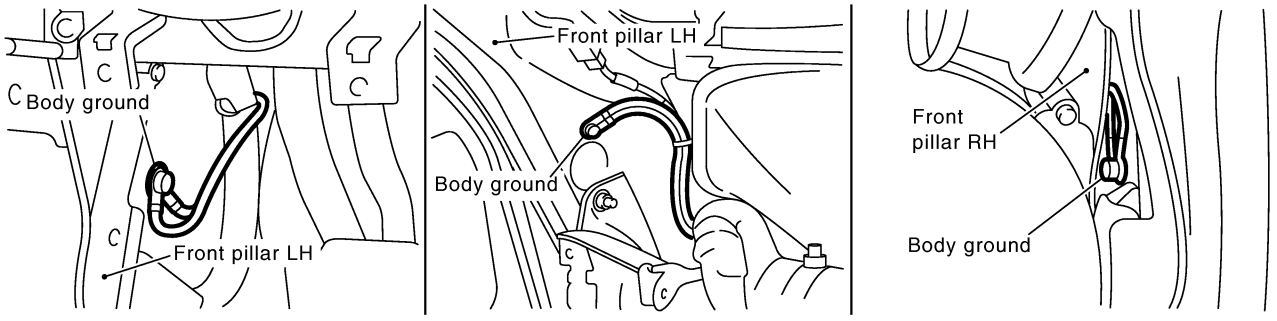
MEC123E

Diagnostic Procedure

NAEC1266

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



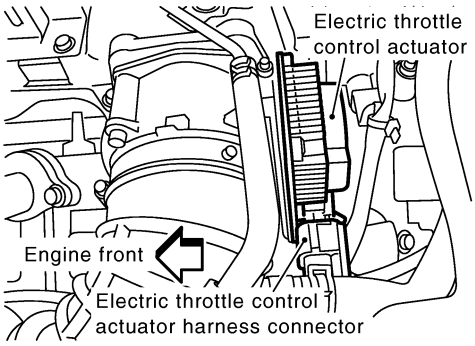
SEC997D

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.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.



SEC433D

Electric throttle control actuator terminal	ECM terminal	Continuity
3	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

MTBL1377

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

OK or NG

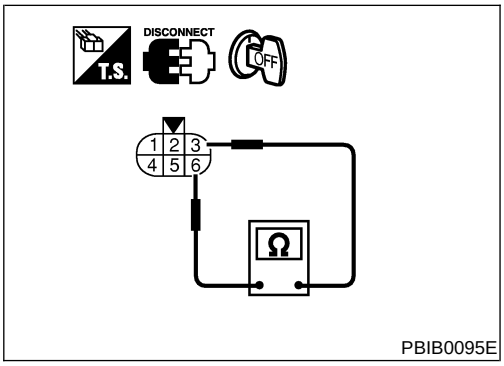
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK THROTTLE CONTROL MOTOR	
Refer to "Component Inspection", EC-476.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
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 "Throttle Valve Closed Position Learning", EC-73. 3. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**



PBIB0095E

Component Inspection

NAEC1267

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.
   Resistance: Approximately 1 - 15Ω [at 25°C (77°F)]
3. If NG, replace electric throttle control actuator and go to next step.
4. Perform "Throttle Valve Closed Position Learning", EC-73.
5. Perform "Idle Air Volume Learning", EC-73.

Description

NAEC1043

If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165, EC-543.

SYSTEM DESCRIPTION

NAEC1043S01

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator ↓ Swirl control valve
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		

This system has a swirl control valve in the intake passage of each cylinder.

While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.

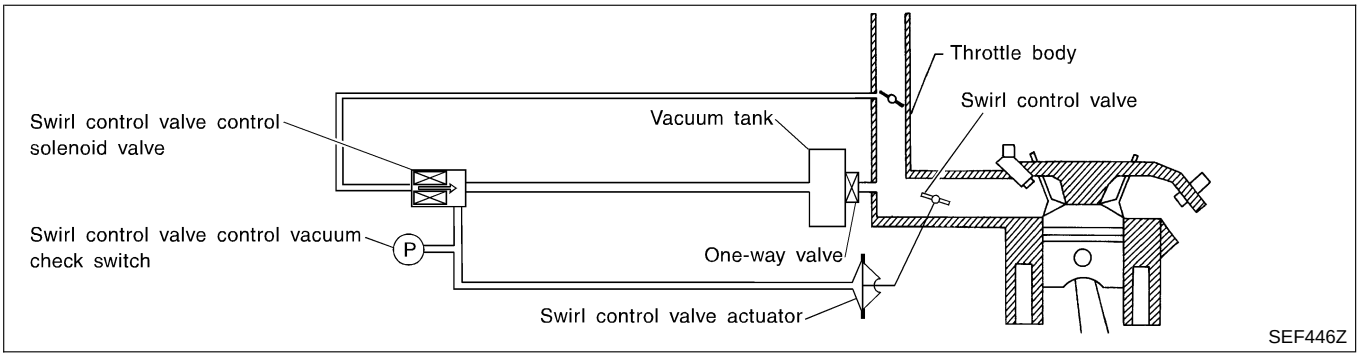
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.

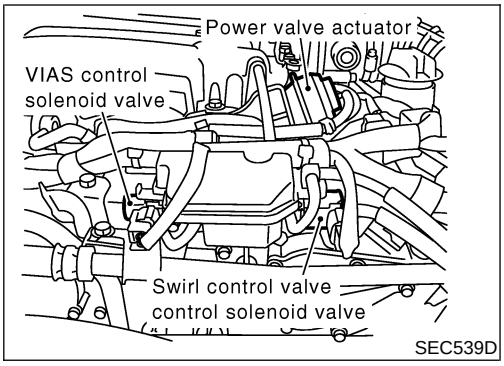
The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

Accelerator pedal position sensor (Idle position)	Engine speed (A/T)	Engine speed (M/T)	Swirl control valve control solenoid valve	Swirl control valve
ON	Below 3,200 rpm	Below 2,400 rpm	ON	Closed
OFF	Less than 3,200 rpm	Less than 2,400 rpm	ON	Closed
	More than 3,600 rpm	More than 2,800 rpm	OFF	Open

When engine coolant temperature is below 10°C (50°F) and above 55°C (131°F), swirl control valve is kept open regardless of above condition.



Description (Cont'd)



COMPONENT DESCRIPTION

NAEC1043S02

Swirl Control Valve Control Solenoid Valve

NAEC1043S0201

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1044

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	● Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

ECM Terminals and Reference Value

NAEC1045

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27	G	Swirl control valve control solenoid valve	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1046

DTC No.	Trouble diagnosis name	DTC Detecting Condition		Possible Cause
P1130 1130	Swirl control valve control solenoid valve	A)	An improper voltage signal is sent to ECM through swirl control valve control solenoid valve.	• Harness or connectors (The swirl control valve control solenoid valve circuit is open or shorted.) • Swirl control valve control solenoid valve
		B)	The vacuum signal is not sent to swirl control valve under specified driving conditions, even though swirl control valve control solenoid valve is ON.	• Harness or connector (The swirl control valve control solenoid valve circuit is open.) • Swirl control valve control solenoid valve • Intake system (Intake air leaks) • Hoses and tubes between intake manifold, vacuum tank and swirl control valve actuator • Swirl control valve actuator • Swirl control valve control vacuum check switch • Mass air flow sensor • Camshaft position sensor (PHASE) • Throttle position sensor • Accelerator pedal position sensor
		C)	The vacuum signal is sent to swirl control valve even though swirl control valve control solenoid valve is OFF.	• Harness or connector (The swirl control valve control solenoid valve circuit is shorted.) • Swirl control valve control vacuum check switch • Camshaft position sensor (PHASE) • Throttle position sensor • Accelerator pedal position sensor • Hoses and tubes between air cleaner and swirl control valve vacuum check switch • Swirl control valve control solenoid valve

DTC Confirmation Procedure

NAEC1047

Perform Procedure for malfunction A first. If the 1st trip DTC cannot be confirmed, perform Procedure for malfunction B. If the 1st trip DTC is not confirmed 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.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NAEC1047S01

With CONSULT-II

NAEC1047S0101

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-482.

With GST

NAEC1047S0102

Follow the procedure "With CONSULT-II" above.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NAEC1047S02

TESTING CONDITION:

- **For best results, perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle, then stop engine immediately.**

With CONSULT-II

NAEC1047S0201

1) Turn ignition switch OFF and wait at least 10 seconds.
2) Turn ignition switch ON.
3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
4) Confirm COOLAN TEMP/S value is 40°C (104°F) or less.
   If the value is more than 40°C (104°F), park the vehicle in a cool place and retry from step 1.
5) Start engine and wait until COOLAN TEMP/S value increases to more than 55°C (131°F).
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-482.

With GST

NAEC1047S0202

Follow the procedure "With CONSULT-II" above.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NAEC1047S03

TESTING CONDITION:

- **For best results, perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

With CONSULT-II

NAEC1047S0301

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 again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and let it idle for at least 20 seconds. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-482.

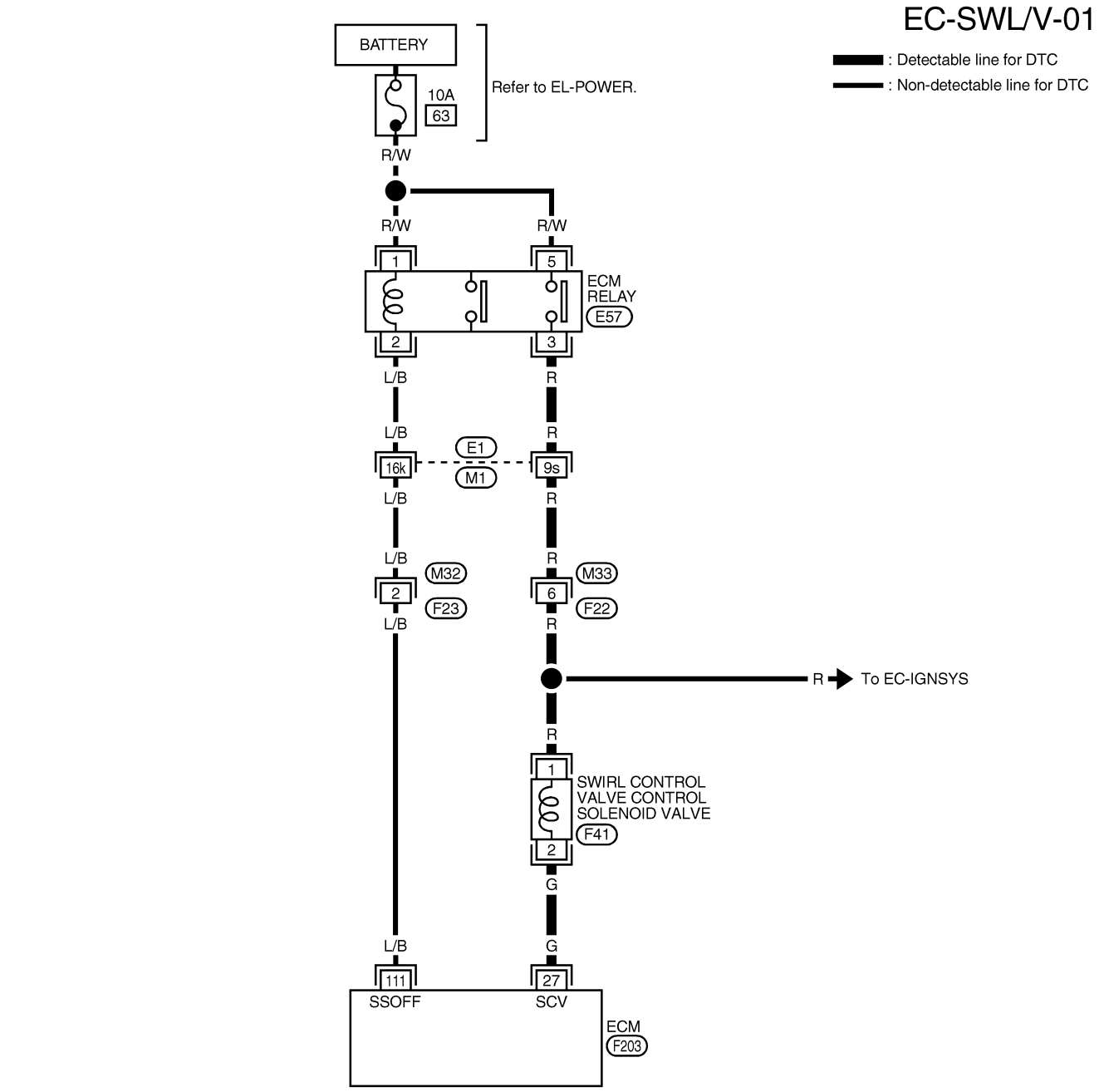
With GST

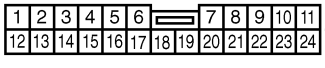
NAEC1047S0302

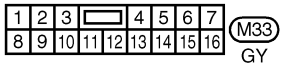
Follow the procedure "With CONSULT-II" above.

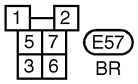
Wiring Diagram

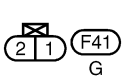
NAEC1048



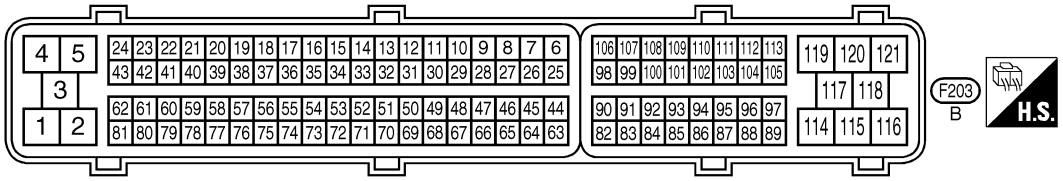








REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)



MEC101E

Diagnostic Procedure

NAEC1049

PROCEDURE A

NAEC1049S01

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SWIRL CONT SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON” and “OFF” on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

SEC004E

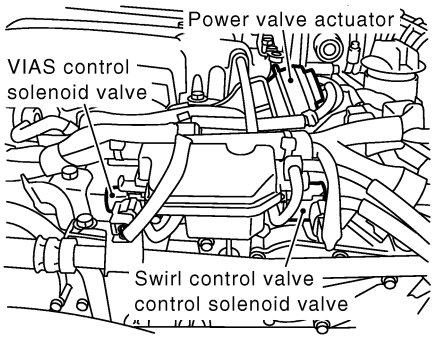
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 3.

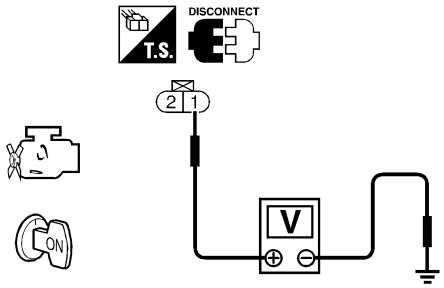
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve control solenoid valve harness connector.



SEC539D

3. Turn ignition switch ON.
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5	CHECK SWIRL CONTROL VALVE 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 27 and swirl control valve 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

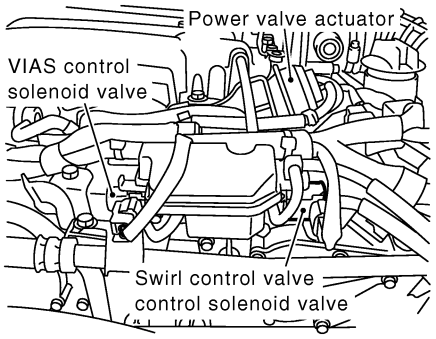
OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness connectors.

Diagnostic Procedure (Cont'd)

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



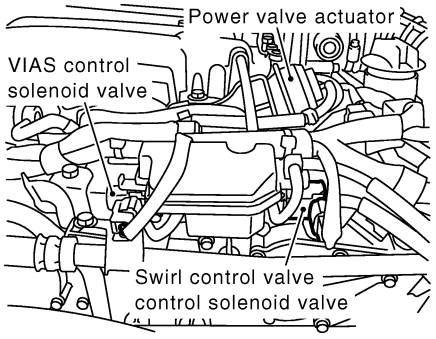
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

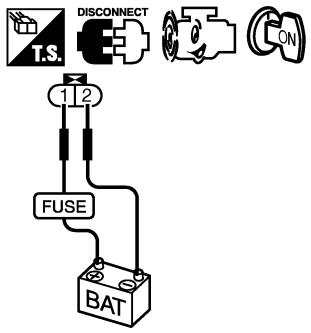
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEC541D

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

PROCEDURE B

NAEC1049S02

1	CHECK INTAKE SYSTEM
1. Start engine and let it idle. 2. Check intake air system for air leaks.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 2.
OK (Without CONSULT-II) ▶	GO TO 3.
NG ▶	Repair intake system.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II
1. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
2. Touch "ON" and "OFF" on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

SEC004E

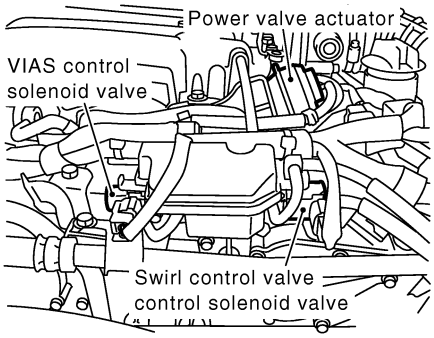
3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 3.

Diagnostic Procedure (Cont'd)

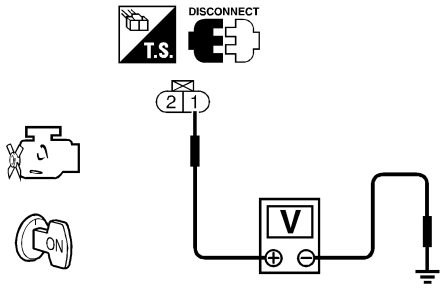
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve control solenoid valve harness connector.



SEC539D

3. Turn ignition switch ON.
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

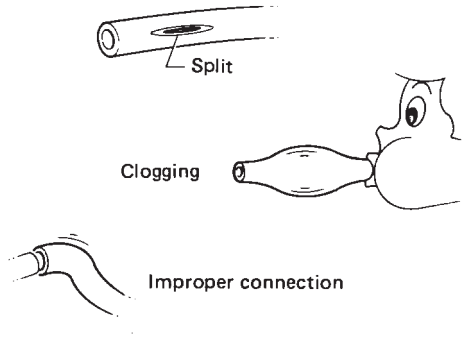
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 27 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness connectors.

6	CHECK HOSES

Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.



SEF109L

OK or NG

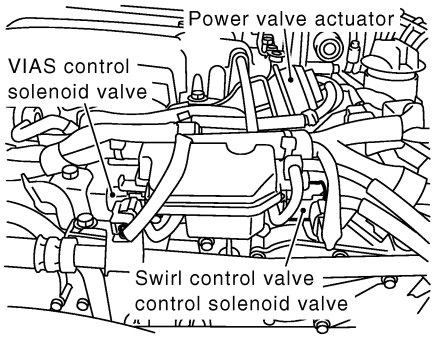
OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



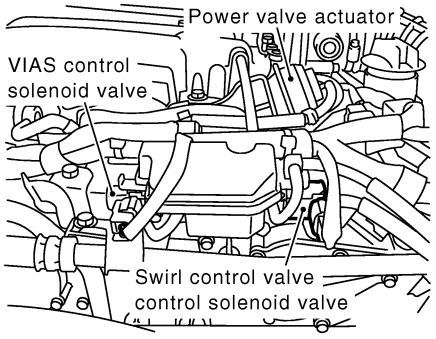
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

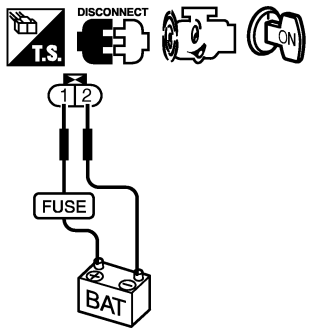
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEC541D

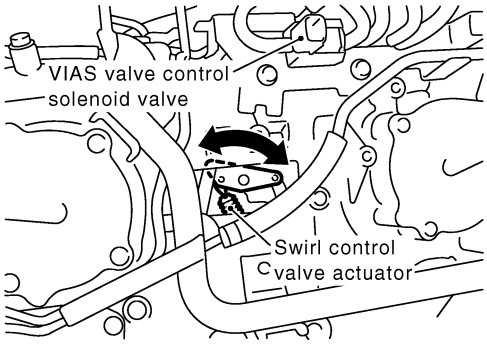
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

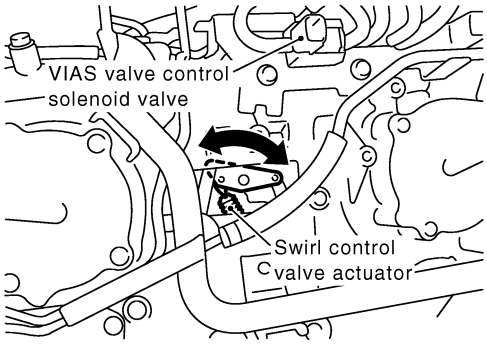
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V indication.



SEF006ZA

Without CONSULT-II

1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Apply 12V direct current between swirl control valve control solenoid valve terminals 1 and 2.
4. Make sure that swirl control valve actuator rod moves according to 12V direct current being applied.



SEF006ZA

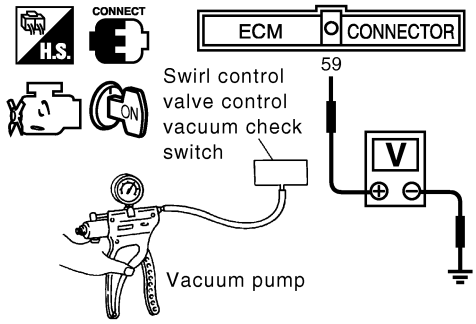
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve actuator.

Diagnostic Procedure (Cont'd)

9	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch ON.
5. Check voltage between ECM terminal 59 and ground under the following conditions.



SEC542D

Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

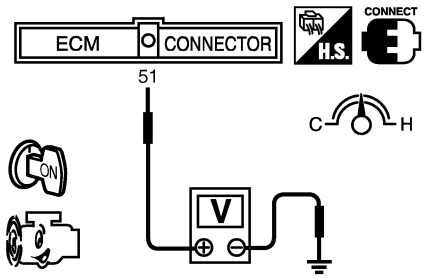
MTBL1369

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace swirl control valve control vacuum check switch.

10	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



SEC543D

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.3 to Approx. 3.7

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

MTBL1844

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

11	CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-704, "Component Inspection".

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace accelerator pedal assembly.

12	CHECK THROTTLE POSITION SENSOR

Refer to EC-696, "Component Inspection".

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace electric throttle control actuator.

13	CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-333, "Component Inspection".

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace crankshaft position sensor (PHASE).

Diagnostic Procedure (Cont'd)

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	INSPECTION END

PROCEDURE C

NAEC1049S03

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch OFF.
2. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON" and "OFF" on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

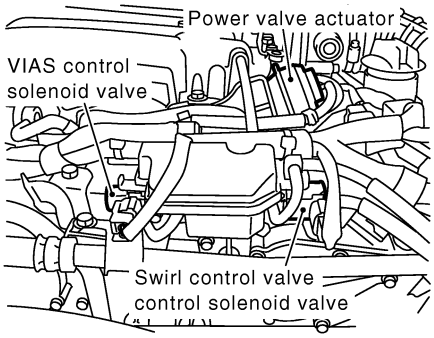
SEC004E

4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 3.

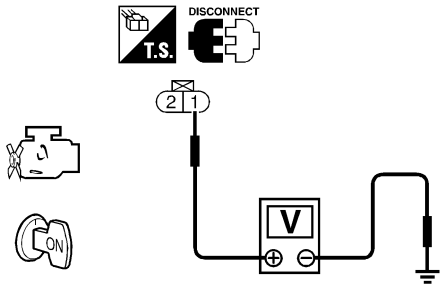
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve control solenoid valve harness connector.



SEC539D

3. Turn ignition switch ON.
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

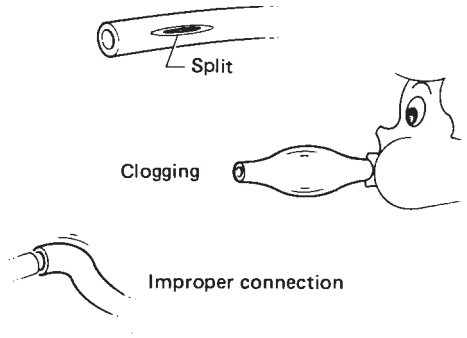
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 27 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness connectors.

6	CHECK HOSES

Check hoses and tubes between air cleaner and swirl control valve vacuum check switch for clogging or improper connection.



SEF109L

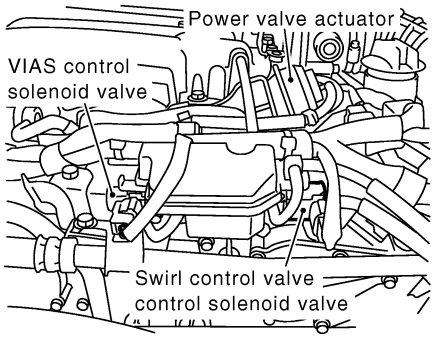
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



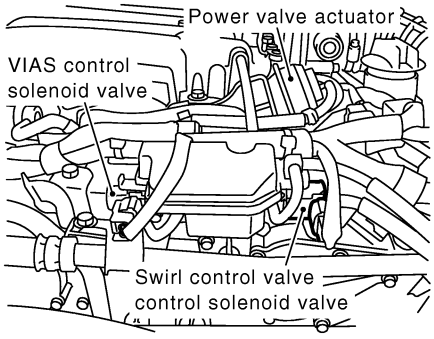
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

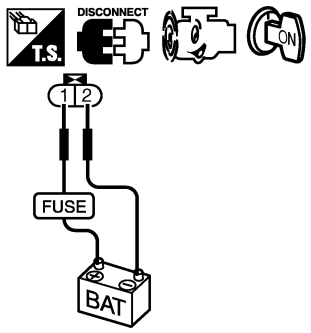
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEC541D

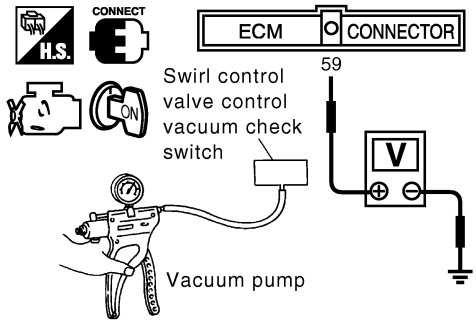
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

Diagnostic Procedure (Cont'd)

8	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch ON.
5. Check voltage between ECM terminal 59 and ground under the following conditions.



SEC542D

Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

MTBL1369

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve control vacuum check switch.

9	CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-333, "Component Inspection".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace camshaft position sensor (PHASE).

10	CHECK THROTTLE POSITION SENSOR

Refer to EC-696, "Component Inspection".

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace electric throttle control actuator.

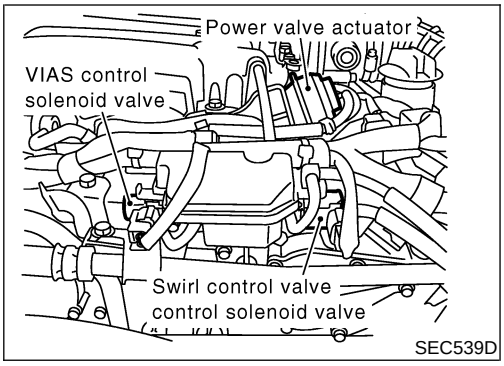
11	CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-704, "Component Inspection".

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace accelerator pedal assembly.

12	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1050

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	● Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

ECM Terminals and Reference Value

NAEC1052

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

CAUTION:

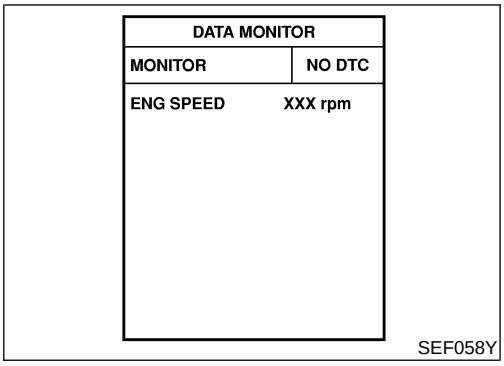
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
27	G	Swirl control valve control solenoid valve	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1053

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1131 1131	Swirl control valve control solenoid valve circuit	An improper voltage signal is sent to ECM through swirl control valve control solenoid valve.	● Harness or connectors (The swirl control valve control solenoid valve circuit is open or shorted.) ● Swirl control valve control solenoid valve



DTC Confirmation Procedure

NAEC1054

NOTE:

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

WITH CONSULT-II

NAEC1054S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-501.

WITH GST

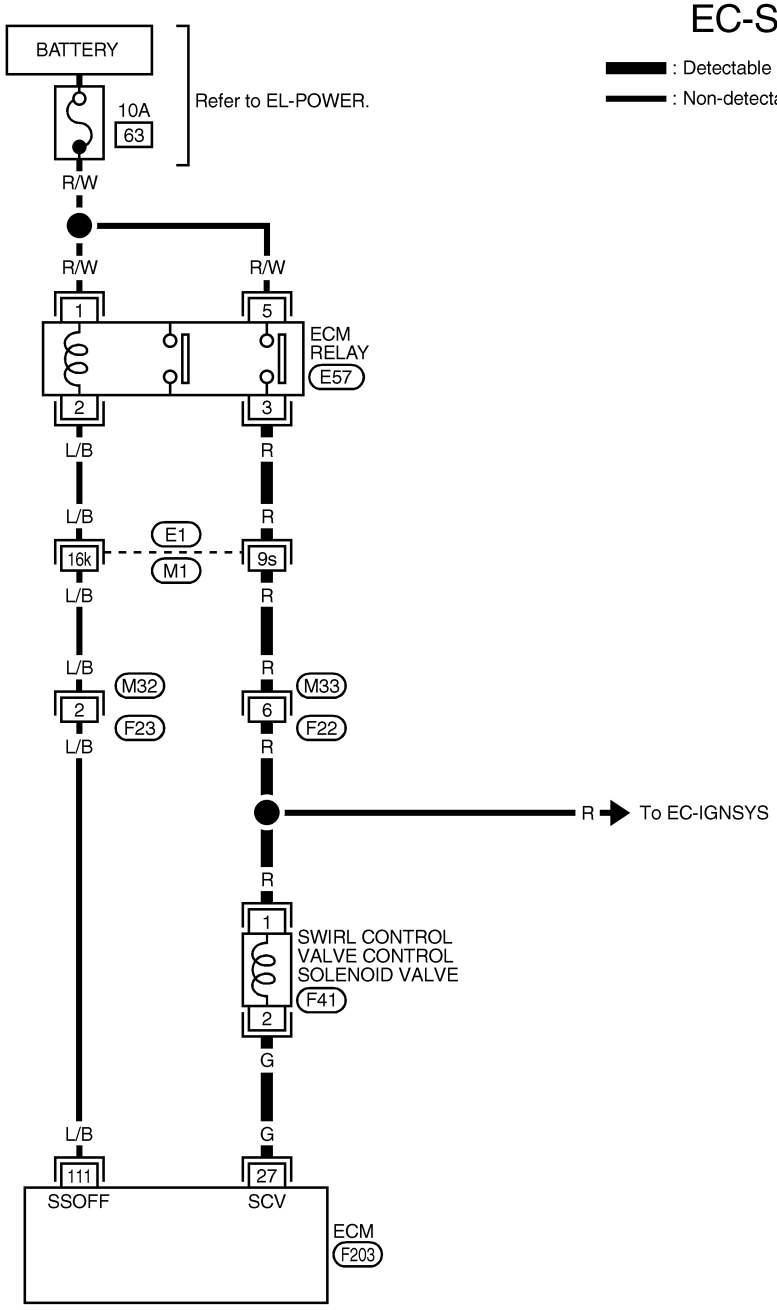
NAEC1054S02

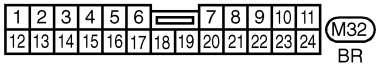
Follow the procedure “With CONSULT-II” above.

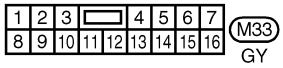
Wiring Diagram

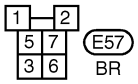
=NAEC1055

EC-SWL/V-01

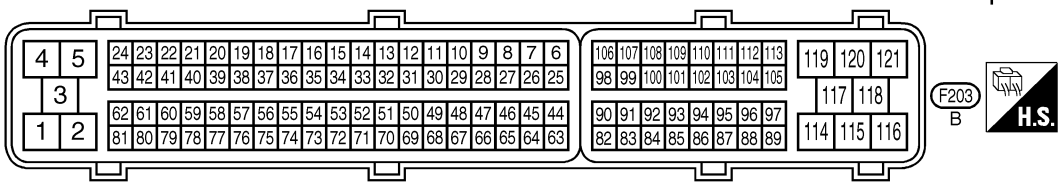








REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)



MEC101E

Diagnostic Procedure

NAEC1056

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT	

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SWIRL CONT SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON” and “OFF” on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

SEC004E

4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

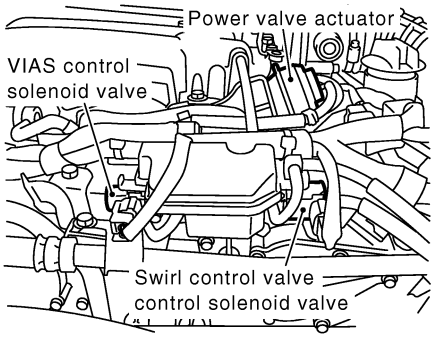
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

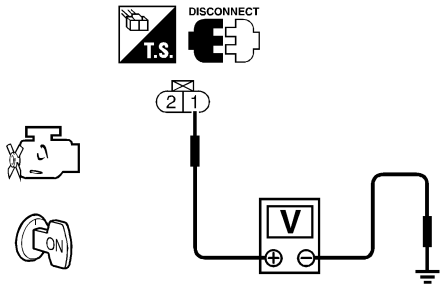
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve control solenoid valve harness connector.



SEC539D

3. Turn ignition switch ON.
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5	CHECK SWIRL CONTROL VALVE 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 27 and swirl control valve control solenoid valve terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

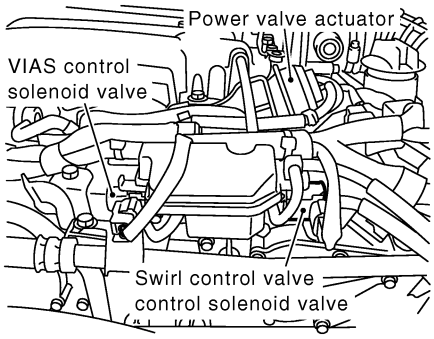
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness connectors.

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



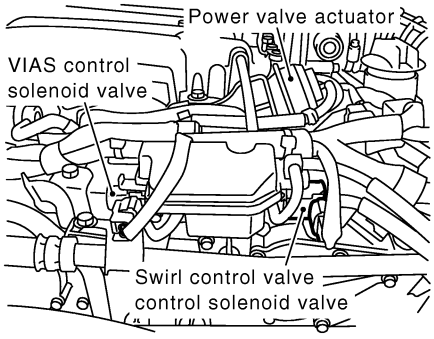
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

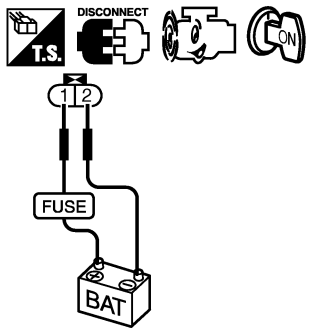
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

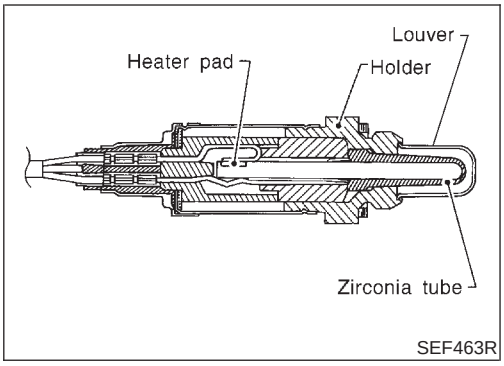
Operation takes less than 1 second.

SEC541D

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

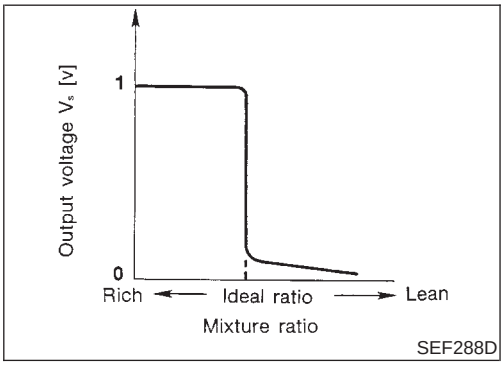
7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1147

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NAEC1148

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

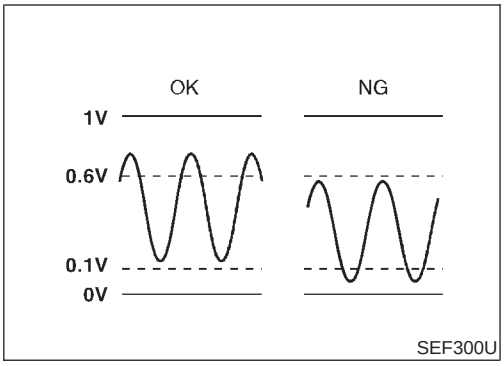
NAEC1149

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)



On Board Diagnosis Logic

NAEC1150

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1143 1143 (Bank 1)	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Injector • Intake air leaks
P1163 1163 (Bank 2)			

DTC Confirmation Procedure

NAEC1151

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 at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

DTC Confirmation Procedure (Cont'd)

6

HO2S1 (B1) P1143	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0546E

6

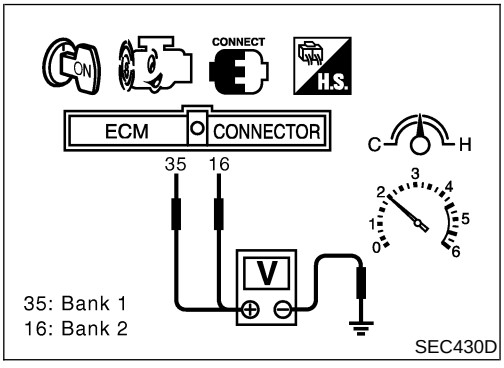
HO2S1 (B1) P1143	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

PBIB0547E

6

HO2S1 (B1) P1143
COMPLETED

SEC769C



SEC430D

WITH CONSULT-II

NAEC1151S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 10 seconds.
3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P1143/ P0154" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,300 - 2,800 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3 - 14 msec
Selector lever	Suitable position

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 "Diagnostic Procedure", EC-507.

Overall Function Check

NAEC1152

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

WITH GST

NAEC1152S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

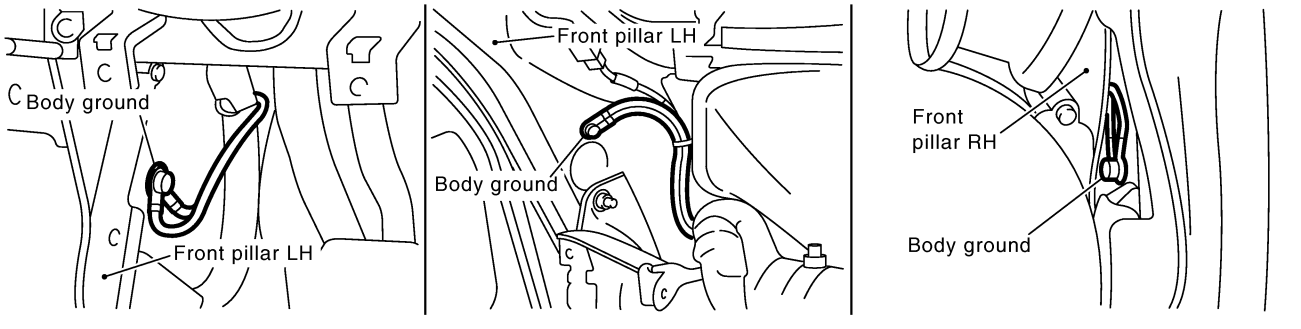
4) If NG, go to "Diagnostic Procedure", EC-507.

Diagnostic Procedure

NAEC1153

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



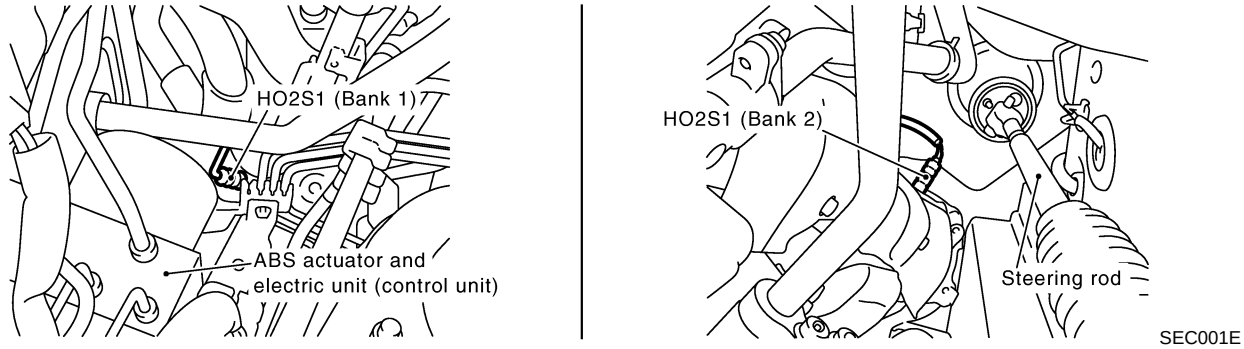
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.



SEC001E

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

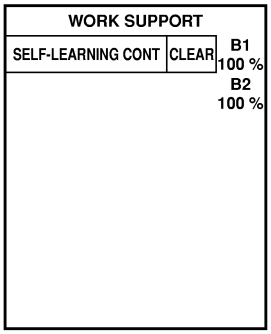
	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

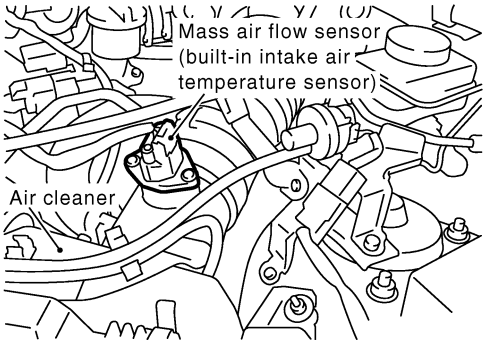


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

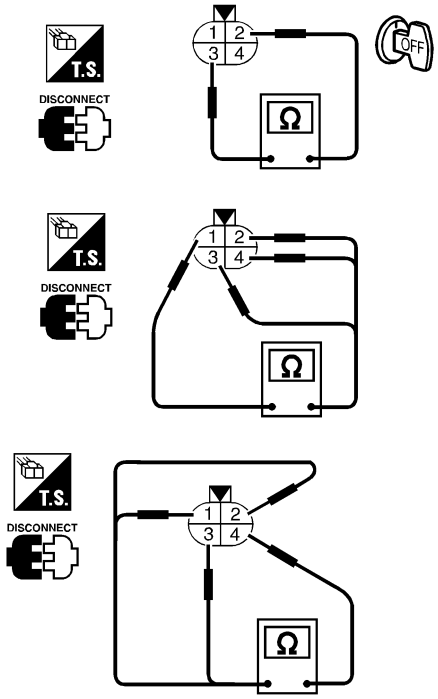
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-273.
No	▶	GO TO 4.

4	CHECK HEATED OXYGEN SENSOR HEATER 1

1. Stop engine.
2. Disconnect HO2S1 harness connector.
3. Check resistance between HO2S1 terminals as follows.



SEF249Y

Terminals	Resistance
2 and 3	3.3 - 4.0Ω at 25 °C (77 °F)
1 and 2, 3, 4 4 and 1, 2, 3	∞Ω (Continuity should not exist.)

MTBL1782

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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

5	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L-R

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L-R

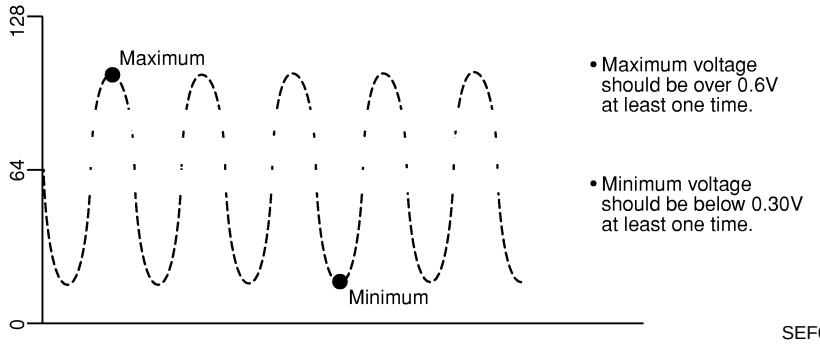
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

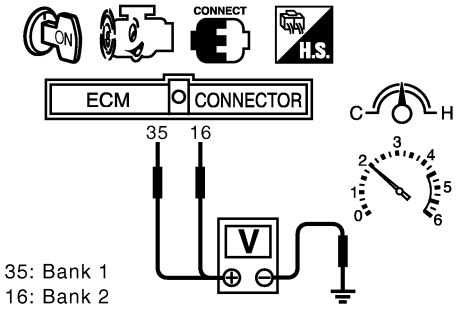
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

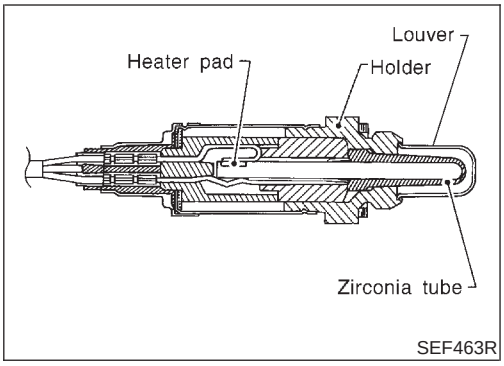
OK or NG

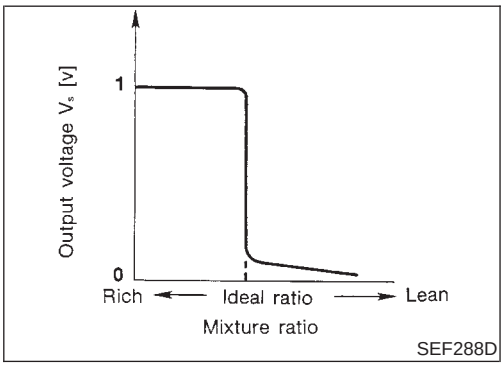
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.
For circuit, refer to "Wiring Diagram", EC-246.

▶ **INSPECTION END**





Component Description

NAEC1154

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1155

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

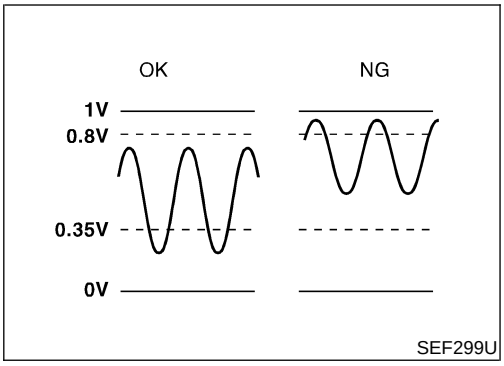
NAEC1156

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	G/B	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
35	G	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)



On Board Diagnosis Logic

NAEC1157

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1144 1144 (Bank 1)	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are outside the specified voltages.	• Heated oxygen sensor 1 • Fuel pressure • Injector • Heated oxygen sensor 1 heater
P1164 1164 (Bank 2)			

DTC Confirmation Procedure

NAEC1158

CAUTION:

Always drive vehicle at a safe speed.

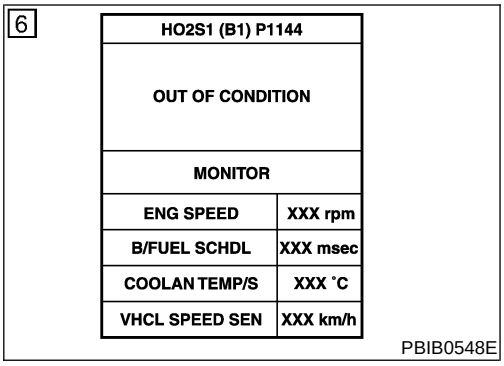
NOTE:

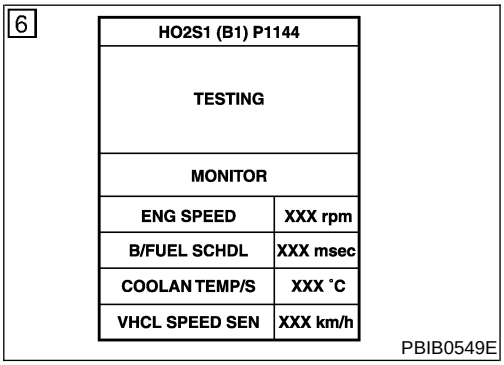
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

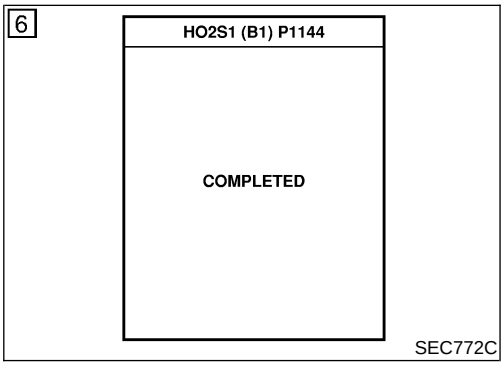
TESTING CONDITION:

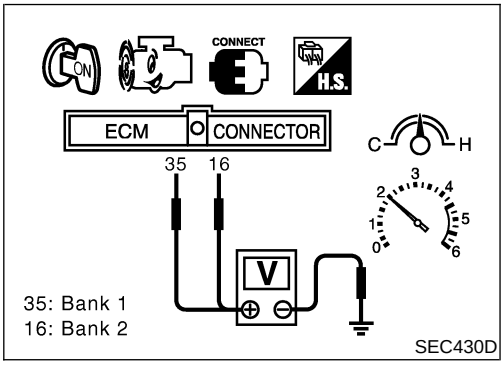
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

DTC Confirmation Procedure (Cont'd)









WITH CONSULT-II

NAEC1158S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P1144/ P1164" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,300 - 2,800 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3 - 14 msec
Selector lever	Suitable position

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 "Diagnostic Procedure", EC-515.

Overall Function Check

NAEC1159

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

WITH GST

NAEC1159S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is below 0.8V at least one time.
- The minimum voltage is below 0.35V at least one time.

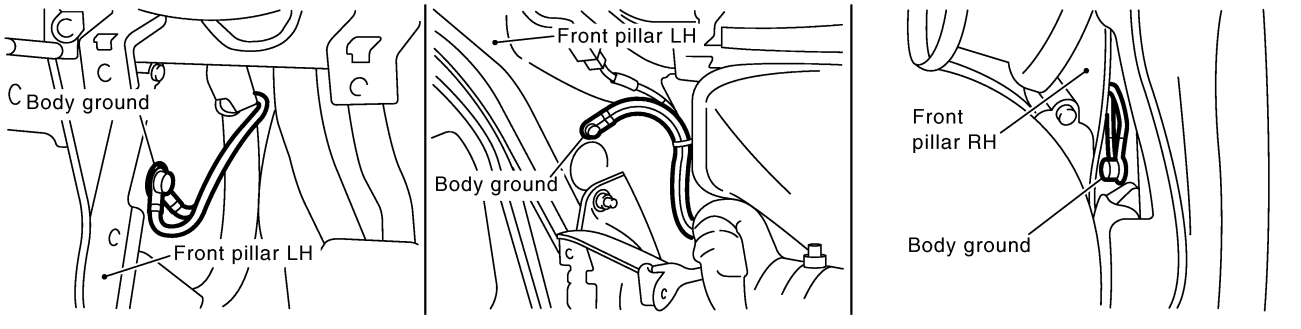
4) If NG, go to "Diagnostic Procedure", EC-515.

