## **ENGINE CONTROL SYSTEM**

**ON BOARD DIAGNOSTIC SYSTEM** 



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### Alphabetical & P No. Index for DTC

Check if the vehicle is a model with the Euro-OBD (E-OBD) system or not by referring to the "Type approval number" on the identification plate. Refer to GI-40, "IDENTIFICATION PLATE".

Type approval number	Model
Available	With Euro-OBD system
Not available	Without Euro-OBD system

#### MODELS WITH EURO-OBD SYSTEM Alphabetical Index for DTC

NJEC0001S03 NJEC0001S0301

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Unable to access ECM	_	_	EC-154
AIR TEMP SEN/CIRC	P0110	0110	EC-194
A/T 1ST GR FNCTN	P0731	0731	AT-204
A/T 2ND GR FNCTN	P0732	0732	AT-211
A/T 3RD GR FNCTN	P0733	0733	AT-217
A/T 4TH GR FNCTN	P0734	0734	AT-223
A/T DIAG COMM LINE	P1605	1605	EC-434
ATF TEMP SEN/CIRC	P0710	0710	AT-189
CMP SEN/CIRCUIT	P0340	0340	EC-335
CLOSED TP SW/CIRC*7	P0510	0510	EC-385
COOLANT T SEN/CIRC*3	P0115	0115	EC-201
CKP SEN/CIRCUIT	P0335	0335	EC-328
CYL 1 MISFIRE	P0301	0301	EC-318
CYL 2 MISFIRE	P0302	0302	EC-318
CYL 3 MISFIRE	P0303	0303	EC-318
CYL 4 MISFIRE	P0304	0304	EC-318
ECM	P0605	0605	EC-391
EGR SYSTEM*7	P0400	0400	EC-343
EGR SYSTEM*7	P1402	1402	EC-425
EGR TEMP SEN/CIRC*7	P1401	1401	EC-418
EGR VOL CON/V CIR*7	P0403	0403	EC-352
ENGINE SPEED SIG	P0725	0725	AT-200
ENG OVER TEMP	P1217	1217	EC-406
FUEL SYS-LEAN/BK1	P0171	0171	EC-297
FUEL SYS-RICH/BK1	P0172	0172	EC-305
FUEL TEMP SEN/CIRC*7	P0180	0180	EC-313
HO2S1 HTR (B1)	P0135	0135	EC-252
HO2S1 (B1)	P0130	0130	EC-216

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იG

1	DT	C*6	
Items (CONSULT-II screen terms)	CONSULT-II GST*2	ECM*1*7	Reference page
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HO2S1 (B1)	P0133	0133	EC-236
HO2S1 (B1)	P0134	0134	EC-245
HO2S2 (B1)	P0137	0137	EC-258
HO2S2 (B1)	P0138	0138	EC-267
HO2S2 (B1)	P0139	0139	EC-275
HO2S2 (B1)	P0140	0140	EC-284
HO2S2 HTR (B1)	P0141	0141	EC-291
IACV/AAC VLV/CIRC	P0505	0505	EC-376
INT/V TIM V/CIR-B1	P1111	1111	EC-393
KNOCK SEN/CIRC-B1	P0325	0325	EC-324
L/PRESS SOL/CIRC	P0745	0745	AT-239
MAF SEN/CIRCUIT*3	P0100	0100	EC-187
MULTI CYL MISFIRE	P0300	0300	EC-318
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EL-430
NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED	_	0000	_
NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED	_	Flashing*5	EC-75
O/R CLTCH SOL/CIRC	P1760	1760	AT-268
PNP SW/CIRC	P0705	0705	AT-183
P-N POS SW/CIRCUIT	P1706	1706	EC-437
PURG VOLUME CONT/V	P0443	0443	EC-364
SFT SOL A/CIRC	P0750	0750	AT-246
SFT SOL B/CIRC	P0755	0755	AT-252
SWRL CONT SOL/V*7	P1131	1131	EC-399
TCC SOLENOID/CIRC	P0740	0740	AT-233
THRTL POS SEN/CIRC*3	P0120	0120	EC-207
TP SEN/CIRC A/T	P1705	1705	AT-258
TW CATALYST SYS-B1	P0420	0420	EC-359
VEH SPD SEN/CIR AT	P0720	0720	AT-195
VEH SPEED SEN/CIRC*4	P0500	0500	EC-370

\*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.