Diagnostic Procedure

NAEC1160

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.

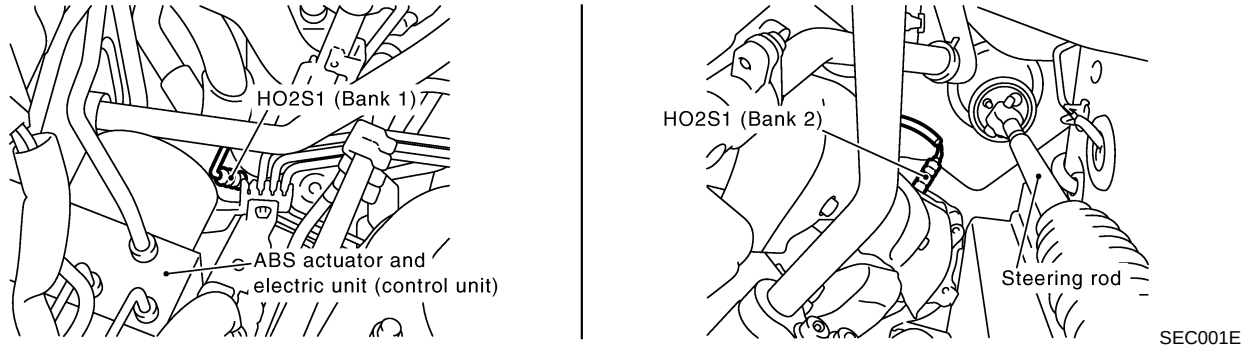


OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.



Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

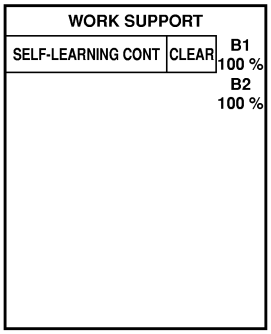
	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

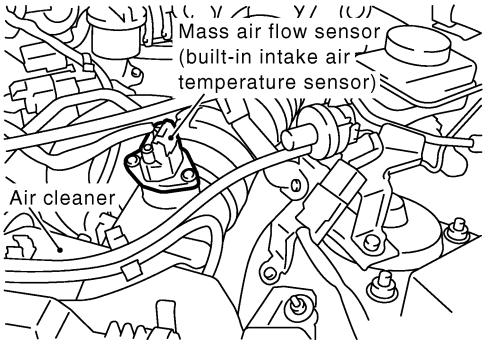


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

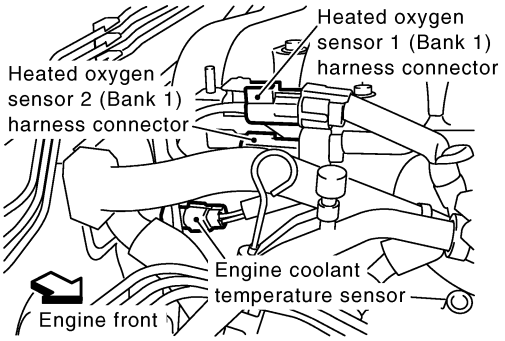
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

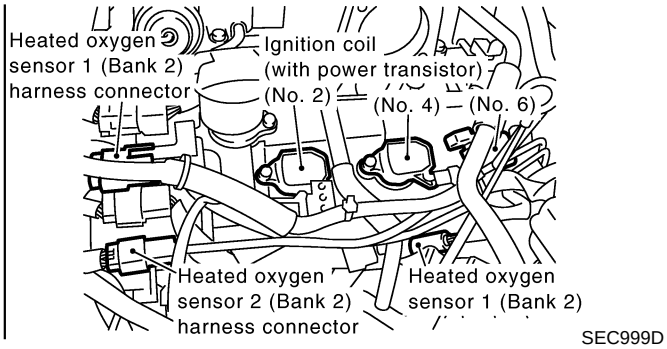
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-282.
No	▶	GO TO 4.

4	CHECK HO2S 1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.





SEC999D

3. Check connectors for water.

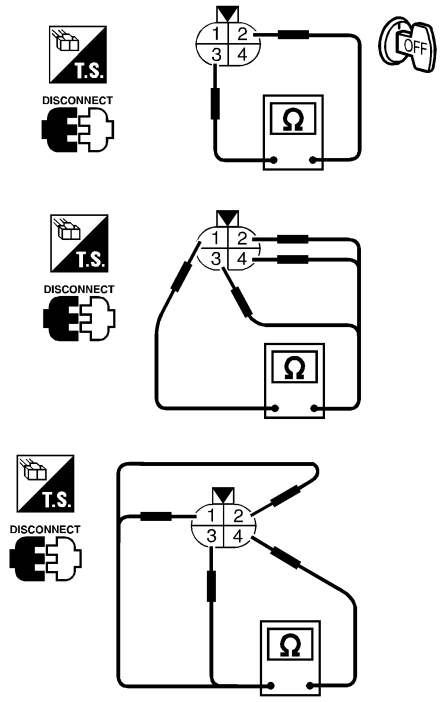
Water should not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals as follows.



SEF249Y

Terminals	Resistance
2 and 3	3.3 - 4.0Ω at 25 °C (77 °F)
1 and 2, 3, 4 4 and 1, 2, 3	∞Ω (Continuity should not exist.)

MTBL1782

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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

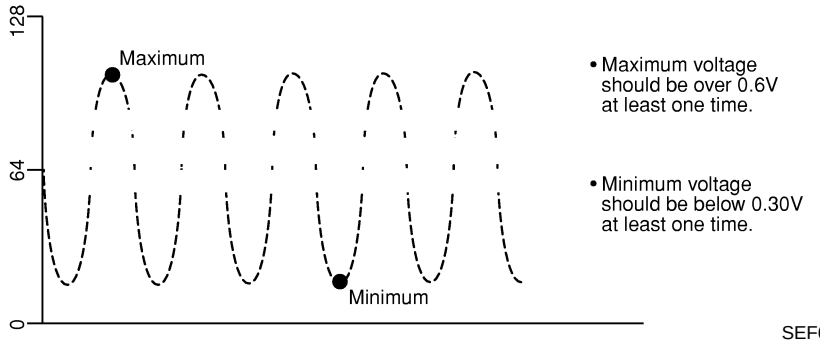
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

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.**

OK or NG

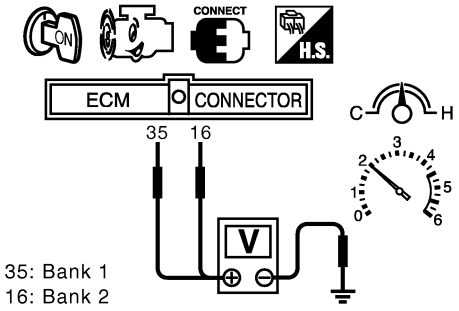
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 bank 1 signal) or 16 (HO2S1 bank 2 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



SEC430D

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

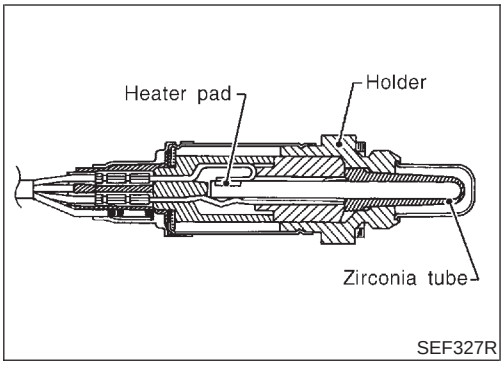
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.
For circuit, refer to "Wiring Diagram", EC-246.

▶ **INSPECTION END**



Component Description

NAEC1161

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1162

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

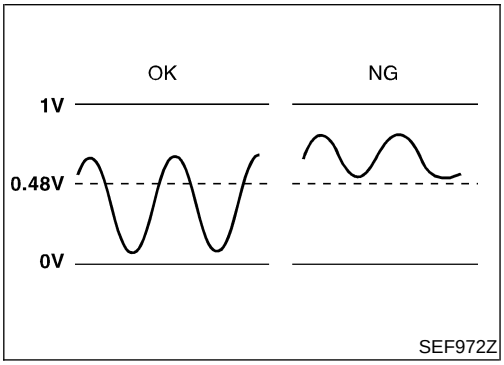
NAEC1163

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

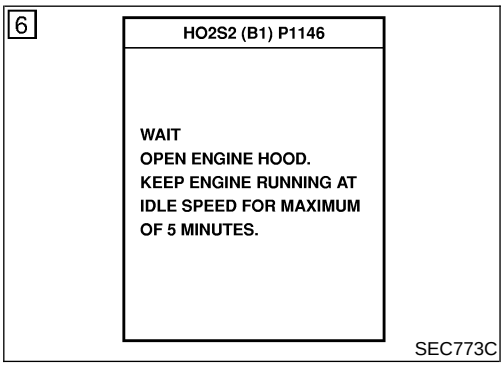


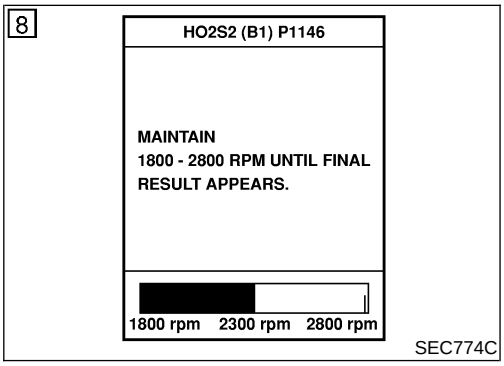
On Board Diagnosis Logic

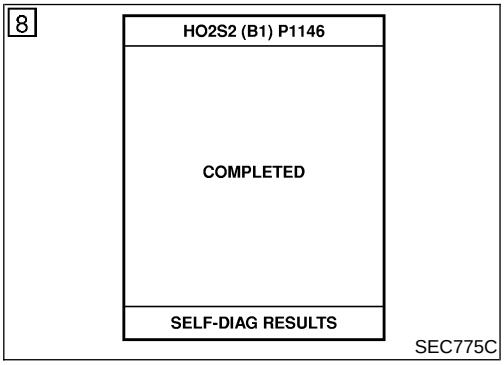
NAEC1164

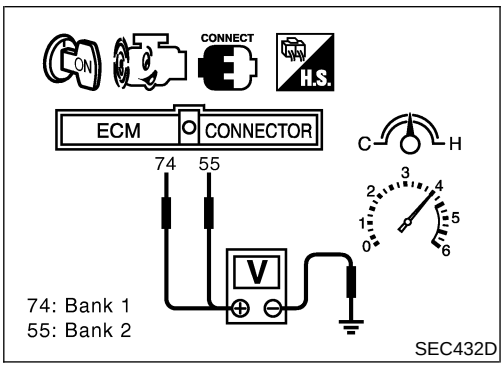
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1146 1146 (Bank 1)	Heated oxygen sensor 2 minimum voltage monitoring	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 • Injector
P1166 1166 (Bank 2)			









DTC Confirmation Procedure

NAEC1165

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:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NAEC1165S01

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) Select "HO2S2 (B1) P1146" or "HO2S2 (B2) P1166" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-526, "Diagnostic 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) Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
d) When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NAEC1166

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

NAEC1166S01

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 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 signal) and ground.
6) Check the voltage when racing 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 0.48V 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 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.
8) If NG, go to "Diagnostic Procedure", EC-526.

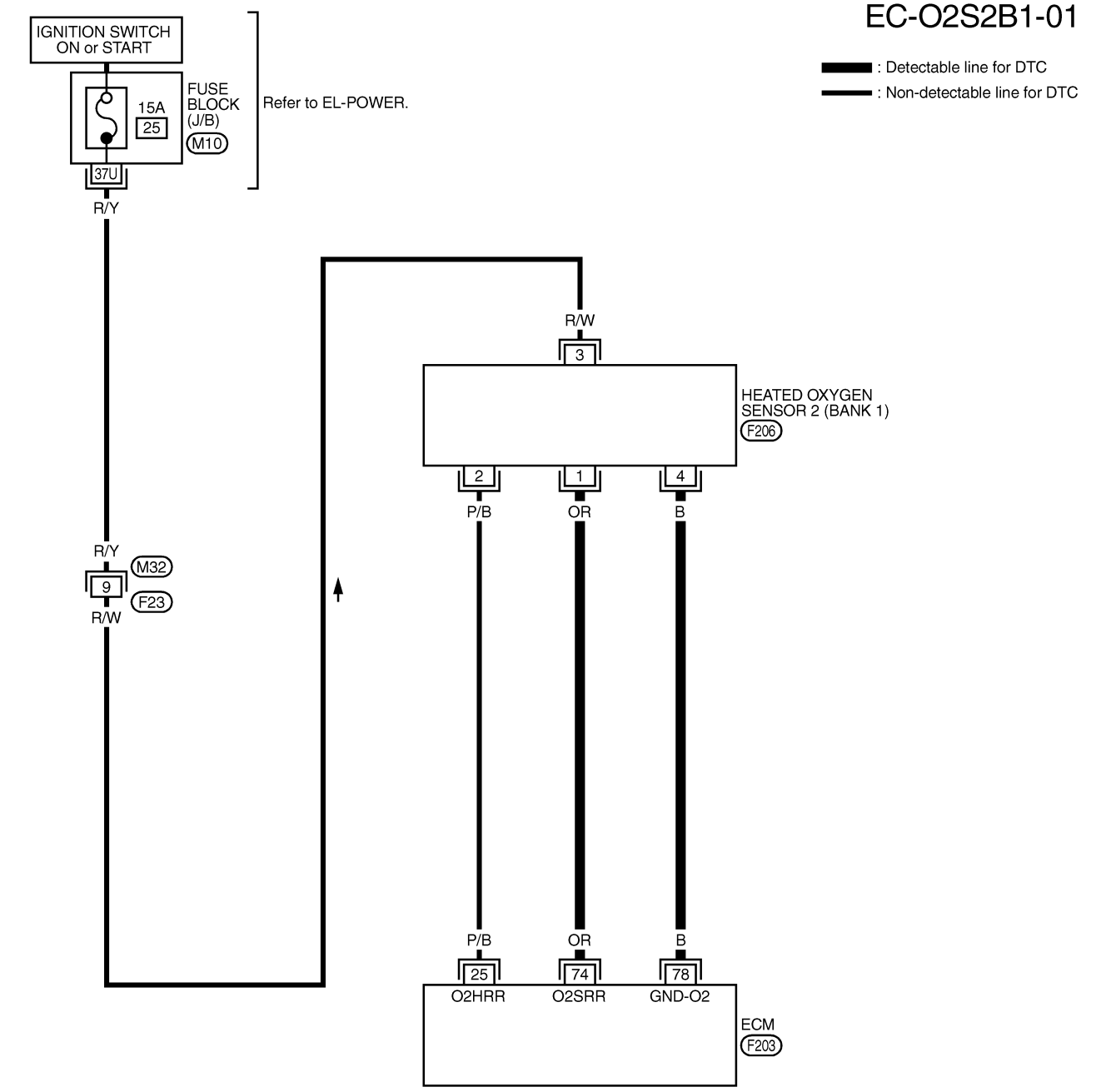
Wiring Diagram

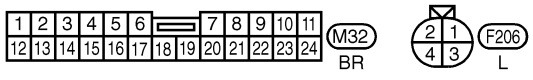
=NAEC1167

NAEC1167S01

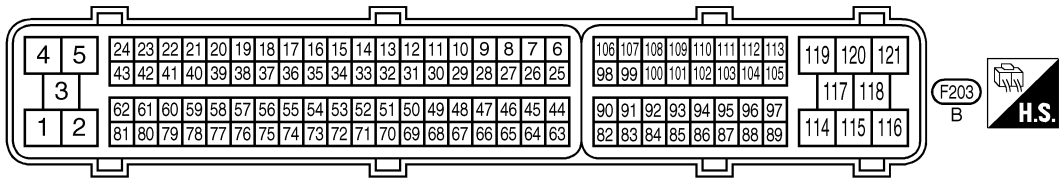
BANK 1

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



MEC089E

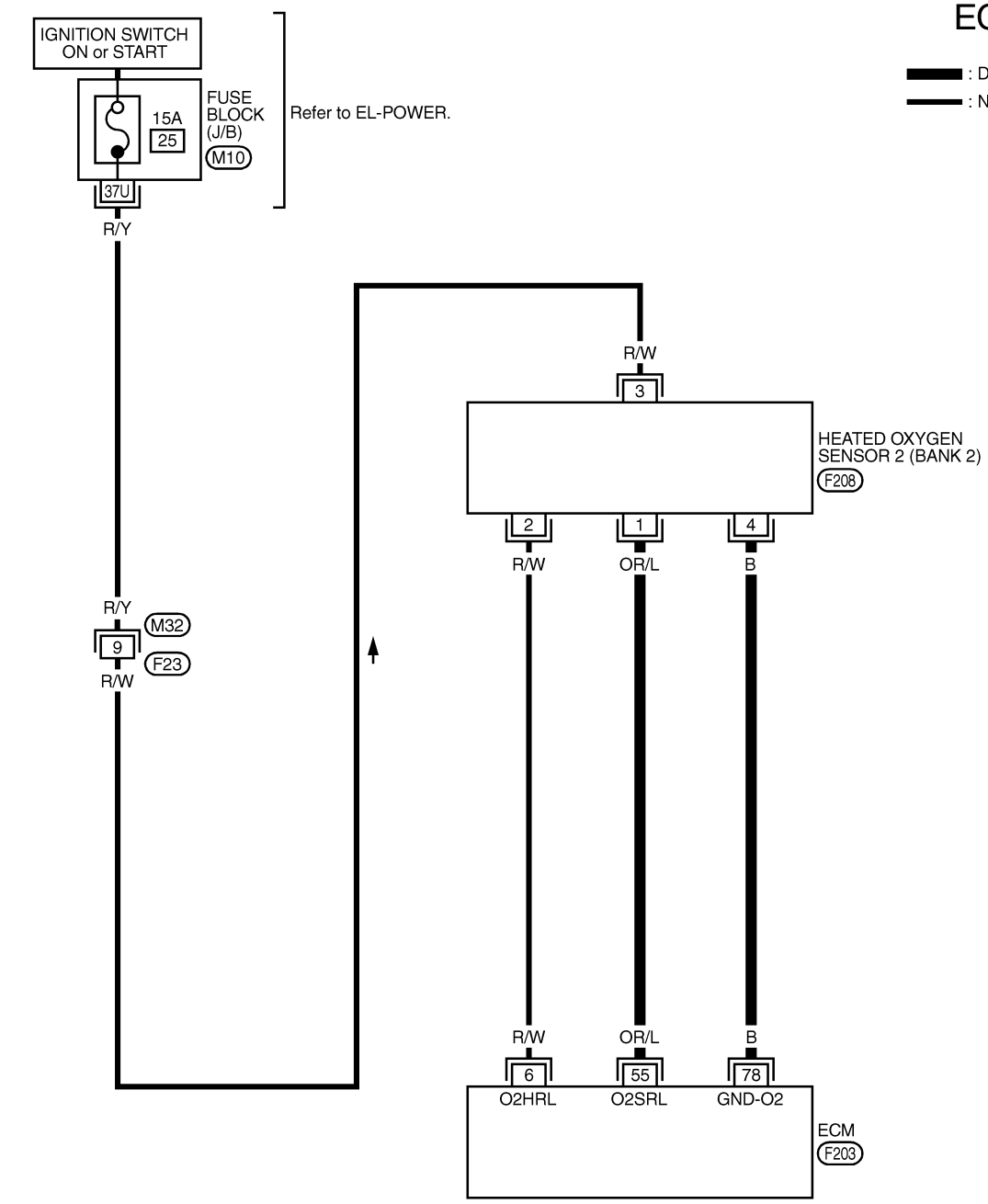
BANK 2

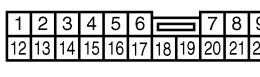
NAEC1167S02

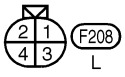
EC-O2S2B2-01

: Detectable line for DTC

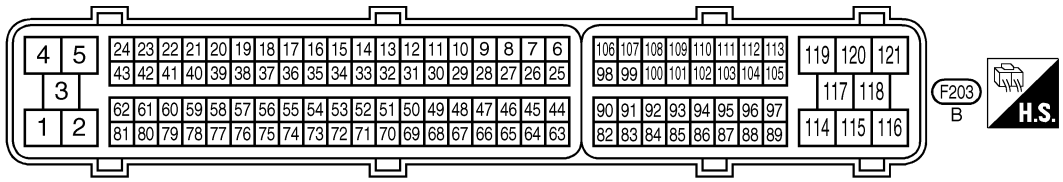
: Non-detectable line for DTC







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



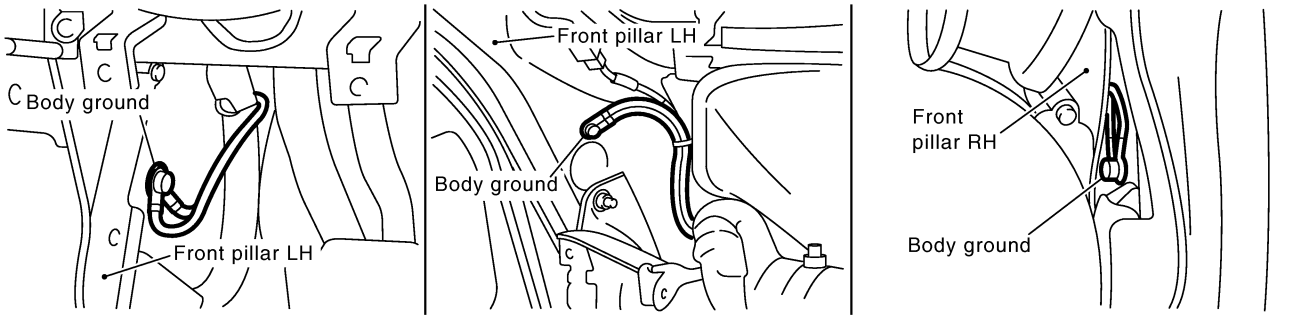
MEC090E

Diagnostic Procedure

NAEC1168

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

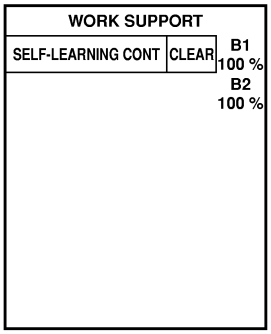
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

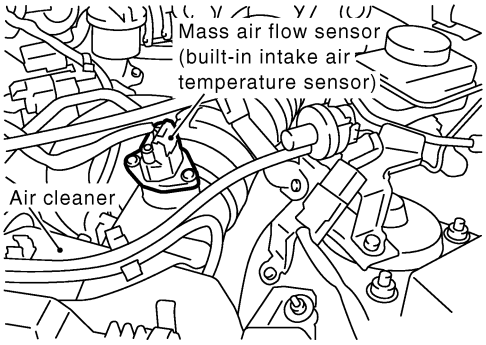


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
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?

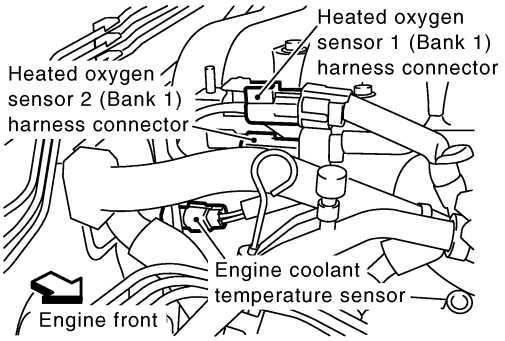
Yes or No

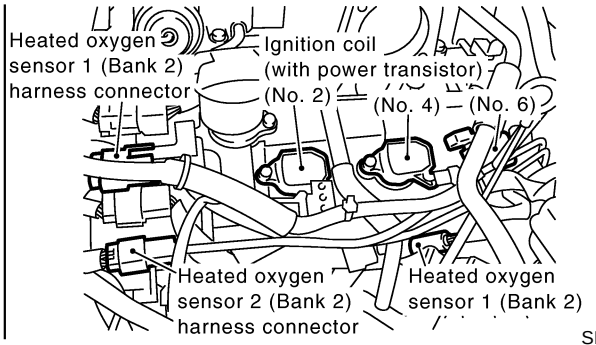
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-282.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.





SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   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 rear HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	Bank 1
P1166	55	1	Bank 2

MTBL1371

   Continuity should exist.
2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	Bank 1
P1166	55	1	Bank 2

MTBL1371

   Continuity should not exist.
3. Also check harness for short to ground and short to power.

OK or NG

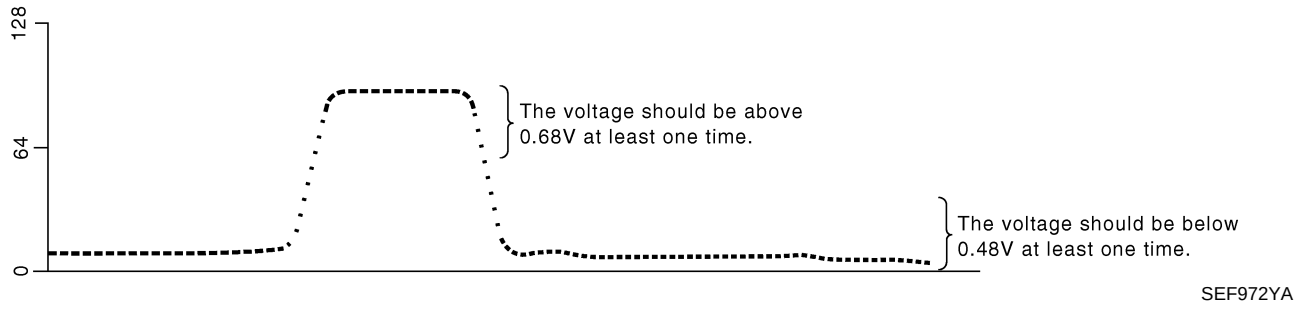
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972YA

"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V 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.**

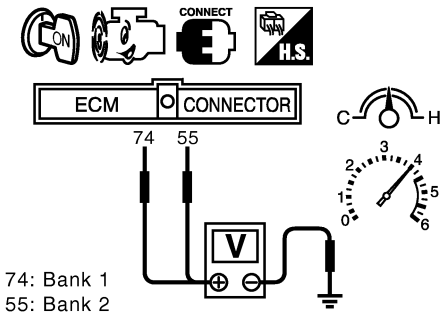
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

6	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 signal) and ground.
6. Check the voltage when rewing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



SEC432D

The voltage should be above 0.68V at least once during this procedure.

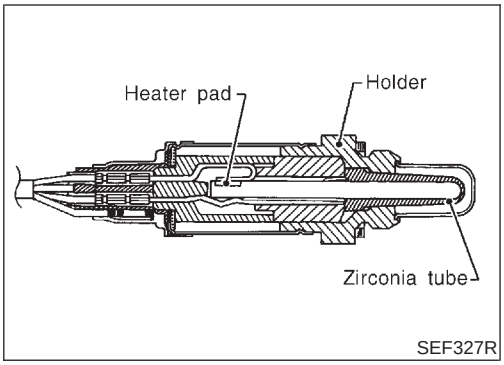
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2-II	
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T). **The voltage should go below 0.48V at least once during this procedure.** **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.**		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



Component Description

NAEC1169

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1170

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

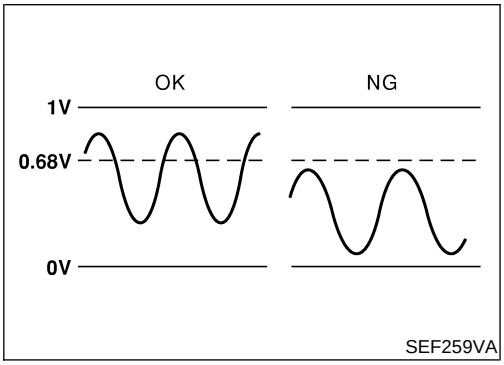
NAEC1171

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

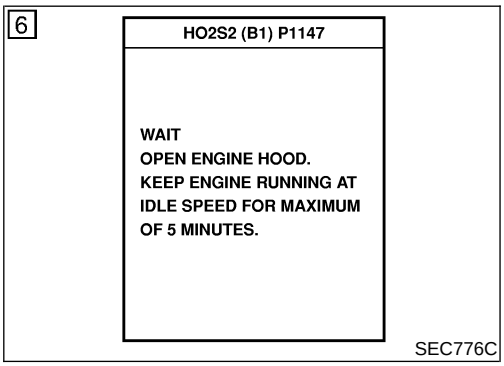


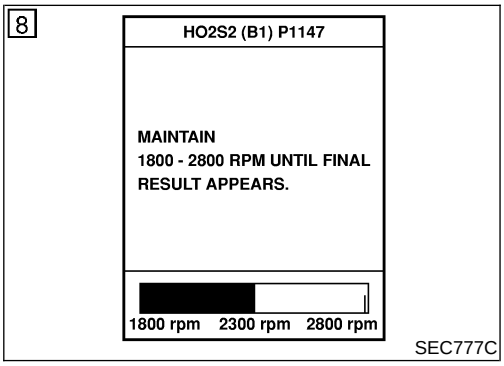
On Board Diagnosis Logic

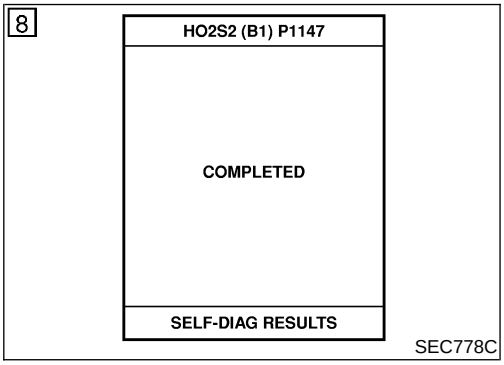
NAEC1172

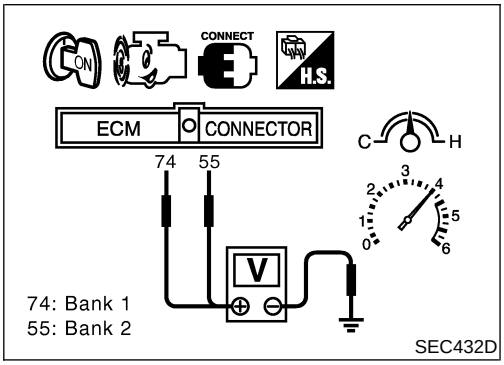
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1147 1147 (Bank 1)	Heated oxygen sensor 2 maximum voltage monitoring	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 • Injector • Intake air leaks
P1167 1167 (Bank 2)			









DTC Confirmation Procedure

NAEC1173

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:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NAEC1173S01

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) Select "HO2S2 (B1) P1147" or "HO2S2 (B2) P1167" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Start engine and follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to EC-536, "Diagnostic 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) Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
d) When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NAEC1174

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

NAEC1174S01

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 74 (HO2S2 bank 1 signal) or 55 (HO2S2 bank 2 signal) and ground.
6) Check the voltage when racing 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 3rd gear position (M/T), D position with "OD" OFF (A/T).
   The voltage should be above 0.68V at least once during this procedure.
8) If NG, go to "Diagnostic Procedure", EC-536.

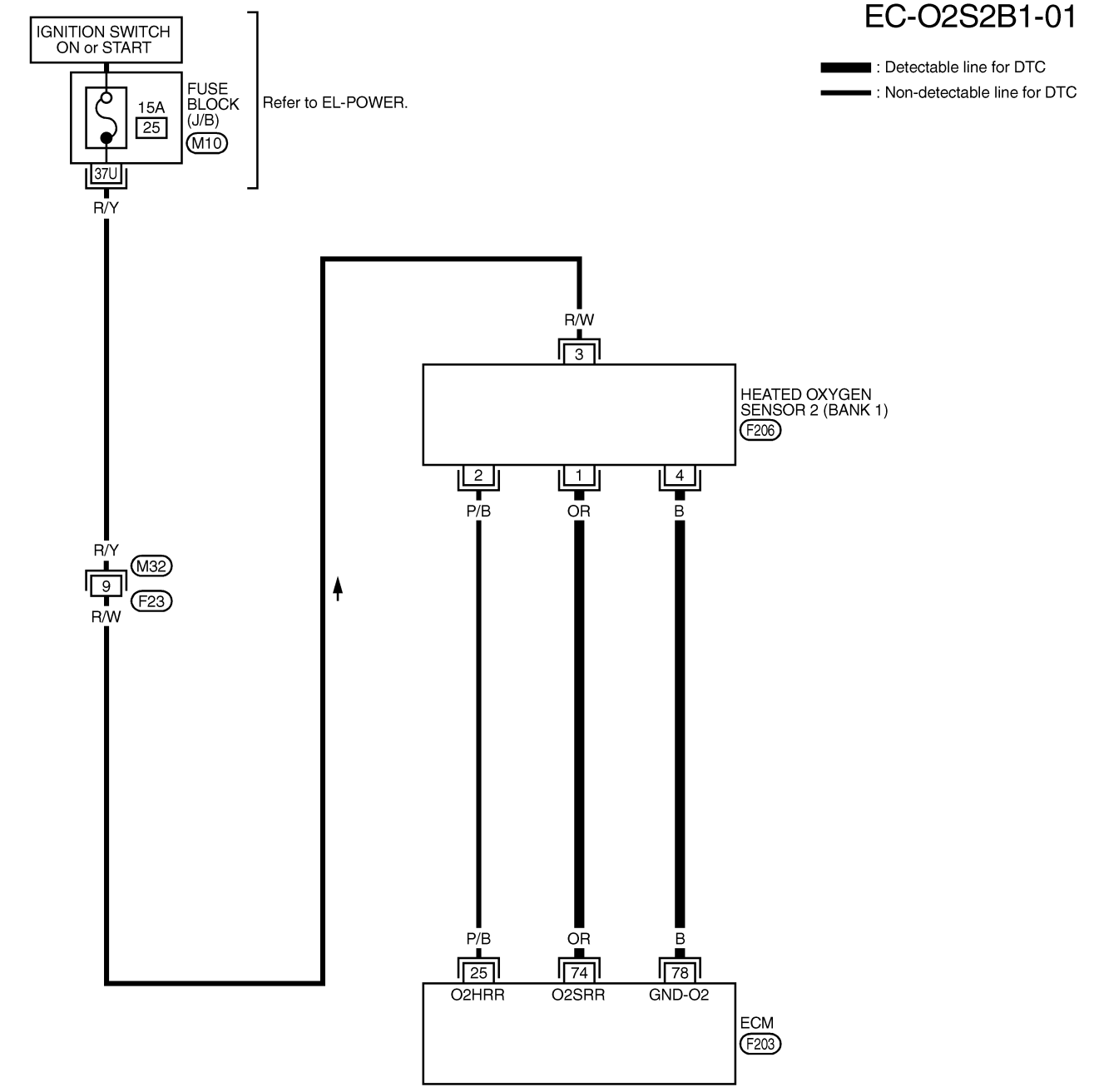
Wiring Diagram

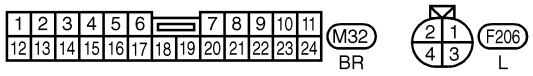
=NAEC1175

NAEC1175S01

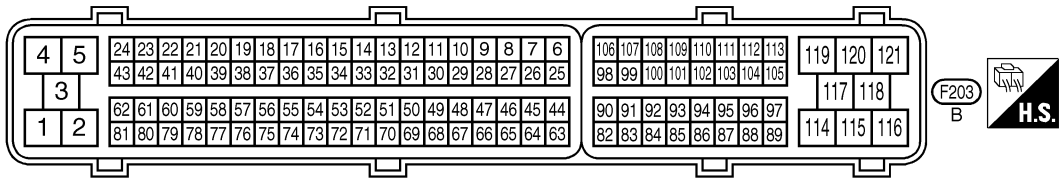
BANK 1

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

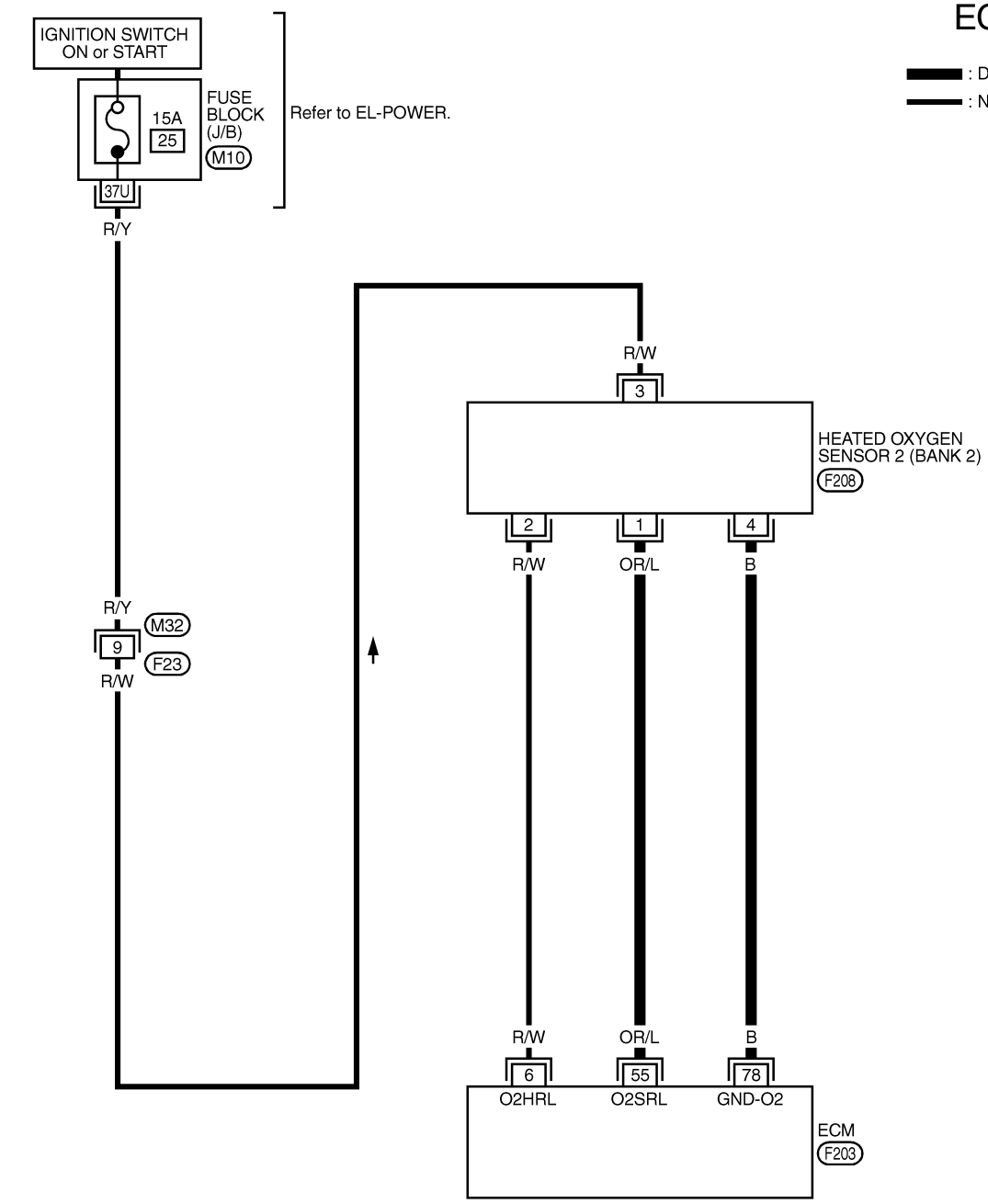


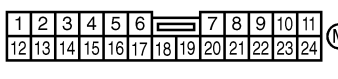
MEC089E

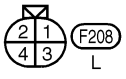
BANK 2

NAEC1175S02

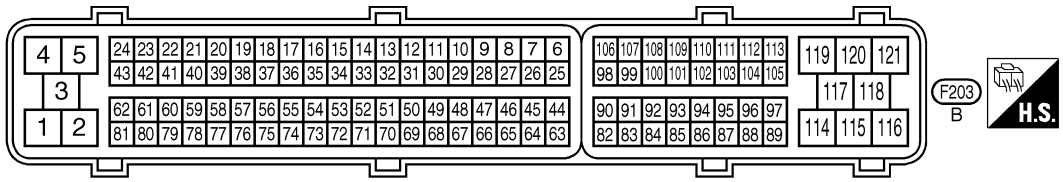
EC-O2S2B2-01







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



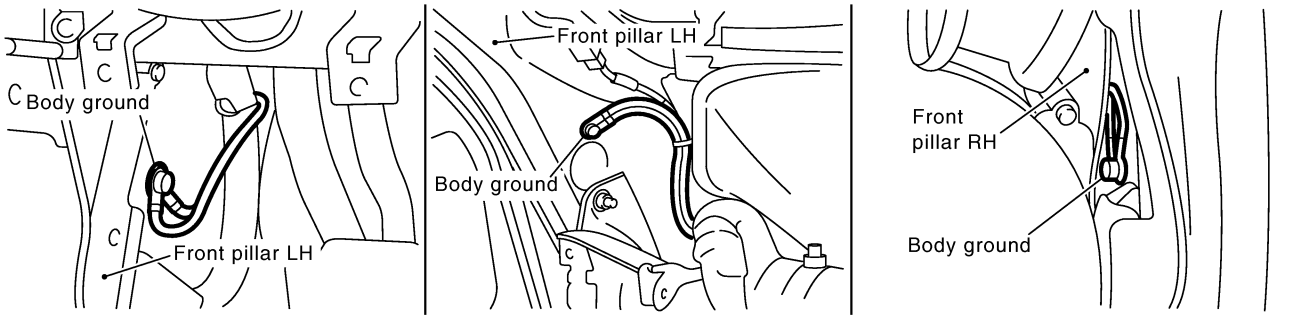
MEC090E

Diagnostic Procedure

NAEC1176

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

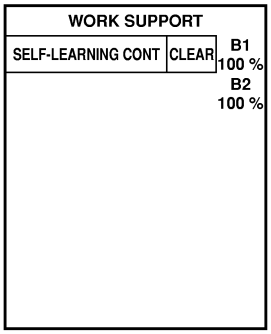
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

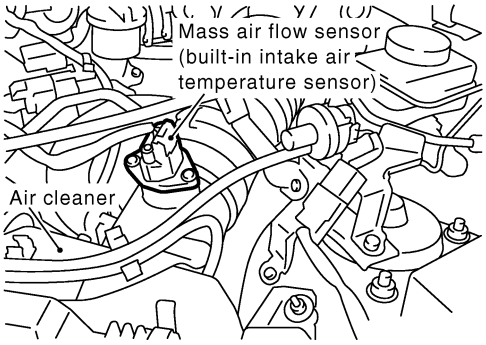


SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.



SEF960YA

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-91.
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?

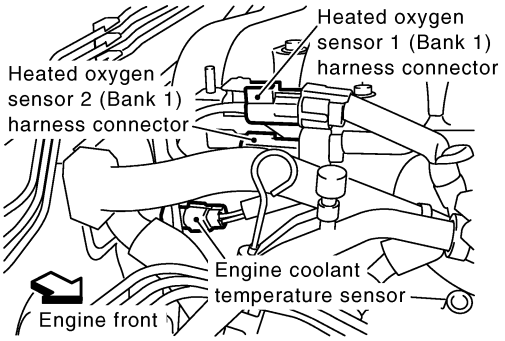
Yes or No

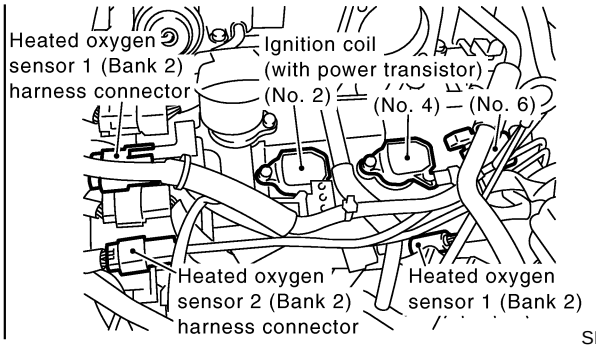
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-273.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.





SEC999D

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   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	
P1147	74	1	Bank 1
P1167	55	1	Bank 2

MTBL1379

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	74	1	Bank 1
P1167	55	1	Bank 2

MTBL1379

Continuity should not exist.

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

OK or NG

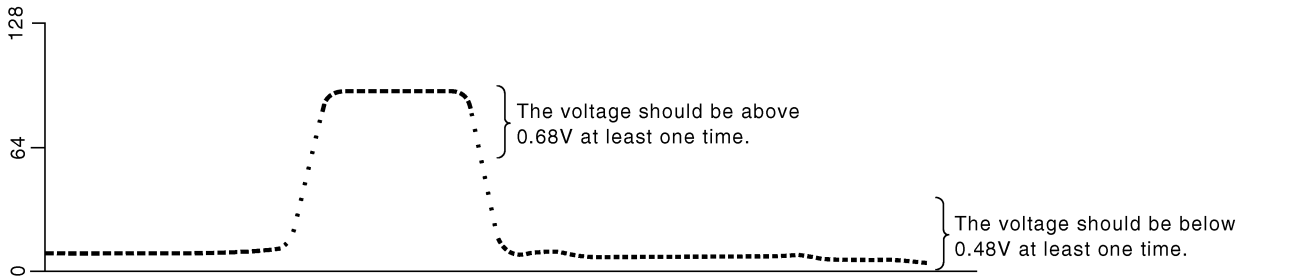
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972YA

"HO2S2 (B1)/(B2)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V 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.**

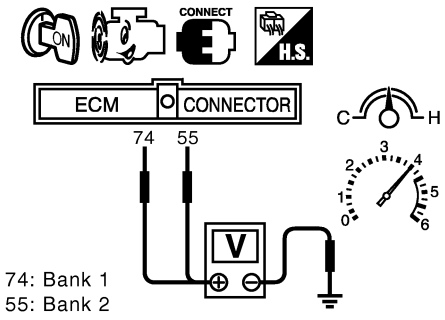
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

6	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 bank 1 signal) or 55 (HO2S bank 2 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.)



SEC432D

The voltage should be above 0.68V at least once during this procedure.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2-II	
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T). **The voltage should go below 0.48V at least once during this procedure.** **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.**		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC1064

★ The closed loop control has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1148 1148 (Bank 1)	Closed loop control	The closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor circuit is open or shorted. • Heated oxygen sensor 1 • Heated oxygen sensor 1 heater
P1168 1168 (Bank 2)			

DTC Confirmation Procedure

NAEC1065

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:

- **Never raise engine speed above 3,600 rpm during the DTC Confirmation Procedure. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX ˚C
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V

SEC011C

WITH CONSULT-II

NAEC1065S01

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) Select “DATA MONITOR” mode with CONSULT-II.
6) Hold engine speed at 2,000 rpm and check one of the following.

- “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
- “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.

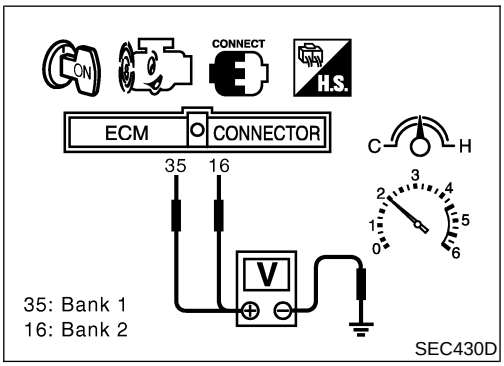
If the check result is NG, perform “Diagnosis Procedure”, EC-542.
If the check result is OK, perform the following step.

7) Let engine idle at least 5 minutes.
8) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.6 msec or more (A/T) 3.0 msec or more (M/T)
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

9) If DTC is detected, go to "Diagnostic Procedure", EC-542.



Overall Function Check

NAEC1066

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

NAEC1066S01

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 35 [Heated oxygen sensor 1 bank 1 signal] or 16 [Heated oxygen sensor 1 bank 2 signal] and ground.
6) Check the following with engine speed held at 2,000 rpm constant under no-load.

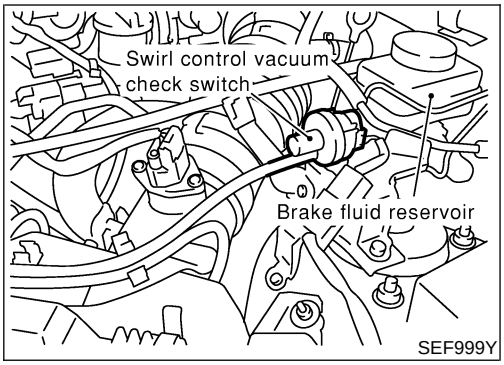
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

7) If NG, go to "Diagnostic Procedure", EC-542.

Diagnostic Procedure

NAEC1067

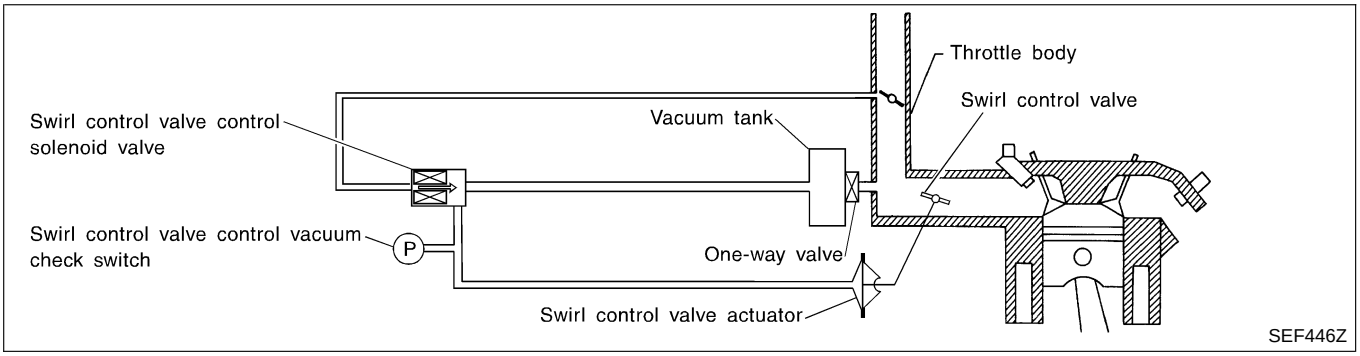
Perform trouble diagnosis for "DTC P0133, P0153", EC-233.



Component Description

NAEC1068

The swirl control valve control vacuum check switch detects vacuum signal to the swirl control valve, and sends ON or OFF signal to the ECM.
When vacuum is supplied to the valve, the swirl control valve control vacuum check switch sends OFF signal to the ECM.
The swirl control valve control vacuum check switch is not used to control the engine system, it is used for on board diagnosis.



CONSULT-II Reference Value in Data Monitor Mode

NAEC1069

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).	ON

ECM Terminals and Reference Value

NAEC1070

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

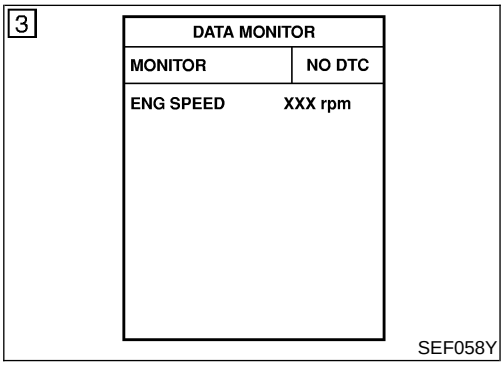
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	W/B	Swirl control valve control vacuum check switch	**[Engine is running]** • Idle speed • Engine coolant temperature is between 15 to 50°C (59 to 122°F).	Approximately 5V
			[Engine is running] • Idle speed • Engine coolant temperature is above 55°C (131°F).	0 - 1.0V

On Board Diagnosis Logic

NAEC1071

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1165 1165	Swirl control valve control vacuum check switch	The swirl control valve control vacuum check switch remains OFF under specified engine conditions.	● Harness or connectors (Swirl control valve control vacuum check switch circuit is open.) ● Hoses (Hoses are clogged or connected incorrectly.) ● Swirl control valve control solenoid valve ● Swirl control valve control vacuum check switch



DTC Confirmation Procedure

NAEC1072

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

TESTING CONDITION:
For best results, perform the test at a temperature above 5°C (41°F).