\*2: These numbers are prescribed by ISO 15031-6.

\*3: When the fail-safe operation occurs, the MI illuminates.

\*4: The MI illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

\*5: While engine is running.

\*6: 1st trip DTC No. is the same as DTC No.

### EC-12

CONSULT-II GST'2         ECM'1'7         CONSULT-II screen terms)         Reference page           -         -         Unable to access ECM         EC-154           -         Flashing'5         NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED.         EC-75           -         0000         MO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED.         -           P0100         0100         MAF SENCIRCUIT'3         EC-187           P0110         0110         AIR TEMP SENCIRC'         EC-201           P0120         0120         THRTL POS SENCIRC'3         EC-201           P0130         0130         HO2S1 (B1)         EC-236           P0132         0132         HO2S1 (B1)         EC-236           P0133         0131         HO2S1 (B1)         EC-236           P0134         0134         HO2S1 (B1)         EC-252           P0135         0135         HO2S1 (B1)         EC-256           P0138         0137         HO2S2 (B1)         EC-256           P0139         0139         HO2S2 (B1)         EC-276           P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-276           P0139         0139	DT	<sup>-</sup> C*6	Items	
-         Flashing*5         NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED.         EC-75           -         0000         PUTHER TESTING MAYBE REQUIRED.         -           P0100         0100         MAF SEN/CIRCUIT*3         EC-187           P0110         0110         AIR TEMP SEN/CIRC         EC-194           P0115         0115         COOLANT T SEN/CIRC*         EC-201           P0120         0120         THRTL POS SEN/CIRC*3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-230           P0132         0132         HO2S1 (B1)         EC-245           P0133         0133         HO2S1 (B1)         EC-252           P0133         0133         HO2S1 (B1)         EC-252           P0134         0134         HO2S2 (B1)         EC-252           P0135         0135         HO2S2 (B1)         EC-252           P0137         0137         HO2S2 (B1)         EC-275           P0138         0138         HO2S2 (B1)         EC-275           P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-271 </td <td></td> <td>ECM*1*7</td> <td></td> <td>Reference page</td>		ECM*1*7		Reference page
-         Pidsning's         FURTHER TESTING MAYBE REQUIRED.         EU'rs           -         0000         PURTHER TESTING MAYBE REQUIRED.         -           P0100         0100         MAF SEN/CIRCUIT'3         EC-187           P0110         0110         AIR TEMP SEN/CIRC         EC-194           P0115         0115         COOLANT T SEN/CIRC'3         EC-201           P0120         0120         THRTL POS SEN/CIRC'3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-230           P0132         0132         HO2S1 (B1)         EC-236           P0133         0133         HO2S1 (B1)         EC-245           P0133         0133         HO2S1 (B1)         EC-252           P0134         0134         HO2S2 (B1)         EC-267           P0135         0135         HO2S2 (B1)         EC-267           P0138         0138         HO2S2 (B1)         EC-267           P0139         0139         HO2S2 (B1)         EC-277           P0140         0140         HO2S2 (B1)         EC-267           P0139         0139         HO2S2 (B1)         EC-277	_	—	Unable to access ECM	EC-154
-         0000         FURTHER TESTING MAYBE REQUIRED.         -           P0100         0100         MAF SEN/CIRCUIT'3         EC-187           P0110         0110         AIR TEMP SEN/CIRC         EC-194           P0115         0115         COOLANT T SEN/CIRC'3         EC-201           P0120         0120         THRTL POS SEN/CIRC'3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-230           P0132         0132         HO2S1 (B1)         EC-236           P0133         0133         HO2S1 (B1)         EC-245           P0134         0134         HO2S1 (B1)         EC-256           P0135         0135         HO2S1 (B1)         EC-258           P0136         0137         HO2S2 (B1)         EC-267           P0137         0137         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-284           P0140         0140         HO2S2 (B1)         EC-297           P0141         0141         HO2S2 (B1)         EC-297           P0172         0172         FUEL SYS-LEAN/BK1         EC-318 <t< td=""><td>_</td><td>Flashing*5</td><td></td><td>EC-75</td></t<>	_	Flashing*5		EC-75