WITH CONSULT-II

NAEC1072S01

1) Turn ignition switch OFF and wait at least 10 seconds.
2) Turn ignition switch ON.
3) Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-546.

WITH GST

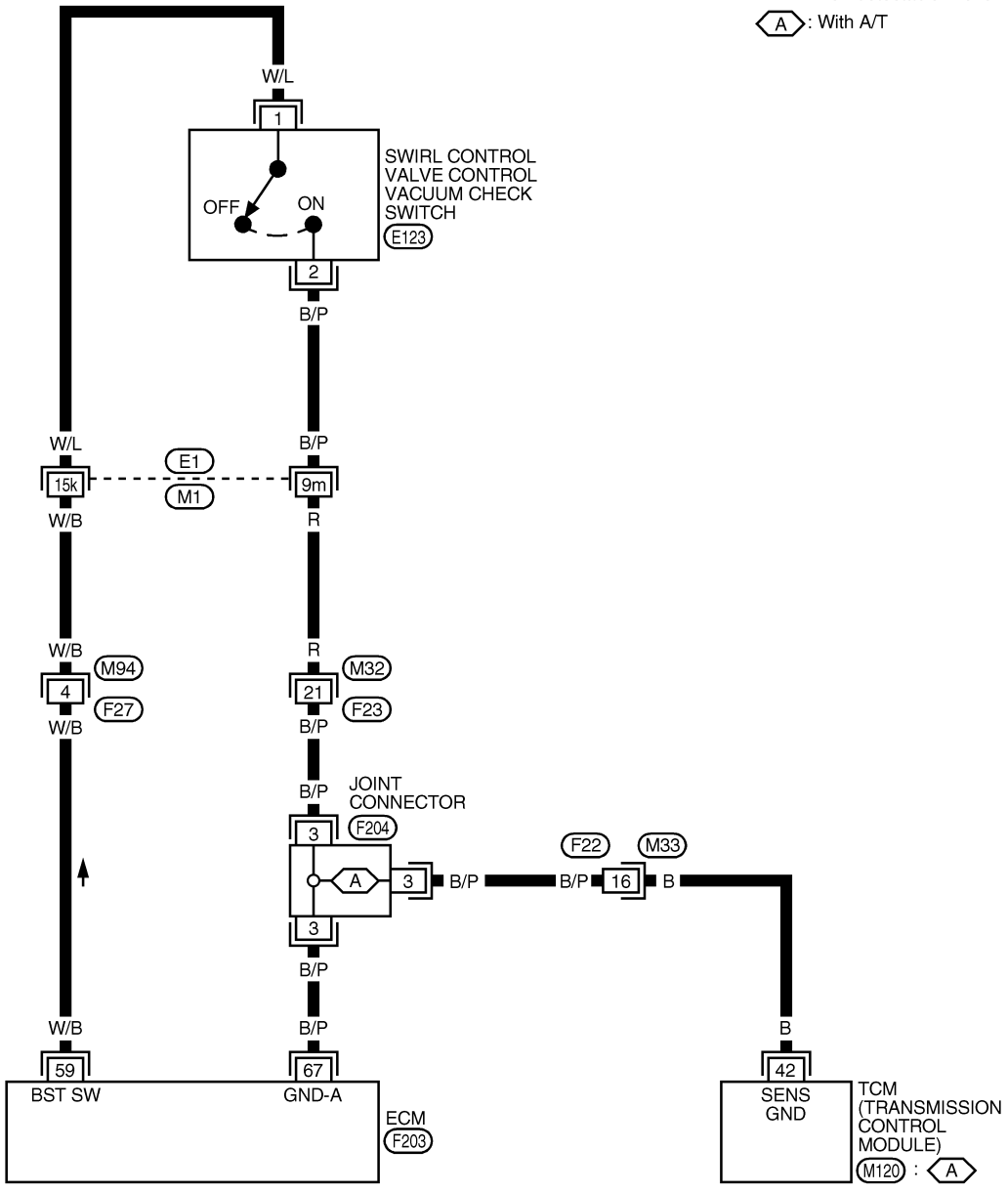
NAEC1072S02

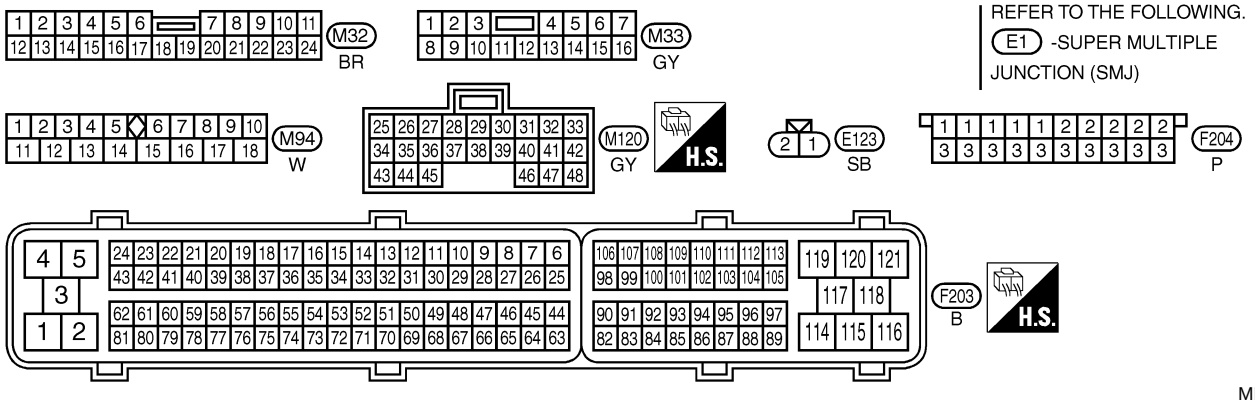
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1073

EC-S/VCSW-01





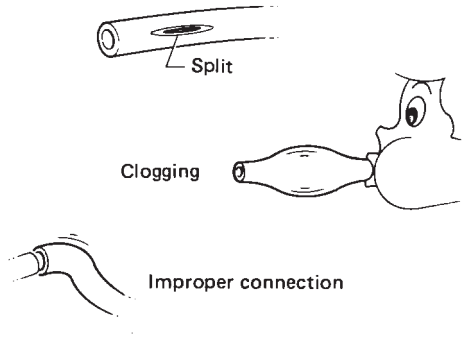
MEC104E

Diagnostic Procedure

NAEC1074

1	CHECK HOSES

1. Turn ignition switch OFF.
2. Check hose for clogging or improper connection.



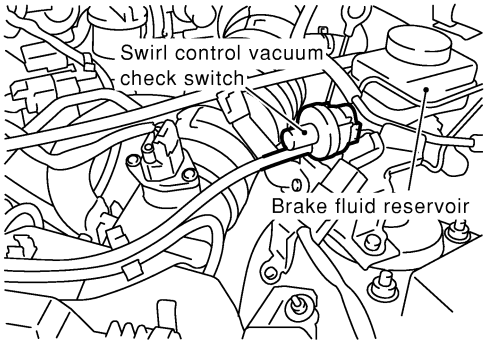
SEF109L

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or reconnect the hose.

2	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect swirl control valve control vacuum check switch harness connector.



SEF999Y

2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between terminal 2 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness connectors F22, M33 (A/T models)
- Joint connector F204
- Harness for open or short between swirl control valve control vacuum check switch and ECM
- Harness for open or short between swirl control valve control vacuum check switch and TCM

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

4	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 59 and swirl control valve control vacuum check switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

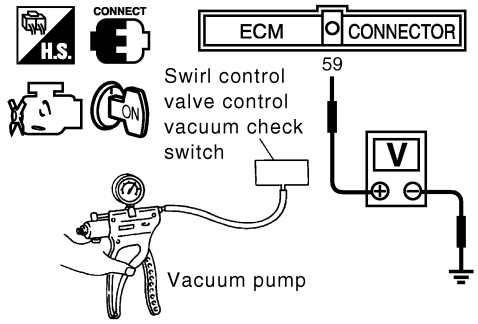
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M94, F27
- Harness for open or short between swirl control valve control vacuum check switch and ECM

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

6	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch ON.
5. Check voltage between ECM terminal 59 and ground under the following conditions.



SEC542D

Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

MTBL1369

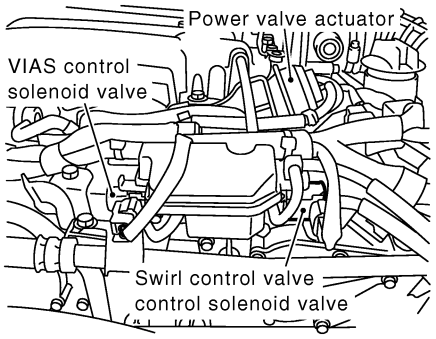
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace swirl control valve control vacuum check switch.

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



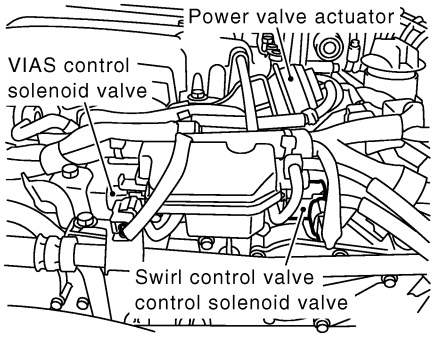
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

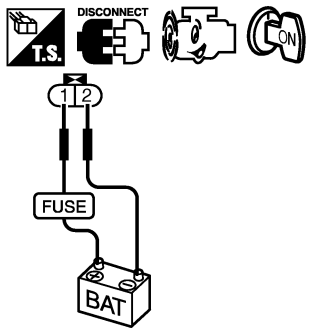
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEC541D

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Description

NAEC1271

The malfunction information related to TCS is transferred through the CAN communication line from ABS actuator and electric unit (control unit) to ECM.

Be sure to erase the malfunction information such as DTC not only for ABS actuator and electric unit (control unit) but also for ECM after TCS related repair.

On Board Diagnosis Logic

NAEC1272

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

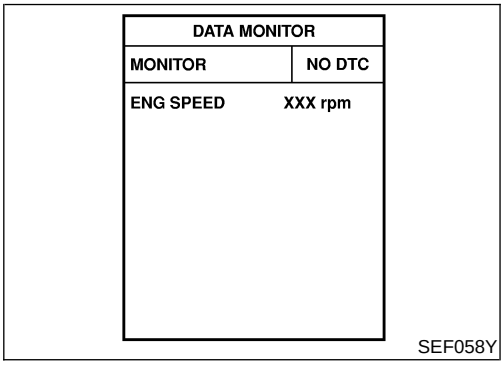
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from ABS actuator and electric unit (Control unit).	• ABS actuator and electric unit (control unit) • TCS related parts

DTC Confirmation Procedure

NAEC1273

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-550.

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

NAEC1274

Go to BR-91, “TROUBLE DIAGNOSIS”.

Description

NAEC1275

NOTE:
If DTC P1212 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to "DTC U1000, U1001 CAN COMMUNICATION LINE", EC-166.

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ABS actuator and electric unit (control unit).
Be sure to erase the malfunction information such as DTC not only in ABS actuator and electric unit (control unit) but also ECM after the ABS related repair.

On Board Diagnosis Logic

NAEC1276

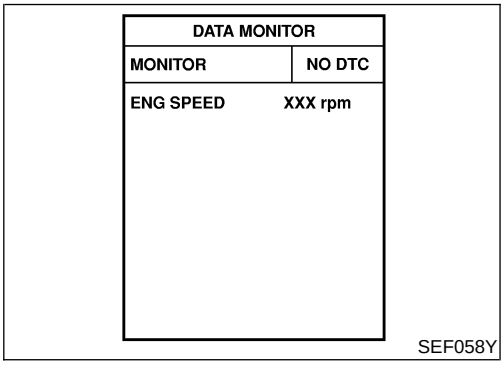
Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM cannot receive the information from ABS actuator and electric unit (control unit) continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC Confirmation Procedure

NAEC1277

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



WITH CONSULT-II

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-552.

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NAEC1278

Go to BR-91, “TROUBLE DIAGNOSIS”.

On Board Diagnosis Logic

NAEC1177

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	• 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.	• Cooling fan (Crankshaft driven) • Thermostat • Radiator hose • Radiator • Radiator cap • Water pump For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-557.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in “Changing Engine Coolant”, “ENGINE MAINTENANCE”, MA-15. Also, replace the engine oil.

1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-13.**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

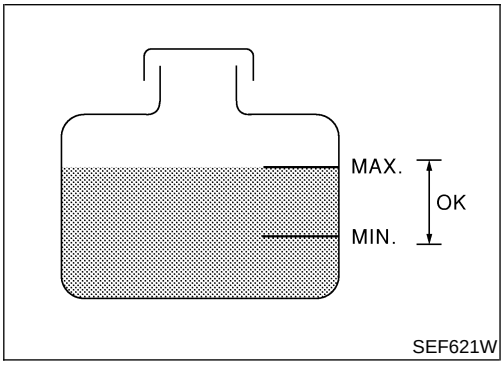
Overall Function Check

NAEC1178

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

NAEC1178S01

1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir and/or radiator is below the proper range, go to “Diagnostic Procedure”, EC-554.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, go to “Diagnostic Procedure”, EC-554.

WITH GST

NAEC1178S02

1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir and/or radiator is below the

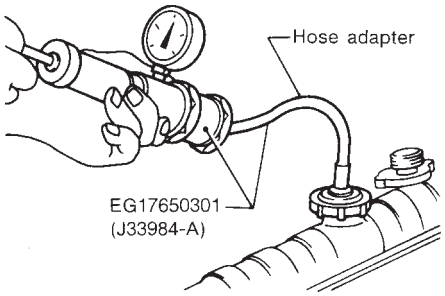
proper range, and go to "Diagnostic Procedure", EC-554.

2) Confirm whether customer filled the coolant or not. If customer filled the coolant, go to "Diagnostic Procedure", EC-554.

Diagnostic Procedure

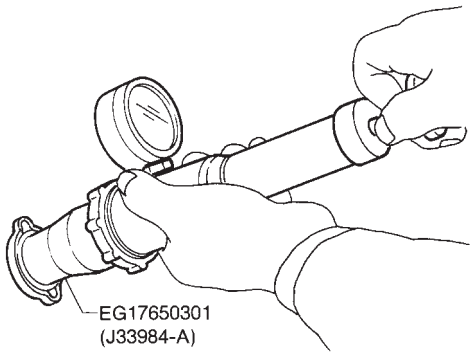
NAEC1179

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-23, "Cooling Fan (Crankshaft driven)".

2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops. **CAUTION:** **Higher than the specified pressure may cause radiator damage.** **Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)**  SLC754A **Pressure should not drop.** **OK or NG**		
OK	▶	GO TO 3.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to "Water Pump", LC-14.

3	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

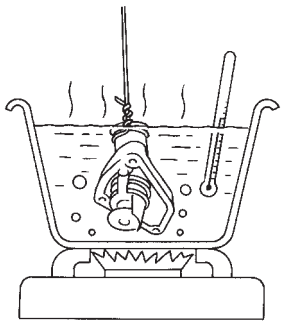
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace radiator cap.

4	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC949A

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 8.6 mm/90°C (0.339 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

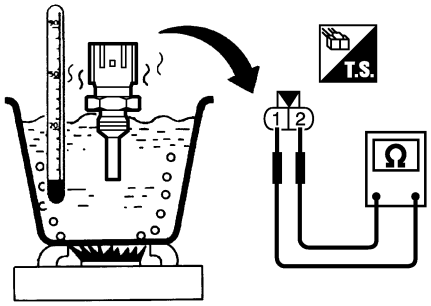
For details, refer to "Thermostat", LC-19.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace thermostat

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

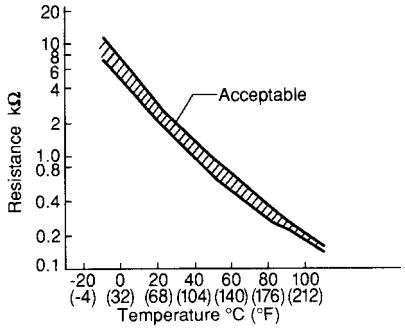


PBIB2064E

<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

MTBL0229



SEF012P

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

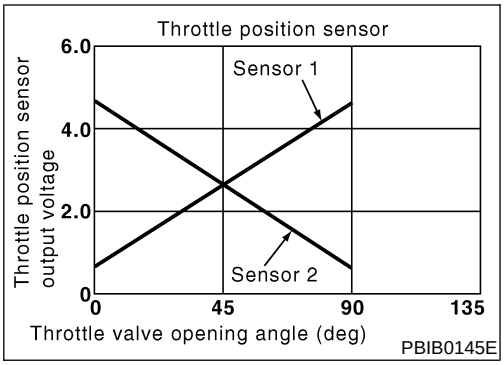
6	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-557.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

=NAEC1180

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	See “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-12.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, MA-15.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See “System Check”, “ENGINE COOLING SYSTEM”, LC-12.
ON*[1]	5	• Coolant leaks	• Visual	No leaks	See “System Check”, “ENGINE COOLING SYSTEM”, LC-12.
ON*[1]	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM”, LC-19, LC-22.
ON*[1]	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See LC-23, “Cooling Fan (Crankshaft driven)”.
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*[2]	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, MA-15.
OFF*[3]	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE”, MA-14.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See “Inspection”, “CYLINDER HEAD DISTORTION”, EM-48.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLINDER BLOCK DISTORTION AND WEAR”, EM-70.

*1: Engine running at 3,000 rpm for 10 minutes.
*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*3: After 60 minutes of cool down time.
For more information, refer to “Engine Cooling System”, “OVERHEATING CAUSE ANALYSIS”, LC-27.



Component Description

NAEC1279

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

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

On Board Diagnosis Logic

NAEC1280

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

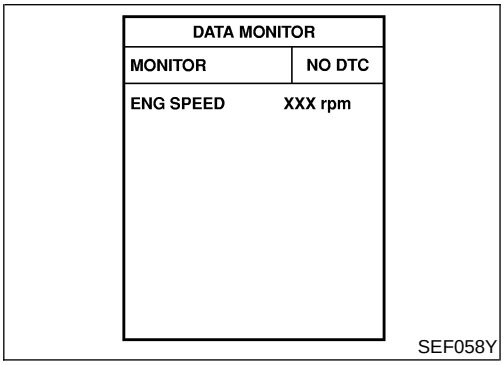
NAEC1281

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



With CONSULT-II

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Turn ignition switch OFF, wait at least 10 seconds.
4) Turn ignition switch ON.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-559.

With GST

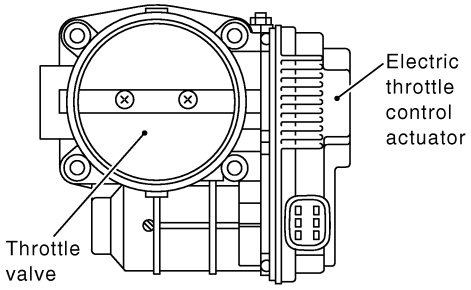
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1282

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.



SEC513D

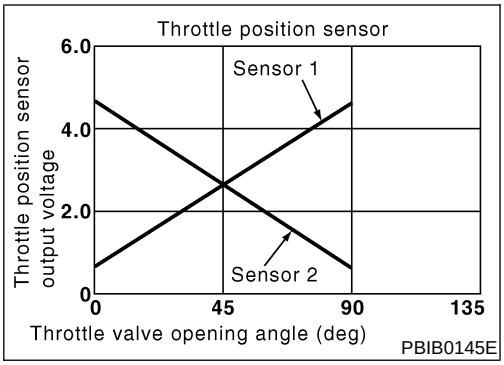
OK or NG

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 "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**



Component Description

NAEC1283

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

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

On Board Diagnosis Logic

NAEC1284

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

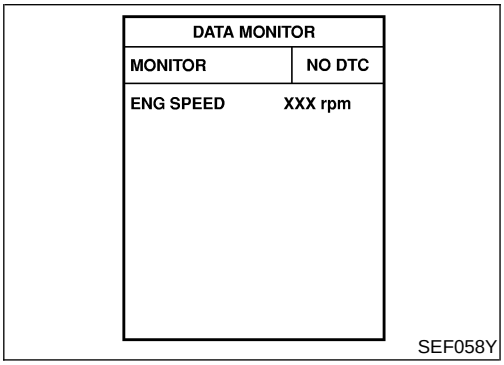
NAEC1285

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



With CONSULT-II

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Turn ignition switch OFF, wait at least 10 seconds.
4) Turn ignition switch ON.
5) Repeat steps 3 and 4, 32 times.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-561.

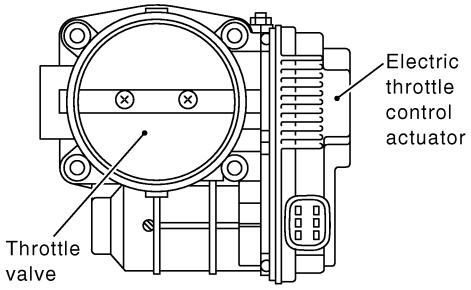
With GST
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1286

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.



SEC513D

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 "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

ECM Terminals and Reference Value

NAEC1291

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48	P/B	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch ON]**	Approximately 5V
49	P/B	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5V
68	L	Sensor power supply (Power steering pressure sensor)	**[Ignition switch ON]**	Approximately 5V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch ON]**	Approximately 5V

On Board Diagnosis Logic

NAEC1287

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1229 1229	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.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor • Power steering pressure sensor • EVAP control system pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

NAEC1287S01

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

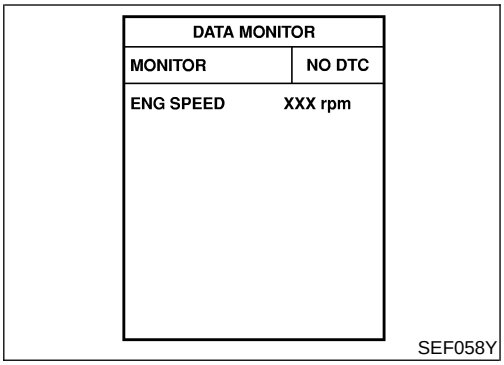
NAEC1288

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



With CONSULT-II

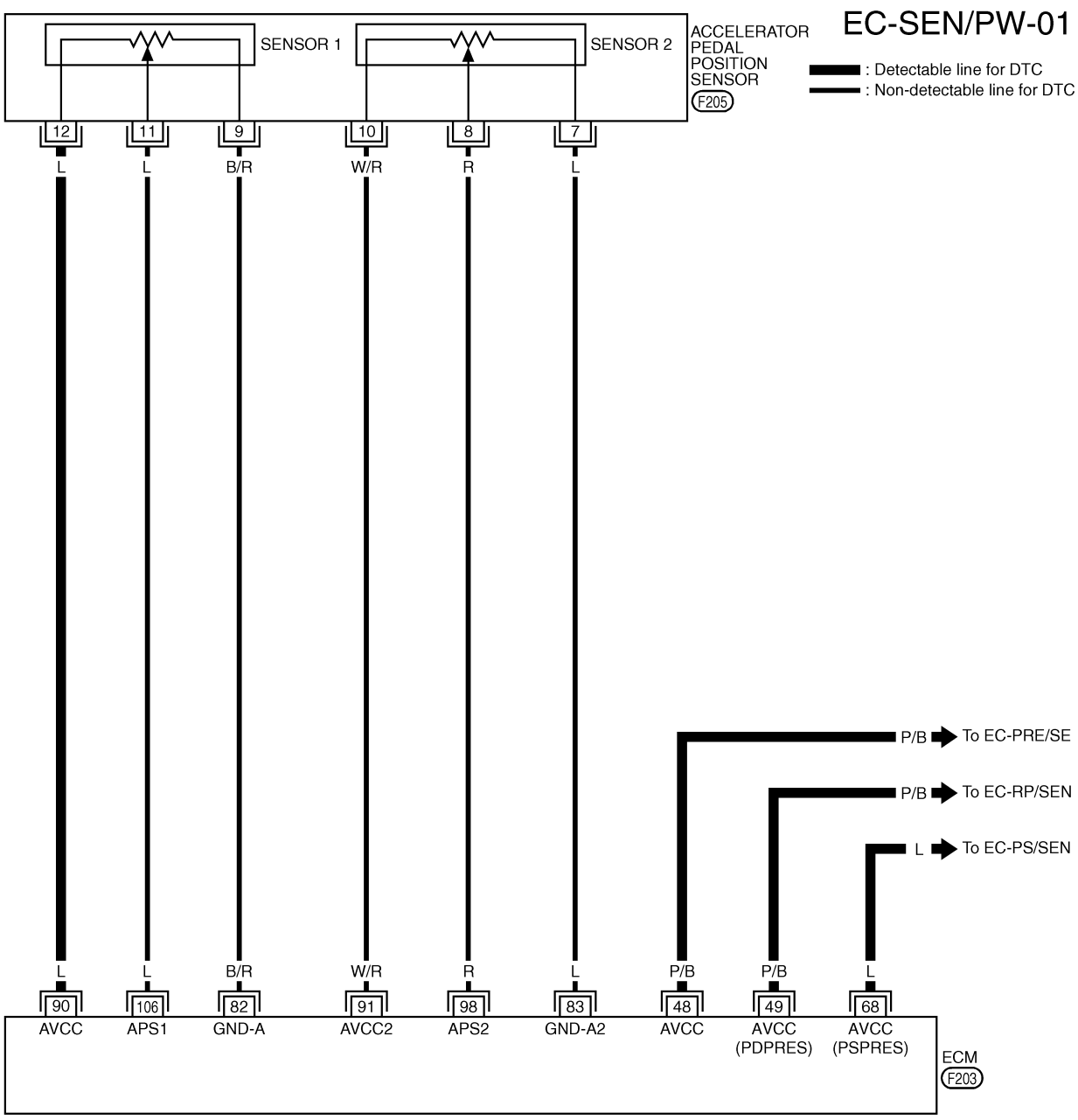
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for 1 second.
4) If DTC is detected, go to "Diagnostic Procedure", EC-565.

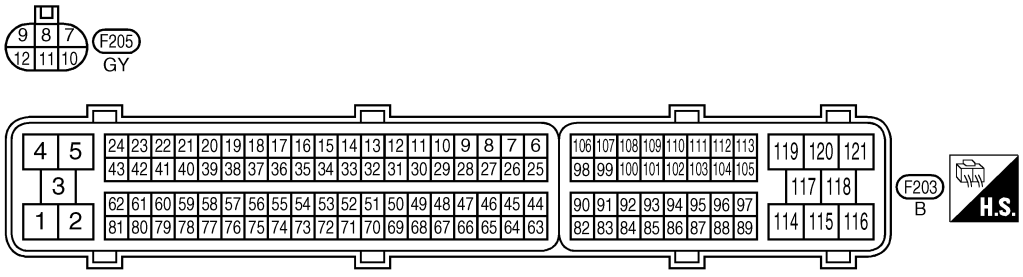
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC1289





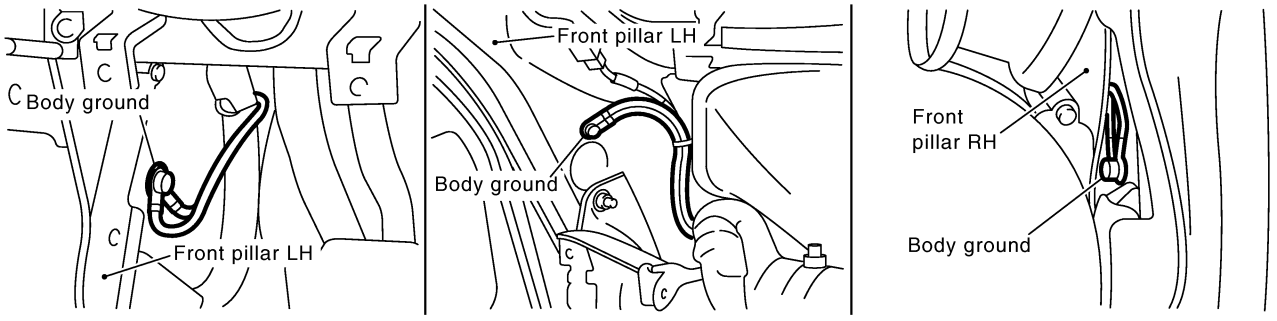
MEC746E

Diagnostic Procedure

NAEC1290

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



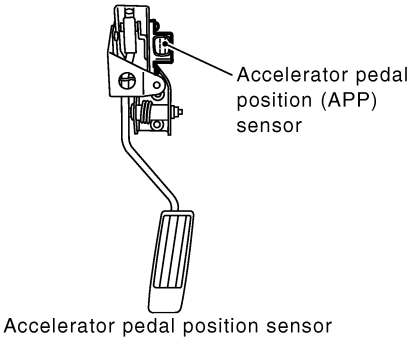
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

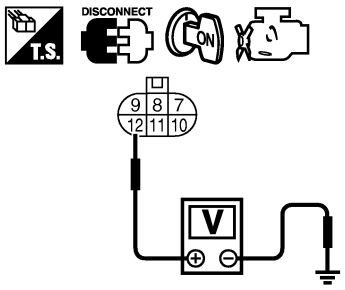
2	CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



SEC550D

3. Check voltage between APP sensor terminal 12 and ground with CONSULT-II or tester.



SEC551D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK SENSOR POWER SUPPLY CIRCUITS	
Check harness for short to power and short to ground, between the following terminals. ● ECM terminal 48 and EVAP control system pressure sensor terminal 3. Refer to "Wiring Diagram", EC-380. ● ECM terminal 68 and power steering pressure sensor terminal 1. Refer to "Wiring Diagram", EC-437. ● ECM terminal 49 and refrigerant pressure sensor terminal 3. Refer to "Wiring Diagram", EC-737. ● ECM terminal 90 and APP sensor terminal 12. Refer to "Wiring Diagram", EC-564.		
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. ● Refrigerant pressure sensor (Refer to "COMPONENT INSPECTION", HA-103.) ● Power steering pressure sensor (Refer to "Component Inspection", EC-440.) ● EVAP control system pressure sensor (Refer to "Diagnostic Procedure", EC-381.)		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning component.

5	CHECK APP SENSOR	
Refer to "Component Inspection", EC-689.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	REPLACE ACCELERATOR PEDAL ASSEMBLY	
1. Replace accelerator pedal assembly. 2. Perform "Accelerator Pedal Released Position Learning", EC-73. 3. Perform "Throttle Valve Closed Position Learning", EC-73. 4. Perform "Idle Air Volume Learning", EC-73.		
	▶	**INSPECTION END**

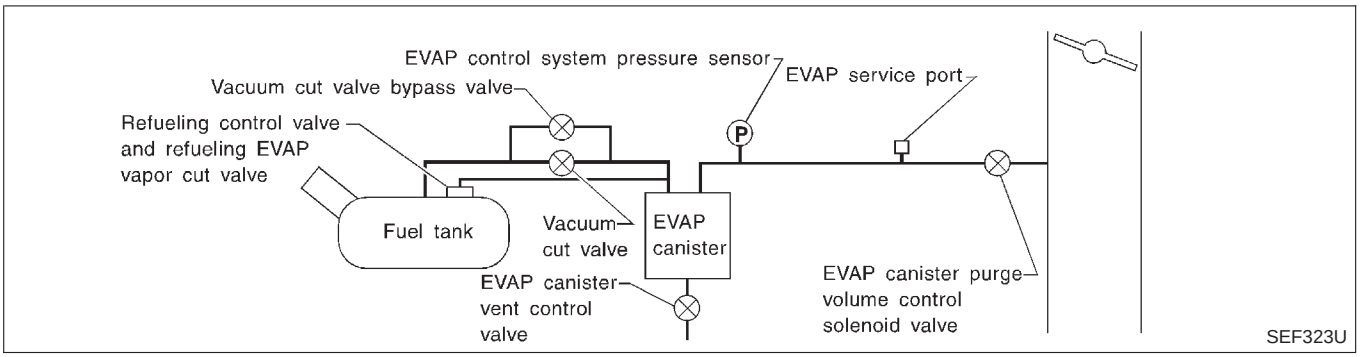
7	REPLACE ACCELERATOR PEDAL ASSEMBLY	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC1377

NOTE:
If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-602.)

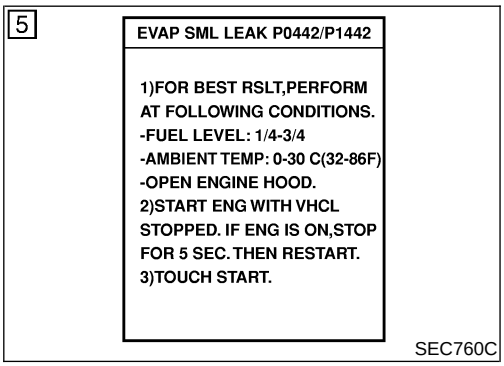
This diagnosis detects leaks in the EVAP purge line using the vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



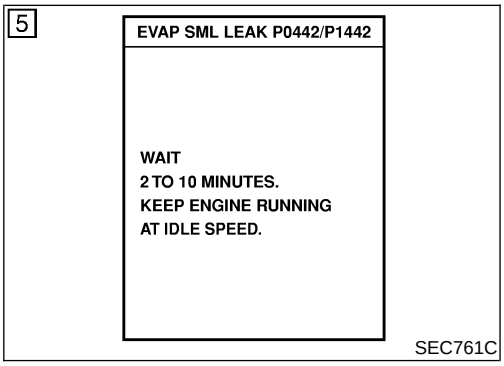
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1442 1442	EVAP control system small leak detected (positive pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel 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 • Blocked or bent rubber tube to EVAP control system pressure sensor • 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. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling control valve • ORVR system leaks

CAUTION:

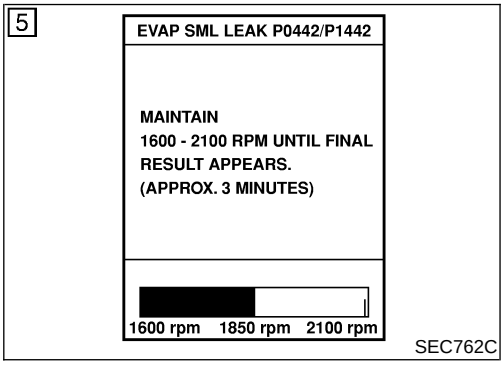
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



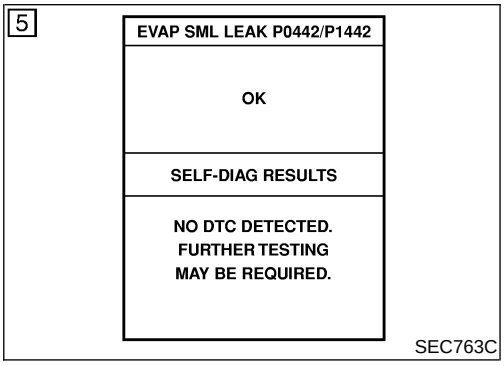
SEC760C



SEC761C



SEC762C



SEC763C

DTC Confirmation Procedure

NAEC1378

NOTE:

- **If DTC P1442 is displayed with P1448, first perform trouble diagnosis for DTC P1448 (See EC-602).**
- 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 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

NAEC1378S01

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5) Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-123.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-569.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NAEC1378S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-84 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-84.
3) Stop vehicle.
4) Select "MODE 1" with GST.

- If SRT of EVAP system is not set yet, go to the following step.

- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch OFF and wait at least 10 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-84.
8) Stop vehicle.
9) Select "MODE 3" with GST.

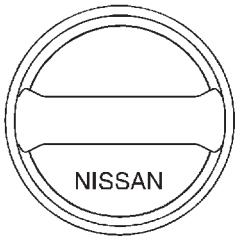
- If P1442 is displayed on the screen, go to "Diagnostic Procedure", EC-569.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", EC-351.
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0441, EC-342.
- If P0441, P0442 and P1442 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NAEC1379

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.  SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

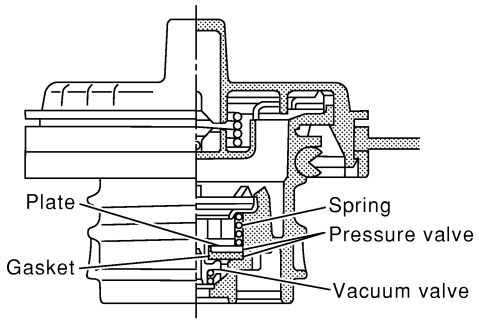
2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

Diagnostic Procedure (Cont'd)

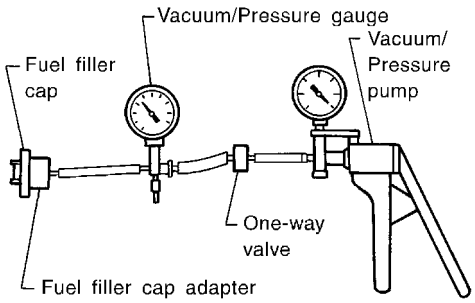
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE	

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

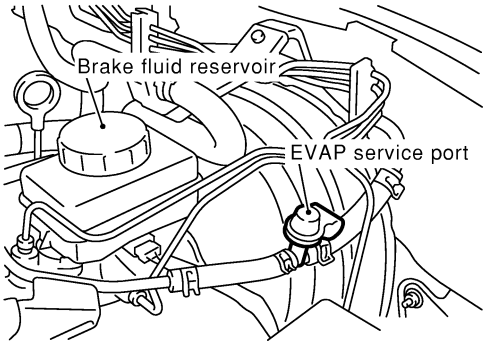
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

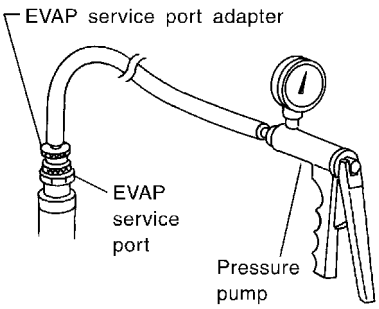
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

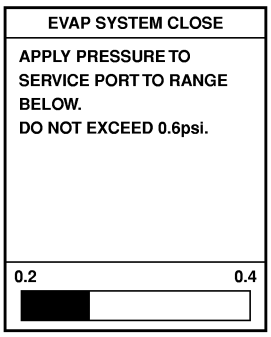
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II	▶	GO TO 6.
Without CONSULT-II	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

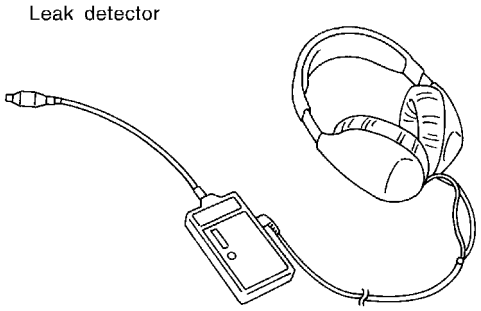
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

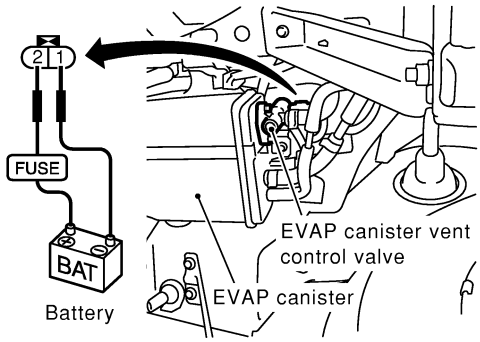
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

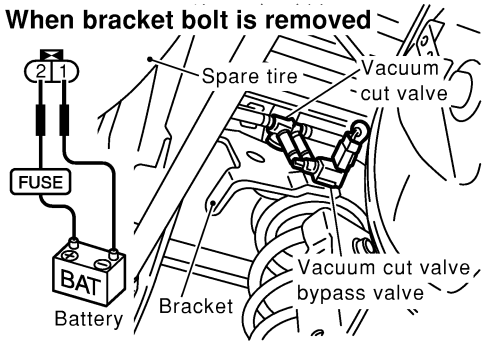
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



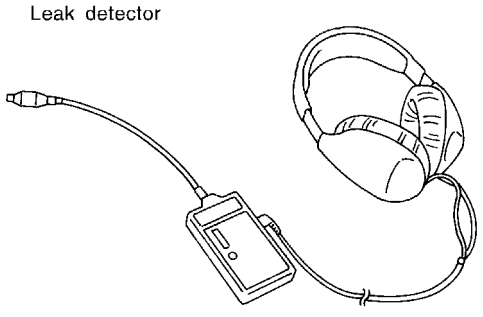
SEC930C

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEC932C

4. 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.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

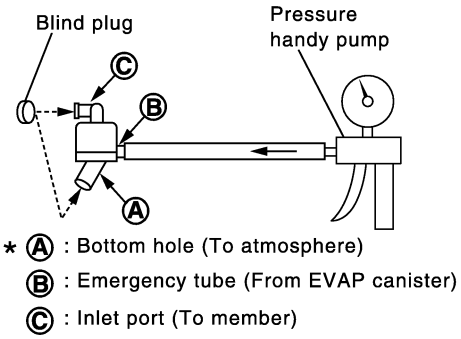
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

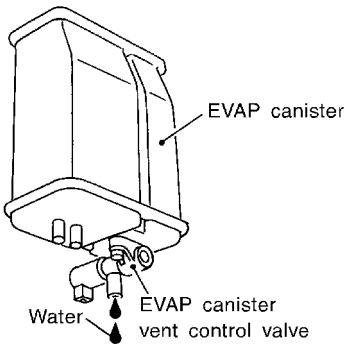
Refer to "DTC Confirmation Procedure", EC-372.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-32.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

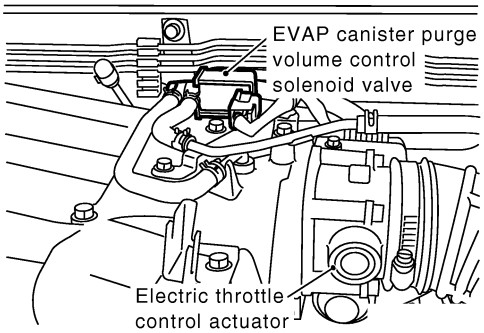
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

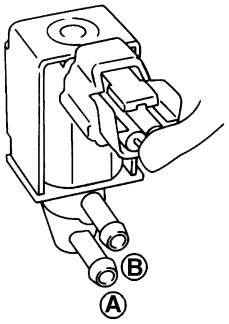
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D

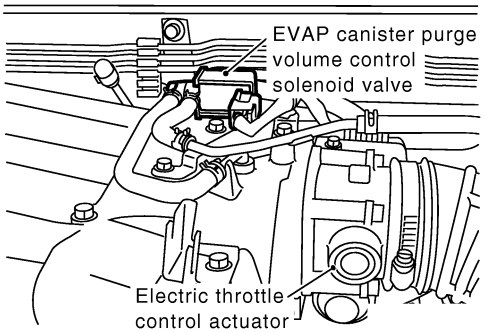


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

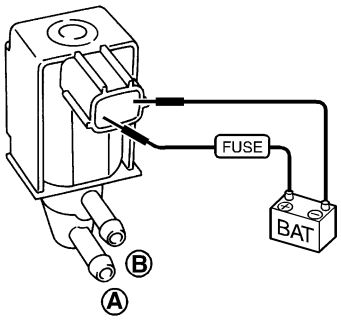
SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

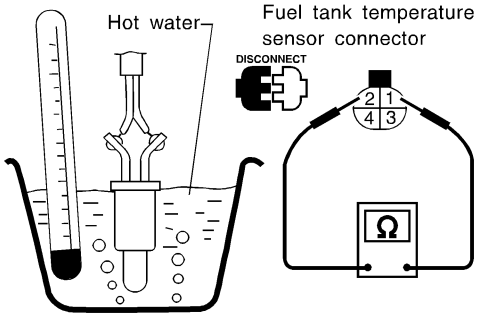
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

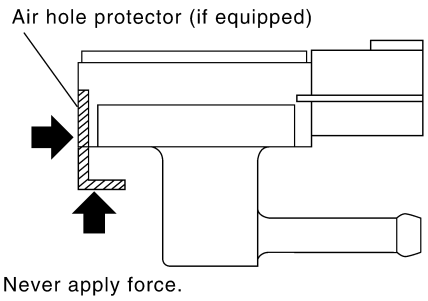
SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

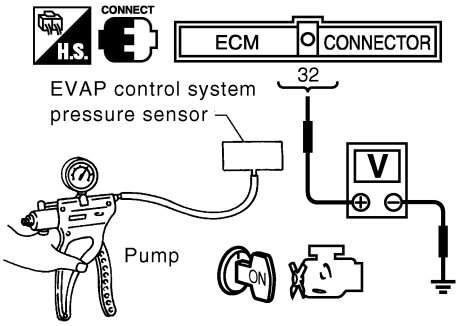
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-38.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

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

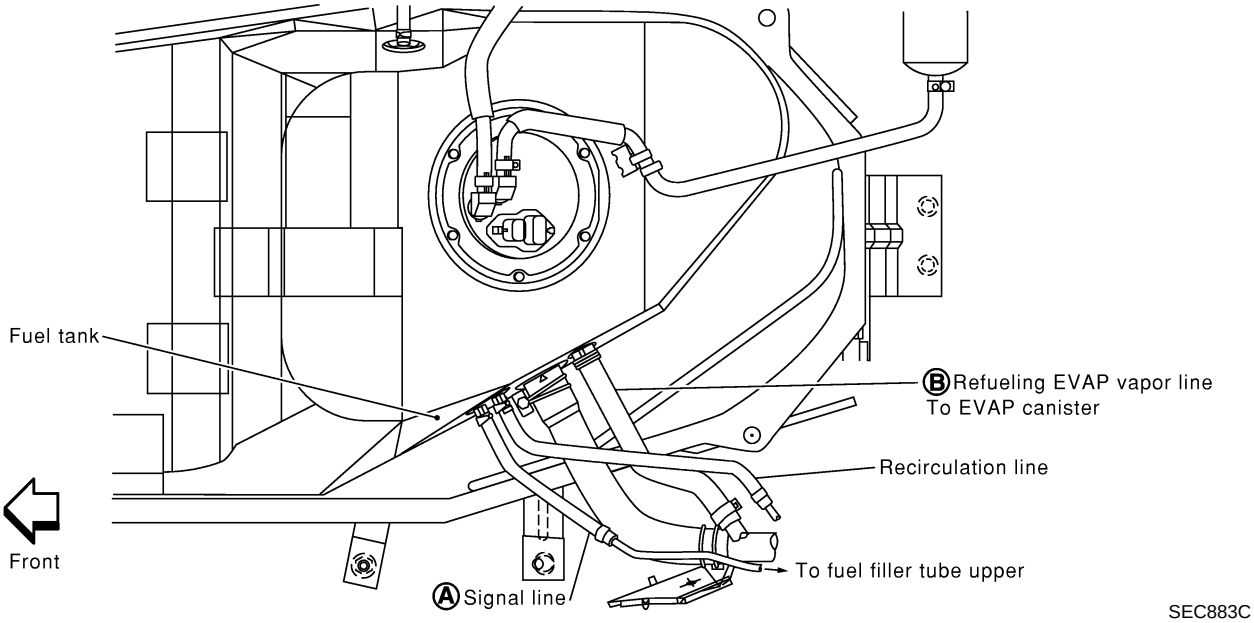
	▶	GO TO 22.

Diagnostic Procedure (Cont'd)

22	CHECK REFUELING EVAP VAPOR LINE	
• Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE	
• Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

24	CHECK REFUELING CONTROL VALVE	
1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check that there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.		
OK or NG		
OK	▶	GO TO 25.
NG	▶	Replace or refueling control valve with fuel tank.



25	CHECK FUEL LEVEL SENSOR	
Refer to EL-125, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Description

NAEC1089

SYSTEM DESCRIPTION

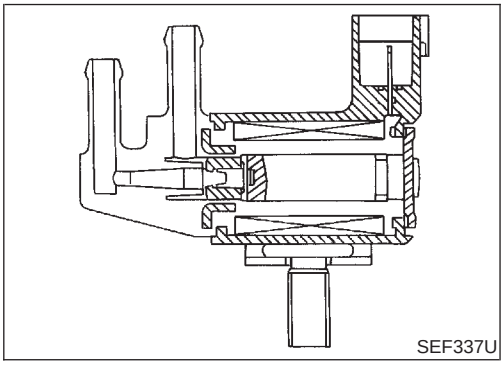
NAEC1089S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2 and piston position	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed signal*1	Vehicle speed		
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 signals of engine speed and battery voltage.

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.


SEF337U

COMPONENT DESCRIPTION

NAEC1089S02

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC1090

Specification data are reference values.

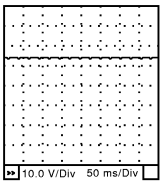
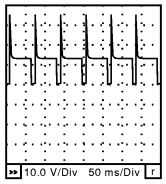
MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

ECM Terminals and Reference Value

NAEC1091

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)★  SEC991C

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

On Board Diagnosis Logic

NAEC1092

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1444 1444	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

NAEC1093

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 0°C (32°F) or more.

DTC Confirmation Procedure (Cont'd)

6

PURG VOL CN/V P1444	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEC143D

6

PURG VOL CN/V P1444	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEC144D

6

PURG VOL CN/V P1444
COMPLETED

SEF237Y

WITH CONSULT-II

NAEC1093S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON.
4) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Touch "START".
6) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for 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 "Diagnostic Procedure", EC-586.

WITH GST

NAEC1093S02

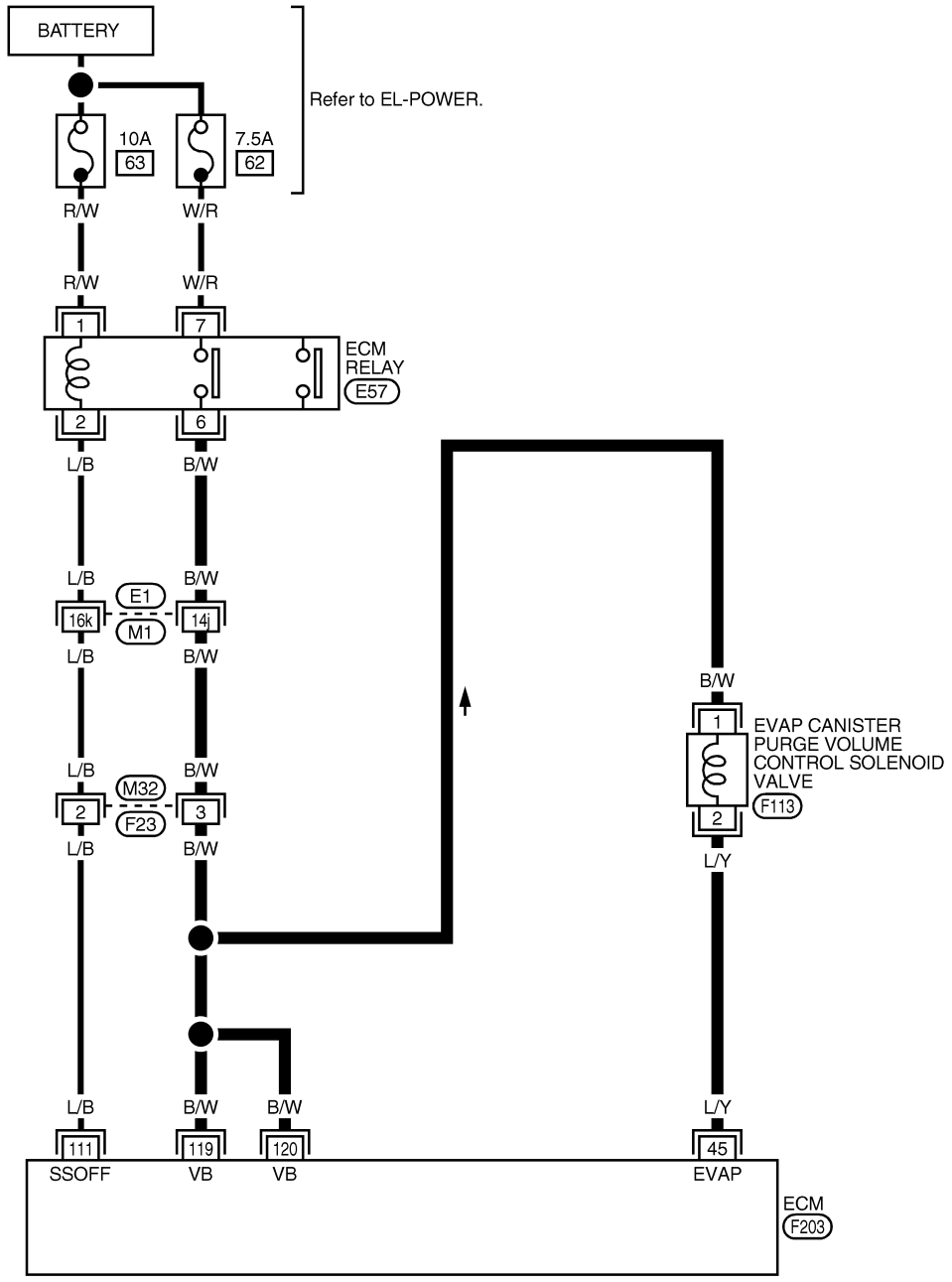
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-586.

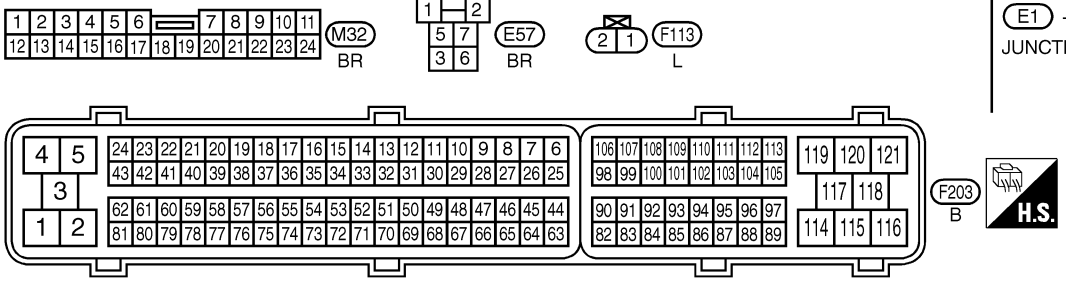
Wiring Diagram

NAEC1094

EC-PGC/V-01

: Detectable line for DTC
: Non-detectable line for DTC





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

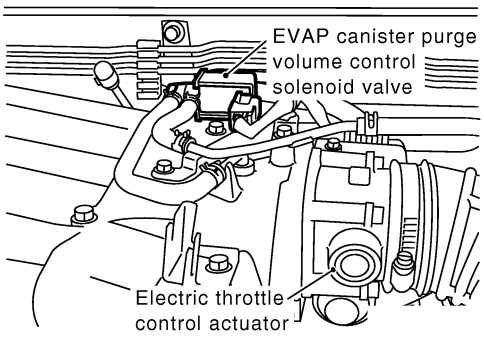
MEC096E

Diagnostic Procedure

NAEC1095

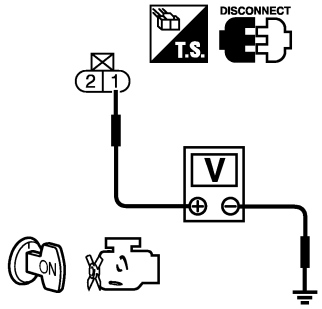
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEC524D

3. Turn ignition switch ON.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



PBIB0080E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay

	▶	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

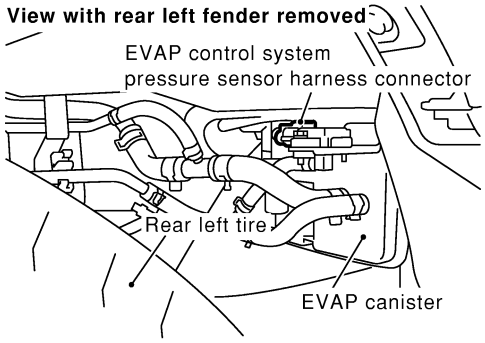
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.



SEC931C

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

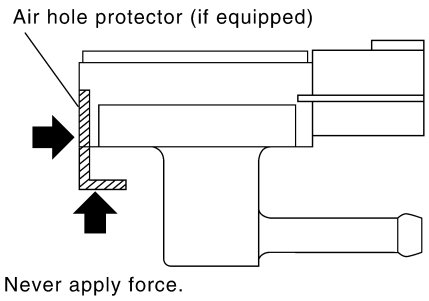
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP control system pressure sensor.

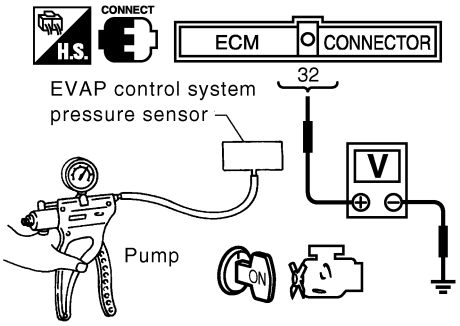
6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

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-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

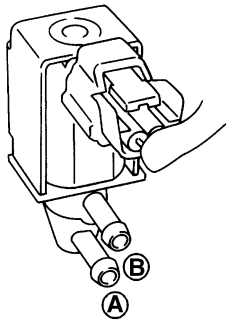
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

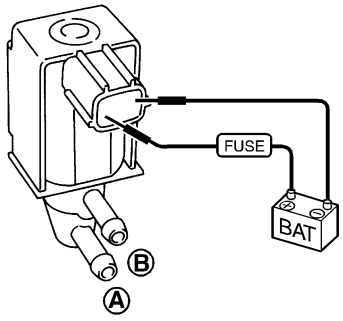


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

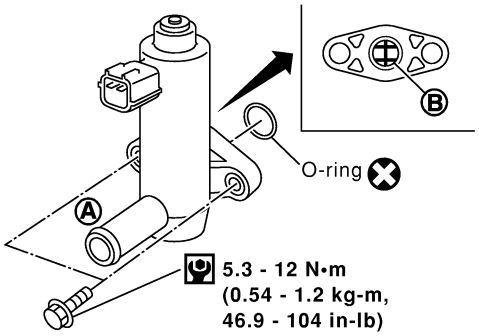
SEF335X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

9	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 10.
NG	▶	Clean the rubber tube using an air blower.

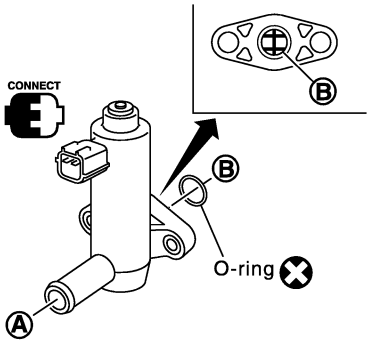
10	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.  SEF376Z **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



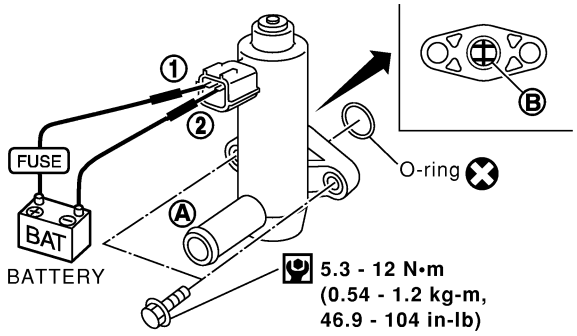
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III

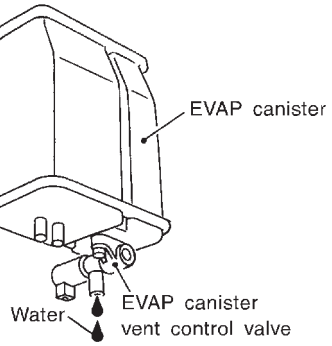
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 9 again.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 14.
No	▶	GO TO 17.

14	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

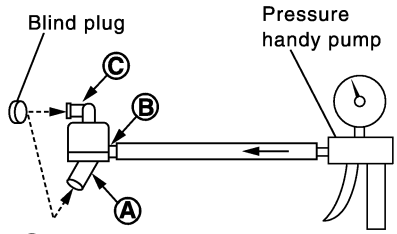
15	DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separater for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

16	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* A : Bottom hole (To atmosphere)
B : Emergency tube (From EVAP canister)
C : Inlet port (To member)

PBIB1032E

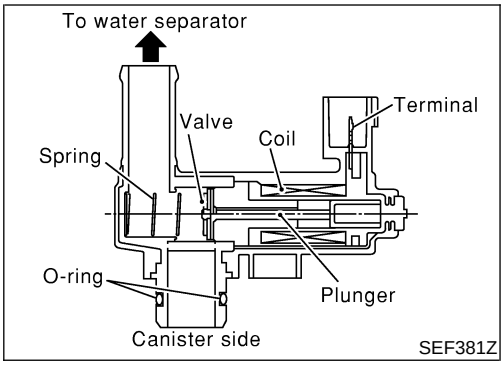
5. In case of NG in items 2 - 4, replace the parts.

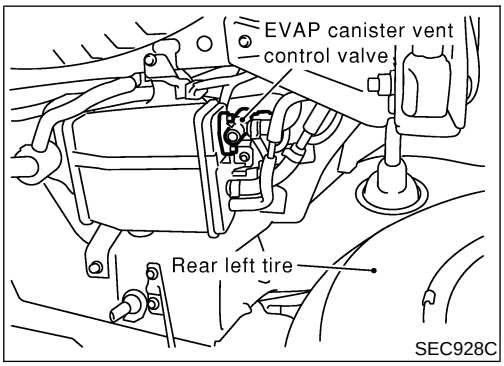
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 17.
NG	▶	Clean or replace water separator.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC1096

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 (Small Leak) diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1097

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC1098

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	G/R	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1099

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1446 1446	EVAP canister vent control valve closed	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 • Water separator • EVAP canister is saturated with water.

4

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

PBIB0164E

DTC Confirmation Procedure

NAEC1100

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.

WITH CONSULT-II

NAEC1100S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine.
4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-597.

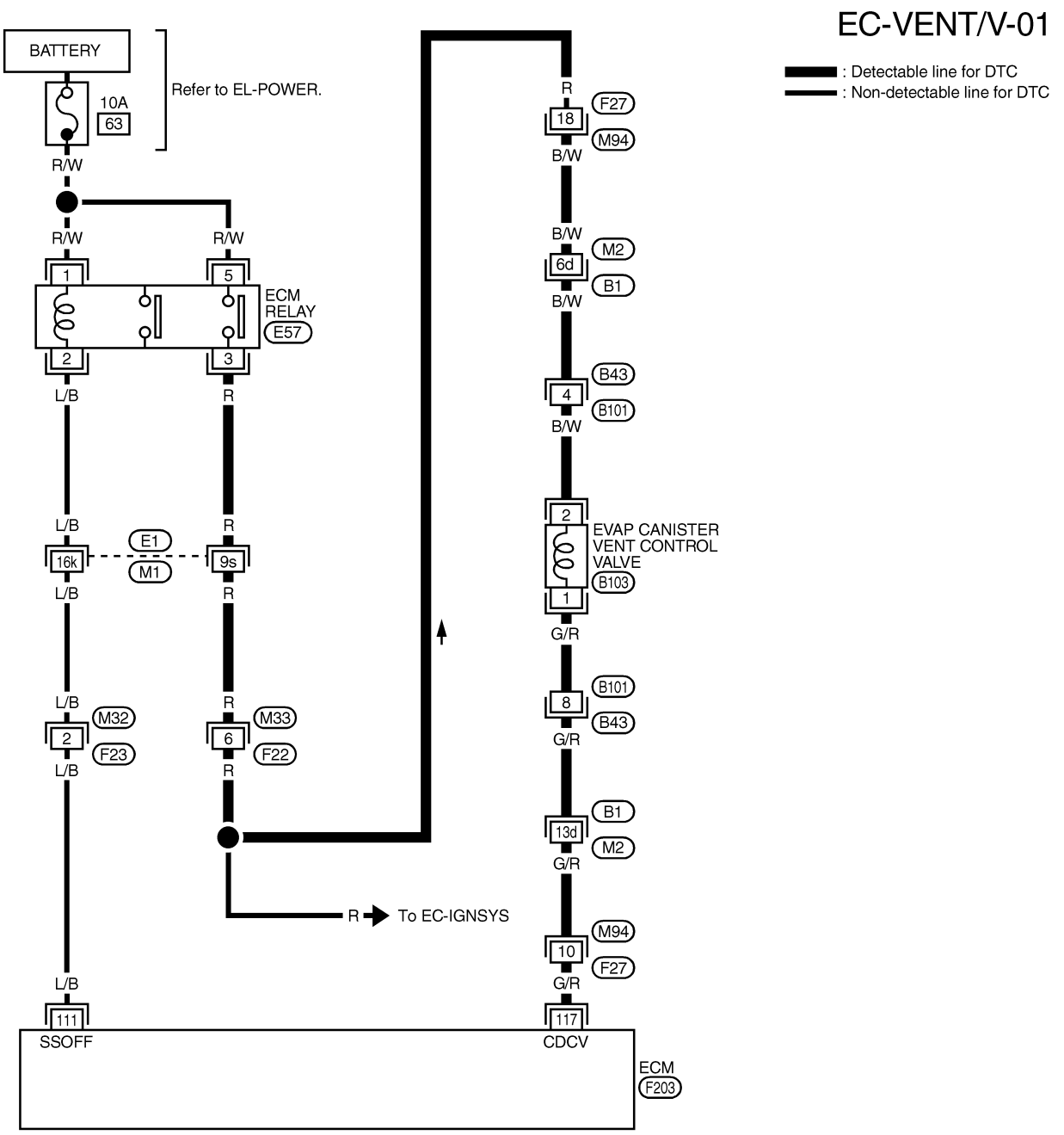
WITH GST

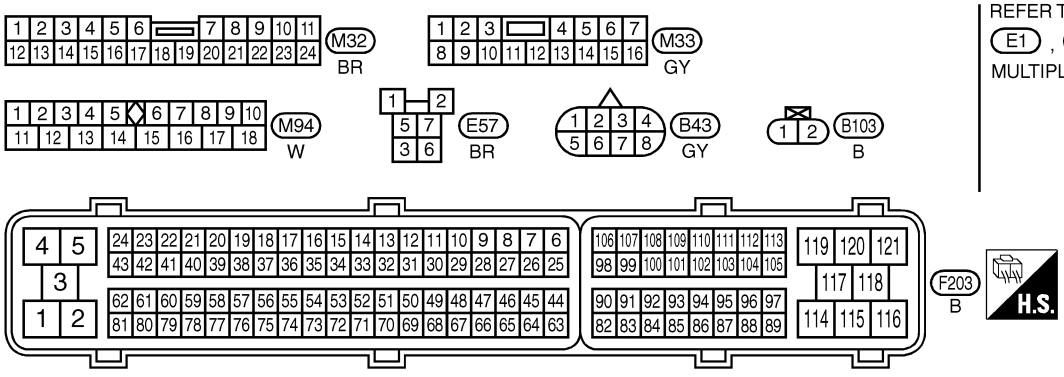
NAEC1100S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1101





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

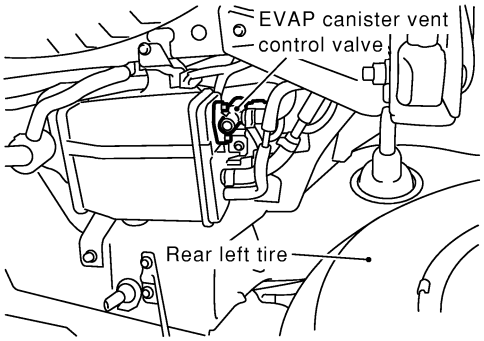
MEC097E

Diagnostic Procedure

NAEC1102

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



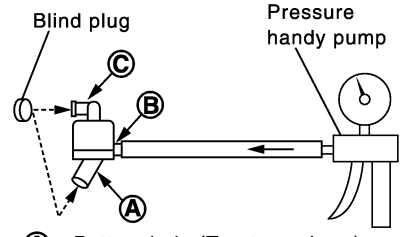
SEC928C

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ : Bottom hole (To atmosphere)
Ⓑ : Emergency tube (From EVAP canister)
Ⓒ : Inlet port (To member)

PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

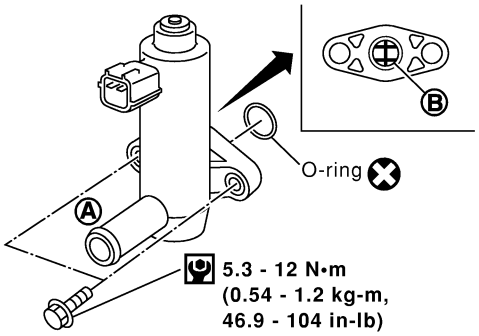
OK or NG

OK	▶	GO TO 3.
NG	▶	Clean or replace water separator.

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

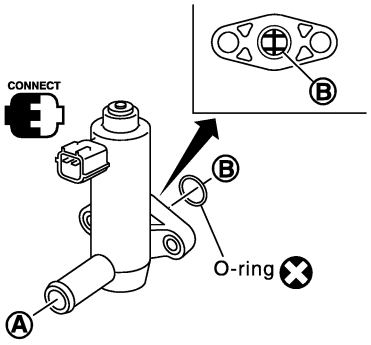
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



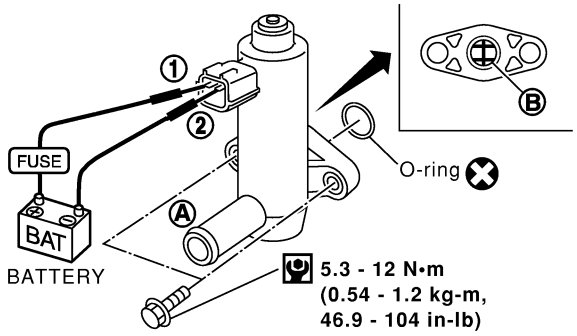
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

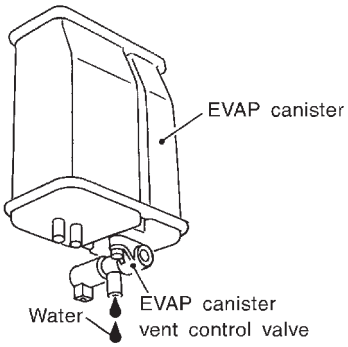
SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the procedure 4 again. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Replace EVAP canister vent control valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.  SEF596U **Yes or No**		
Yes	▶	GO TO 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

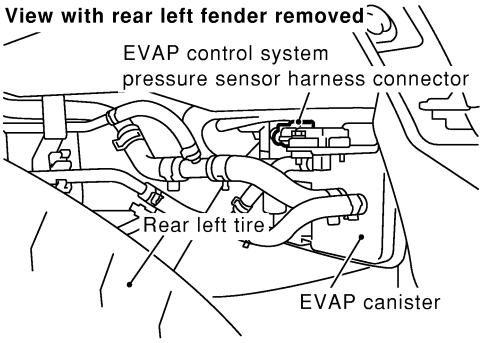
8	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEC931C

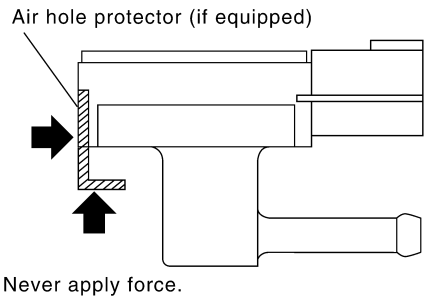
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

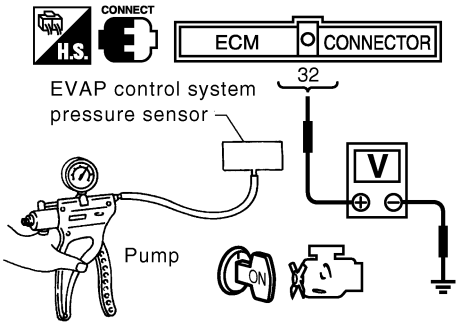
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

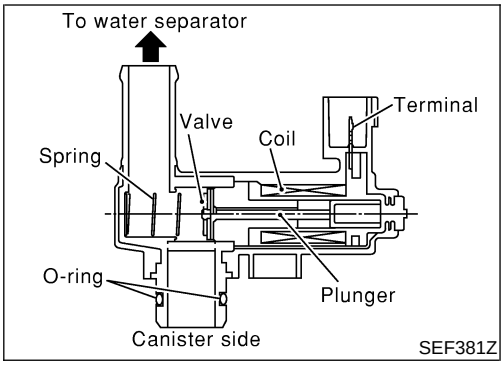
SEC422D

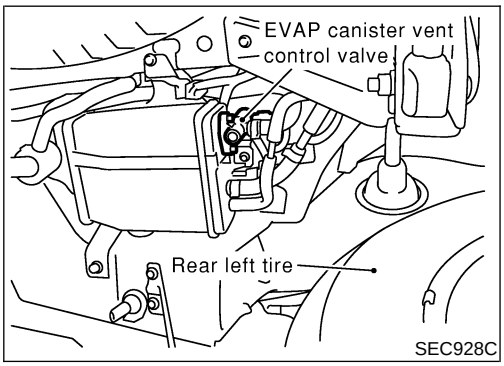
CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**





Component Description

NAEC1103

NOTE:
If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

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 (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1104

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC1105

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	G/R	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1106

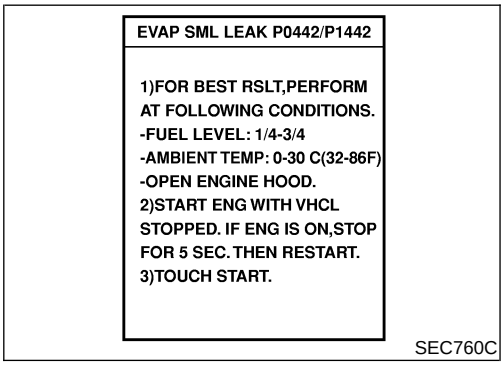
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1448 1448	EVAP canister vent control valve open	EVAP canister vent control valve remains opened under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water. • Vacuum cut valve

DTC Confirmation Procedure

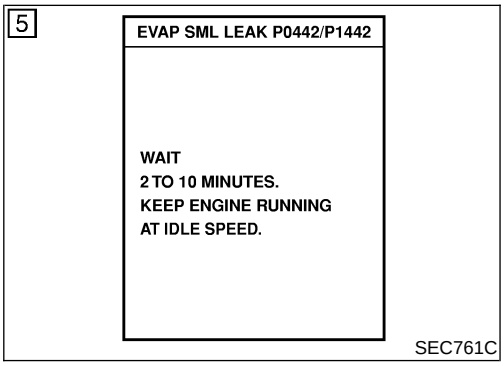
NAEC1107

NOTE:

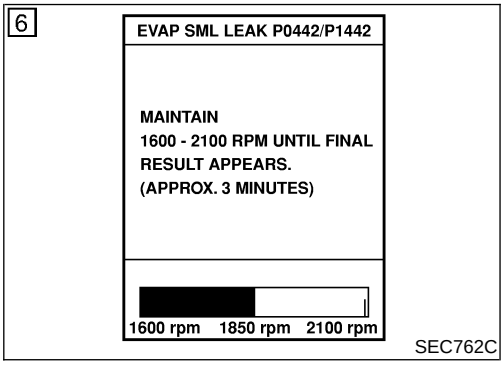
- **If DTC P1448 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P1448 first.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.



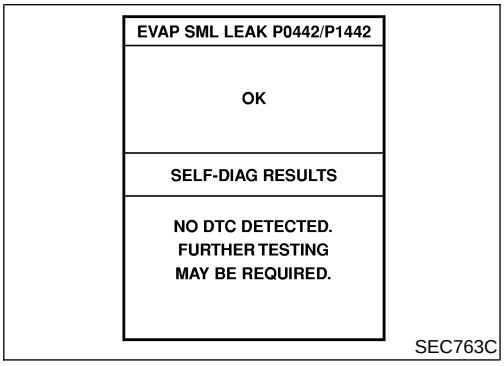
SEC760C



SEC761C



SEC762C



SEC763C

WITH CONSULT-II

NAEC1107S01

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 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).**
- **Open engine hood before conducting the following procedure.**

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

5) Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

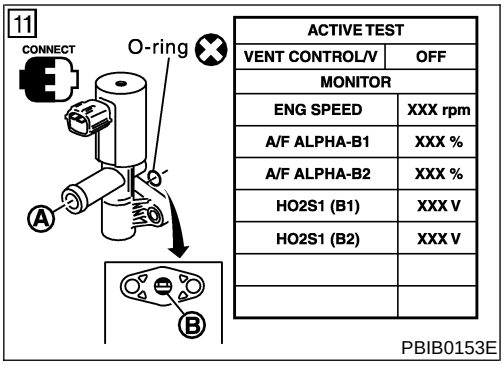
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-123.

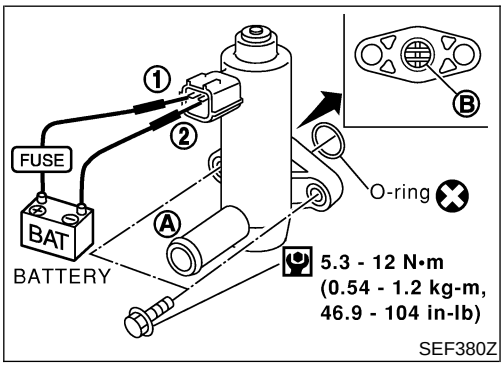
6) Make sure that "OK" is displayed.
   If "NG" is displayed, go to the following step.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7) Stop engine and wait at least 10 seconds, then turn "ON".
8) Disconnect hose from water separator.
9) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT-II.
10) Touch "ON" and "OFF" alternately.

DTC Confirmation Procedure (Cont'd)





11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

If the result is NG, go to "Diagnostic Procedure", EC-606.
If the result is OK, go to "Diagnostic Procedure" for DTC P0442, EC-351.

Overall Function Check

NAEC1108

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC1108S01

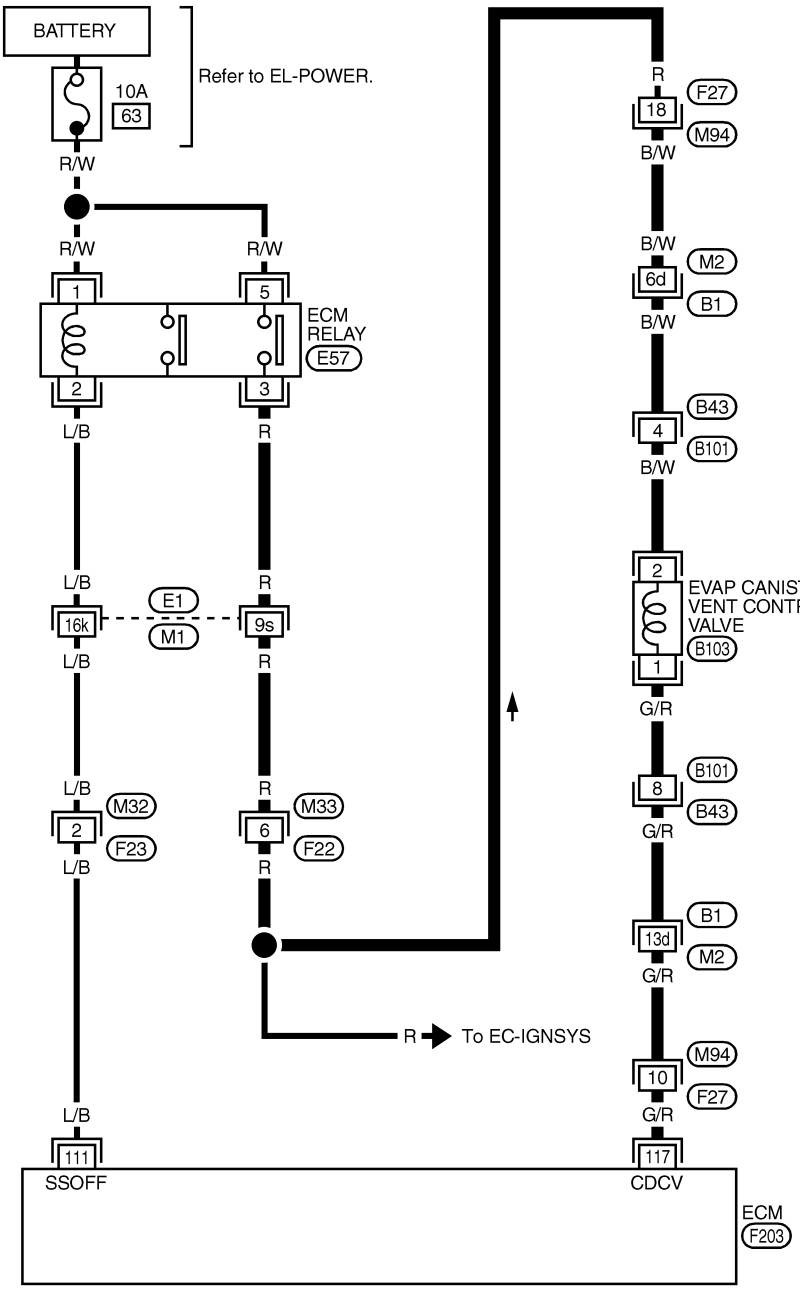
1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

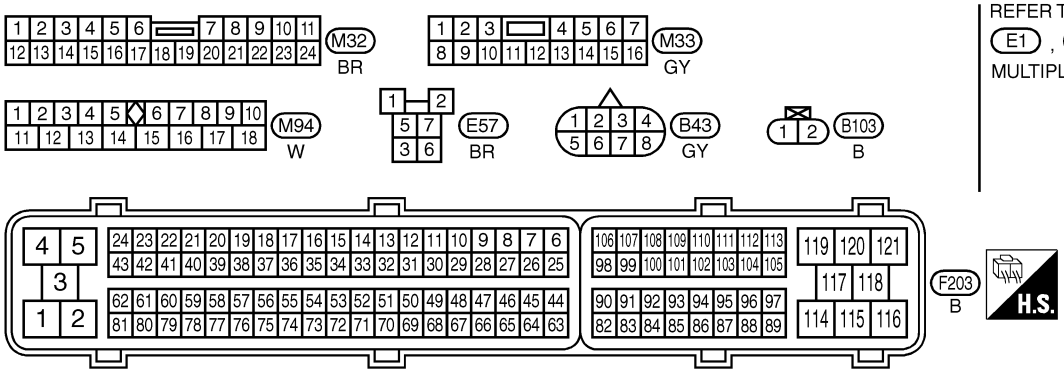
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-606.
If the result is OK, go to "Diagnostic Procedure" for DTC P0442, EC-351.

Wiring Diagram

NAEC1109





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

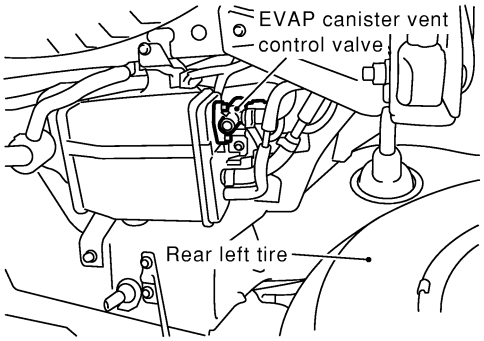
MEC097E

Diagnostic Procedure

NAEC1110

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



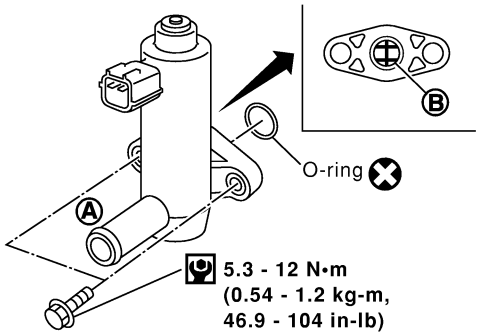
SEC928C

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

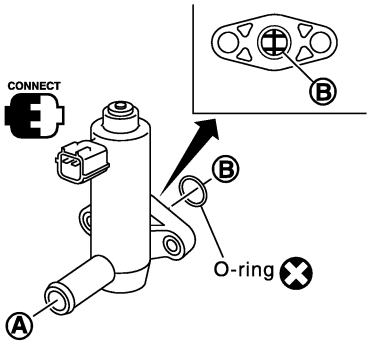
OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

3	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



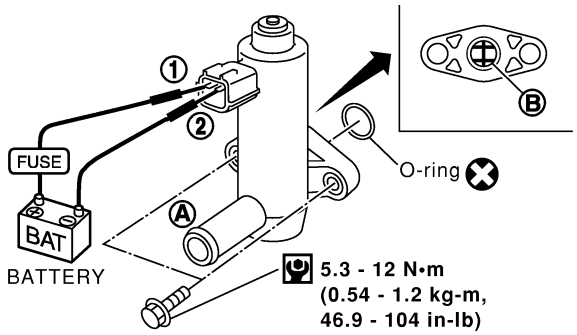
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

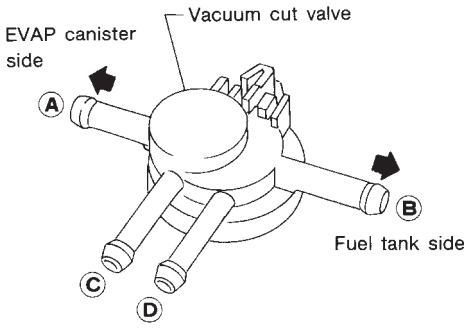
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:



SEF379Q

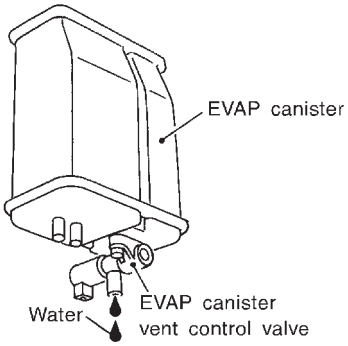
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace vacuum cut valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

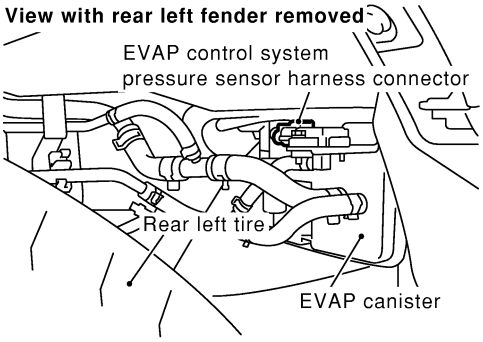
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	



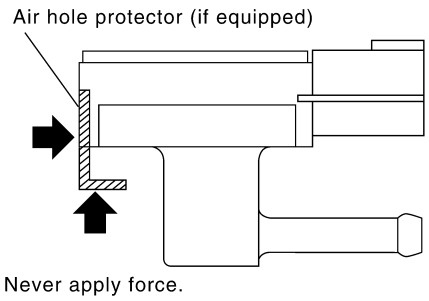
SEC931C

2. Check connectors for water.
Water should not exist.

OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

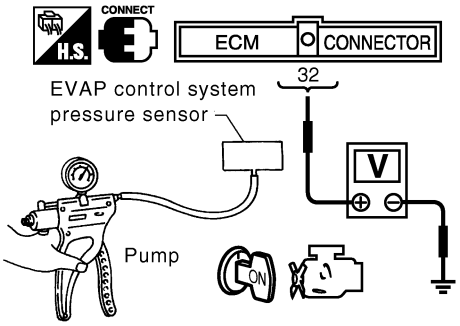
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

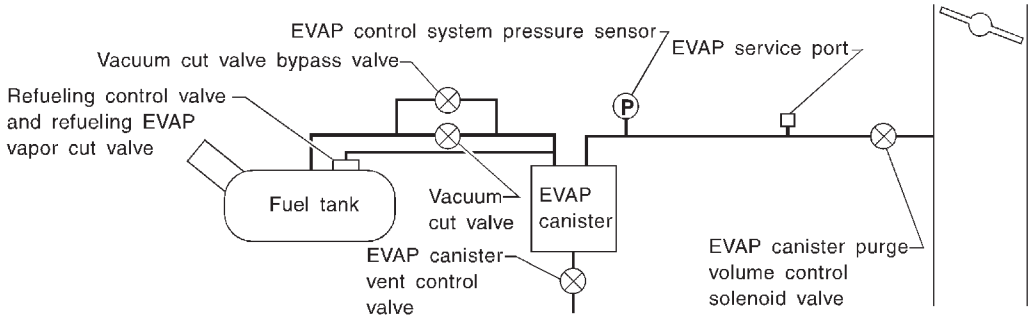
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC1380



This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the vapor pressure in the fuel tank same as a conventional EVAP small leak diagnosis.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.

If ECM judges a leak which corresponds to a very small leak, the very small leak P1456 will be detected.

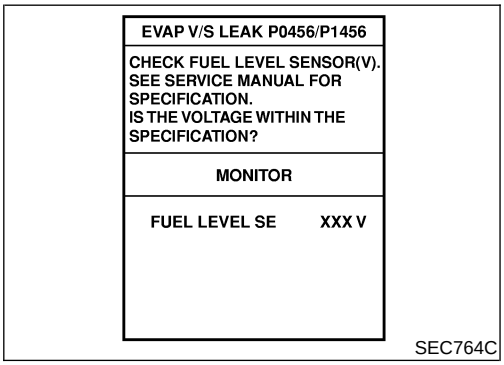
If ECM judges a leak equivalent to a small leak, EVAP small leak P1442 will be detected.

If ECM judges there are no leaks, the diagnosis will be OK.

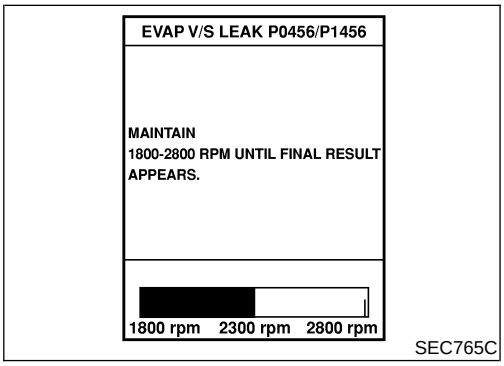
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1456 1456	Evaporative emission control system very small leak (positive pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler 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 • Blocked or bent rubber tube to EVAP control system pressure sensor • 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. • Water separator • EVAP canister saturated with water • EVAP control system pressure sensor • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

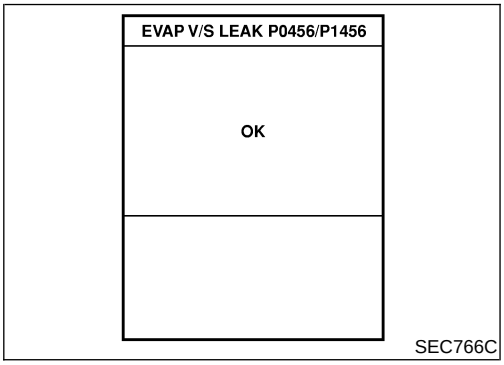
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEC764C



SEC765C



SEC766C

DTC Confirmation Procedure

NAEC1381

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1456 is displayed with P1442, perform TROUBLE DIAGNOSIS FOR DTC P1456 first.**
- If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **After repair, make sure that the hoses and clips are installed properly.**

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**

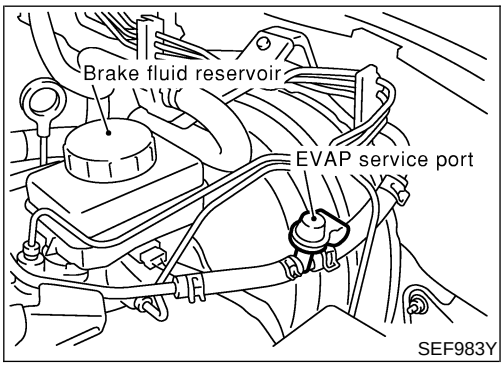
a) **Fuel filler cap is removed.**
b) **Refilled or drained the fuel.**
c) **EVAP component parts is/are removed.**

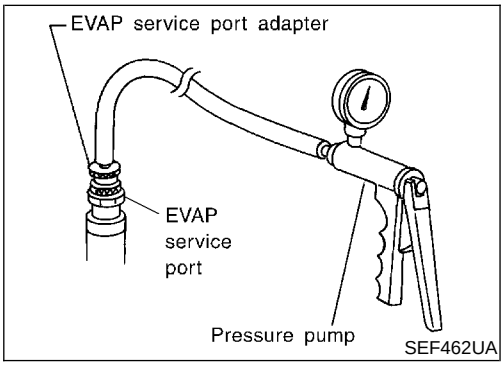
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   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 5 seconds.
4) Turn ignition switch ON.
5) Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-614.

NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-123.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**





Overall Function Check

NAEC1382

WITH GST

NAEC1382S01

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/cm^2, 0.6 psi).**

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Set the pressure pump and a hose.
3) Also set a vacuum gauge via 3-way connector and a hose.
4) Turn ignition switch ON.
5) Connect GST and select MODE 8.
6) Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
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 diagnostic procedure, EC-614.
   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.

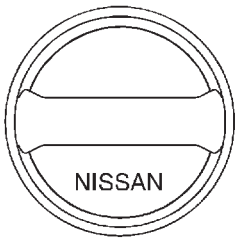
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NAEC1383

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

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	▶	● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

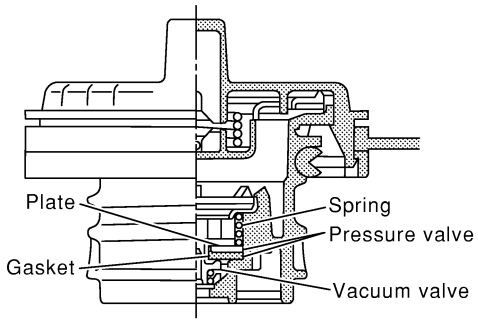
Check for air releasing sound while opening the fuel filler cap.

OK or NG

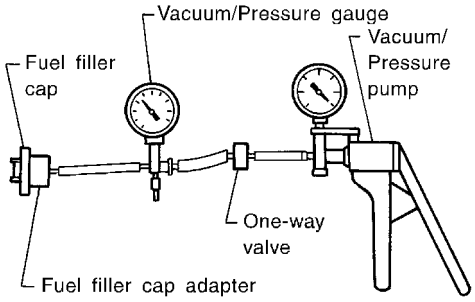
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

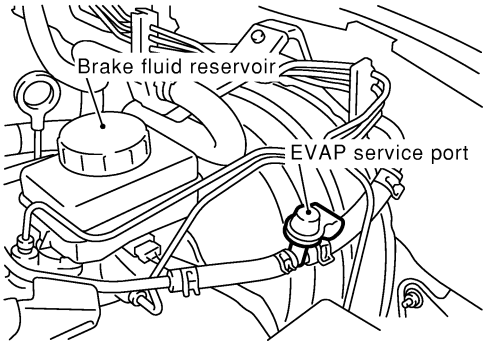
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

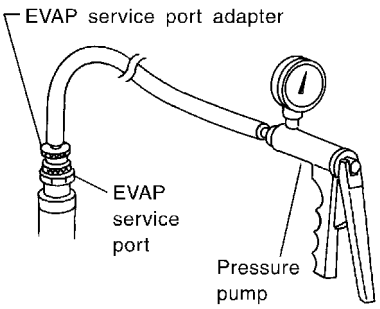
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

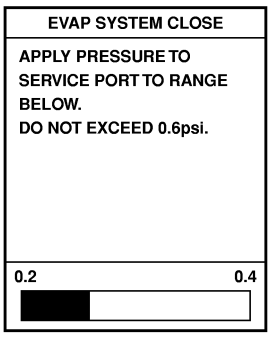
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II	▶	GO TO 6.
Without CONSULT-II	▶	GO TO 7.

6	CHECK FOR EVAP LEAK

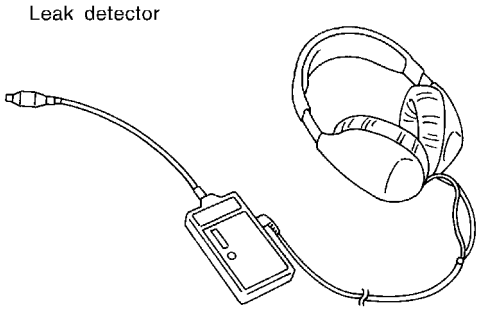
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



SEF200U

OK or NG

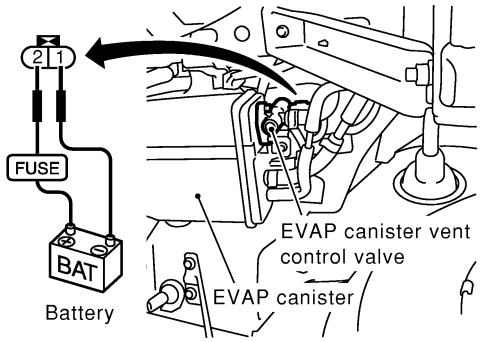
OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

7	CHECK FOR EVAP LEAK

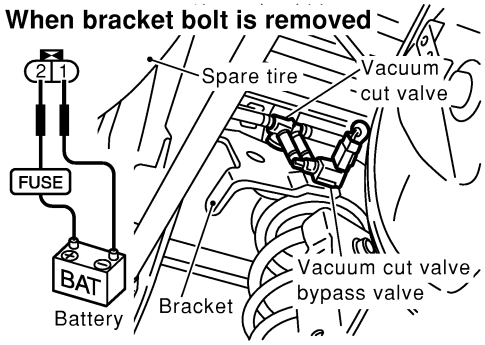
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



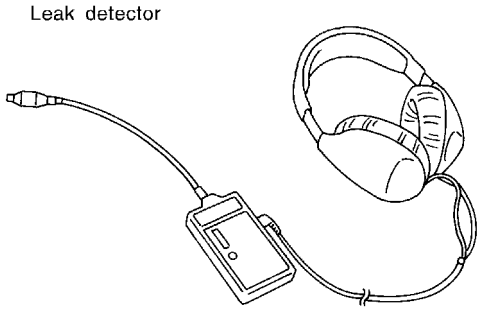
SEC930C

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEC932C

4. 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.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.



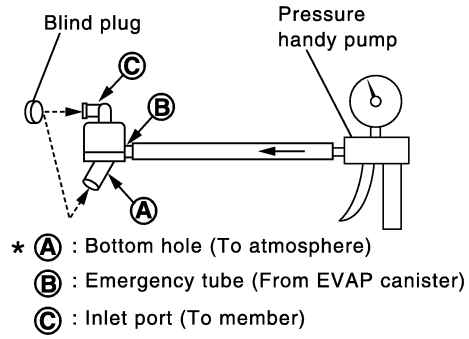
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

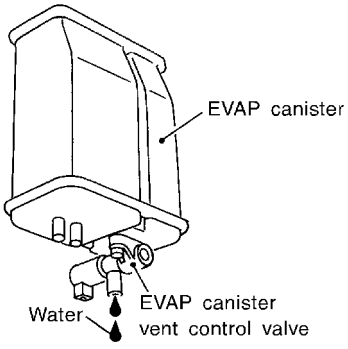
Refer to "DTC Confirmation Procedure", EC-372.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-32.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
With CONSULT-II 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

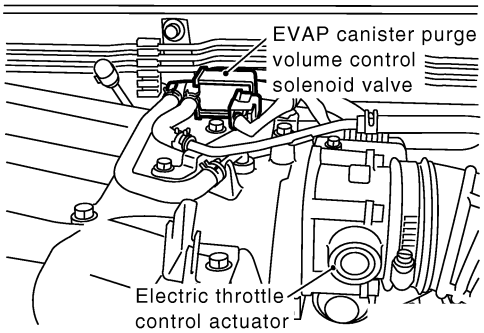
PBIB1678E

Diagnostic Procedure (Cont'd)

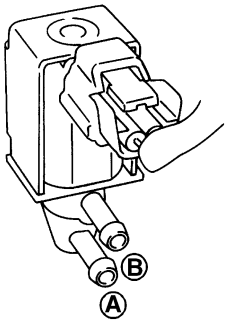
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D

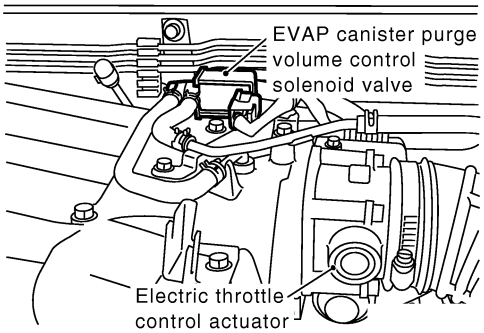


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

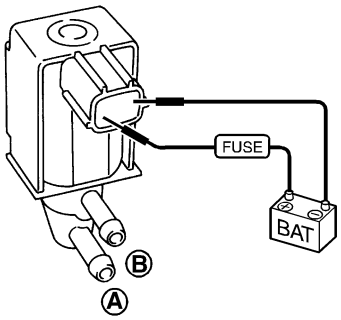
SEF334XA

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC524D



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

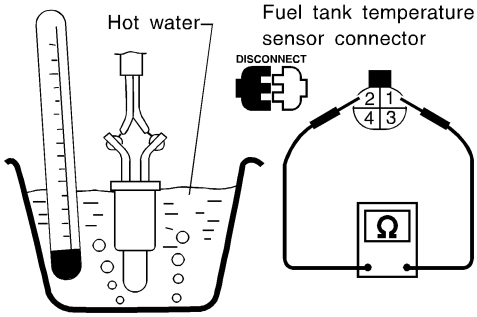
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

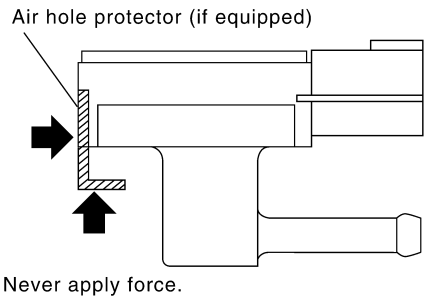
SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

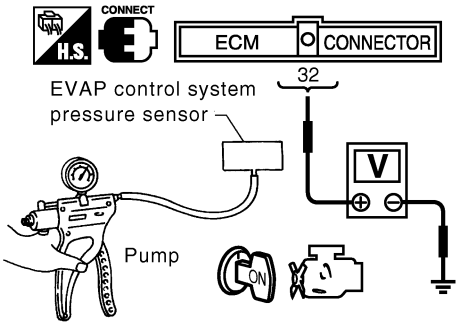
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-38.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

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

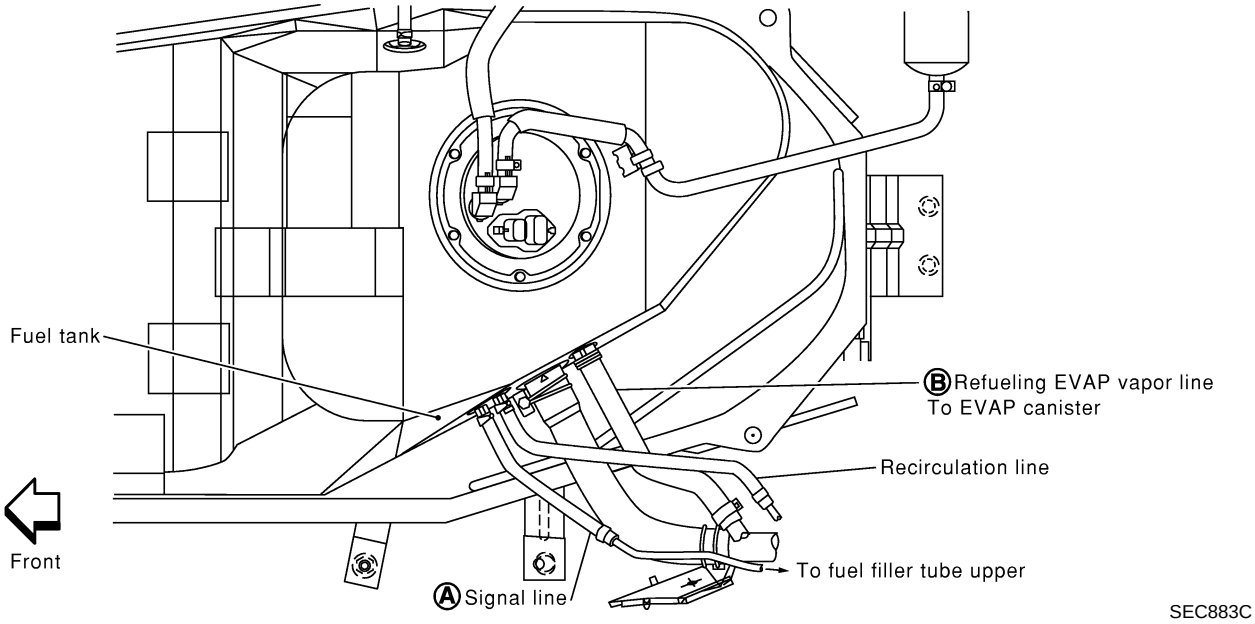
	▶	GO TO 22.