P0110         0110         AIR TEMP SEN/CIRC         EC-194           P0115         0115         COQLANT T SEN/CIRC*3         EC-201           P0120         0120         THRTL POS SEN/CIRC*3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-224           P0132         0132         HO2S1 (B1)         EC-230           P0133         0133         HO2S1 (B1)         EC-236           P0134         0134         HO2S1 (B1)         EC-245           P0135         0135         HO2S1 (B1)         EC-245           P0134         0134         HO2S2 (B1)         EC-252           P0137         0137         HO2S2 (B1)         EC-258           P0138         0138         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-291           P0141         0141         HO2S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P03	_	0000		_
P0115         0115         COOLANT T SEN/CIRC*3         EC-201           P0120         0120         THRTL POS SEN/CIRC*3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-224           P0132         0132         HO2S1 (B1)         EC-230           P0133         0133         HO2S1 (B1)         EC-236           P0134         0134         HO2S1 (B1)         EC-245           P0135         0136         HO2S1 (B1)         EC-236           P0134         0134         HO2S1 (B1)         EC-252           P0135         0135         HO2S1 (B1)         EC-267           P0136         0137         HO2S2 (B1)         EC-267           P0138         0138         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-291           P0141         0141         HO2S2 (B1)         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-316           P0301 </td <td>P0100</td> <td>0100</td> <td>MAF SEN/CIRCUIT*3</td> <td>EC-187</td>	P0100	0100	MAF SEN/CIRCUIT*3	EC-187
P0120         0120         THRL POS SEN/CIRC*3         EC-207           P0130         0130         HO2S1 (B1)         EC-216           P0131         0131         HO2S1 (B1)         EC-224           P0132         0132         HO2S1 (B1)         EC-230           P0133         0133         HO2S1 (B1)         EC-236           P0133         0133         HO2S1 (B1)         EC-245           P0134         0134         HO2S1 (B1)         EC-252           P0135         0135         HO2S1 (B1)         EC-258           P0137         0137         HO2S2 (B1)         EC-267           P0138         0138         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-291           P0141         0141         HO2S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 2 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303	P0110	0110	AIR TEMP SEN/CIRC	EC-194
P0130         0130         H02S1 (B1)         EC-216           P0131         0131         H02S1 (B1)         EC-224           P0132         0132         H02S1 (B1)         EC-230           P0133         0133         H02S1 (B1)         EC-236           P0134         0134         H02S1 (B1)         EC-245           P0135         0135         H02S1 (B1)         EC-252           P0137         0137         H02S2 (B1)         EC-267           P0138         0138         H02S2 (B1)         EC-275           P0140         0140         H02S2 (B1)         EC-291           P0141         0141         H02S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 3 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0115	0115	COOLANT T SEN/CIRC*3	EC-201
P0131         0131         H02S1 (B1)         EC-224           P0132         0132         H02S1 (B1)         EC-230           P0133         0133         H02S1 (B1)         EC-236           P0134         0134         H02S1 (B1)         EC-245           P0135         0135         H02S1 HTR (B1)         EC-252           P0136         0137         H02S2 (B1)         EC-258           P0138         0138         H02S2 (B1)         EC-267           P0139         0139         H02S2 (B1)         EC-275           P0140         0140         H02S2 (B1)         EC-291           P0141         0141         H02S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325	P0120	0120	THRTL POS SEN/CIRC*3	EC-207
P0132         0132         H02S1 (B1)         EC-230           P0133         0133         H02S1 (B1)         EC-236           P0134         0134         H02S1 (B1)         EC-245           P0135         0135         H02S1 (B1)         EC-252           P0137         0137         H02S2 (B1)         EC-258           P0138         0138         H02S2 (B1)         EC-267           P0139         0139         H02S2 (B1)         EC-275           P0140         0140         H02S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-318           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0130	0130	HO2S1 (B1)	EC-216
P0133         0133         HO2S1 (B1)         EC-236           P0134         0134         HO2S1 (B1)         EC-245           P0135         0135         HO2S1 (B1)         EC-252           P0137         0137         HO2S2 (B1)         EC-267           P0138         0138         HO2S2 (B1)         EC-267           P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0131	0131	HO2S1 (B1)	EC-224
P0134         0134         H02S1 (B1)         EC-245           P0135         0135         H02S1 HTR (B1)         EC-252           P0137         0137         H02S2 (B1)         EC-258           P0138         0138         H02S2 (B1)         EC-267           P0139         0139         H02S2 (B1)         EC-275           P0140         0140         H02S2 (B1)         EC-284           P0141         0141         H02S2 (B1)         EC-297           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0132	0132	HO2S1 (B1)	EC-230
P0135         0135         HO2S1 HTR (B1)         EC-252           P0137         0137         HO2S2 (B1)         EC-258           P0138         0138         HO2S2 (B1)         EC-267           P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-284           P0141         0141         HO2S2 HTR (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0133	0133	HO2S1 (B1)	EC-236
P0137         0137         H02S2 (B1)         EC-258           P0138         0138         H02S2 (B1)         EC-267           P0139         0139         H02S2 (B1)         EC-275           P0140         0140         H02S2 (B1)         EC-284           P0141         0141         H02S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0134	0134	HO2S1 (B1)	EC-245
P0138         0138         HO2S2 (B1)         EC-267           P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-284           P0141         0141         HO2S2 HTR (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0135	0135	HO2S1 HTR (B1)	EC-252
P0139         0139         HO2S2 (B1)         EC-275           P0140         0140         HO2S2 (B1)         EC-284           P0141         0141         HO2S2 (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318	P0137	0137	HO2S2 (B1)	EC-258
P0140         0140         HO2S2 (B1)         EC-284           P0141         0141         HO2S2 HTR (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0138	0138	HO2S2 (B1)	EC-267
P0141         0141         HO2S2 HTR (B1)         EC-291           P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0139	0139	HO2S2 (B1)	EC-275
P0171         0171         FUEL SYS-LEAN/BK1         EC-297           P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0140	0140	HO2S2 (B1)	EC-284
P0172         0172         FUEL SYS-RICH/BK1         EC-305           P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0141	0141	HO2S2 HTR (B1)	EC-291
P0180         0180         FUEL TEMP SEN/CIRC*7         EC-313           P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0171	0171	FUEL SYS-LEAN/BK1	EC-297
P0300         0300         MULTI CYL MISFIRE         EC-318           P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0172	0172	FUEL SYS-RICH/BK1	EC-305
P0301         0301         CYL 1 MISFIRE         EC-318           P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0180	0180	FUEL TEMP SEN/CIRC*7	EC-313
P0302         0302         CYL 2 MISFIRE         EC-318           P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0300	0300	MULTI CYL MISFIRE	EC-318
P0303         0303         CYL 3 MISFIRE         EC-318           P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0301	0301	CYL 1 MISFIRE	EC-318
P0304         0304         CYL 4 MISFIRE         EC-318           P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0302	0302	CYL 2 MISFIRE	EC-318
P0325         0325         KNOCK SEN/CIRC-B1         EC-324	P0303	0303	CYL 3 MISFIRE	EC-318
	P0304	0304	CYL 4 MISFIRE	EC-318
P0335         0335         CKP SEN/CIRCUIT         EC-328	P0325	0325	KNOCK SEN/CIRC-B1	EC-324
	P0335	0335	CKP SEN/CIRCUIT	EC-328
P0340         0340         CMP SEN/CIRCUIT         EC-335	P0340	0340	CMP SEN/CIRCUIT	EC-335
P0400 0400 EGR SYSTEM*7 EC-343	P0400	0400	EGR SYSTEM*7	EC-343
P0403         0403         EGR VOL CON/V CIR*7         EC-352	P0403	0403	EGR VOL CON/V CIR*7	EC-352
P0420         0420         TW CATALYST SYS-B1         EC-359	P0420	0420	TW CATALYST SYS-B1	EC-359
P0443         0443         PURG VOLUME CONT/V         EC-364	P0443	0443	PURG VOLUME CONT/V	EC-364