22	CHECK REFUELING EVAP VAPOR LINE	
• Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-42.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE	
• Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

24 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



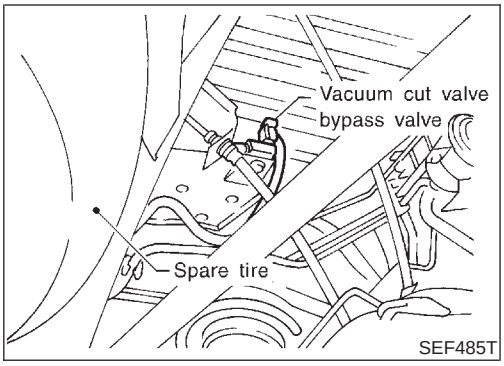
OK or NG

OK	▶	GO TO 25.
NG	▶	Replace or refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Description

=NAEC1116

COMPONENT DESCRIPTION

NAEC1116S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

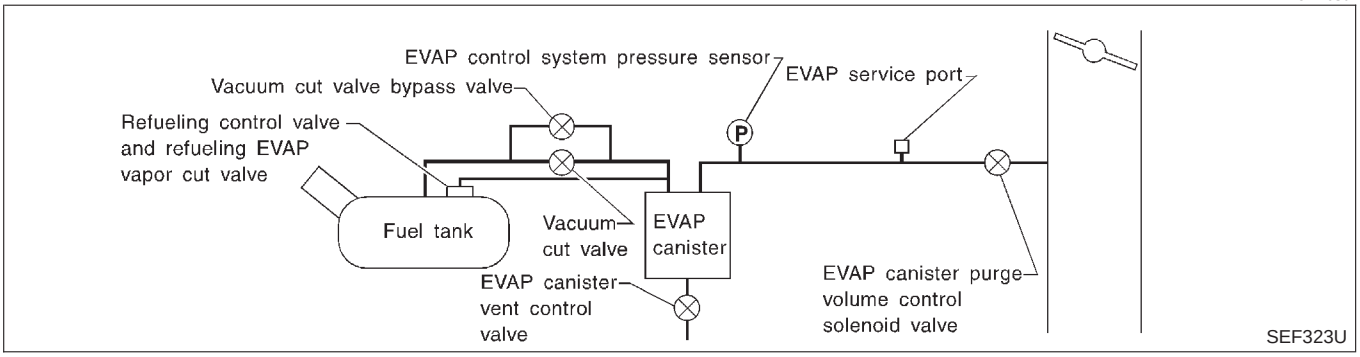
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC1116S02



CONSULT-II Reference Value in Data Monitor Mode

NAEC1117

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC1118

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
112	G/W	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1119

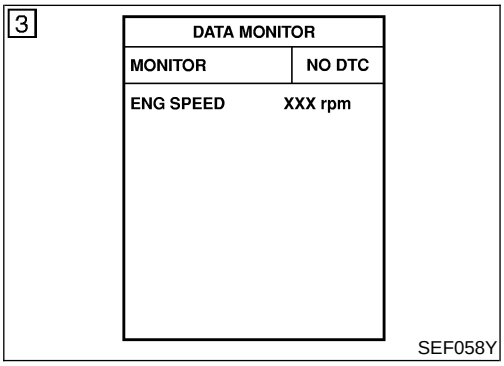
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1490 1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) ● Vacuum cut valve bypass valve

DTC Confirmation Procedure

NAEC1120

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 speed.



WITH CONSULT-II

NAEC1120S01

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-630.

WITH GST

NAEC1120S02

Follow the procedure “WITH CONSULT-II” above.

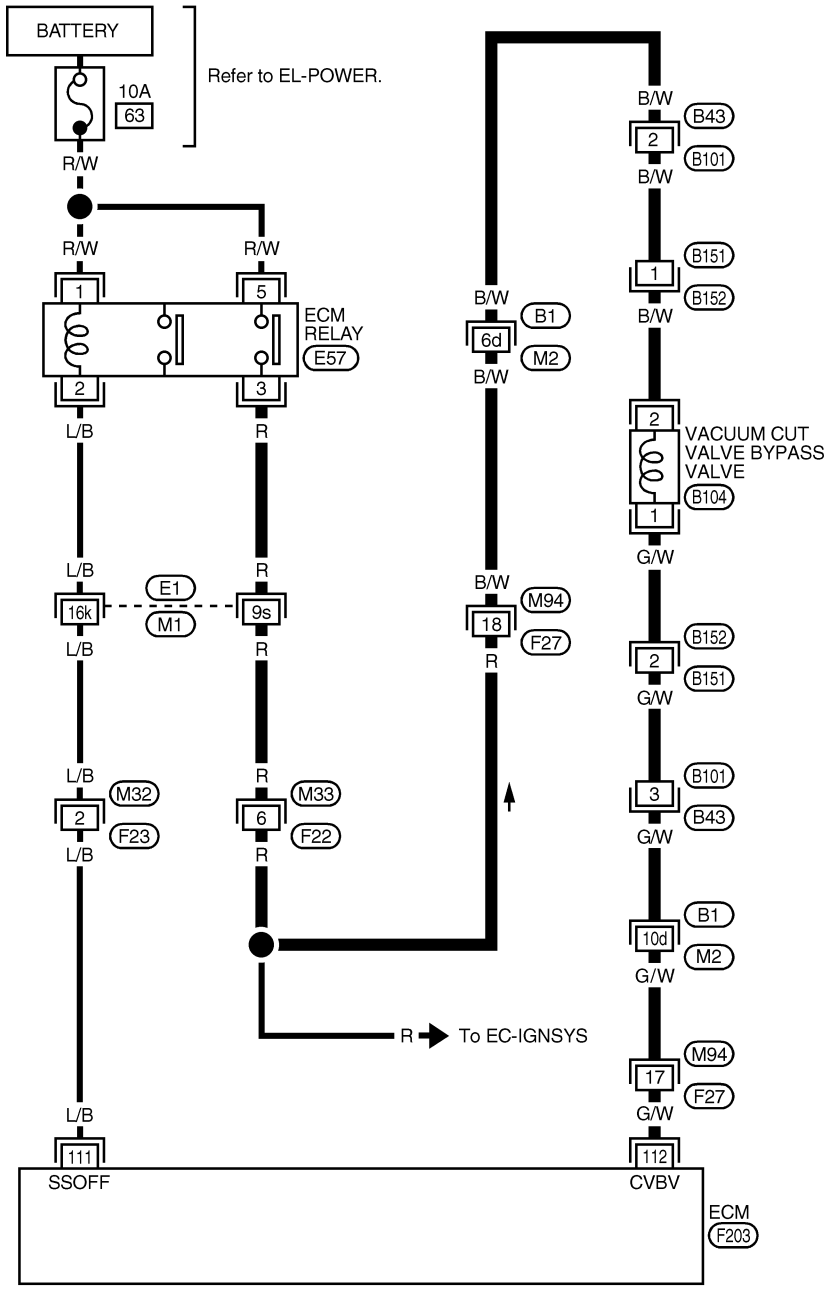
Wiring Diagram

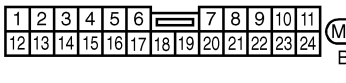
NAEC1121

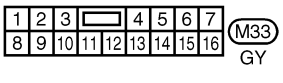
EC-BYPS/V-01

: Detectable line for DTC

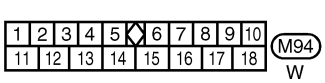
: Non-detectable line for DTC

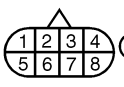


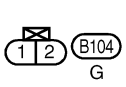


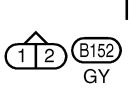


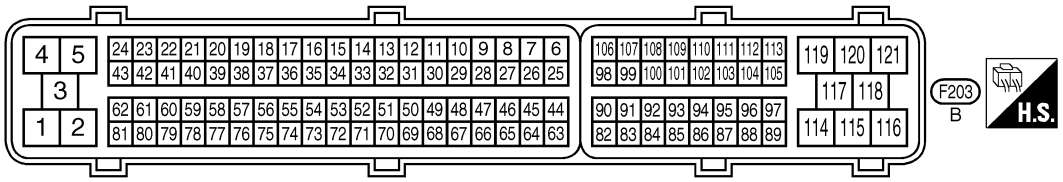
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)











MEC105E

Diagnostic Procedure

NAEC1122

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT	

With CONSULT-II

1. Turn ignition switch OFF and then ON.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN

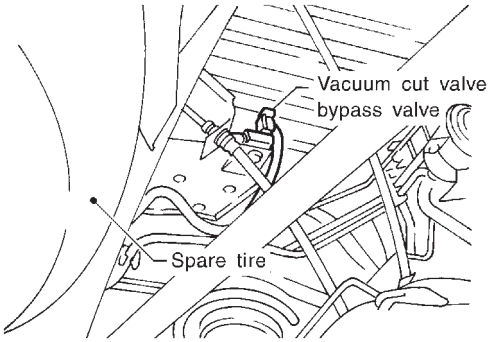
PBIB0157E

4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

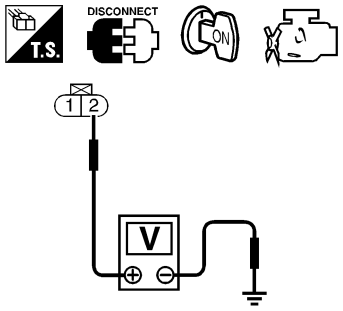
3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF485T

3. Turn ignition switch ON.
4. Check voltage between vacuum cut valve bypass valve terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF015Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness connectors M94, F27
- Harness connectors B1, M2
- Harness connectors B43, B101
- Harness connectors B151, B152
- Harness for open or short between vacuum cut valve bypass valve and ECM relay

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

5	CHECK VACUUM CUT VALVE BYPASS 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 112 and vacuum cut valve bypass 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 7.
NG	▶	GO TO 6.

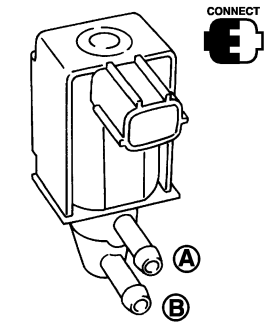
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B152, B151 ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between vacuum cut valve bypass valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN

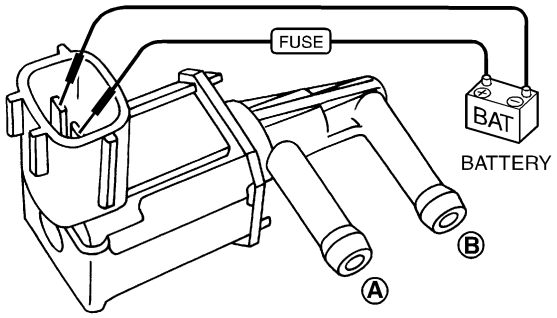
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEC156D

Without CONSULT-II

Check air passage continuity and operation delay time 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

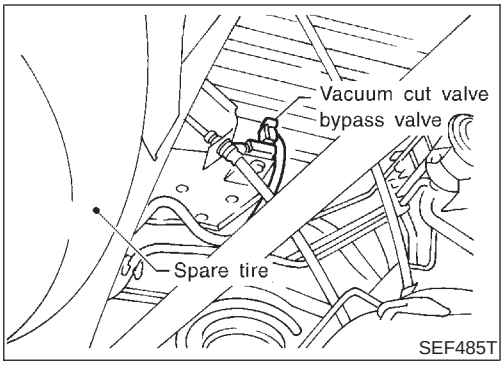
Operation takes less than 1 second.

SEF358X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Description

NAEC1123

COMPONENT DESCRIPTION

NAEC1123S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

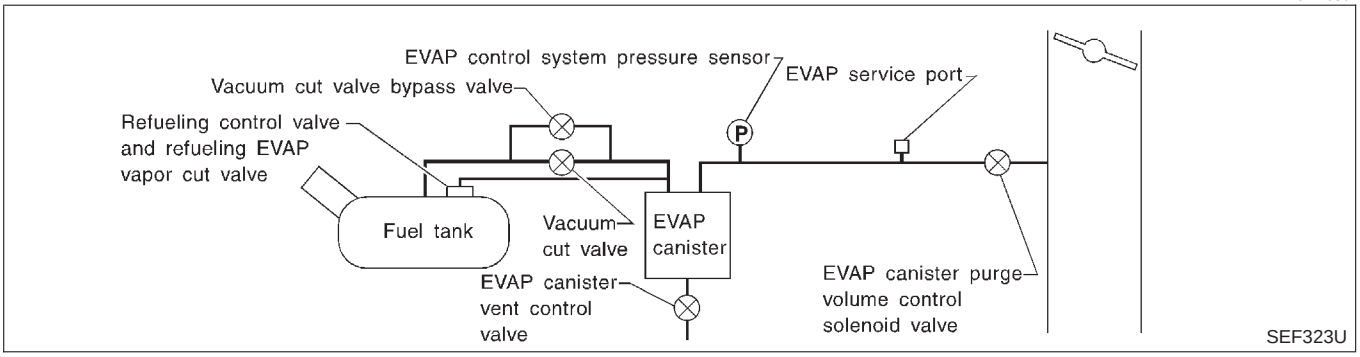
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC1123S02



CONSULT-II Reference Value in Data Monitor Mode

NAEC1124

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC1125

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

CAUTION:

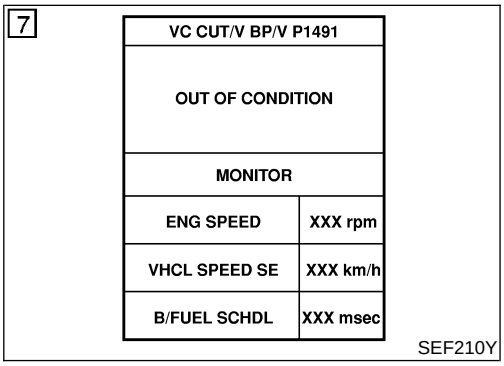
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

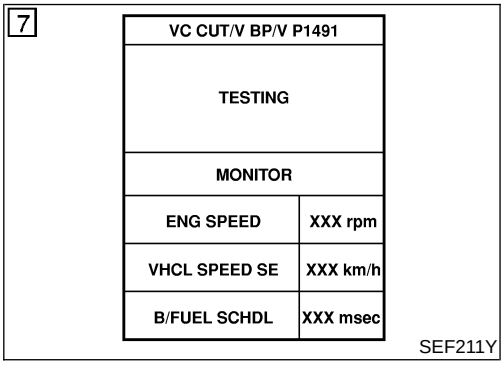
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
112	G/W	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

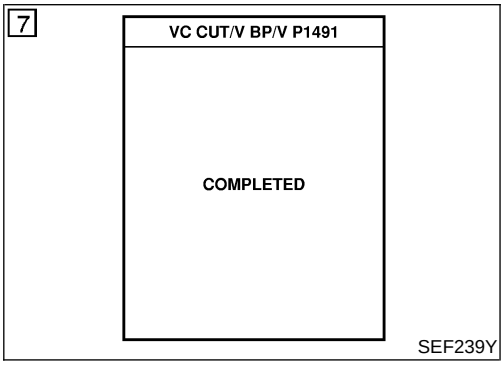
On Board Diagnosis Logic

NAEC1126

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1491 1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor and circuit • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging







DTC Confirmation Procedure

NAEC1127

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:
For best results, perform test at a temperature of 5 to 30°C (41 to 86°F).

WITH CONSULT-II

NAEC1127S01

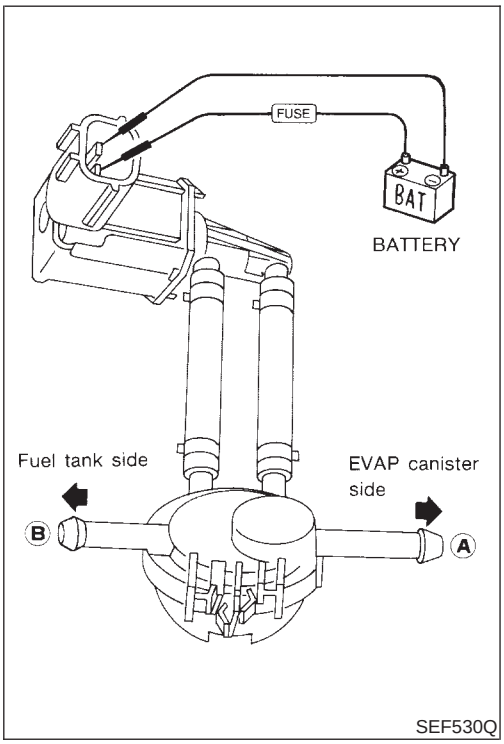
1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 10 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
6) Touch “START”.
7) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)

ENG SPEED	Idle speed or more
Selector lever	Suitable position
Vehicle speed	37 km/h (23 MPH) or more
B/FUEL SCHDL	1.3 - 10 msec

If “TESTING” is not displayed after 5 minutes, retry from step 3.

8) Make sure that “OK” is displayed after touching “SELF-DIAG

RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-637.



Overall Function Check

NAEC1128

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

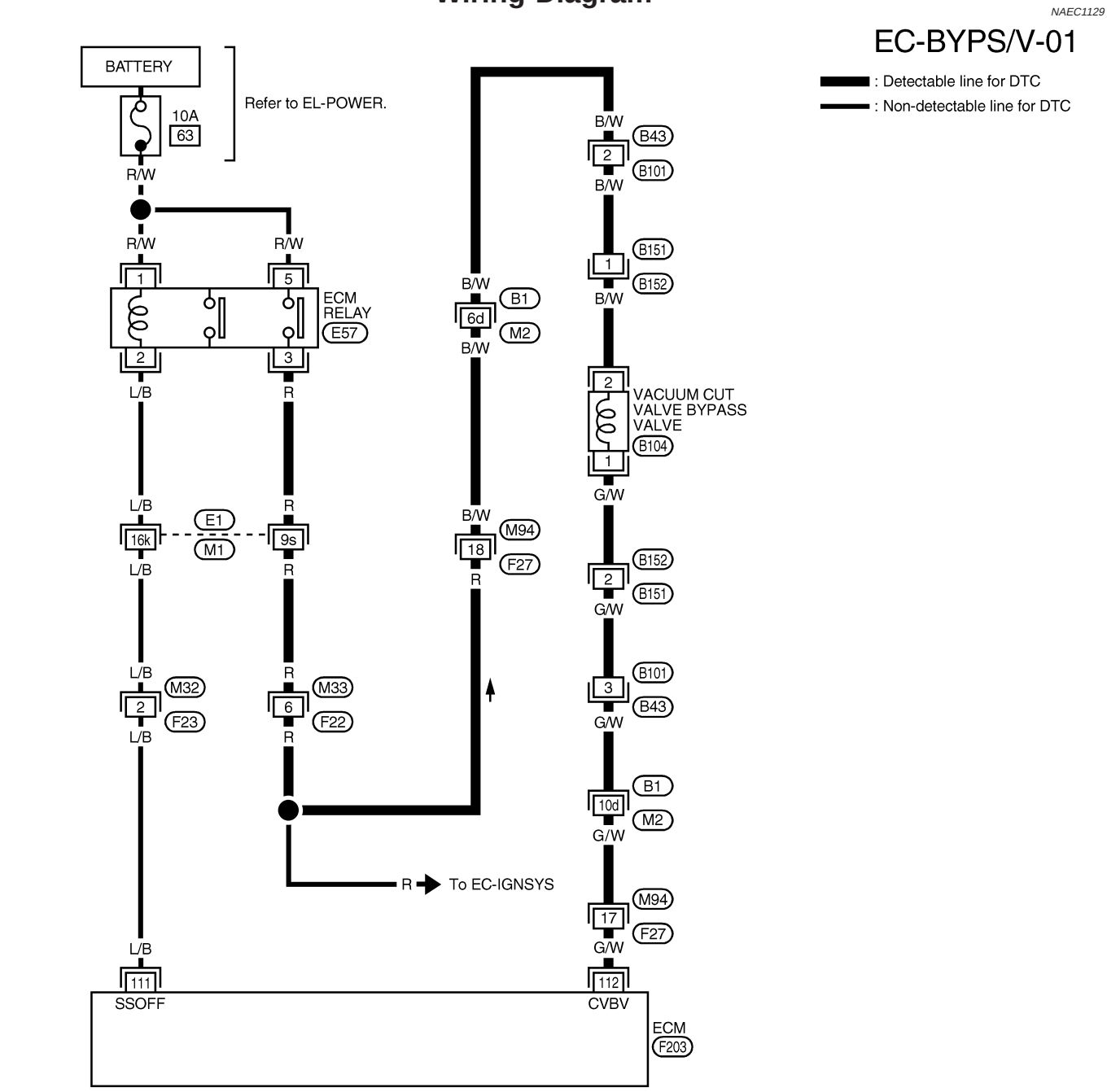
WITH GST

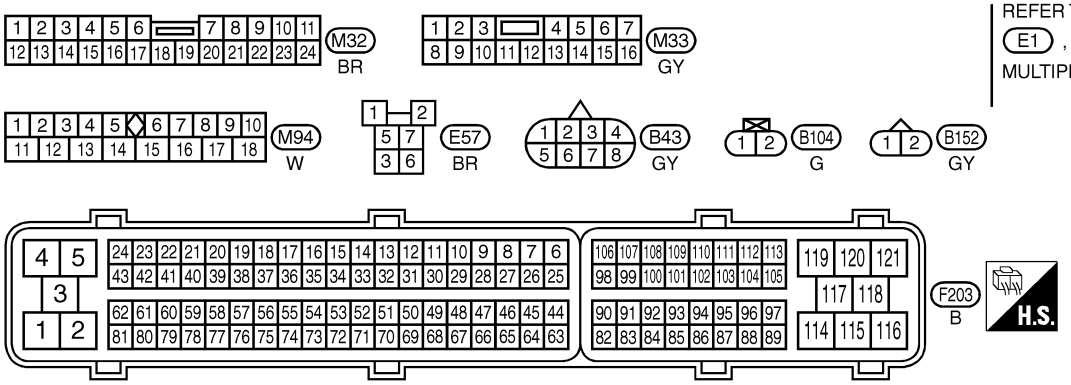
NAEC1128S01

1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5) Supply battery voltage to the terminal.
6) Blow air in port **A** and check that air flows freely out of port **B**.
7) Blow air in port **B** and check that air flows freely out of port **A**.
8) If NG, go to "Diagnostic Procedure", EC-637.

Wiring Diagram

NAEC1129





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC105E

Diagnostic Procedure

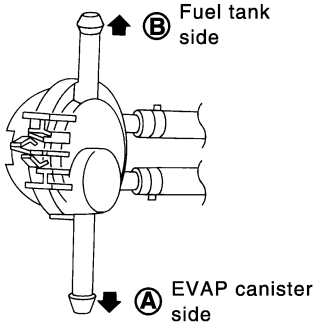
NAEC1130

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch OFF.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch ON.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN

SEC157D

OK or NG

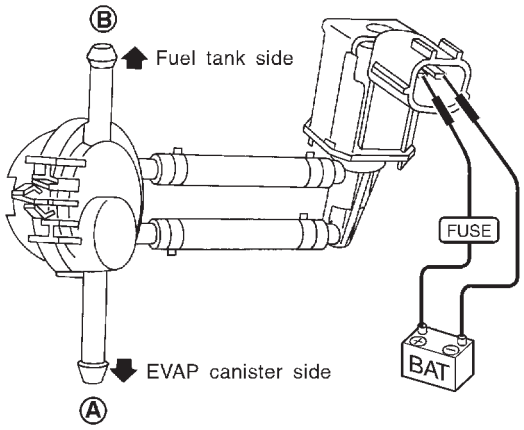
OK ▶	GO TO 4.
NG ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 7.

4	CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP PURGE PORT

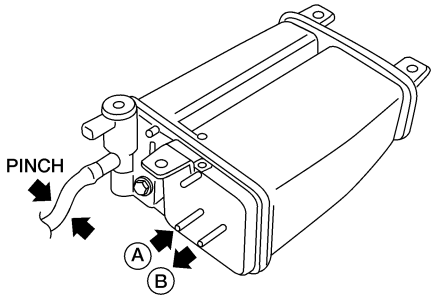
Check EVAP purge port of fuel tank for clogging.

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

6	CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.



AEC630A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

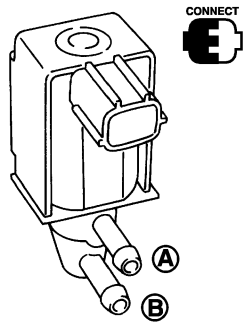
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

Diagnostic Procedure (Cont'd)

8	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN

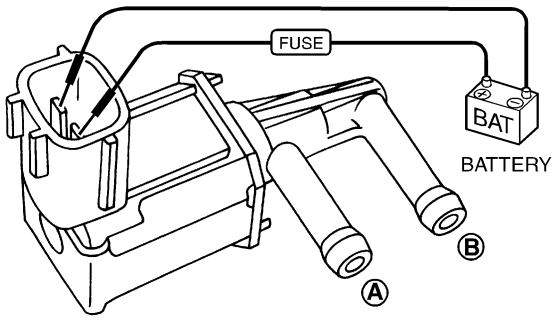
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEC156D

Without CONSULT-II

Check air passage continuity and operation delay time 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

Operation takes less than 1 second.

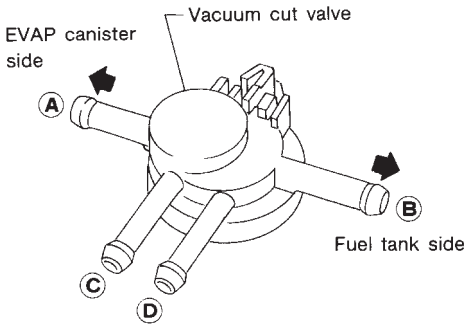
SEF358X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

9	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace vacuum cut valve.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

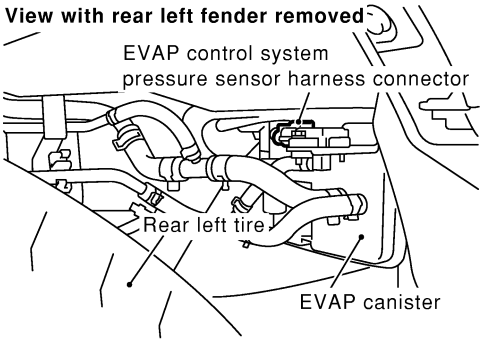
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEC931C

2. Check connectors for water.
Water should not exist.

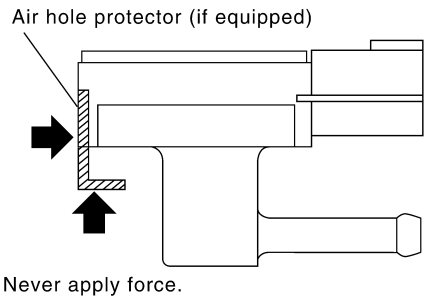
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

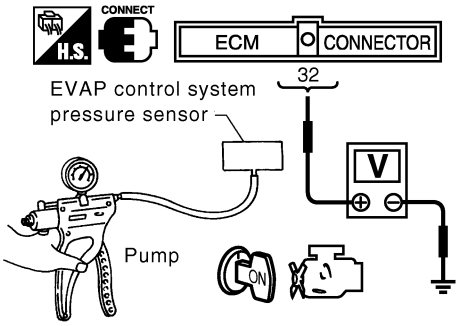
12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

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).**
- **Discard and EVAP control system pressure 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.**

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE FOR CLOGGING

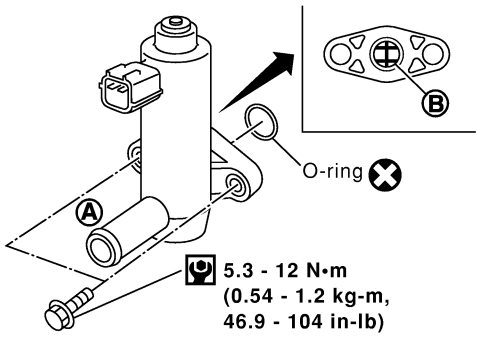
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 14.
NG	▶	Clean the rubber tube using an air blower.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

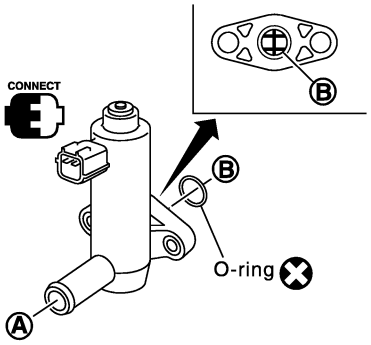
OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



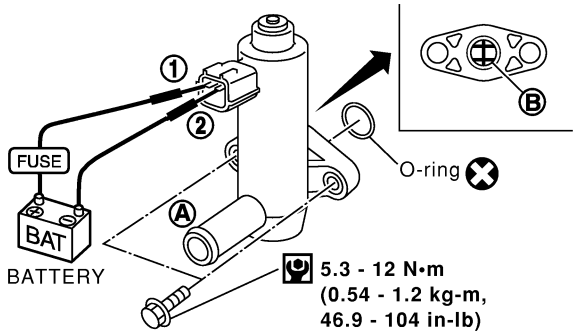
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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.

SEF378Z

Make sure new O-ring is installed properly.

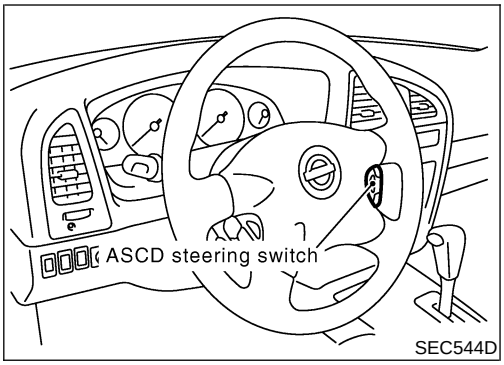
OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

Diagnostic Procedure (Cont'd)

16	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the Test No. 15 again.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister vent control valve.

17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



Component Description

NAEC1292

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1293

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/ACCEL switch: Pressed	ON
		• RESUME/ACCEL switch: Released	OFF
SET SW	• Ignition switch: ON	• SET/COAST switch: Pressed	ON
		• SET/COAST switch: Released	OFF

ECM Terminals and Reference Value

NAEC1299

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B/P	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
99	L/Y	ASCD steering switch	**[Ignition switch ON]** • ASCD steering switch: OFF	Approximately 4V
			[Ignition switch ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch ON] • SET/COAST switch: Pressed	Approximately 2V
			[Ignition switch ON] • RESUME/ACCEL switch: Pressed	Approximately 3V

On Board Diagnosis Procedure

=NAEC1294

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-441.

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 ASCD steering switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

NAEC1295

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

With CONSULT-II

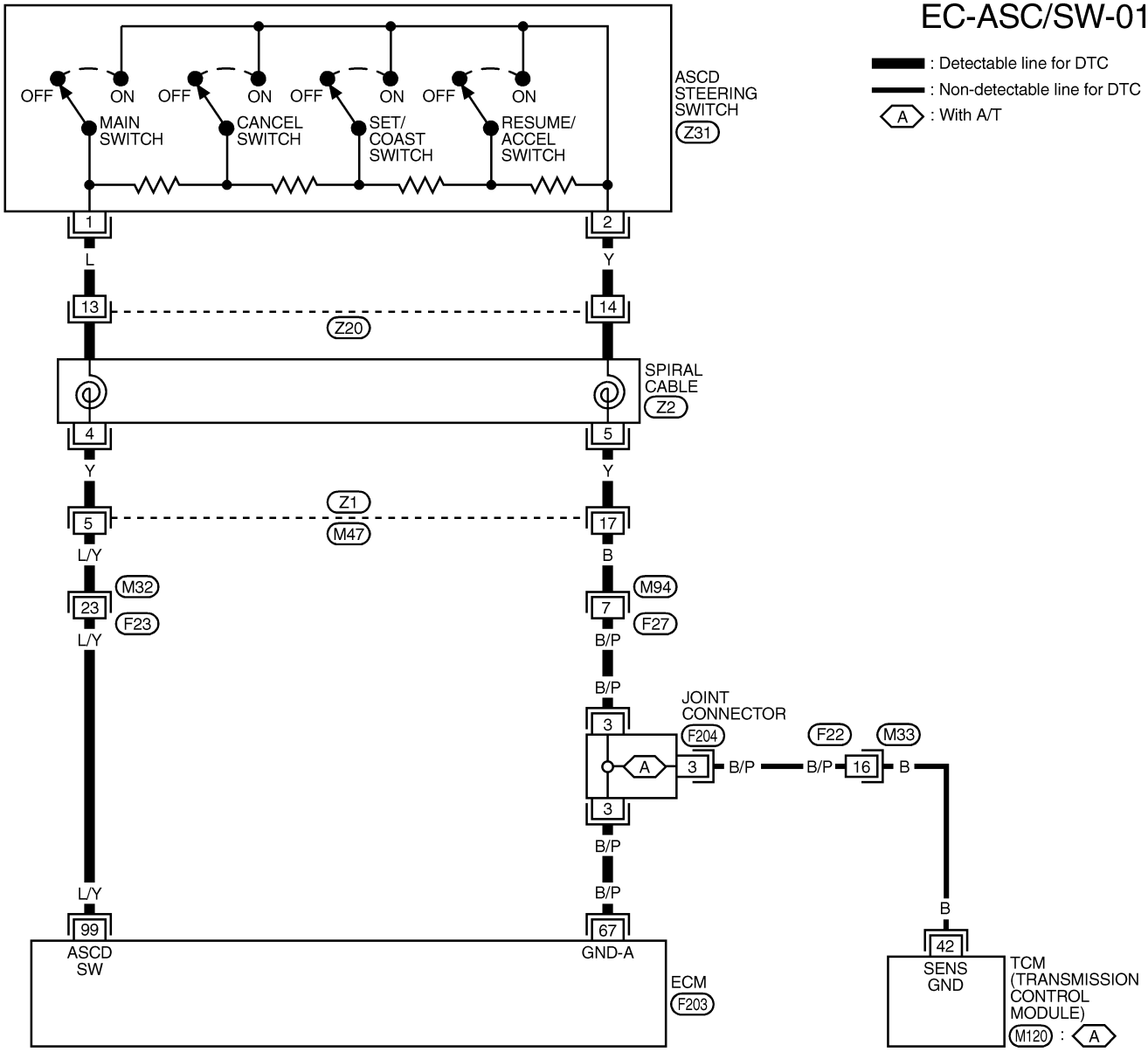
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press “MAIN” switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press “RESUME/ACCEL” switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press “SET/COAST” switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press “CANCEL” switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to “Diagnostic Procedure”, EC-648.

With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NAEC1296



* : This connector is not shown in "HARNESS LAYOUT", EL section.

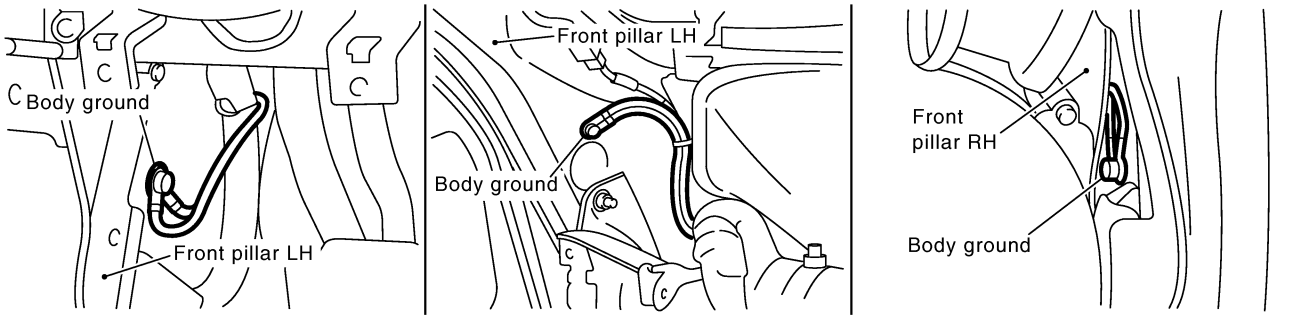
MEC117E

Diagnostic Procedure

NAEC1297

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select "MAIN SW", "RESUME/ACC SW", "SET SW" and "CANCEL SW" in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
MAIN SW	OFF
CANCEL SW	OFF
RESUME/ACC SW	OFF
SET SW	OFF

SEC006D

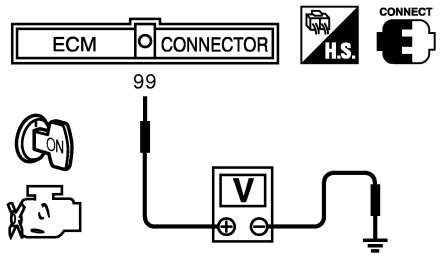
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
CRUISE	MAIN SW	Pressed	ON
		Released	OFF
COAST/SET	SET SW	Pressed	ON
		Released	OFF
ACCEL/RES	RESUME/ACC SW	Pressed	ON
		Released	OFF
CANCEL	CANCEL SW	Pressed	ON
		Released	OFF

MTBL1193

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.



PBIB0311E

Switch	Condition	Voltage [V]
CRUISE SW	Pressed	Approx. 0
	Released	Approx. 4
COAST/SET SW	Pressed	Approx. 2
	Released	Approx. 4
ACCEL/RES SW	Pressed	Approx. 3
	Released	Approx. 4
CANCEL SW	Pressed	Approx. 1
	Released	Approx. 4

MTBL1400

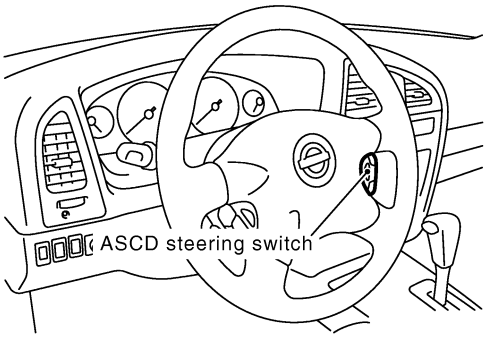
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect ASCD steering switch harness connector.



SEC544D

4. Check harness continuity between ASCD steering switch terminal 2 and ECM terminal 67, TCM terminal 42. 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 Z20
- Spiral cable Z2
- Harness connectors Z1, M47
- Harness connectors M94, F27
- Harness connectors F22, M33
- Joint connector F204
- Harness for open and short between ECM and ASCD steering switch
- Harness for open and short between TCM and ASCD steering 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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and ASCD steering 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	▶	GO TO 6.

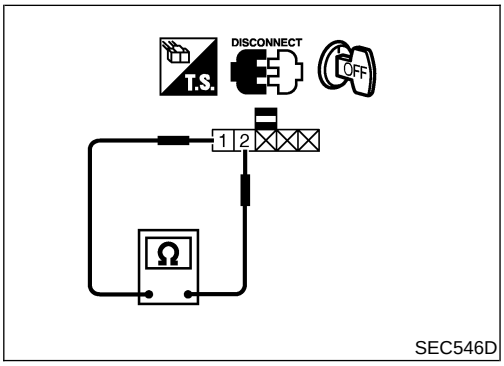
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector Z20
- Spiral cable Z2
- Harness connectors Z1, M47
- Harness connectors M32, F23
- Harness for open and short between ECM and ASCD steering switch

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

7	CHECK ASCD STEERING SWITCH	
Refer to "Component Inspection", EC-651.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace ASCD steering switch.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**



SEC546D

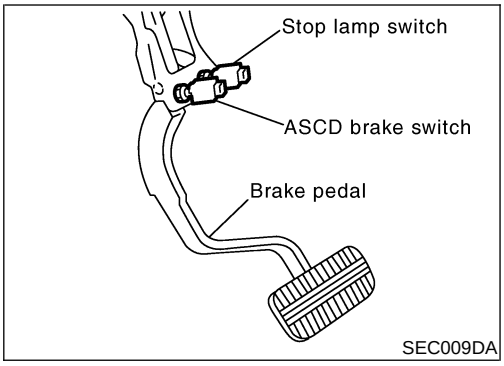
Component Inspection

NAEC1298

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between terminals 1 and 2 by pushing each switch.

Switch	Condition	Resistance [kΩ]
MAIN SW	Pressed	Approx. 0
	Released	Approx. 4
SET/COAST SW	Pressed	Approx. 0.66
	Released	Approx. 4
RESUME/ACCEL SW	Pressed	Approx. 1.48
	Released	Approx. 4
CANCEL SW	Pressed	Approx. 0.25
	Released	Approx. 4



Component Description

NAEC1300

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-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1301

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal fully released • Clutch pedal is fully released (M/T models)	ON
		• Brake pedal depressed • Clutch pedal is depressed (M/T models)	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	• Brake pedal fully released	OFF
		• Brake pedal depressed	ON

ECM Terminals and Reference Value

NAEC1307

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	G/Y	Stop lamp switch	**[Ignition switch ON]** • Brake pedal is fully released	Approximately 0V
			[Ignition switch ON] • Brake pedal is depressed	BATTERY VOLTAGE (11 - 14V)
108	L/Y	ASCD brake switch	**[Ignition switch ON]** • Brake pedal is fully released • Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] • Brake pedal is depressed • Clutch pedal is depressed (M/T models)	Approximately 0V

On Board Diagnosis Procedure

=NAEC1302

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-441.**
- **If DTC P1572 is displayed with DTC P1805, first perform the trouble diagnosis for DTC P1805. Refer to EC-669.**
- **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 30 km/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 Confirmation Procedure

NAEC1303

CAUTION:

Always drive vehicle at a safe speed.

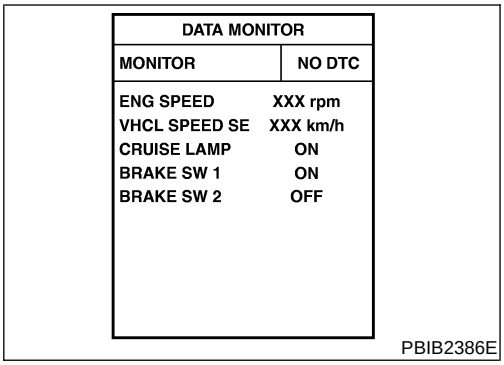
NOTE:

- 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.

DTC Confirmation Procedure (Cont'd)



With CONSULT-II

1) Start engine (VDC switch OFF).
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Press MAIN switch and make sure that CRUISE indicator lights up.
4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-656.
If 1st trip DTC is not detected, go to the following step.

5) Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

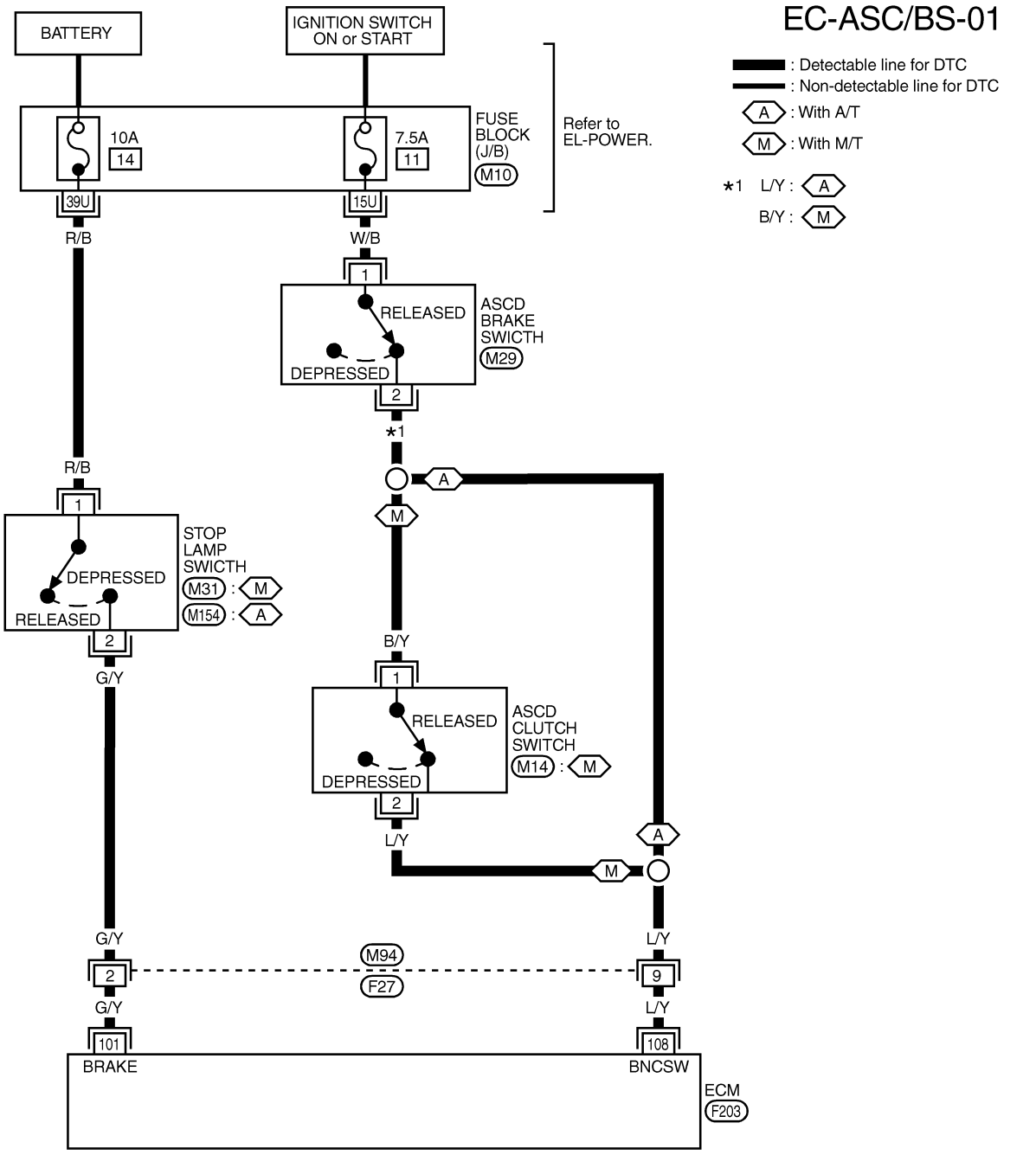
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-656.

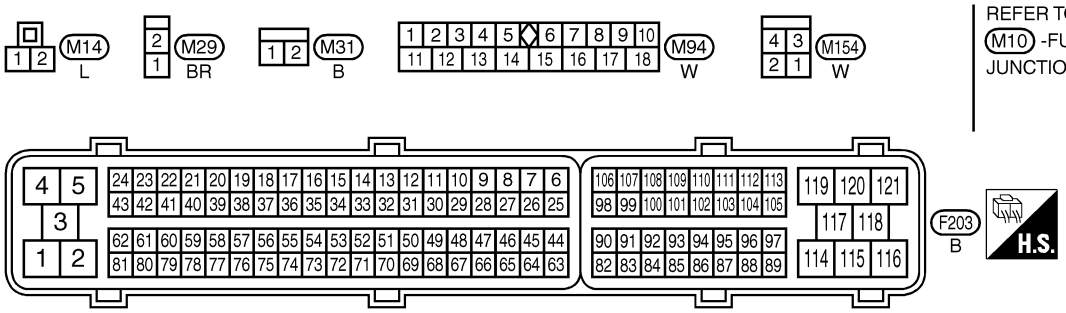
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC1304





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC118E

Diagnostic Procedure

NAEC1305

1 **CHECK OVERALL FUNCTION-I**

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check the indication of “BRAKE SW1” under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW1	OFF

SEC011D

A/T models

CONDITION	INDICATION
When brake pedal is depressed.	OFF
When brake pedal is released.	ON

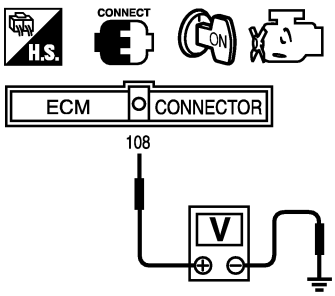
M/T models

CONDITION	INDICATION
When clutch pedal or brake pedal is depressed.	OFF
When clutch pedal and brake pedal are released.	ON

MTBL1334

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



MBIB0061E

A/T models

CONDITION	VOLTAGE
When brake pedal is depressed.	Approximately 0V
When brake pedal is released.	Battery voltage

M/T models

CONDITION	VOLTAGE
When clutch pedal or brake pedal is depressed.	Approximately 0V
When clutch pedal and brake pedal are released.	Battery voltage

MTBL1335

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK OVERALL FUNCTION-II

With CONSULT-II

See "BRAKE SW2" indication in "DATA MONITOR" mode.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW2	OFF

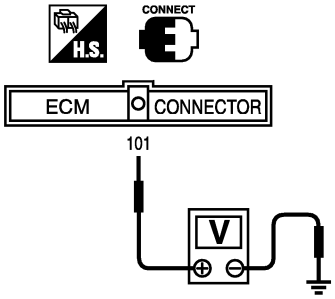
SEC013D

CONDITION	INDICATION
When brake pedal is depressed.	ON
When brake pedal is released.	OFF

MTBL1336

Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.



MBIB0060E

CONDITION	VOLTAGE
When brake pedal is depressed.	Battery voltage
When brake pedal is released.	Approximately 0V

MTBL1337

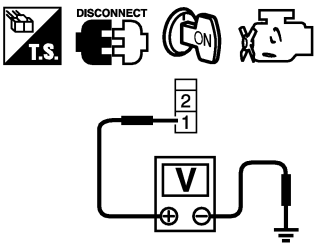
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 11.

Diagnostic Procedure (Cont'd)

3	CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.



PBIB0857E

Voltage: Battery voltage

OK or NG

OK (A/T models)	▶	GO TO 5.
OK (M/T models)	▶	GO TO 7.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector M10
- 7.5A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5	CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for open to ground and short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M94, F27
- Harness for open and 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 CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1, ASCD clutch switch terminal 2 and ECM terminal 108.
   Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for open 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 M94, F27
- Harness for open and short between ASCD brake switch and ASCD clutch switch
- Harness for open and short between ASCD clutch switch and ECM

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

9	CHECK ASCD CLUTCH SWITCH

Refer to "Component Inspection", EC-661.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace ASCD clutch switch.

10	CHECK ASCD BRAKE SWITCH

Refer to "Component Inspection", EC-661.

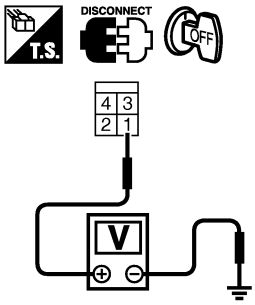
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace ASCD brake switch.

11	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

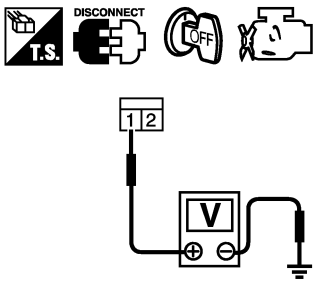
1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

A/T models



SEC547D

M/T models



PBIB0117E

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 M10
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

	▶	Repair open circuit or short to ground 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 stop lamp switch terminal 2 and ECM terminal 101. Refer to wiring diagram.
   Continuity should exist
3. Also check harness for short to ground and short to power.

OK or NG

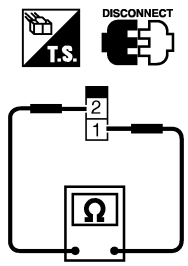
OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M94, F27 ● Harness for open or short between stop lamp switch and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK STOP LAMP SWITCH
Refer to "Component Inspection", EC-661.	
OK or NG	
OK ▶	GO TO 16.
NG ▶	Replace stop lamp switch.