**TROUBLE DIAGNOSIS — INDEX** 

Т

Alphabetical & P No. Index for DTC (Cont'd)

\*7: If so equipped

P No. Index for DTC

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## **TROUBLE DIAGNOSIS — INDEX**

Alphabetical & P No. Index for DTC (Cont'd)

OG

DTC	C*6	Items	
CONSULT-II GST*2	ECM*1*7	(CONSULT-II screen terms)	Reference page
P0500	0500	VEH SPEED SEN/CIRC*4	EC-370
P0505	0505	IACV/AAC VLV/CIRC	EC-376
P0510	0510	CLOSED TP SW/CIRC*7	EC-385
P0605	0605	ECM	EC-391
P0705	0705	PNP SW/CIRC	AT-183
P0710	0710	ATF TEMP SEN/CIRC	AT-189
P0720	0720	VEH SPD SEN/CIR AT	AT-195
P0725	0725	ENGINE SPEED SIG	AT-200
P0731	0731	A/T 1ST GR FNCTN	AT-204
P0732	0732	A/T 2ND GR FNCTN	AT-211
P0733	0733	A/T 3RD GR FNCTN	AT-217
P0734	0734	A/T 4TH GR FNCTN	AT-223
P0740	0740	TCC SOLENOID/CIRC	AT-233
P0745	0745	L/PRESS SOL/CIRC	AT-239
P0750	0750	SFT SOL A/CIRC	AT-246
P0755	0755	SFT SOL B/CIRC	AT-252
P1111	1111	INT/V TIM V/CIR-B1	EC-393
P1131	1131	SWRL CONT SOL/V*7	EC-399
P1217	1217	ENG OVER TEMP	EC-406
P1401	1401	EGR TEMP SEN/CIRC*7	EC-418
P1402	1402	EGR SYSTEM*7	EC-425
P1605	1605	A/T DIAG COMM LINE	EC-434
P1610 - 1615	1610 - 1615	NATS MALFUNCTION	EL-430
P1705	1705	TP SEN/CIRC A/T	AT-258
P1706	1706	P-N POS SW/CIRCUIT	EC-437
P1760	1760	O/R CLTCH SOL/CIRC	AT-268

\*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.

\*2: These numbers are prescribed by ISO 15031-6

\*3: When the fail-safe operation occurs, the MI illuminates.

\*4: The MI illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

\*5: While engine is running.

\*6: 1st trip DTC No. is the same as DTC No.

\*7: If so equipped

Alphabetical & P No. Index for DTC (Cont'd)

### MODELS WITHOUT EURO-OBD SYSTEM Alphabetical Index for DTC

	DTC*6		
Items (CONSULT-II screen terms)	CONSULT-II GST*2	ECM*1	Reference page
Unable to access ECM	_	_	EC-154
CKP SEN/CIRCUIT	P0335	0335	EC-328
CMP SEN/CIRCUIT	P0340	0340	EC-335
COOLANT T SEN/CIRC*3	P0115	0115	EC-201
ENG OVER TEMP	P1217	1217	EC-406
HO2S1 (B1)	P0130	0130	EC-216
KNOCK SEN/CIRC-B1	P0325	0325	EC-324
MAF SEN/CIRCUIT*3	P0100	0100	EC-187
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EL-430
NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED	_	0000	_
NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED	_	Flashing*5	EC-75
THRTL POS SEN/CIRC*3	P0120	0120	EC-207
VEH SPEED SEN/CIRC*4	P0500	0500	EC-370

\*1: In Diagnostic Test Mode II (Self-diagnostic results) (If so equipped). These numbers are controlled by NISSAN.

\*2: These numbers are prescribed by ISO 15031-6.

\*3: When the fail-safe operation occurs, the MI illuminates.

\*4: The MI illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

\*5: While engine is running.

\*6: 1st trip DTC No. is the same as DTC No.

### P No. Index for DTC

DTC*6		lterre		
CONSULT-II GST*2	ECM*1	- Items (CONSULT-II screen terms)	Reference page	
_	—	Unable to access ECM	EC-154	
_	Flashing*5	NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED.	EC-75	
_	0000	NO DTC IS DETECTED. FURTHER TESTING MAYBE REQUIRED.	_	
P0100	0100	MAF SEN/CIRCUIT*3	EC-187	
P0115	0115	COOLANT T SEN/CIRC*3	EC-201	
P0120	0120	THRTL POS SEN/CIRC*3	EC-207	
P0130	0130	HO2S1 (B1)	EC-216	
P0325	0325	KNOCK SEN/CIRC-B1	EC-324	
P0335	0335	CKP SEN/CIRCUIT	EC-328	
P0340	0340	CMP SEN/CIRCUIT	EC-335	
P0500	0500	VEH SPEED SEN/CIRC*4	EC-370	

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## **TROUBLE DIAGNOSIS — INDEX**

Alphabetical & P No. Index for DTC (Cont'd)

OG

DTC*6		ltomo	
CONSULT-II GST*2	ECM*1	Items (CONSULT-II screen terms)	Reference page
P1217	1217	ENG OVER TEMP	EC-406
P1610 - 1615	1610 - 1615	NATS MALFUNCTION	EL-430

\*1: In Diagnostic Test Mode II (Self-diagnostic results) (If so equipped). These numbers are controlled by NISSAN.

\*2: These numbers are prescribed by ISO 15031-6

\*3: When the fail-safe operation occurs, the MI illuminates.

\*4: The MI illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

\*5: While engine is running.

\*6: 1st trip DTC No. is the same as DTC No.

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

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL N16 is as follows (The composition varies according to the destination and optional equipment.):

• 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), front seat belt pre-tensioners, a diagnoses sensor unit, warning lamp, wiring harness and spiral cable.

• For a side collision

The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), side air bag (satellite) sensor, diagnoses 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 should 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, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harness can be identified by yellow harness connector.

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

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

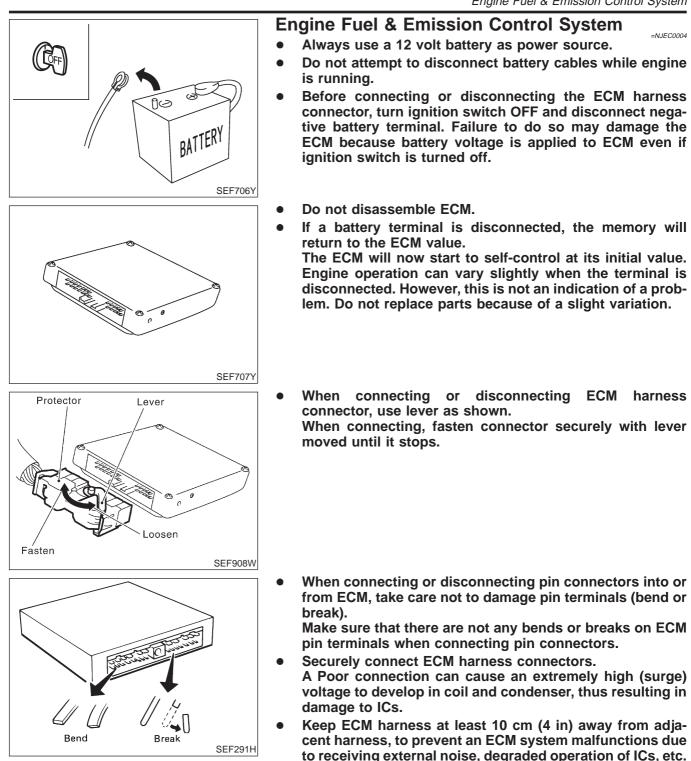
#### **CAUTION:**

- 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 MI to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI 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 slidelocking type harness connector. For description and how to disconnect, refer to EL section, "Description", "HARNESS CONNEC-TOR".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI 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 MI to light up due to the malfunction of 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.

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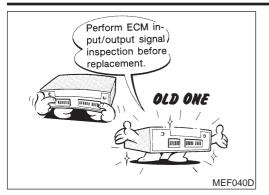
Engine Fuel & Emission Control System

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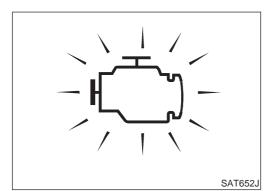


Keep ECM parts and harness dry.

#### Engine Fuel & Emission Control System (Cont'd)

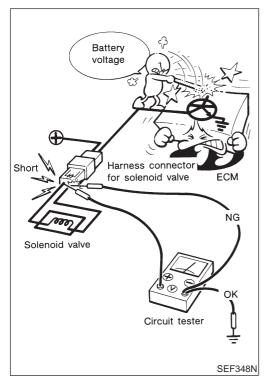


- Handle mass air flow sensor carefully to avoid damage.
  - Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IAC valve-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor and crankshaft position sensor.
- Before replacing ECM, perform refer to "ECM Terminals and Reference Value" inspection and make sure ECM functions properly, EC-164.