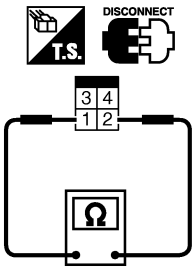
16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

ASCD brake switch



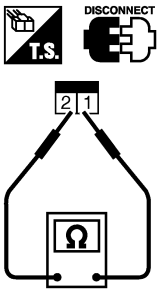
SEC023DA

Stop lamp switch (A/T models)



SEC548D

Stop lamp switch (M/T models)



SEC155DA

Component Inspection

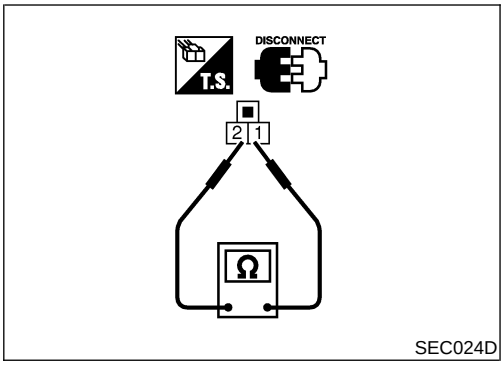
NAEC1306

ASCD BRAKE SWITCH AND STOP LAMP SWITCH

Condition	Continuity	
	ASCD brake switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

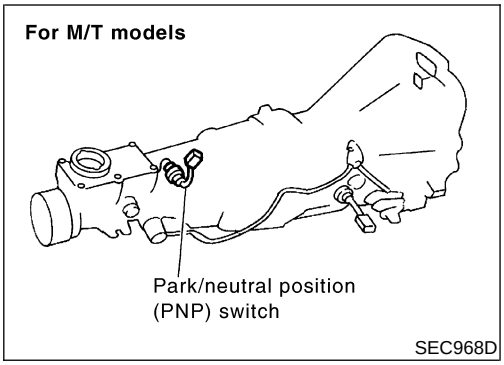
Check each switch after adjusting brake pedal — refer to BR section.

Component Inspection (Cont'd)



ASCD CLUTCH SWITCH (FOR M/T MODELS)

Condition	Continuity
When clutch pedal is depressed	No
When clutch pedal is released	Yes



Component Description

NAEC1134

When the gear position is P (A/T models only) or N, park/neutral position (PNP) switch is ON.
ECM detects the position because the continuity of the line (the "ON" signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1135

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N	ON
		Except above	OFF

ECM Terminals and Reference Value

NAEC1136

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	L	PNP switch	**[Ignition switch ON]** ● Gear position is P (A/T models) or N (Neutral position).	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1137

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1706 1706	Park/Neutral position switch	The signal of the park/neutral position (PNP) switch 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

DTC Confirmation Procedure

NAEC1138

CAUTION:
Always drive vehicle at a safe speed.

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

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

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

SEF213Y

WITH CONSULT-II

NAEC1138S01

1) Turn ignition switch ON.
2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

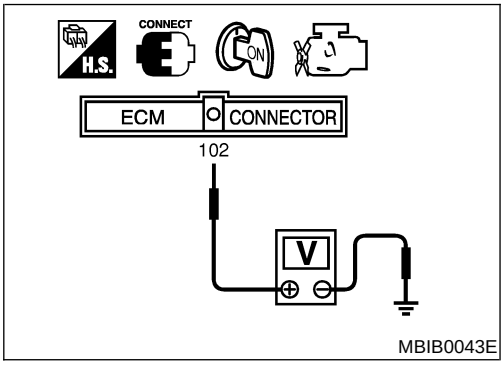
Position (Selector lever)	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-666.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,500 rpm (A/T) More than 1,800 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More than 3.7 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position (A/T) 5th position (M/T)

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-666.



MBIB0043E

Overall Function Check

NAEC1139

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC1139S01

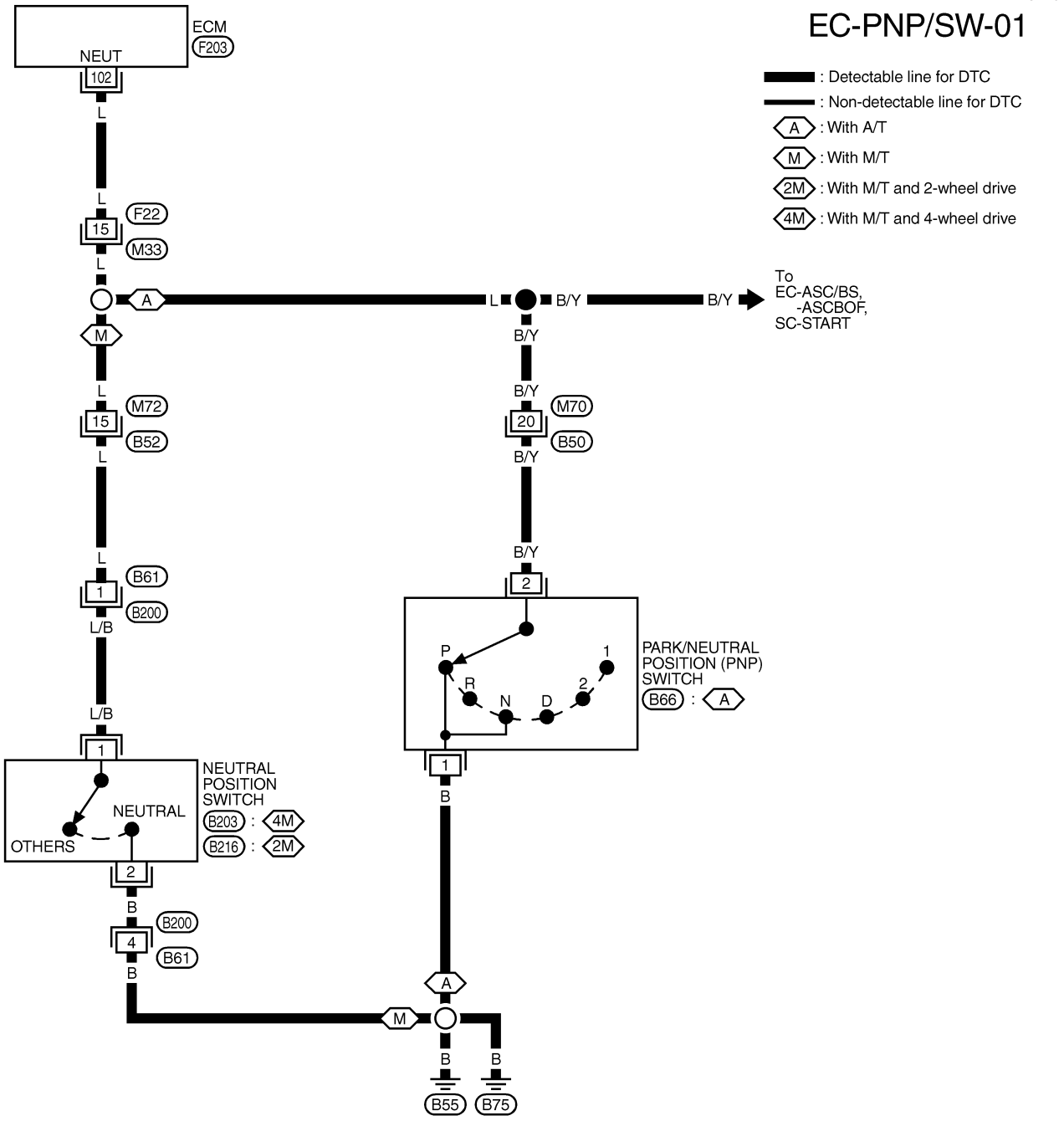
1) Turn ignition switch ON.
2) Check voltage between ECM terminal 102 and ground under the following conditions.

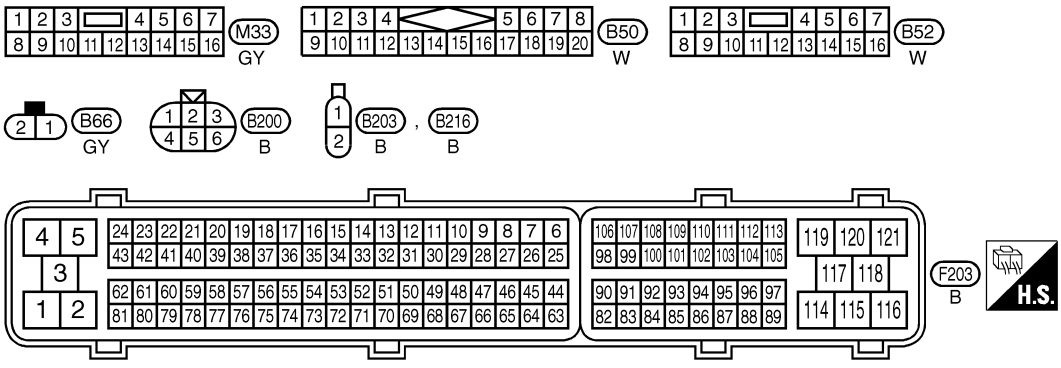
Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except the above position	Battery voltage

3) If NG, go to "Diagnostic Procedure", EC-666.

Wiring Diagram

NAEC1140





MEC106E

Diagnostic Procedure

NAEC1141

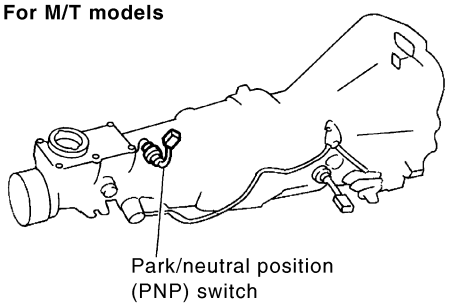
FOR M/T MODELS

NAEC1141S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.

For M/T models



SEC968D

3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B200, B61
- Harness for open or short between park/neutral position (PNP) switch and ground

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

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness connectors M72, B52
- Harness connectors B61, B200
- Harness for open or short between park/neutral position (PNP) switch and ECM

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

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to MT-5 "Position Switch Check".		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.		
	▶	**INSPECTION END**

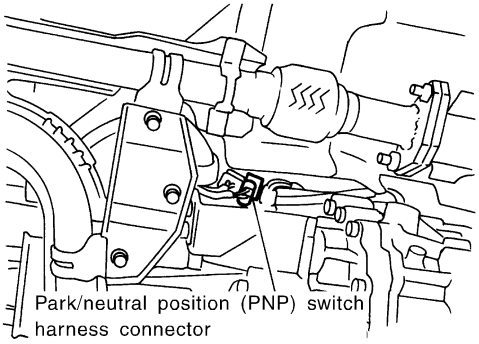
Diagnostic Procedure (Cont'd)

FOR A/T MODELS

=NAEC1141S02

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.



SEF011SA

3. Check harness continuity between PNP switch terminal 1 and ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to power in harness or connectors.

2	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch 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 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness connectors M70, B50
- Harness for open or short between ECM and park/neutral position (PNP) switch

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

4	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-105, "Diagnostic Procedure".

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace park/neutral position (PNP) switch.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**

Description

NAEC1308

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1309

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ECM Terminals and Reference Value

NAEC1315

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	G/Y	Stop lamp switch	**[Engine is running]** • Brake pedal fully released	Approximately 0V
			[Engine is running] • Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC1310

The MIL will not light up for this self-diagnosis.

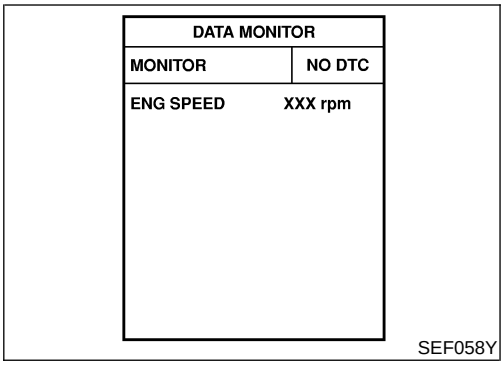
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

NAEC1310S01

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 small range. Therefore, acceleration will be poor.	
Condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration



DTC Confirmation Procedure

=NAEC1311

WITH CONSULT-II

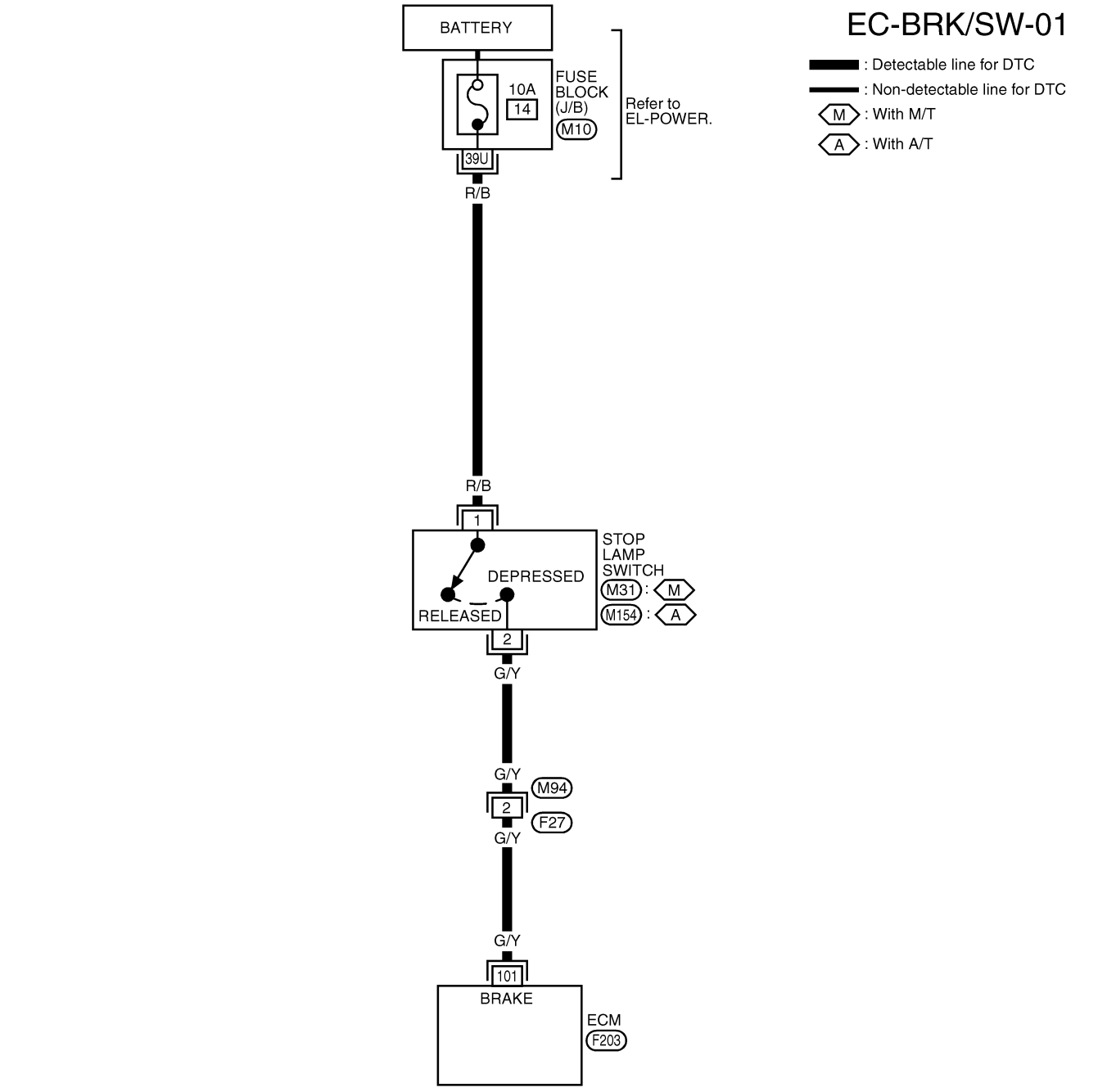
1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-672.

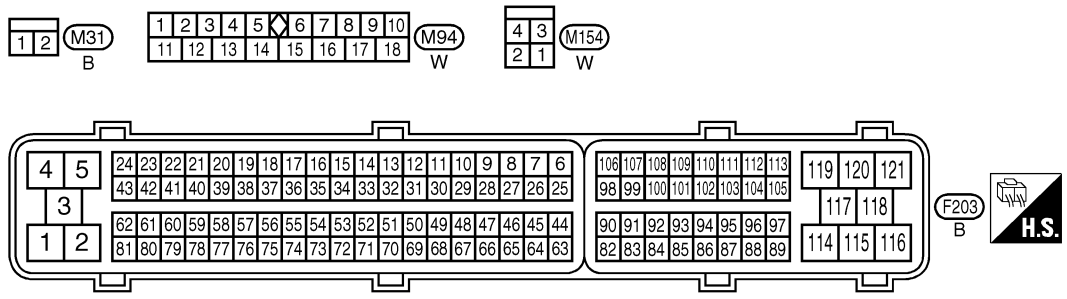
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1312





REFER TO THE FOLLOWING.
M10
-FUSE BLOCK-JUNCTION BOX (J/B)

MEC120E

Diagnostic Procedure

NAEC1313

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
Depressed	Illuminated

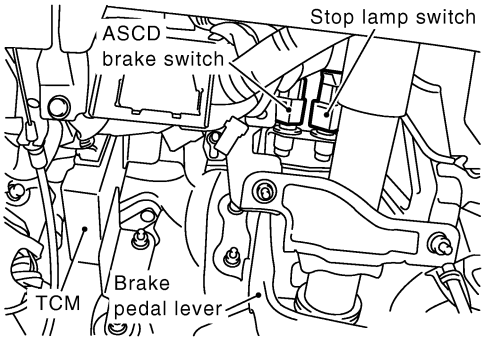
MTBL1138

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 2.

2	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

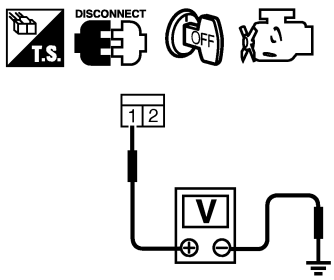
1. Disconnect stop lamp switch harness connector.



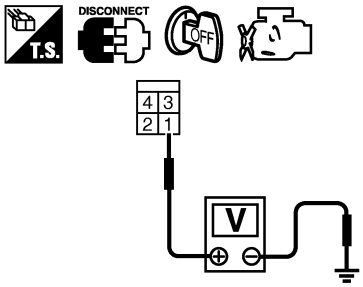
SEC549D

2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

M/T models



A/T models



PBIB2284E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

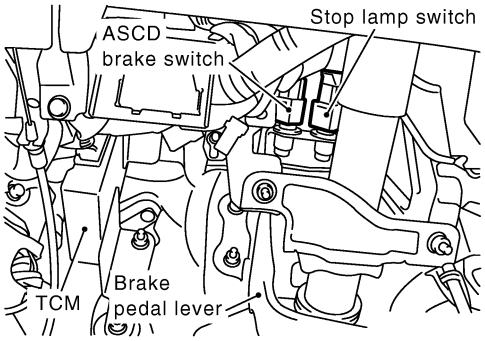
3	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Fuse block (J/B) connector M10
- Harness for open and short between stop lamp switch and battery

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

4	CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.



SEC549D

3. Check harness continuity between ECM terminal 101 and stop lamp 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 connector M94, F27
- Harness for open and 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 "Component Inspection", EC-674.

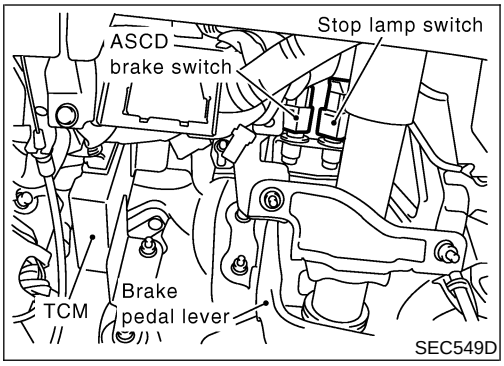
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace stop lamp switch.

7	CHECK INTERMITTENT INCIDENT

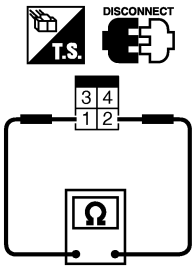
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**



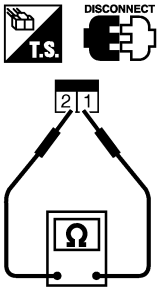
SEC549D

Stop lamp switch (A/T models)



SEC548D

M/T models



SEC052DA

Component Inspection

=NAEC1314

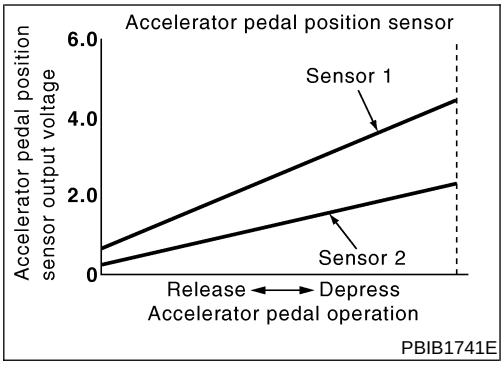
STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.

2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

3. If NG, replace stop lamp switch.



Component Description

NAEC1316

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1317

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) "1st" (M/T models)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	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 signal.

ECM Terminals and Reference Value

NAEC1323

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B/R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
83	L	Sensor ground (APP sensor 2)	**[Ignition switch ON]**	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch ON]**	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V
98	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.15 - 0.6V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	1.95 - 2.4V
106	L	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	3.9 - 4.7V

On Board Diagnosis Logic

NAEC1318

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-562.

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 (Accelerator pedal position 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

NAEC1318S01

When the malfunction is detected, ECM enters in 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

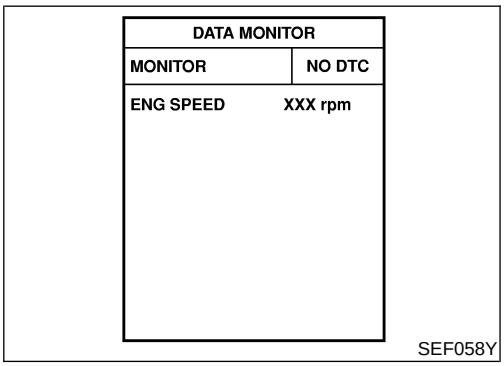
NAEC1319

NOTE:

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

TESTING CONDITION:

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



With CONSULT-II

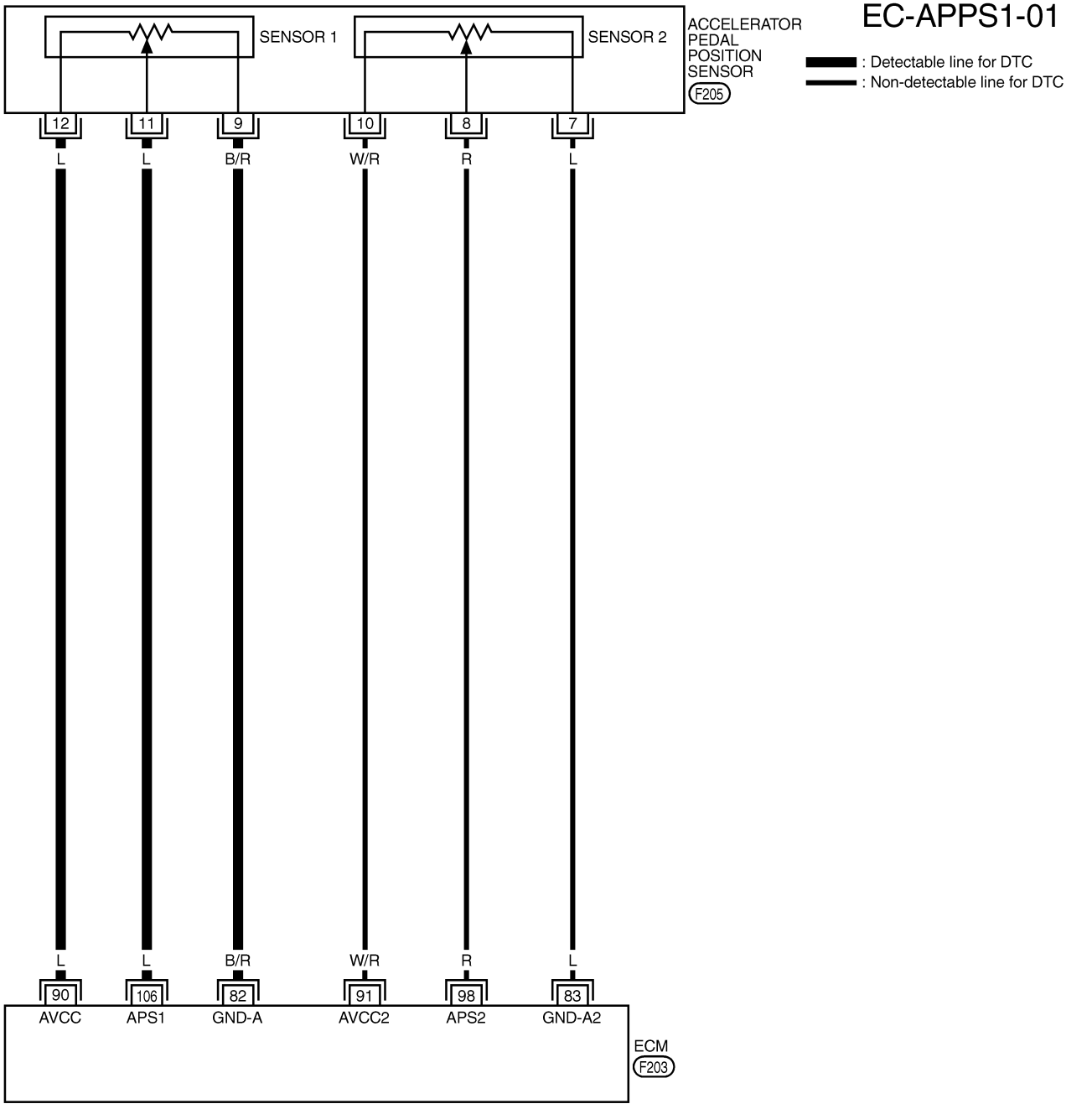
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to “Diagnostic Procedure”, EC-679.

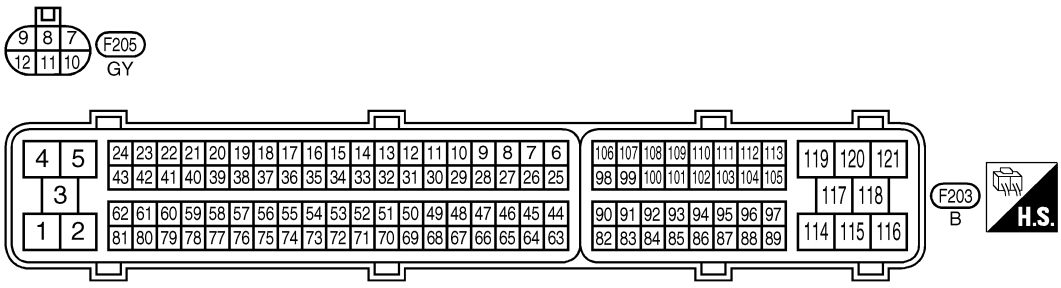
With GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1320





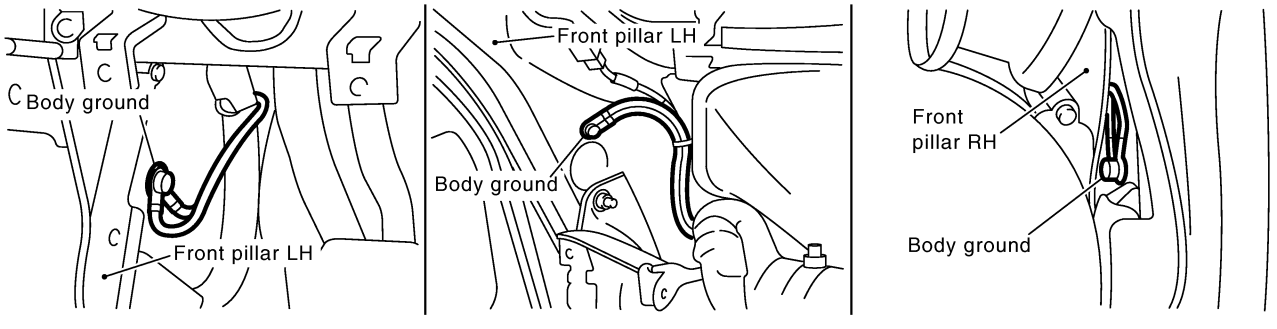
MEC184E

Diagnostic Procedure

NAEC1321

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



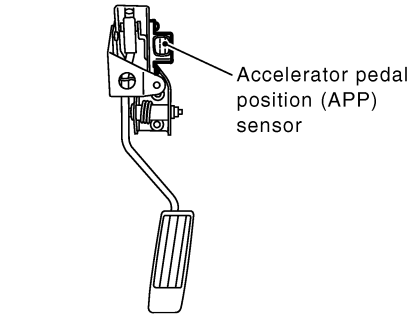
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

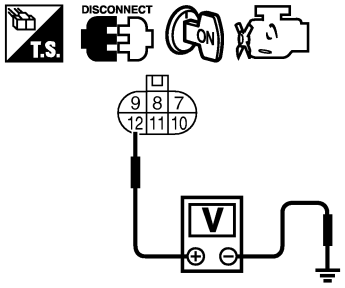
2	CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



SEC550D

3. Check voltage between APP sensor terminal 12 and ground with CONSULT-II or tester.



SEC551D

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.

Diagnostic Procedure (Cont'd)

3	CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 9 and ECM terminal 82.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 11.
   Refer to Wiring Diagram
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK APP SENSOR

Refer to "Component Inspection", EC-681.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	REPLACE ACCELERATOR PEDAL ASSEMBLY

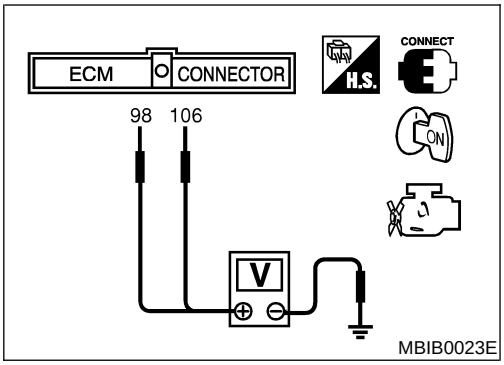
1. Replace accelerator pedal assembly.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.
3. Perform "Throttle Valve Closed Position Learning", EC-73.
4. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**



Component Inspection

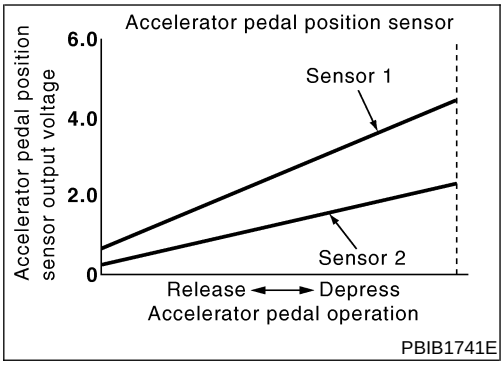
=NAEC1322

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly.
5. Perform “Accelerator Pedal Released Position Learning”, EC-73.
6. Perform “Throttle Valve Closed Position Learning”, EC-73.
7. Perform “Idle Air Volume Learning”, EC-73.



Component Description

NAEC1324

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1325

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	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 signal.

ECM Terminals and Reference Value

NAEC1331

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor power supply (Throttle position sensor)	**[Ignition switch ON]**	Approximately 5V
82	B/R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
83	L	Sensor ground (APP sensor 2)	**[Ignition switch ON]**	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch ON]**	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V
98	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.15 - 0.6V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	1.95 - 2.4V
106	L	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Shift lever: D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	3.9 - 4.7V

On Board Diagnosis Logic

NAEC1326

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 (The APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2) ● Electric throttle control actuator (TP sensors 1 and 2)
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

NAEC1326S01

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

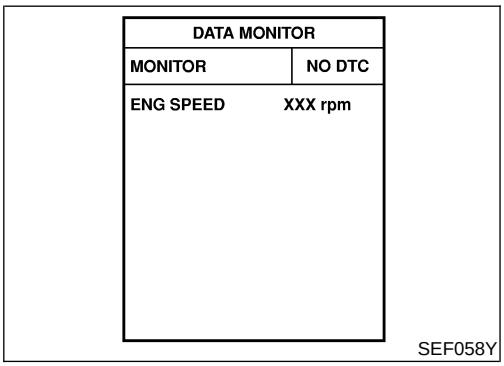
Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NAEC1327

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

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



With CONSULT-II

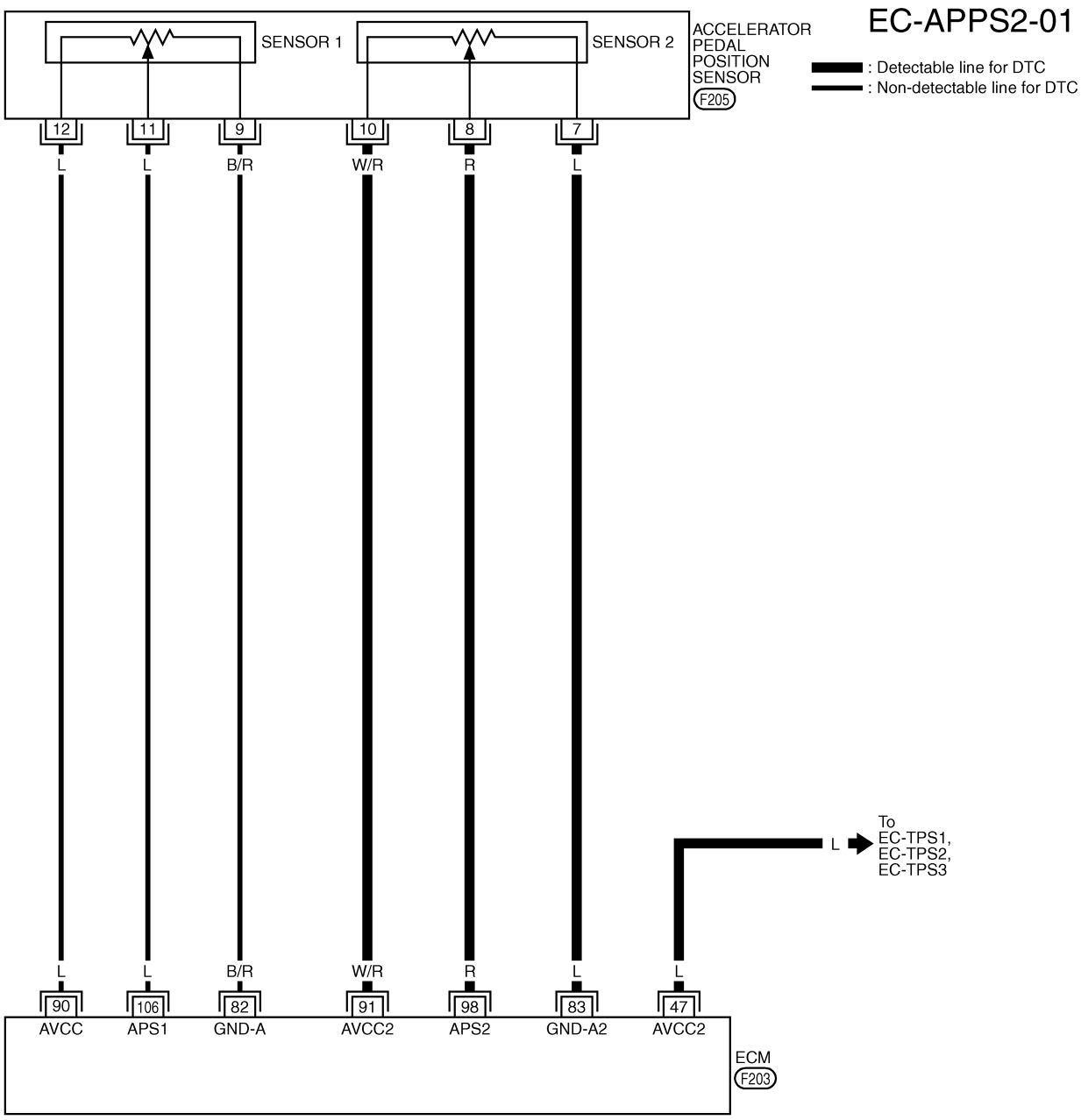
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for 1 second.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-686.

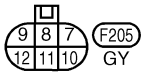
With GST

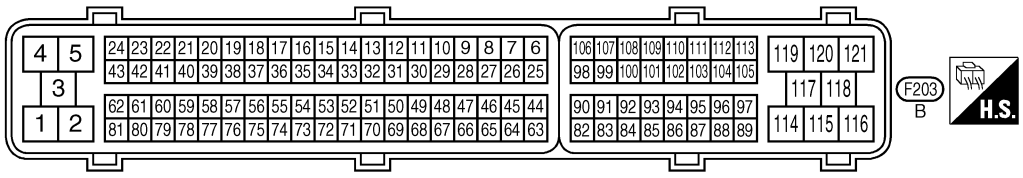
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NAEC1328







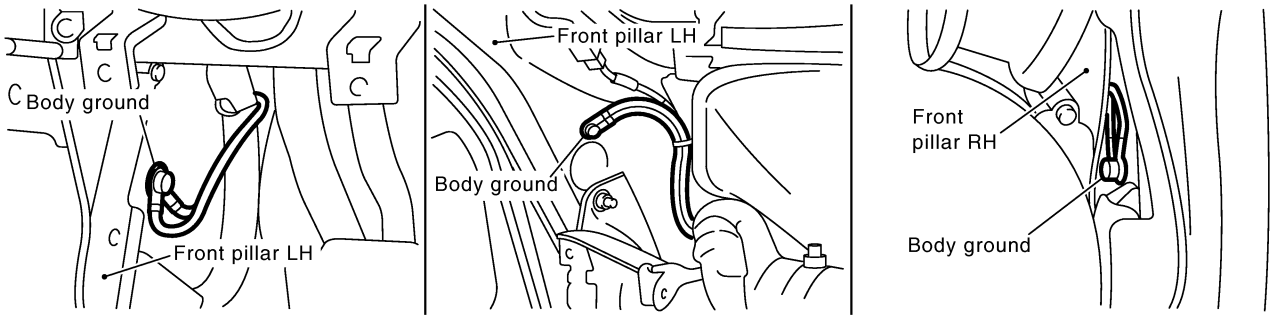
MEC747E

Diagnostic Procedure

NAEC1329

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



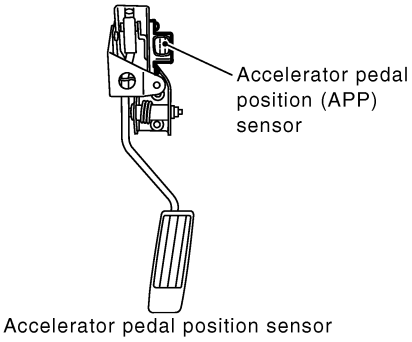
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

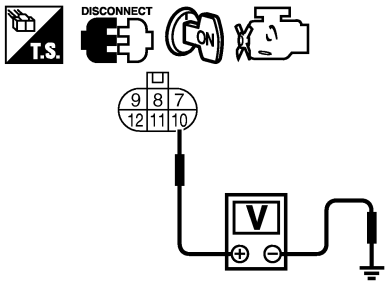
2	CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



SEC550D

3. Check voltage between APP sensor terminal 10 and ground with CONSULT-II or tester.



SEC552D

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 10 and ECM terminal 91. Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace open circuit.

4	CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.
- ECM terminal 47 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-693.
- ECM terminal 91 and APP sensor terminal 10. Refer to "Wiring Diagram", EC-685.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair short to ground or short to power in harness or connectors.

5	CHECK THROTTLE POSITION SENSOR

Refer to "Component Inspection", EC-696.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

7	CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 7 and ECM terminal 83. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

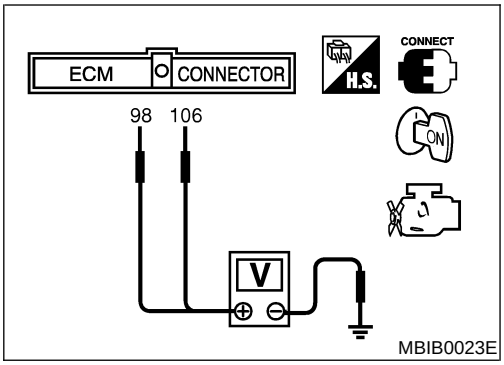
Diagnostic Procedure (Cont'd)

8	CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 98 and APP sensor terminal 8. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK APP SENSOR
Refer to "Component Inspection", EC-689.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	GO TO 10.

10	REPLACE ACCELERATOR PEDAL ASSEMBLY
1. Replace accelerator pedal assembly. 2. Perform "Accelerator Pedal Released Position Learning", EC-73. 3. Perform "Throttle Valve Closed Position Learning", EC-73. 4. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Inspection

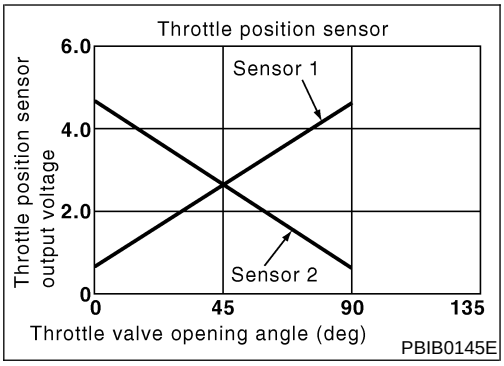
=NAEC1330

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly.
5. Perform “Accelerator Pedal Released Position Learning”, EC-73.
6. Perform “Throttle Valve Closed Position Learning”, EC-73.
7. Perform “Idle Air Volume Learning”, EC-73.



Component Description

NAEC1332

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

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

CONSULT-II Reference Value in Data Monitor Mode

NAEC1333

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T model) 1st (M/T model)	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.

ECM Terminals and Reference Value

NAEC1339

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
50	BR	Throttle position sensor 1	**[Ignition switch ON]** • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully released	More than 0.36V
			[Ignition switch ON] • Engine stopped • Shift lever position is D (A/T models) • Shift lever position is 1st (M/T models) • Accelerator pedal fully depressed	Less than 4.75V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66	BR/Y	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	BR/W	Throttle position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch ON] ● Engine stopped ● Shift lever position is D (A/T models) ● Shift lever position is 1st (M/T models) ● Accelerator pedal fully depressed	More than 0.36V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V

On Board Diagnosis Logic

NAEC1334

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2135 2135	Throttle position sensor circuit range/ performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor

FAIL-SAFE MODE

NAEC1334S01

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

NAEC1335

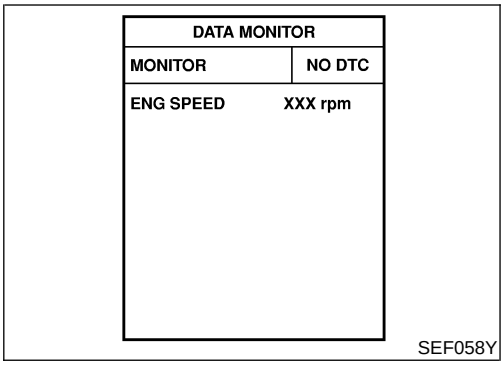
NOTE:

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.

DTC Confirmation Procedure (Cont'd)



With CONSULT-II

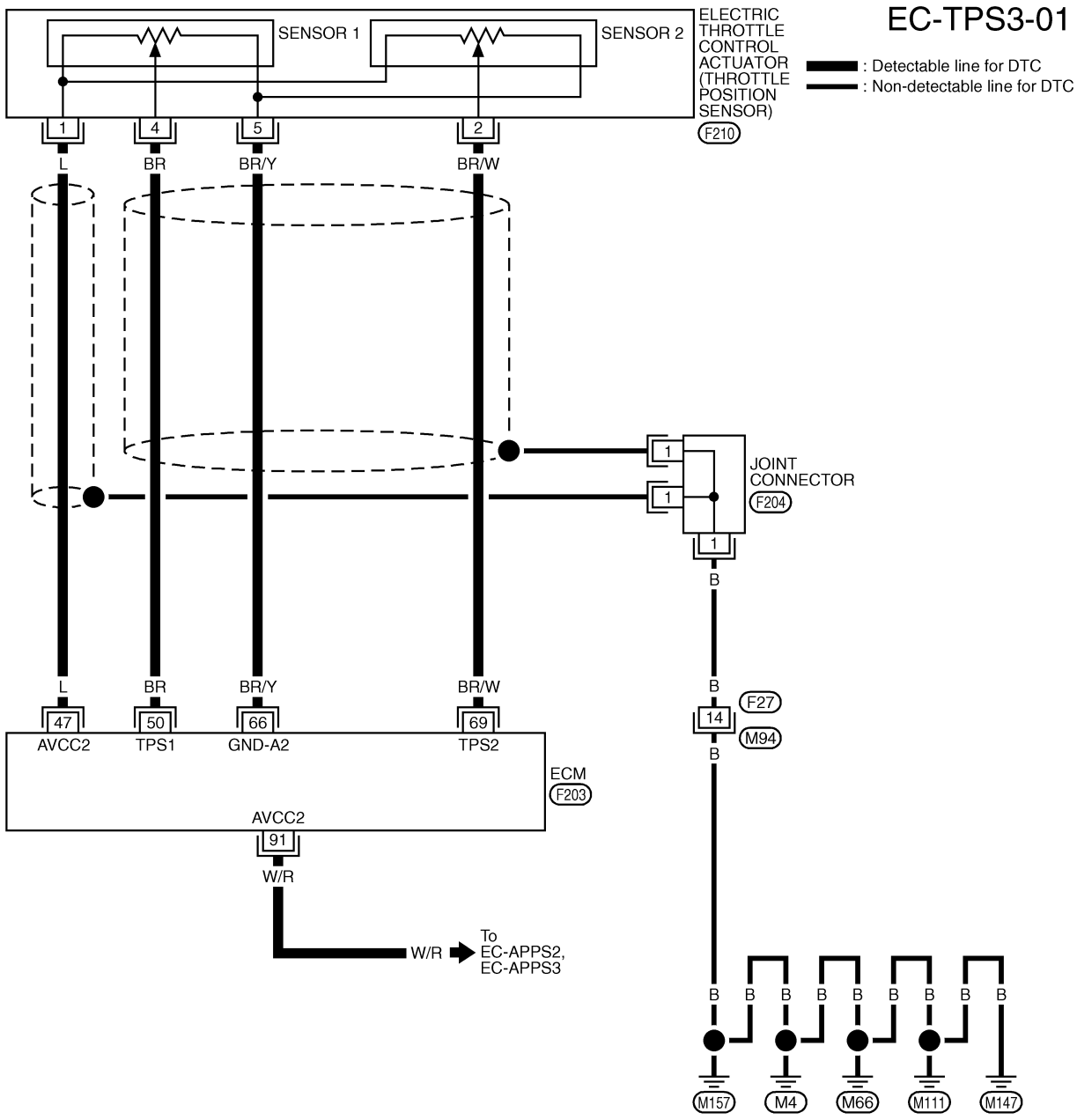
1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to "Diagnostic Procedure", EC-694.

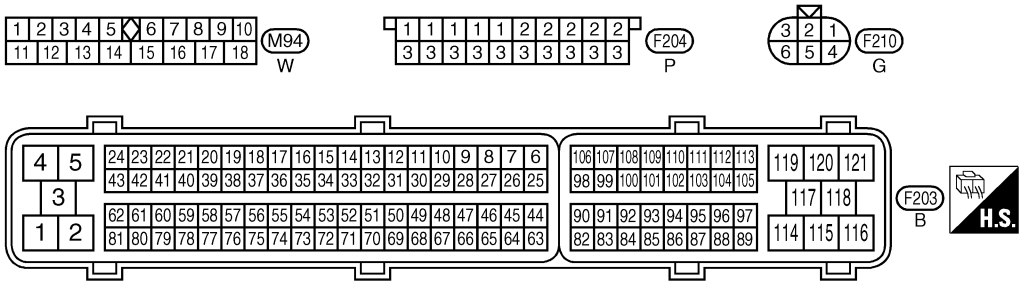
With GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NAEC1336





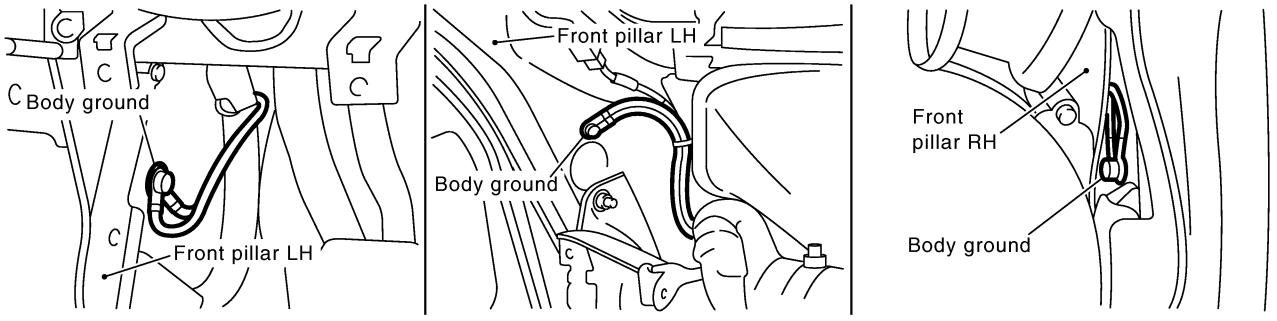
MEC748E

Diagnostic Procedure

NAEC1337

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



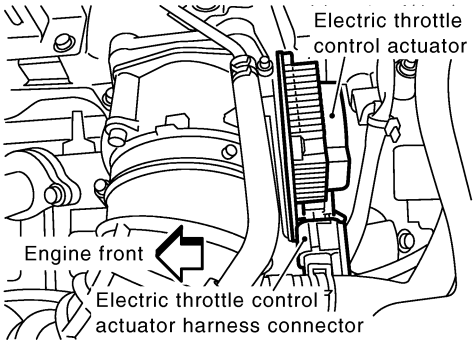
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

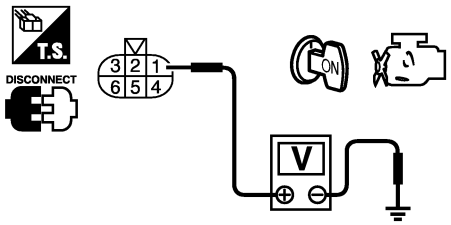
2	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



SEC433D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

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 THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace open circuit.

4	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.
- ECM terminal 47 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-693.
- ECM terminal 91 and APP sensor terminal 10. Refer to "Wiring Diagram", EC-685.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair short to ground or short to power in harness or connectors.

5	CHECK APP SENSOR

Refer to "Component Inspection", EC-689.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.
3. Perform "Throttle Valve Closed Position Learning", EC-73.
4. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

7	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

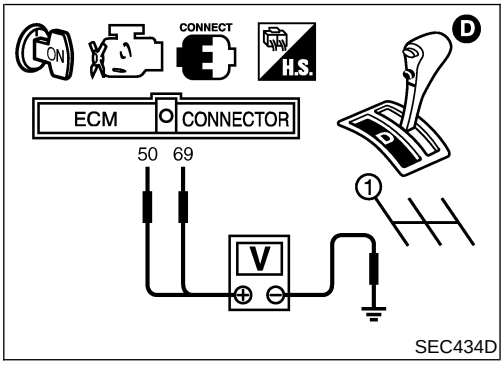
Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 4, ECM terminal 69 and electric throttle control actuator 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 ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-696.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	GO TO 10.

10	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-73. 3. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Inspection

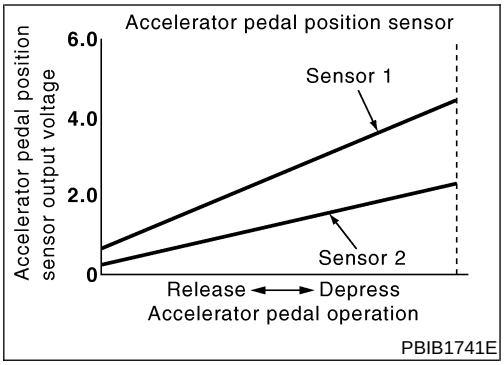
NAEC1338

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1), 69 (TP sensor 2) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-73.
8. Perform "Idle Air Volume Learning", EC-73.



Component Description

NAEC1340

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1341

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (engine stopped) • Shift lever: D (A/T models) 1st (M/T models)	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 signal.

ECM Terminals and Reference Value

NAEC1347

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Sensor power supply (Throttle position sensor)	**[Ignition switch ON]**	Approximately 5V
82	B/R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
83	L	Sensor ground (APP sensor 2)	**[Ignition switch ON]**	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch ON]**	Approximately 5V
91	W/R	Sensor power supply (APP sensor 2)	**[Ignition switch ON]**	Approximately 5V
98	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal fully released	0.15 - 0.6V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal fully depressed	1.95 - 2.4V
106	L	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

On Board Diagnosis Logic

NAEC1342

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-562.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	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.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor 1 and 2 ● Electric throttle control actuator (TP sensors 1 and 2)

FAIL-SAFE MODE

NAEC1342S01

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

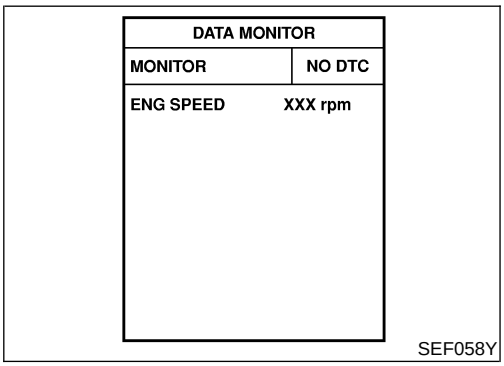
Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NAEC1343

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

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



With CONSULT-II

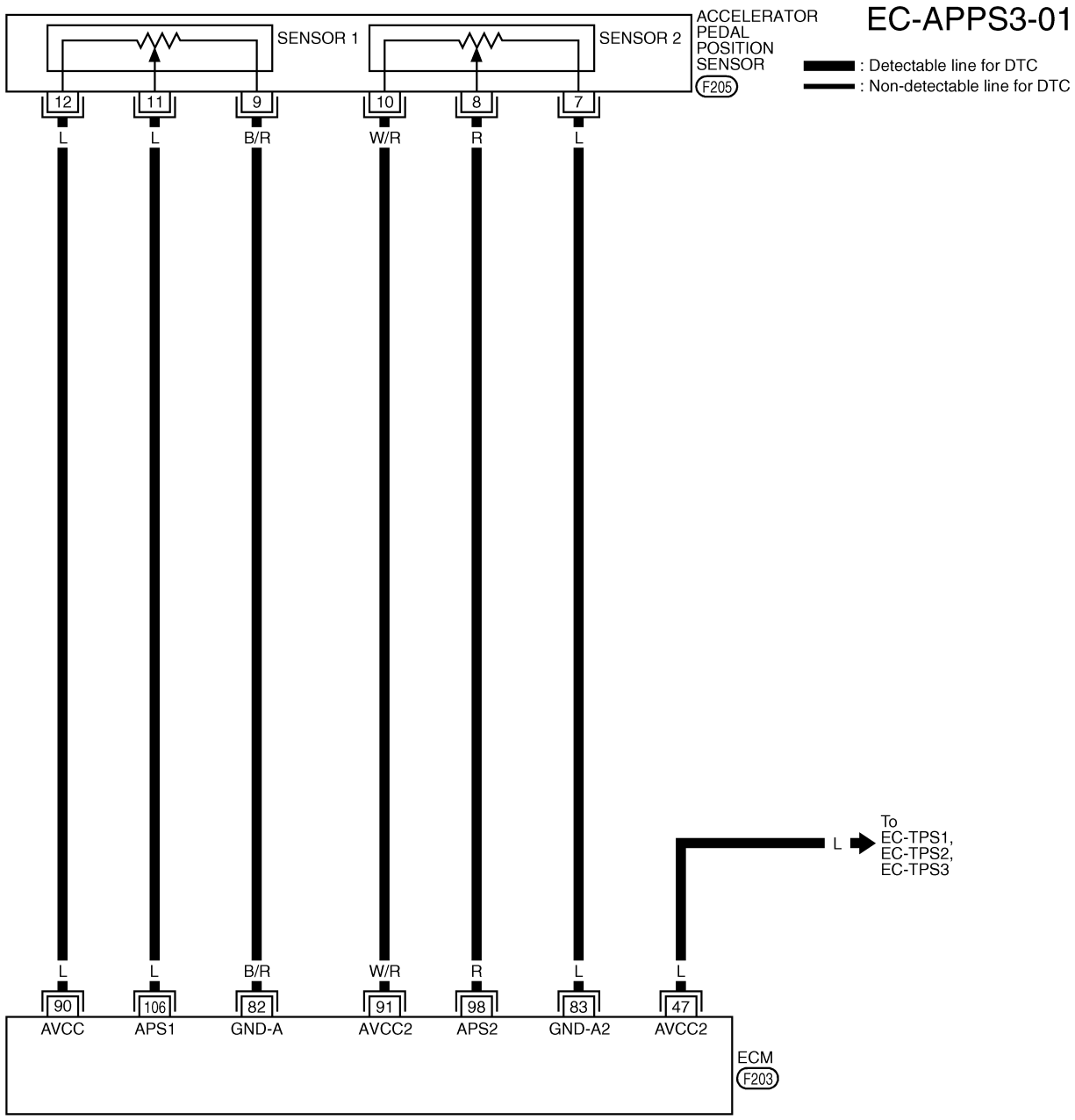
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to “Diagnostic Procedure”, EC-701.

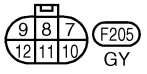
With GST

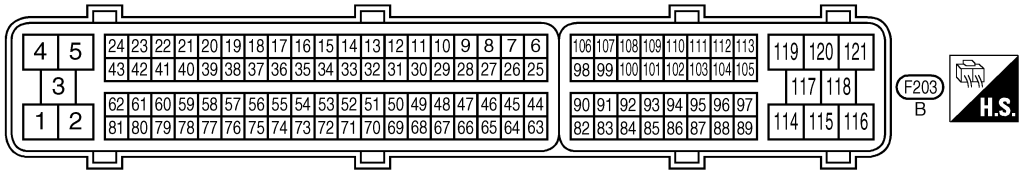
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC1344







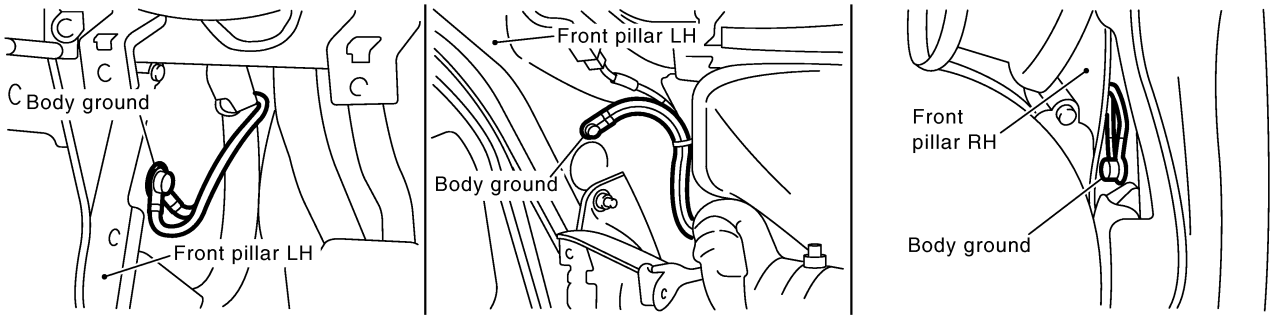
MEC749E

Diagnostic Procedure

NAEC1345

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



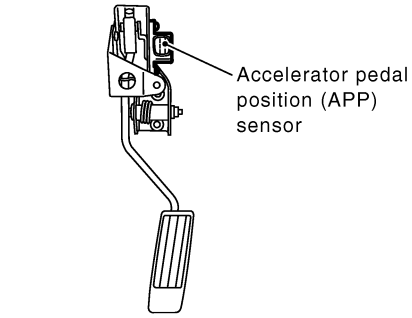
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

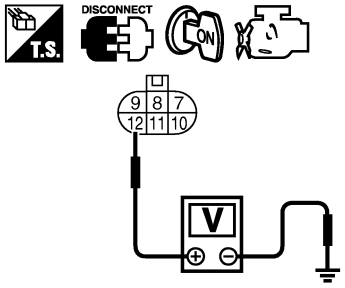
2	CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



SEC550D

3. Check voltage between APP sensor terminal 12 and ground with CONSULT-II or tester.



SEC551D

Voltage: Approximately 5V

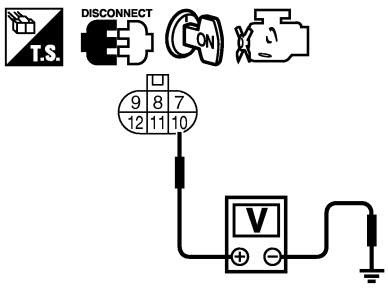
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 10 and ground with CONSULT-II or tester.



SEC552D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

4	CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 10 and ECM terminal 91. Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace 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 47 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-693.
- ECM terminal 91 and APP sensor terminal 10. Refer to "Wiring Diagram", EC-685.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair short to ground or short to power in harness or connectors.

6	CHECK THROTTLE POSITION SENSOR

Refer to "Component Inspection", EC-696.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 7.

7	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

8	CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 9, ECM terminal 83 and APP sensor terminal 7.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 11, ECM terminal 98 and APP sensor terminal 8.
   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 APP SENSOR

Refer to "Component Inspection", EC-704.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace accelerator pedal assembly.

11	REPLACE ACCELERATOR PEDAL ASSEMBLY

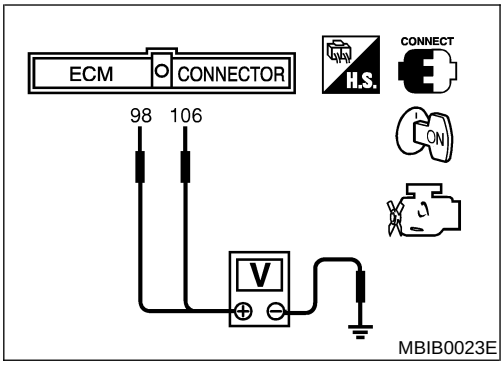
1. Replace accelerator pedal assembly.
2. Perform "Accelerator Pedal Released Position Learning", EC-73.
3. Perform "Throttle Valve Closed Position Learning", EC-73.
4. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

12	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**



Component Inspection

=NAEC1346

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly.
5. Perform “Accelerator Pedal Released Position Learning”, EC-73.
6. Perform “Throttle Valve Closed Position Learning”, EC-73.
7. Perform “Idle Air Volume Learning”, EC-73.

Description

NAEC0596

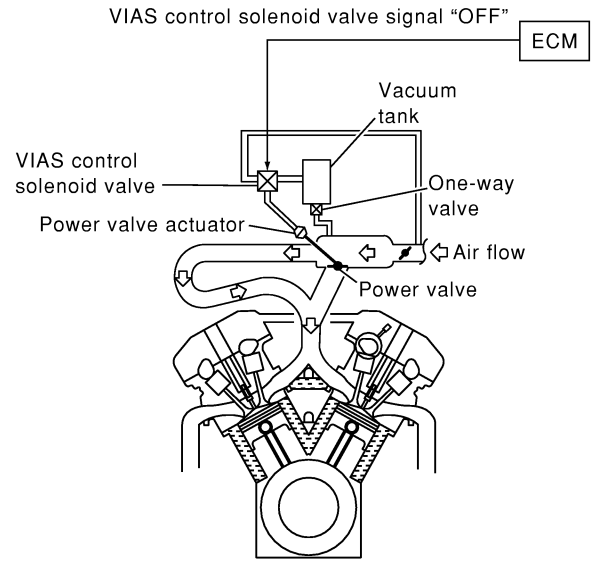
SYSTEM DESCRIPTION

NAEC0596S01

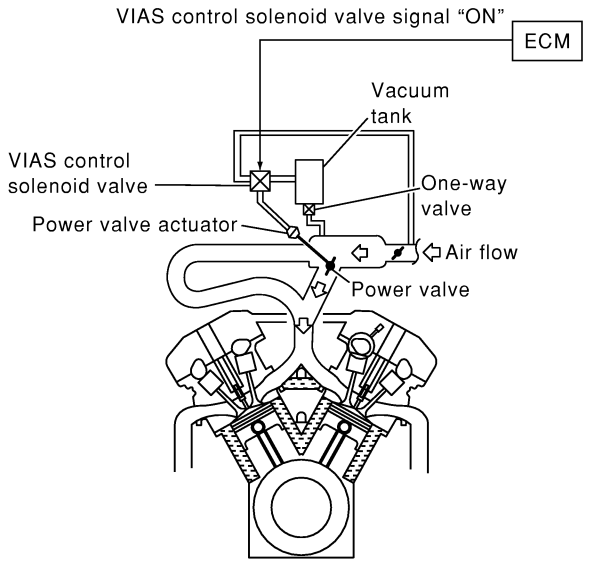
Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* and piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*		

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

When VIAS control signal is “OFF”.



When VIAS control signal is “ON”.



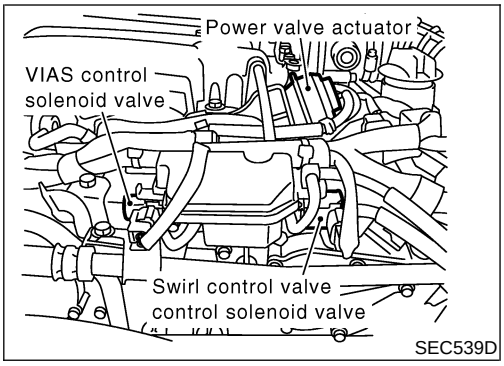
SEF447Z

When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector’s suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

Description (Cont'd)



COMPONENT DESCRIPTION

NAEC0596S02

Power Valve

NAEC0596S0201

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

VIAS Control Solenoid Valve

NAEC0596S0202

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

ECM Terminals and Reference Value

NAEC0684

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

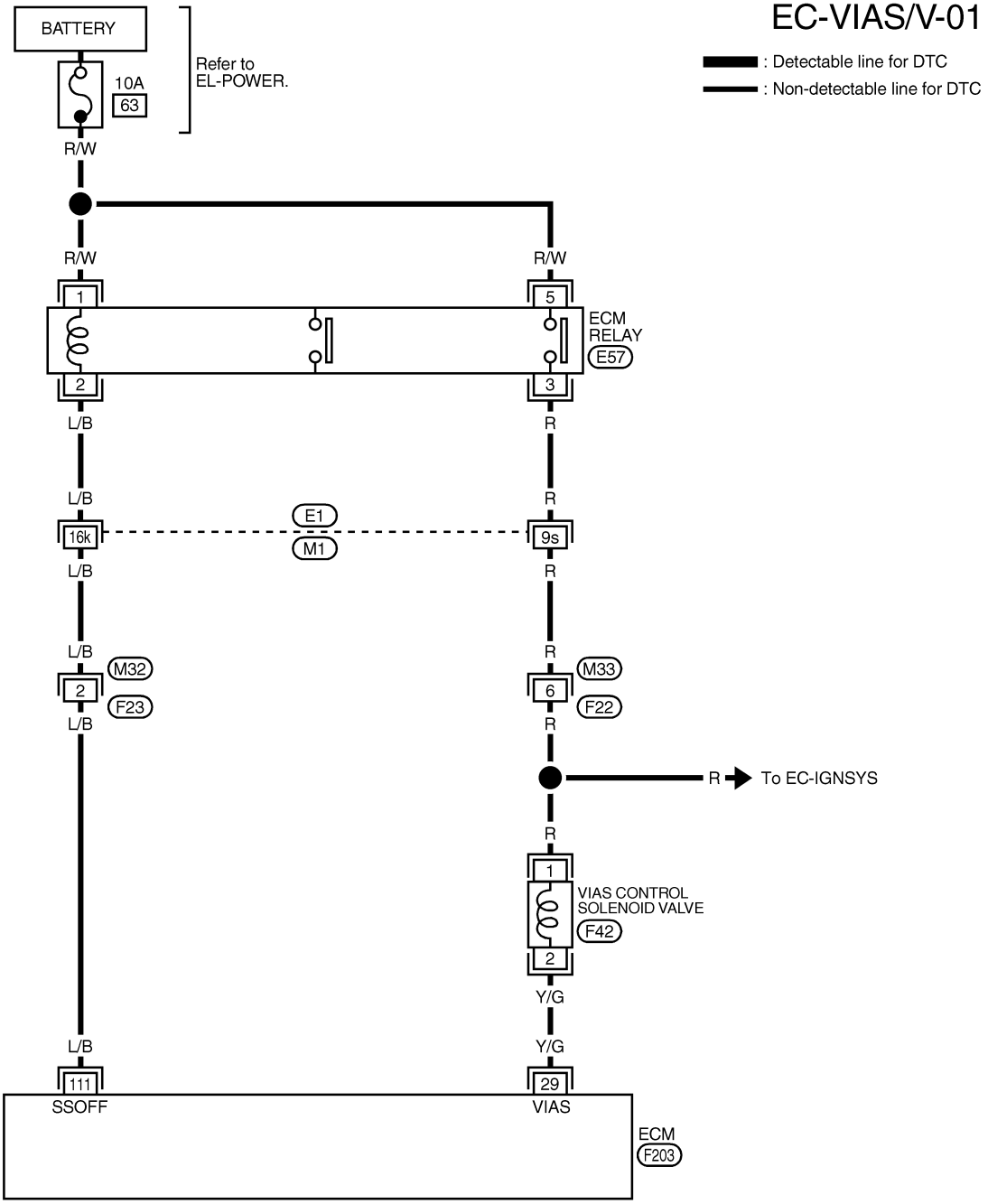
CAUTION:

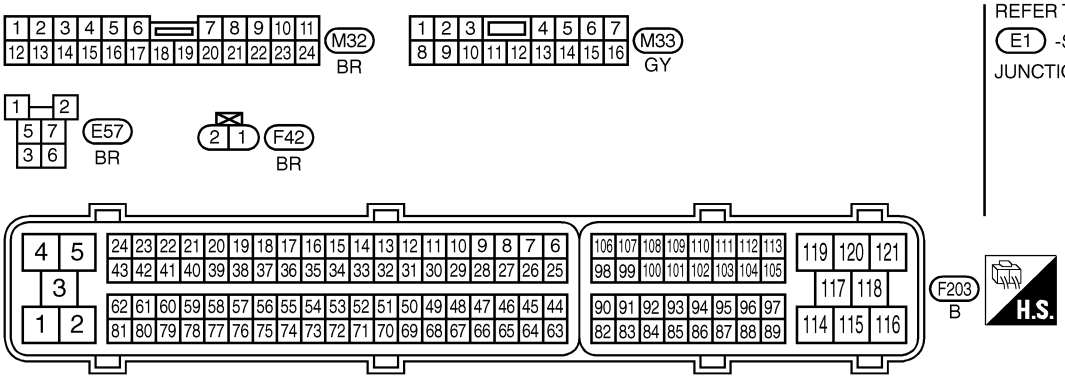
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V

Wiring Diagram

NAEC0597





REFER TO THE FOLLOWING.
(E1) -SUPER MULTIPLE JUNCTION (SMJ)

MEC667E

Diagnostic Procedure

NAEC0598

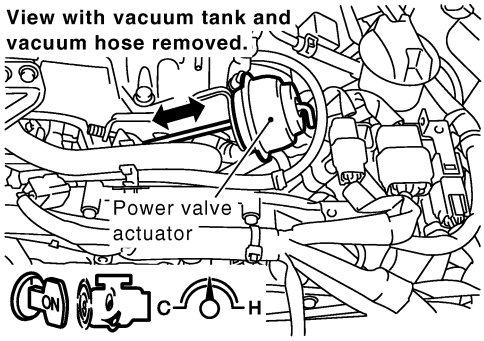
1 **CHECK OVERALL FUNCTION**

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

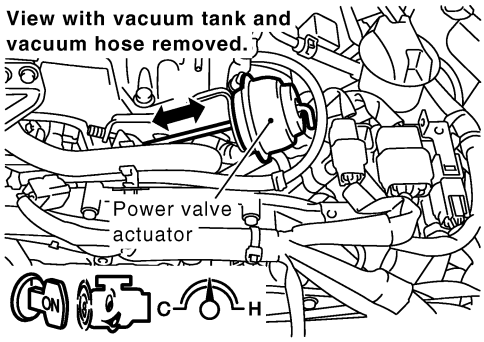
PBIB0844E



SEC558D

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



SEC558D

OK or NG

OK	▶	**INSPECTION END**
NG (With CONSULT-II)	▶	GO TO 2.
NG (Without CONSULT-II)	▶	GO TO 3.

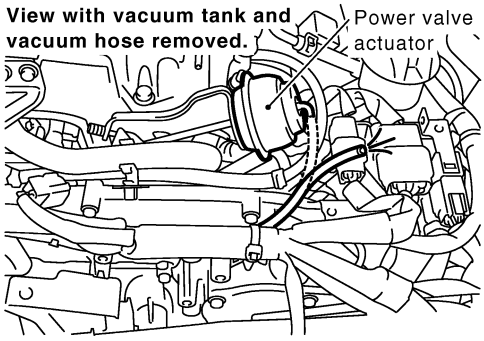
2	CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
4. Turn VIAS control solenoid valve "ON" and "OFF", and check for the existence of vacuum under the following conditions.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E



SEC559D

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

MTBL1174

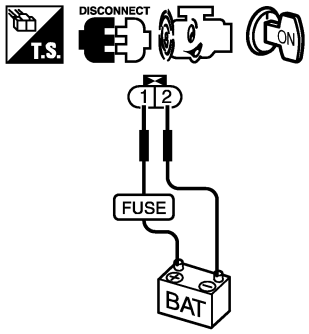
OK or NG

OK	▶	Repair or replace power valve actuator.
NG	▶	GO TO 4.

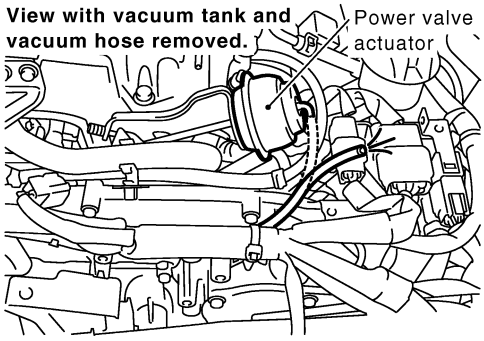
3	CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check for the existence of vacuum under the following conditions.



PBIB0845E



SEC559D

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

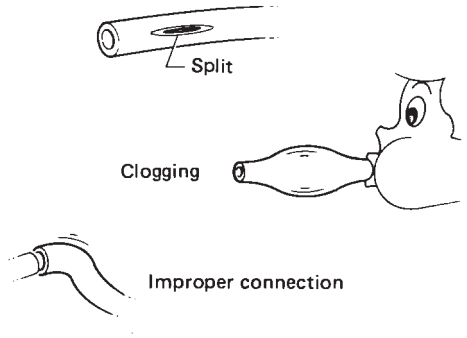
MTBL1175

OK or NG

OK	▶	Repair or replace power valve actuator.
NG	▶	GO TO 4.

4	CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, disconnection or improper connection.



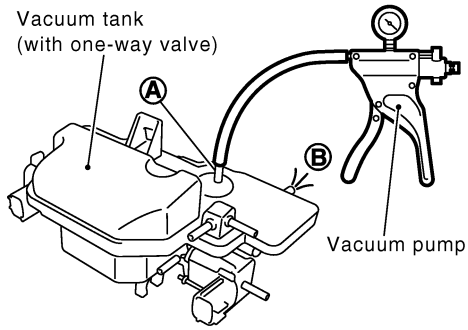
SEF109L

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace vacuum hose.

5	CHECK VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



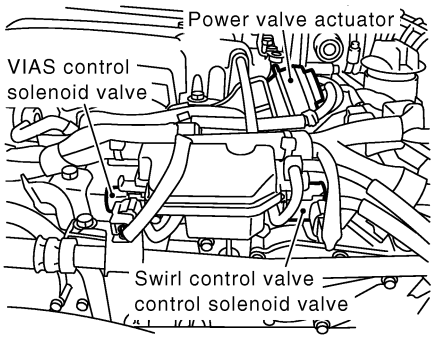
SEC560D

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace vacuum tank.

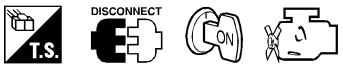
6	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

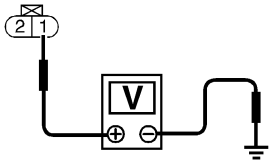
1. Stop engine.
2. Disconnect VIAS control solenoid valve harness connector.



SEC539D

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness continuity between VIAS control solenoid valve and ECM relay

	▶	Repair harness or connectors.

8	CHECK VIAS 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 29 and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

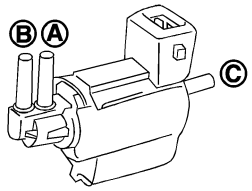
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect disconnected harness connector.
2. Turn ignition switch ON.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VIAS SOL VALVE	ON
MONITOR	
ENG SPEED	XXX rpm

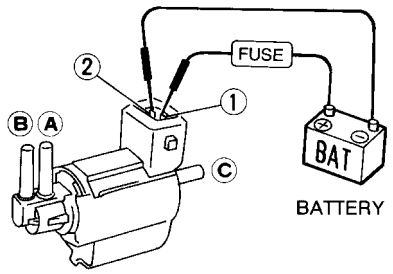
PBIB0177E

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

MTBL1171

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



MEC488B

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL1172

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace VIAS control solenoid valve.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

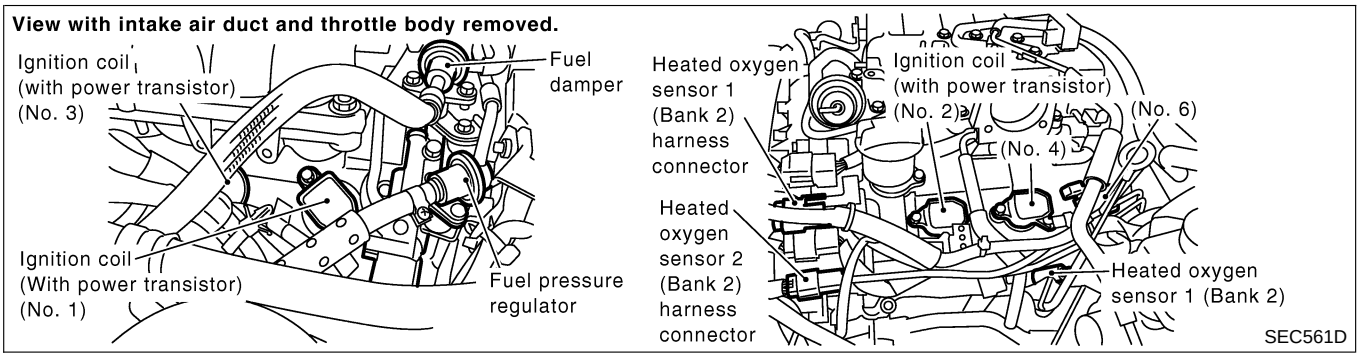
Component Description

NAEC0817

IGNITION COIL & POWER TRANSISTOR

NAEC0817S01

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.



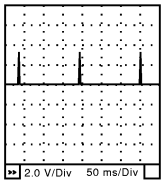
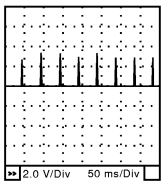
ECM Terminals and Reference Value

NAEC0818

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

CAUTION:

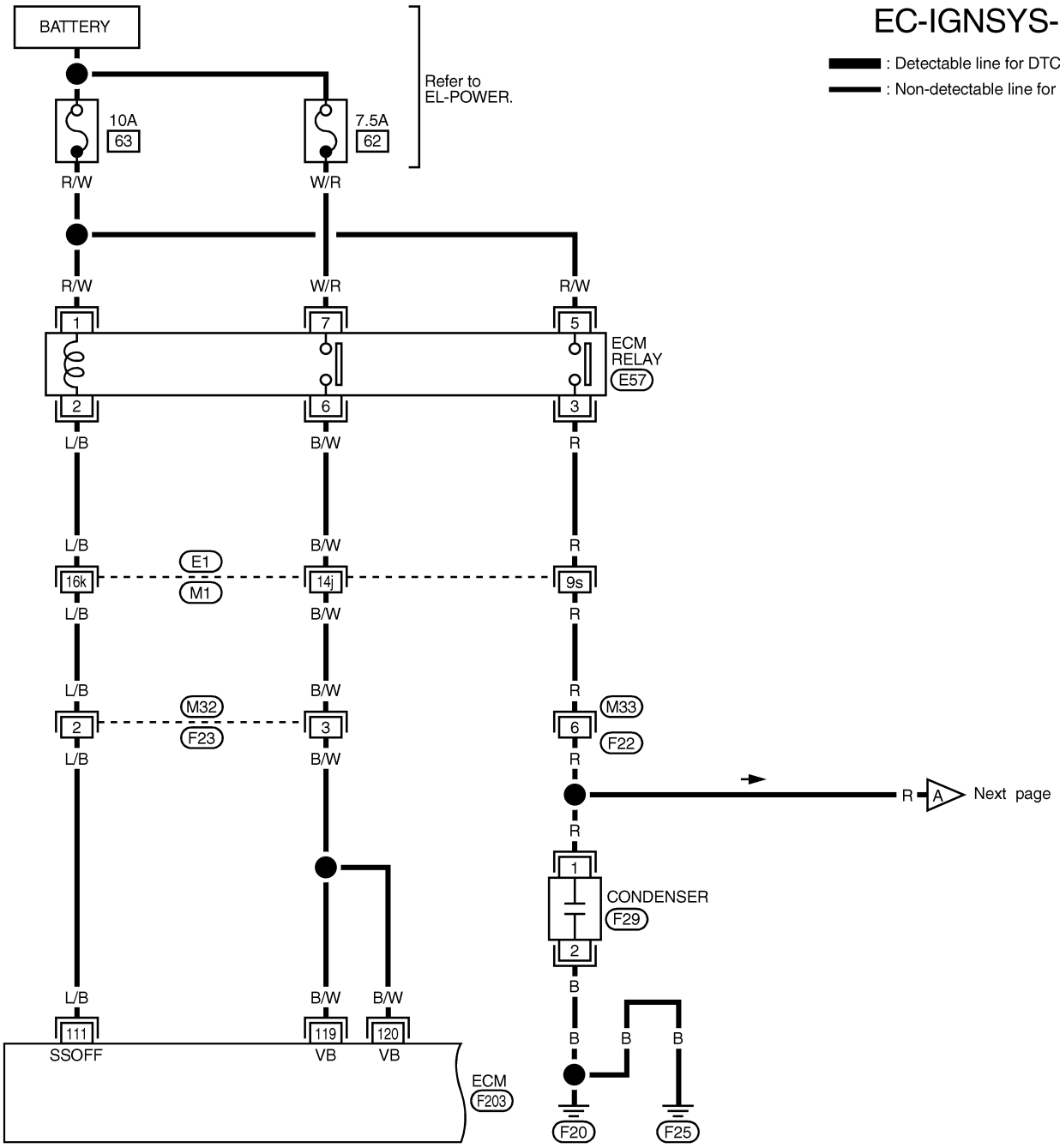
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

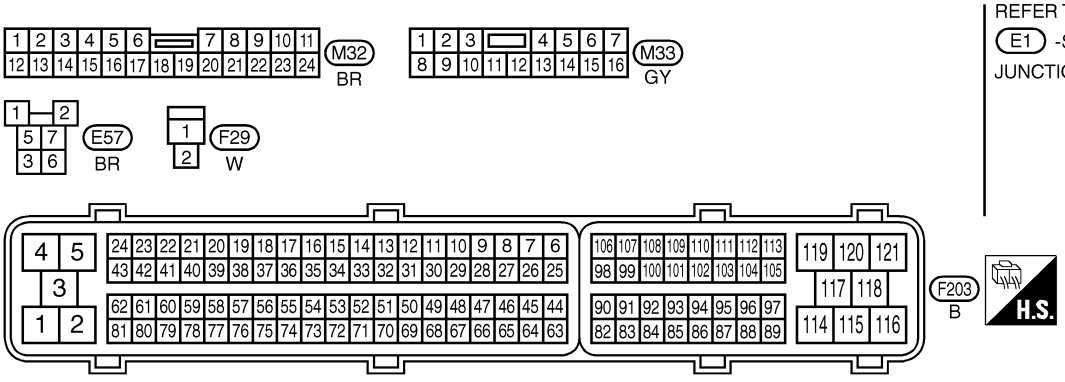
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62 79 80 81	PU/W L/R Y/R GY/R GY G/R	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEC987C

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

Wiring Diagram

NAEC0819

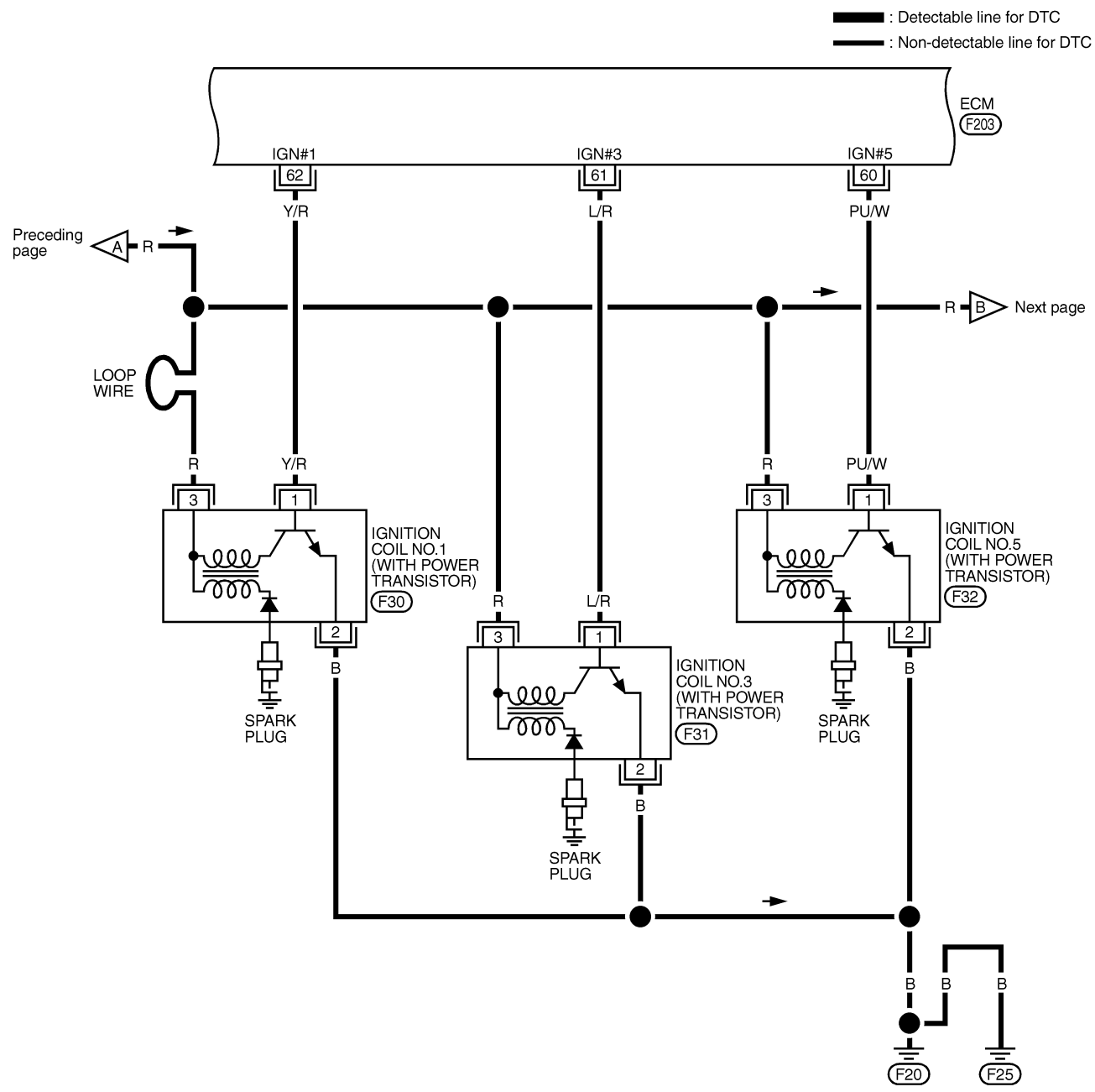


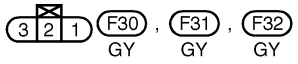


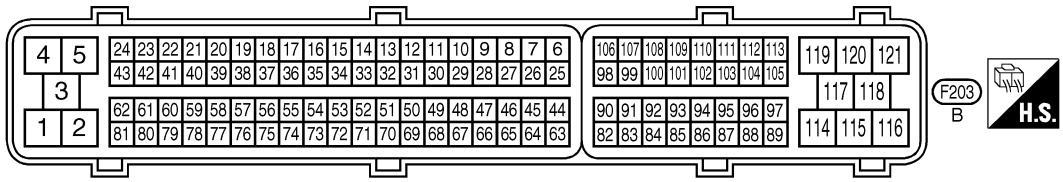
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC108E

EC-IGNSYS-02

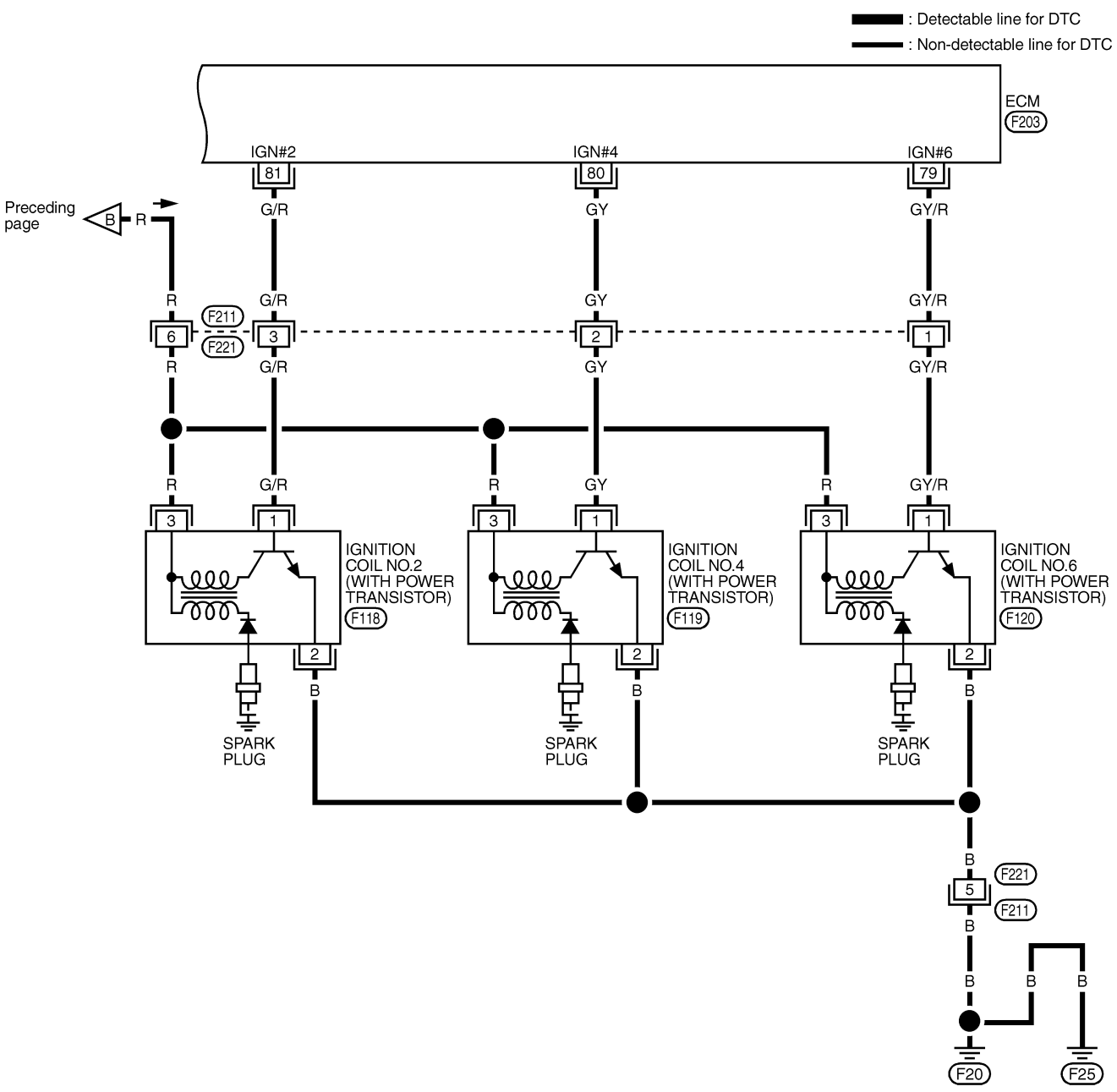


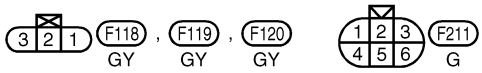


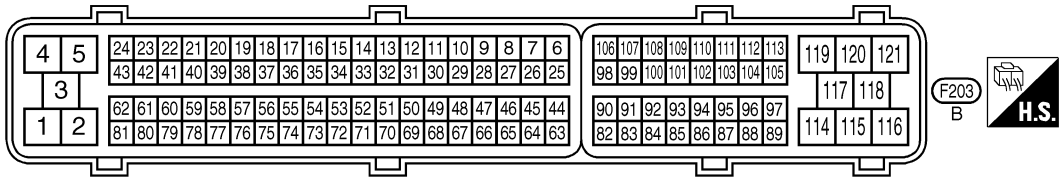


MEC109E

EC-IGNSYS-03







MEC110E

Diagnostic Procedure

NAEC0820

1	CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)	▶	GO TO 2.
Yes (Without CONSULT-II)	▶	GO TO 3.
No	▶	GO TO 4.

2	SEARCH FOR MALFUNCTIONING CIRCUIT

With CONSULT-II
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Search for circuit which does not produce a momentary engine speed drop.

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

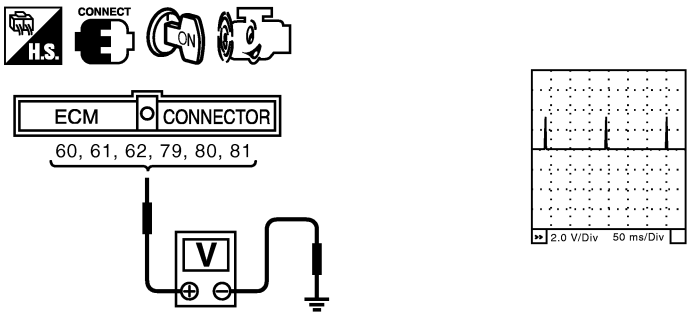
PBIB0133E

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 13.

3	CHECK OVERALL FUNCTION

Without CONSULT-II
1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.
   NOTE:
   The pulse cycle changes depending on rpm at idle.



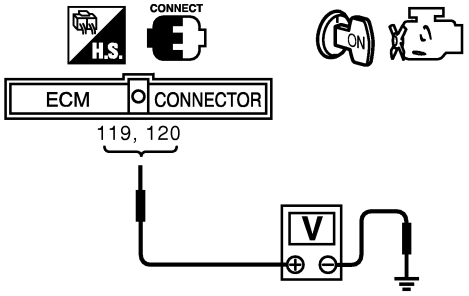
SEC579D

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 14.

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 119, 120 and ground with CONSULT-II or tester.



MBIB0034E

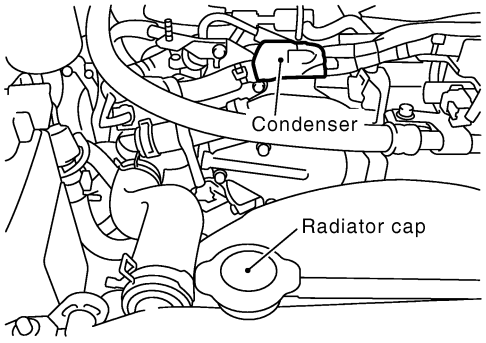
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-157.

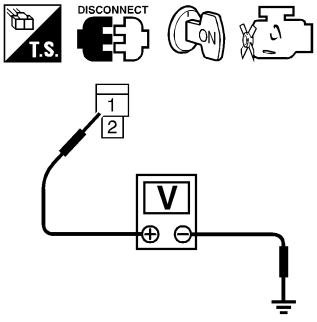
5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

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



SEC562D

3. Turn ignition switch ON.
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

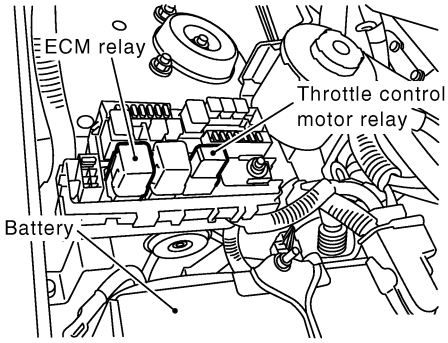
SEF367X

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



SEC425D

3. Check harness continuity between ECM relay terminal 3 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 8.
NG	▶	GO TO 7.

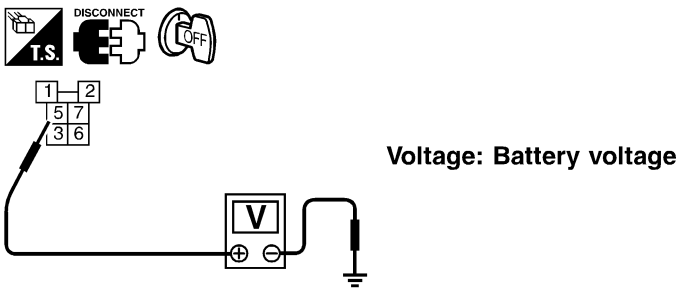
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between ECM relay and condenser

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

8	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF010Z

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

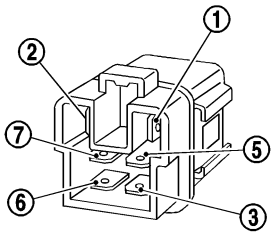
9	DETECT MALFUNCTIONING PART

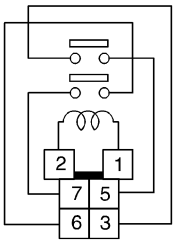
Check the following.
- 10A fuse
- Harness for open and short between ECM relay and fuse

	▶	Repair or replace harness or connectors.

10	CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.





Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace ECM relay.

11	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

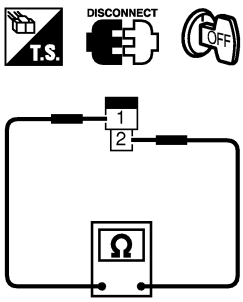
1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

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

12	CHECK CONDENSER

Check resistance between condenser terminals 1 and 2.



MBIB0031E

Resistance: Above 1 MΩ at 25°C (77°F)

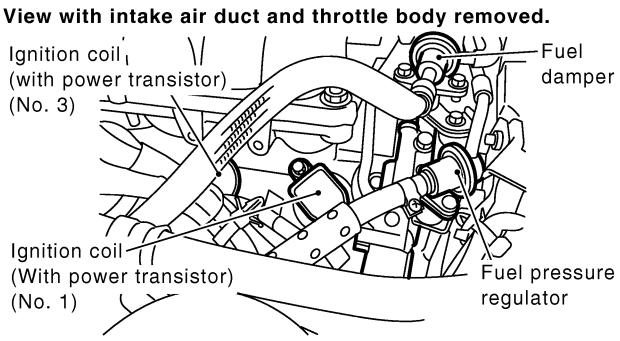
OK or NG

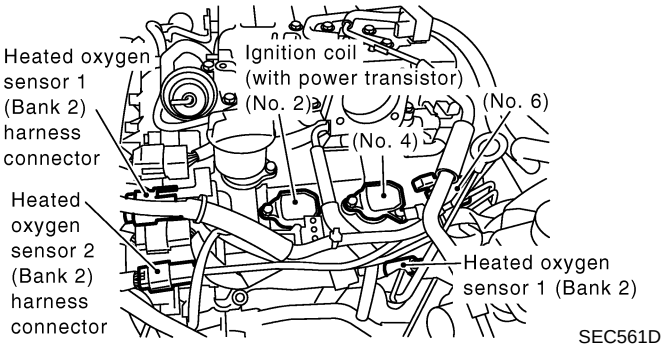
OK	▶	GO TO 13.
NG	▶	Replace condenser.

13	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.

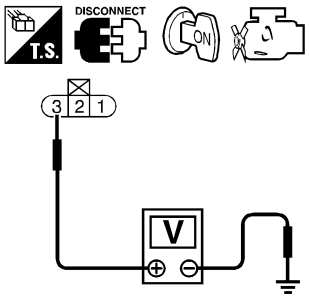
View with intake air duct and throttle body removed.





SEC561D

4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF370X

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector F211, F221 (Ignition coil No. 2, No. 4, No. 6)
- Harness for open or short between ignition coil and harness connector F22

	▶	Repair or replace harness or connectors.

15	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 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F221, F211 (Ignition coil No. 2, No. 4, No. 6)
- Check the harness for open between ignition coil and ground.

	▶	Repair or replace harness or connectors.

17	CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 62, 81, 61, 80, 60, 79 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 19.
NG	▶	GO TO 18.

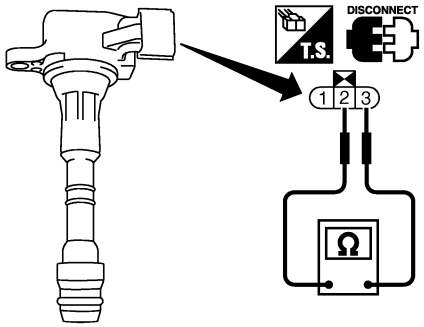
18	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F211, F221 (Ignition coil No. 2, No. 4, No. 6)
- Check the harness for open or short between ignition coil and ECM.

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

19	CHECK IGNITION COIL WITH POWER TRANSISTOR

Check resistance between ignition coil terminals 2 and 3.



SEC563D

Terminals	Resistance	Result
2 and 3	Not 0 Ω	OK
	0 Ω	NG

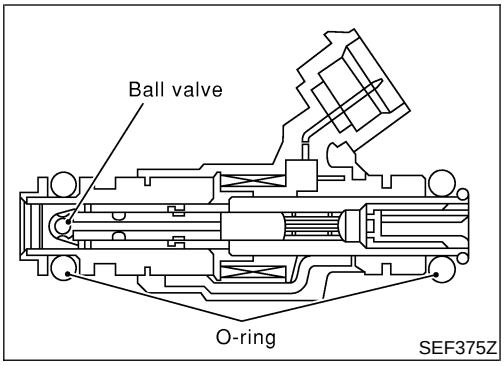
OK or NG

OK	▶	GO TO 20.
NG	▶	Replace ignition coil with power transistor.

20	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.

	▶	**INSPECTION END**



Component Description

NAEC0383

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0384

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec

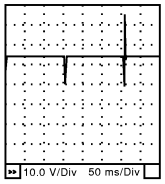
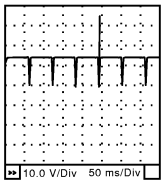
ECM Terminals and Reference Value

NAEC0685

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

CAUTION:

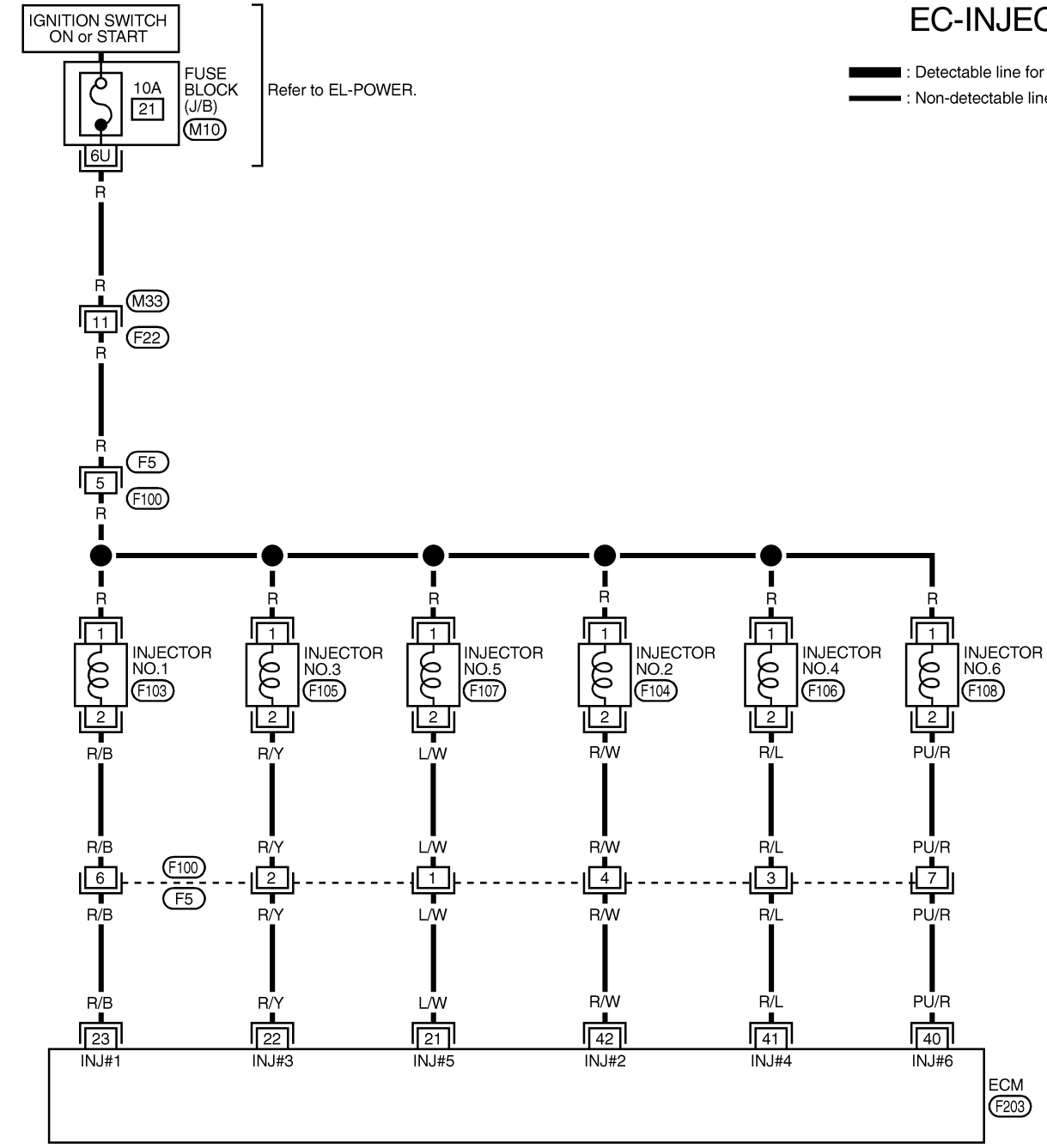
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

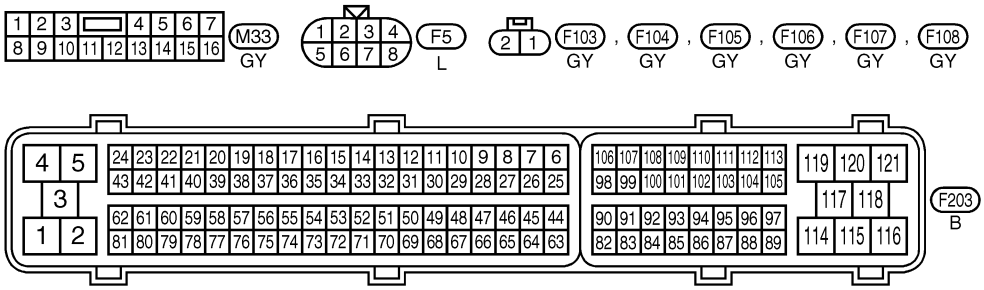
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 40 41 42	L/W R/Y R/B PU/R R/L R/W	Injector No. 5 Injector No. 3 Injector No. 1 Injector No. 6 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

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

Wiring Diagram

NAEC0386





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC111E

Diagnostic Procedure

NAEC0387

1	INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

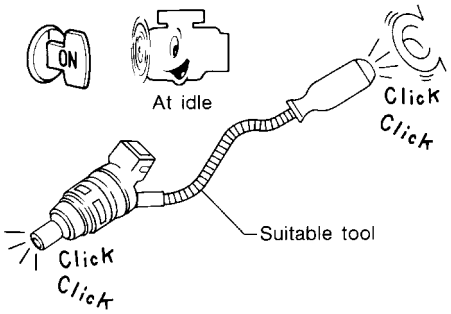
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

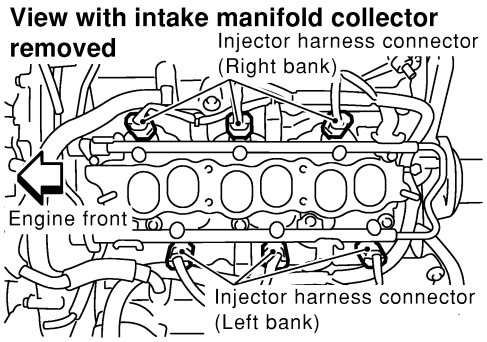
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

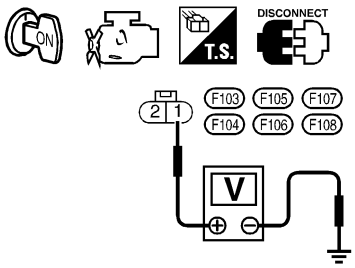
3	CHECK INJECTOR POWER SUPPLY CIRCUIT

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



SEF023Z

3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF364Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M33, F22
- Harness connectors F5, F100
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

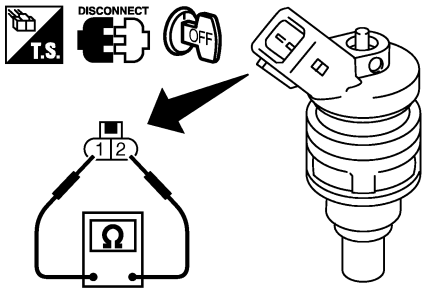
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 23, 22, 21, 42, 41, 40. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F100, F5 ● Harness for open or short between injector and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INJECTOR
1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.	
 **Resistance: 13.5 - 17.3Ω [at 10 - 60°C (50 - 140°F)]** SEF964XF	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace injector.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

System Description

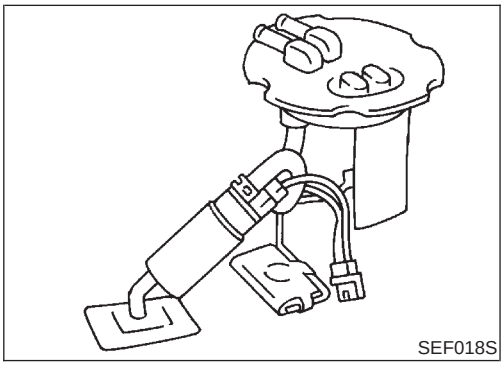
NAEC0392

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* and piston position	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 120° signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.


SEF018S

Component Description

NAEC0393

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NAEC0394

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 1 second.) ● Engine running and cranking	ON
	Except as shown above	OFF

ECM Terminals and Reference Value

=NAEC0686

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

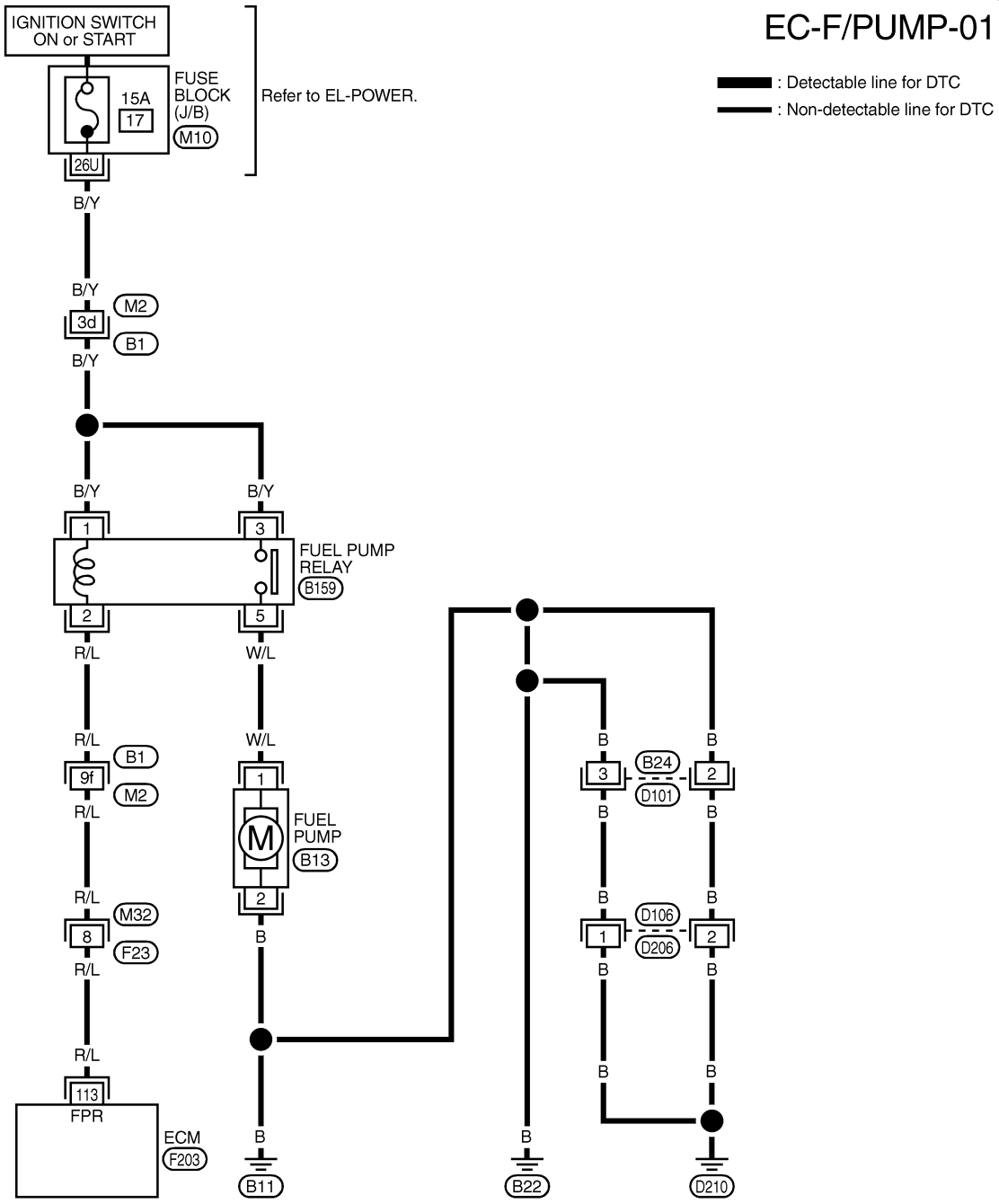
CAUTION:

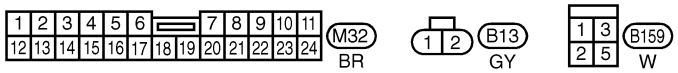
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

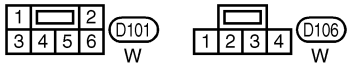
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	R/L	Fuel pump relay	**[Ignition switch ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch ON] ● 1 second passed after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

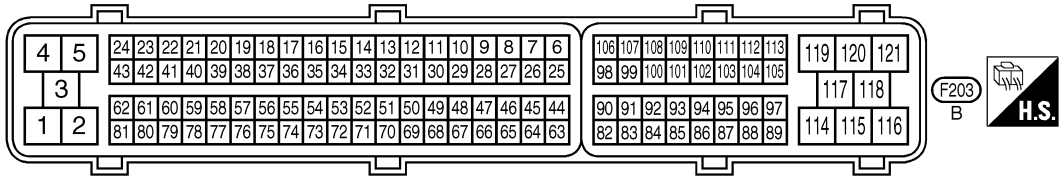
NAEC0396







REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



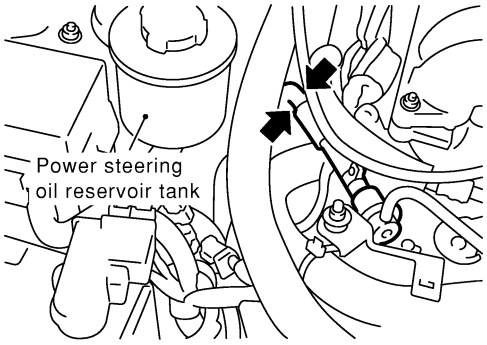
MEC112E

Diagnostic Procedure

NAEC0397

1	CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.



SEF025Z

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

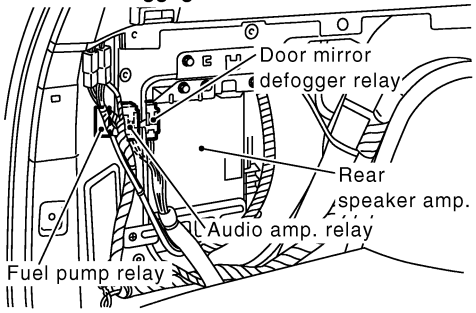
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT-I

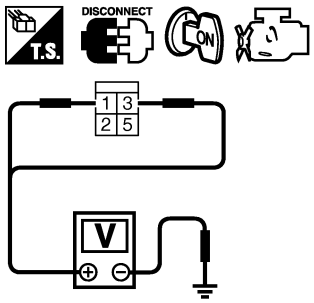
1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.

Behind the luggage room trim LH side



SEC564D

3. Turn ignition switch ON.
4. Check voltage between terminals 1, 3 and ground with CONSULT-II or tester.



SEC565D

Voltage: Battery voltage

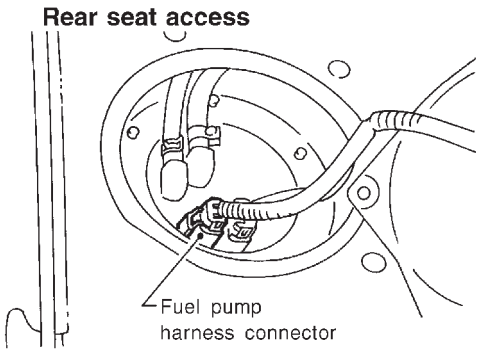
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Fuse block (J/B) connector M10 ● 15A fuse in fuse block (J/B) ● Harness connectors M2, B1 ● Harness for open or short between fuse and fuel pump relay and fuse	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



SEF021S

3. Check harness continuity between fuel pump terminal 2 and ground, fuel pump terminal 1 and fuel pump relay terminal 5. 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 B24, D101 ● Harness connectors D106, D206 ● Harness for open or short between fuel pump relay and fuel pump ● Harness for open between fuel pump and ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and fuel pump relay terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B1, M2 ● Harness connectors M32, F23 ● Harness for open or short between ECM and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK FUEL PUMP RELAY

With CONSULT-II

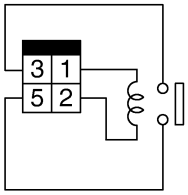
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5 under the following conditions.



SEC566D

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

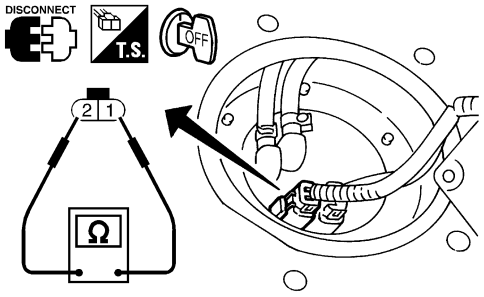
MTBL1373

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check resistance between fuel pump terminals 1 and 2.



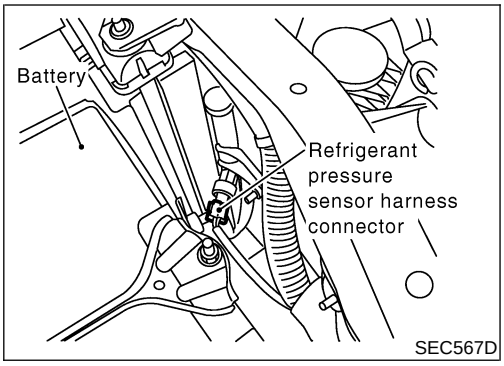
Resistance: 0.2 - 5.0 Ω [at 25°C (77°F)]

SEF027Z

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

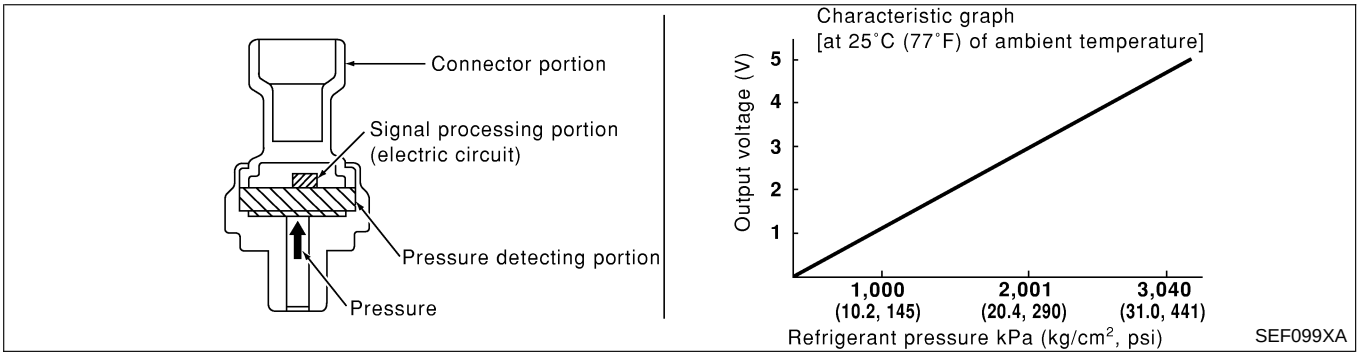
10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Description

NAEC0636

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.



ECM Terminals and Reference Value

NAEC0689

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

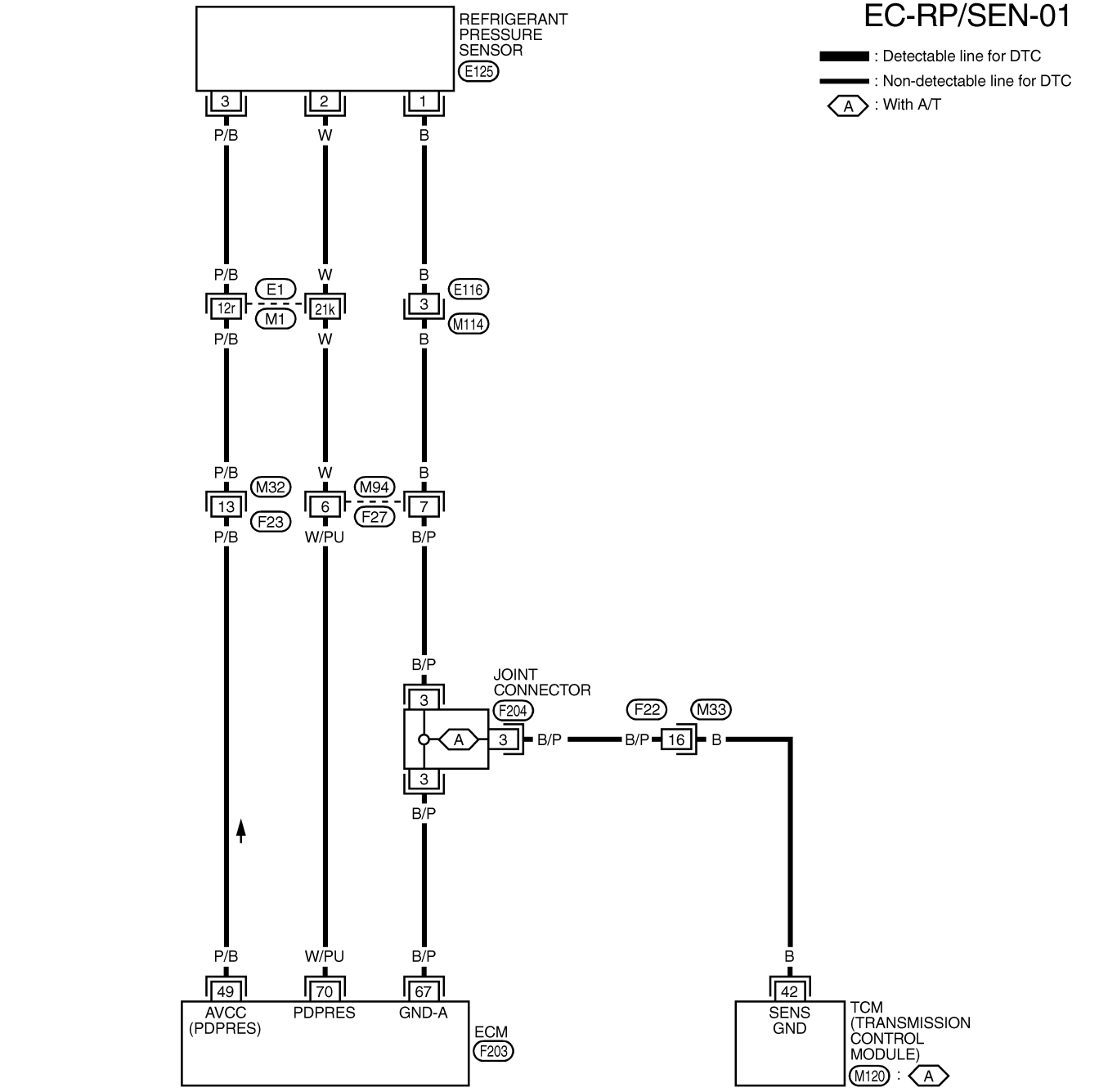
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P/B	Sensor power supply	**[Ignition switch ON]**	Approximately 5V
67	B/P	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
70	W/PU	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON. (Compressor operates.)	1.0 - 4.0V

Wiring Diagram

NAEC0637



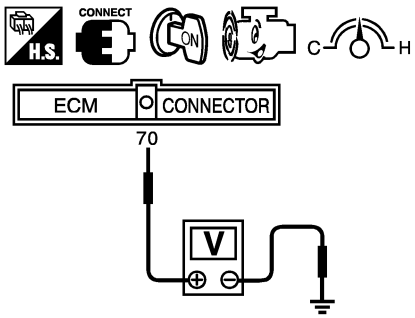
MEC114E

Diagnostic Procedure

NAEC0638

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.



PBIB0832E

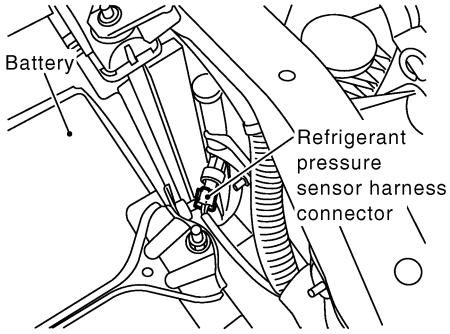
Voltage: 1 - 4V

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

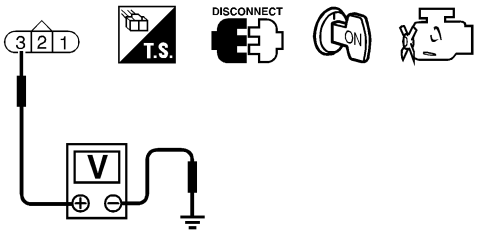
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



SEC567D

4. Turn ignition switch ON.
5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF030Z

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair harness or connectors.

4	CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Disconnect TCM harness connector. 4. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42. 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 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E116, M114 ● Harness connectors M94, F27 ● Joint connector F204 ● Harness for open between ECM and refrigerant pressure sensor ● Harness connectors F22, M33 (A/T models) ● Harness for open between TCM and refrigerant pressure sensor (A/T models)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

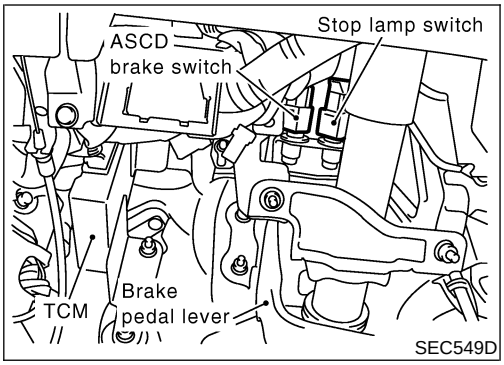
6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M94, F27 ● 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.

8	CHECK REFRIGERANT PRESSURE SENSOR
Refer to HA-15, "Refrigerant pressure sensor".	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace refrigerant pressure sensor.

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1348

When depressing the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON.
ECM detects the state of the brake pedal by this two kinds of input (ON/OFF signal).
Refer to EC-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1349

CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal fully released • Clutch pedal is fully released (M/T models)	ON
		• Brake pedal depressed • Clutch pedal is depressed (M/T models)	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	• Brake pedal fully released	OFF
		• Brake pedal depressed	ON

ECM Terminals and Reference Value

NAEC1356

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

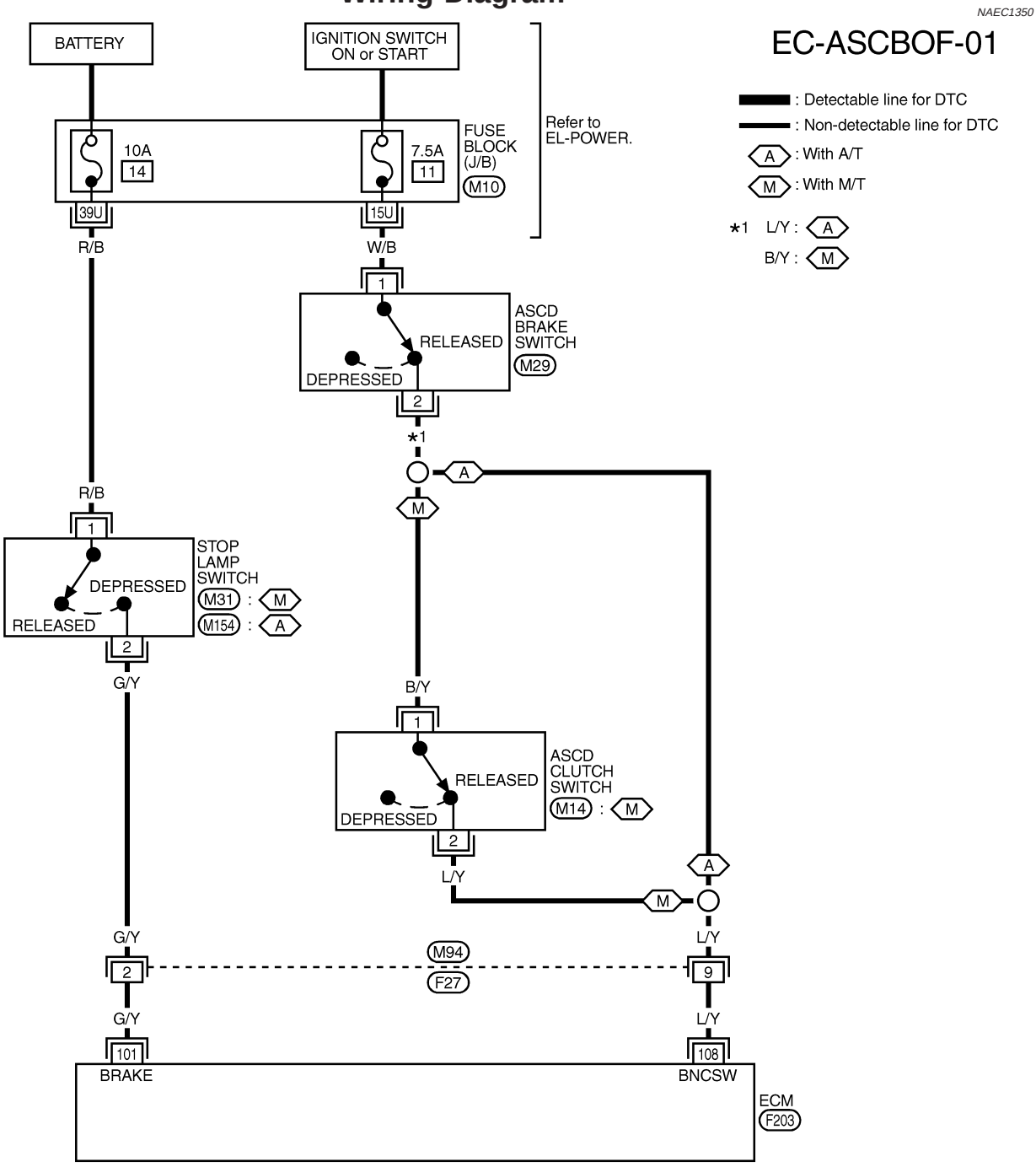
CAUTION:

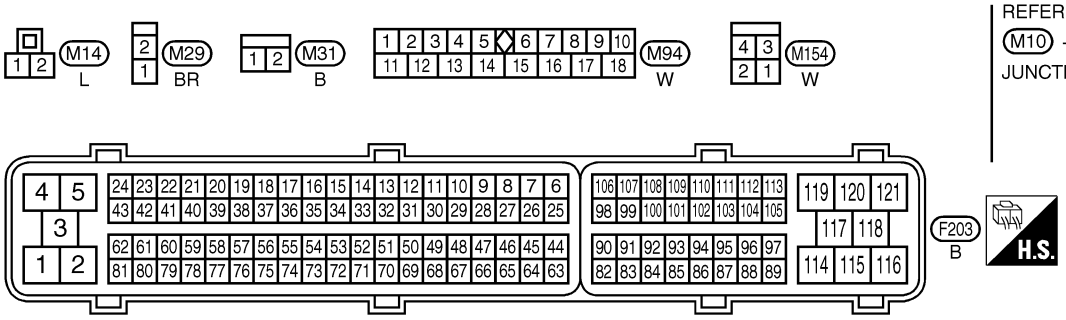
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	G/Y	Stop lamp switch	**[Ignition switch ON]** • Brake pedal is fully released	Approximately 0V
			[Ignition switch ON] • Brake pedal is depressed	BATTERY VOLTAGE (11 - 14V)
108	L/Y	ASCD brake switch	**[Ignition switch ON]** • Brake pedal is fully released • Clutch pedal is fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] • Brake pedal is depressed • Clutch pedal is depressed (M/T models)	Approximately 0V

Wiring Diagram

NAEC1350





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC119E

Diagnostic Procedure

NAEC1351

1	CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check the indication of “BRAKE SW1” under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW1	OFF

SEC011D

A/T models

CONDITION	INDICATION
When brake pedal is depressed.	OFF
When brake pedal is released.	ON

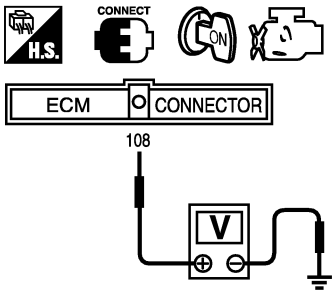
M/T models

CONDITION	INDICATION
When clutch pedal or brake pedal is depressed.	OFF
When clutch pedal and brake pedal are released.	ON

MTBL1334

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



MBIB0061E

A/T models

CONDITION	VOLTAGE
When brake pedal is depressed.	Approximately 0V
When brake pedal is released.	Battery voltage

M/T models

CONDITION	VOLTAGE
When clutch pedal or brake pedal is depressed.	Approximately 0V
When clutch pedal and brake pedal are released.	Battery voltage

MTBL1335

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK OVERALL FUNCTION-II

With CONSULT-II

See "BRAKE SW2" indication in "DATA MONITOR" mode.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW2	OFF

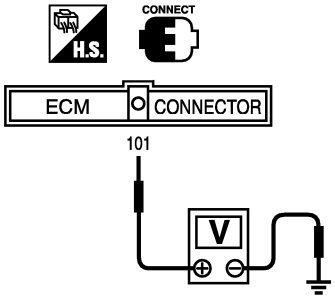
SEC013D

CONDITION	INDICATION
When brake pedal is depressed.	ON
When brake pedal is released.	OFF

MTBL1336

Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.



MBIB0060E

CONDITION	VOLTAGE
When brake pedal is depressed.	Battery voltage
When brake pedal is released.	Approximately 0V

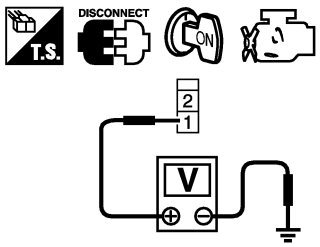
MTBL1337

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11.

3	CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.



PBIB0857E

Voltage: Battery voltage

OK or NG

OK (A/T models)	▶	GO TO 5.
OK (M/T models)	▶	GO TO 7.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector M10
- 7.5A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5	CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for open to ground and short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M94, F27
- Harness for open and short between ECM and ASCD brake switch

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

Diagnostic Procedure (Cont'd)

7	CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1, ASCD clutch switch terminal 2 and ECM terminal 108.
   Refer to Wiring Diagram.
   Continuity should exist.
5. Also check harness for open 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 M94, F27
- Harness for open and short between ASCD brake switch and ASCD clutch switch
- Harness for open and short between ASCD clutch switch and ECM

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

9	CHECK ASCD CLUTCH SWITCH

Refer to "Component Inspection", EC-661.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace ASCD clutch switch.

10	CHECK ASCD BRAKE SWITCH

Refer to "Component Inspection", EC-661.

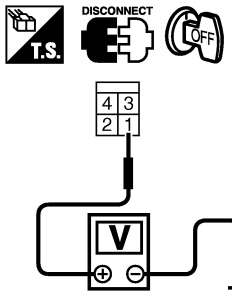
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace ASCD brake switch.

11	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

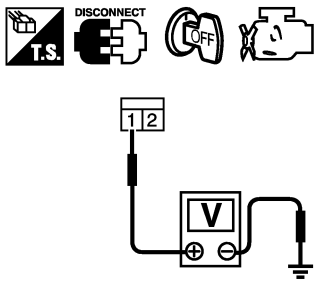
1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

A/T models



SEC547D

M/T models



PBIB0117E

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 M10
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

	▶	Repair open circuit or short to ground 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 stop lamp switch terminal 2 and ECM terminal 101. 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.

Diagnostic Procedure (Cont'd)

14	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M94, F27 ● Harness for open or short between stop lamp switch and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK STOP LAMP SWITCH
Refer to "Component Inspection", EC-661.	
OK or NG	
OK ▶	GO TO 16.
NG ▶	Replace stop lamp switch.

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Component Description

NAEC1352

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when MAIN switch on steering switch is turned ON to indicate that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met. CRUISE indicator illuminates, and SET/COAST switch on steering switch is turned ON while vehicle speed is within range of ASCD setting.

SET indicator remains lit during ASCD control. Refer to EC-54 for ASCD functions.

CONSULT-II Reference Value in Data Monitor Mode

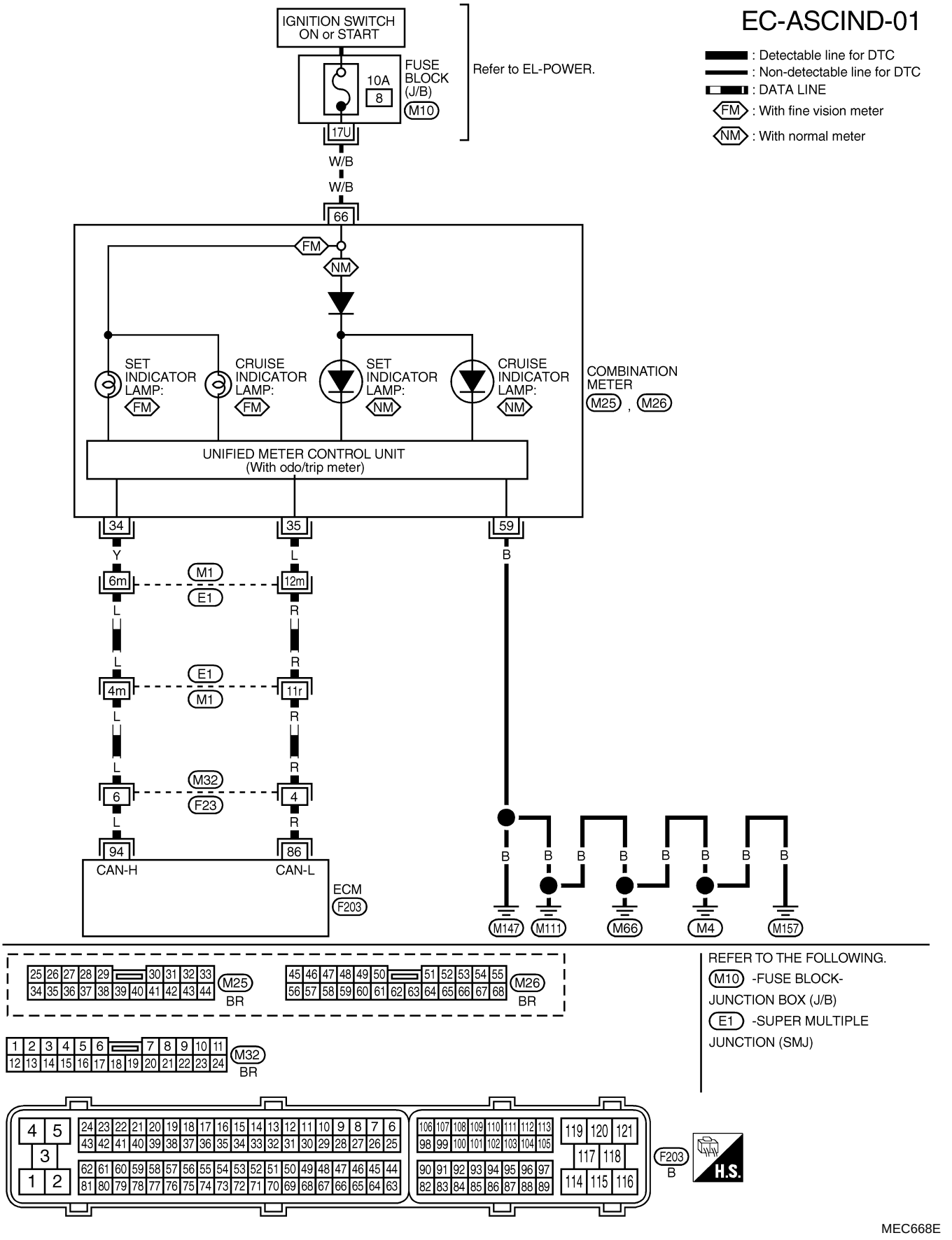
NAEC1353

Specification data are reference values.

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 (89 MPH)	• ASCD is operating.	ON
		• ASCD is not operating.	OFF

Wiring Diagram

NAEC1354



MEC668E

Diagnostic Procedure

NAEC1355

1 CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

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 (89 MPH)	• ASCD is operating.	ON
		• ASCD is not operating.	OFF

MTBL1881

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2 CHECK DTC

Make sure that DTC U1000 or U1001 is not displayed.

OK or NG

OK	▶	GO TO 3.
NG	▶	Perform “Diagnostic Procedure” for DTC U1000 or U1001, EC-168.

3 CHECK COMBINATION METER OPERATION

Check that combination meter operates normally.

OK or NG

OK	▶	GO TO 4.
NG	▶	Check combination meter circuit. Refer to EL-124.

4 CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-155.

▶ **INSPECTION END**

ECM Terminals and Reference Value

NAEC0690

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

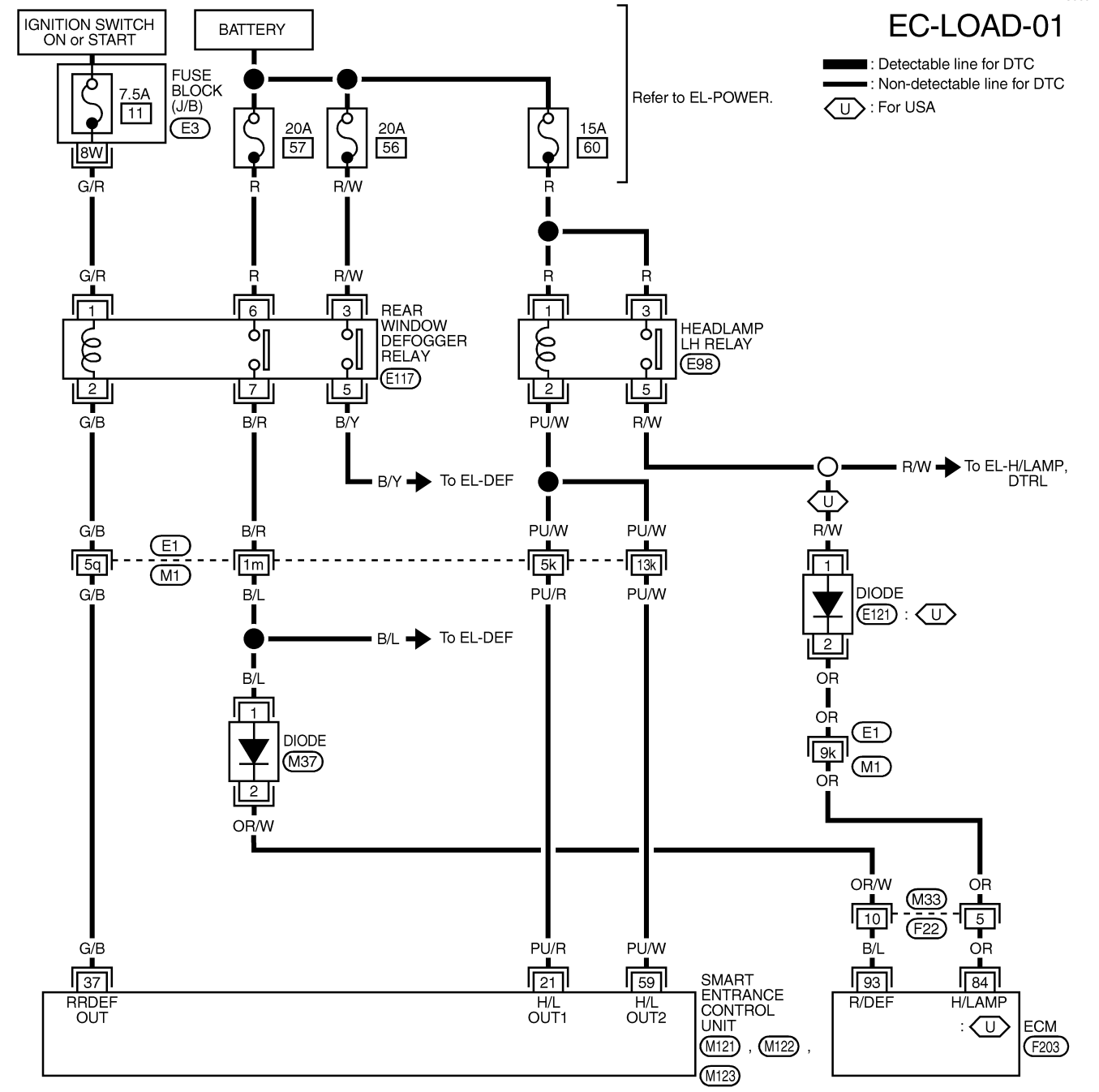
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	OR	Headlamp signal	**[Engine is running]** ● Headlamp: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Headlamp: OFF	0V
93	B/L	Rear window defogger signal	**[Engine is running]** ● Rear window defogger: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Rear window defogger: OFF	0V

Wiring Diagram

NAEC0604



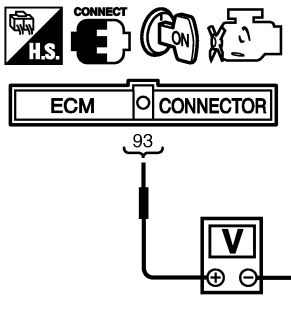
MEC115E

Diagnostic Procedure

NAEC0605

1	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 93 and ground under the following conditions.



SEC568D

Condition	Voltage
Rear window defogger switch “ON”	BATTERY VOLTAGE
Rear window defogger switch “OFF”	0V

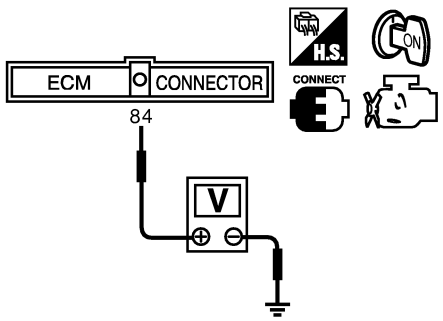
MTBL1374

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check voltage between ECM terminal 84 and ground under the following conditions.



MBIB0158E

Condition	Voltage
Lighting switch “ON” at 1st position	BATTERY VOLTAGE
Lighting switch “OFF”	0V

MTBL1375

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

3	CHECK REAR WINDOW DEFOGGER FUNCTION

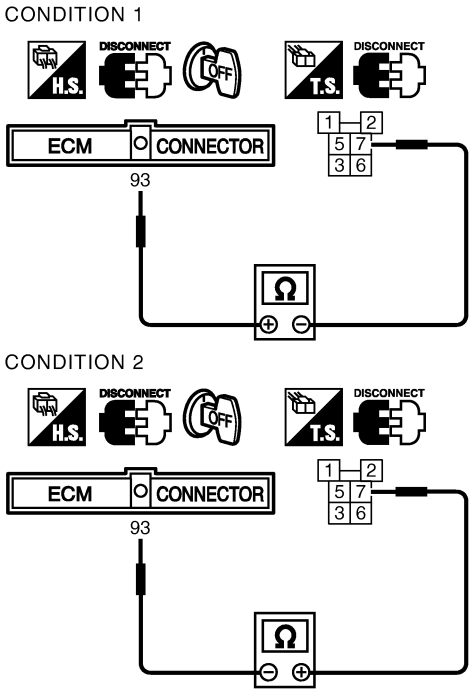
1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes	▶	GO TO 4.
No	▶	Refer to EL-192, "Rear Window Defogger".

4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 93 and rear window defogger relay terminal 7.



SEC569D

CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

MTBL1376

5. 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 E1, M1
- Harness connectors M33, F22
- Diode M37
- Harness for open and short between ECM and rear window defigger relay

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

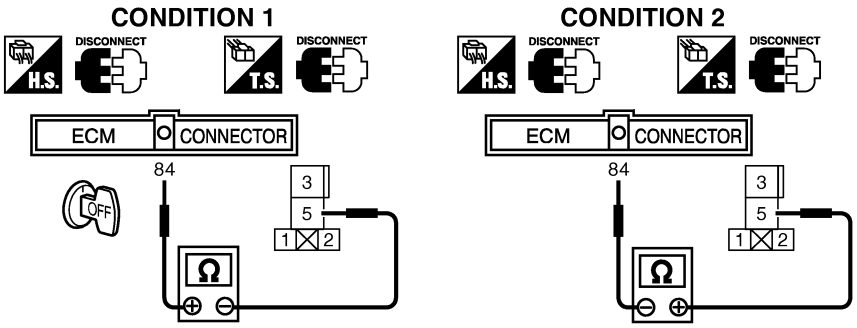
Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

7	CHECK HEADLAMP FUNCTION
1. Start engine. 2. Turn the lighting switch ON at 1st position with high beam. 3. Check that headlamps are illuminated.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Refer to EL-35, "HEADLAMP (FOR USA)".

8	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect headlamp LH relay.
4. Check harness continuity between ECM terminal 84 and headlamp LH relay terminal 5 under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEC570D

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

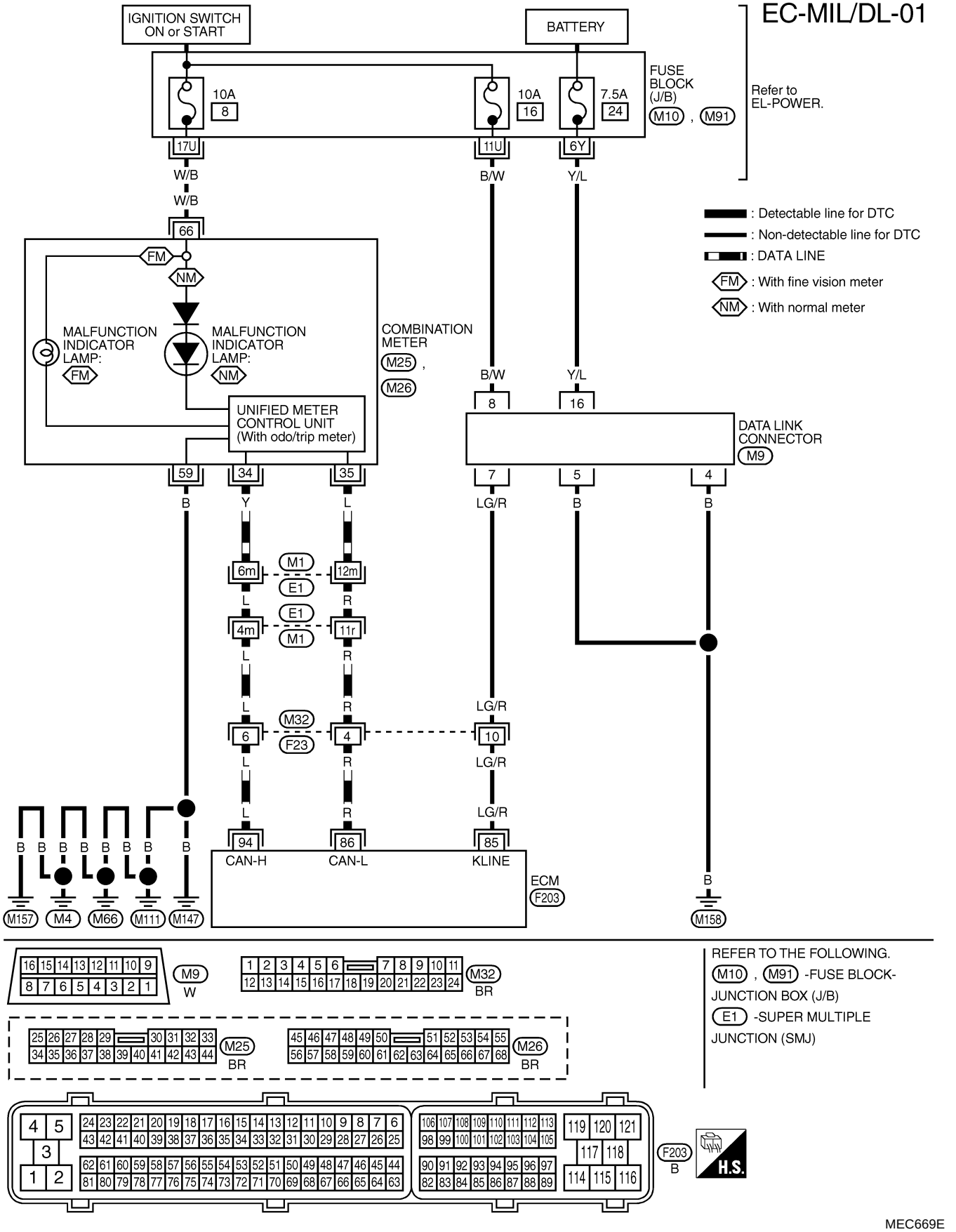
OK or NG	
OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Diode E121 ● Harness for open and short between ECM and headlamp LH relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

Wiring Diagram

NAEC0407



REFER TO THE FOLLOWING.
M10 , M91 -FUSE BLOCK-JUNCTION BOX (J/B)
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC669E

Fuel Pressure Regulator

NAEC0408

Condition	Fuel pressure at idling kPa (kg/cm^2, psi)
Vacuum hose is connected.	Approximately 235 (2.4, 34)
Vacuum hose is disconnected.	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NAEC0409

Target idle speed	No-load*1 (in P or N position)	M/T: 750±50 rpm A/T: 750±50 rpm
Air conditioner: ON	In P or N position	825 rpm or more
Ignition timing	In P or N position	15°±5° BTDC

*1: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NAEC1412

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.3V*
Mass air flow (Using CONSULT-II 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.

Engine Coolant Temperature Sensor

NAEC0412

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

NAEC0414

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Heated Oxygen Sensor 2 Heater

NAEC0422

Resistance [at 23°C (73°F)]	Approximately 11Ω

Fuel Pump

NAEC0415

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

Injector

NAEC0417

Resistance [at 10 - 60°C (50 - 140°F)]	13.5 - 17.3Ω

Calculated Load Value

NAEC0420

	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

Intake Air Temperature Sensor

NAEC0421

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

Fuel Tank Temperature Sensor

NAEC0424

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Crankshaft Position Sensor (POS)

NAEC1357

Refer to “Component Inspection”, EC-319.

Camshaft Position Sensor (PHASE)

NAEC1358

Refer to “Component Inspection”, EC-326.

NOTES