• After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".

The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.

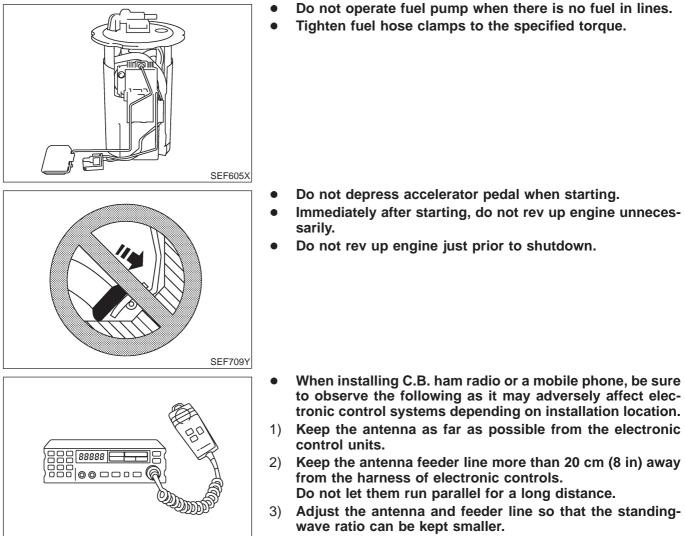


- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's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

Engine Fuel & Emission Control System (Cont'd)

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4) Be sure to ground the radio to vehicle body.

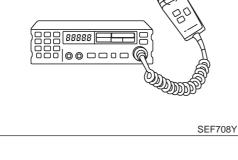
### Wiring Diagrams and Trouble Diagnosis

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-10, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-31, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-21, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"



## PREPARATION

Special Service Tools

**Special Service Tools** 

	Special Service	F TOOIS NJEC0007
Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	NT379	Loosening or tightening heated oxygen sensor 1 (front) with 22 mm hexagon nut
KV10114400 Heated oxygen sensor wrench	NT636	Loosening or tightening heated oxygen sensor 2 (rear) a: 22 mm

## **Commercial Service Tools**

Tool name	Description	
Fuel filler cap adapter		Checking fuel tank vacuum relief valve opening pressure
	NT653	
Oxygen sensor thread cleaner	a Mating surface shave cylinder	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm dia. with pitch 1.5 mm, for Zirconia Oxygen Sensor b: 12 mm dia. with pitch 1.25 mm, for Titania Oxygen Sensor
	NT778	
Anti-seize lubricant (Per- matex <sup>TM</sup> 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.
	NT779	

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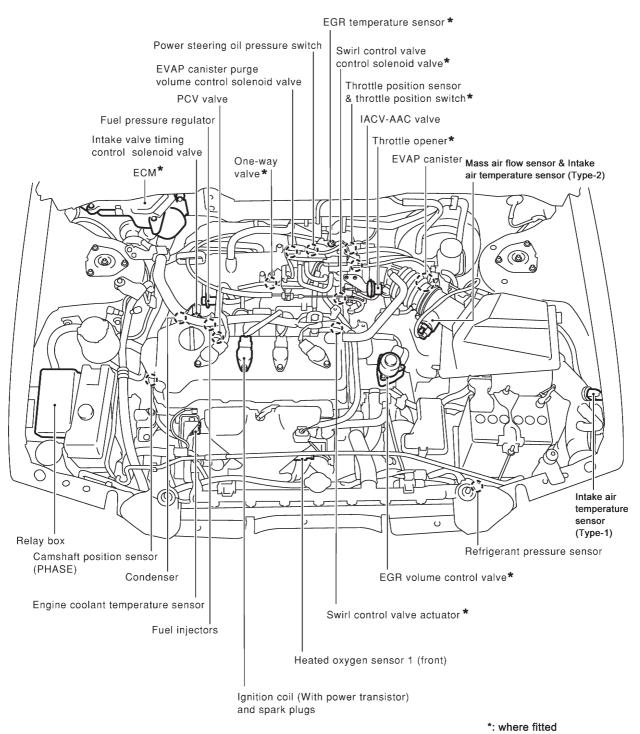
Engine Control Component Parts Location

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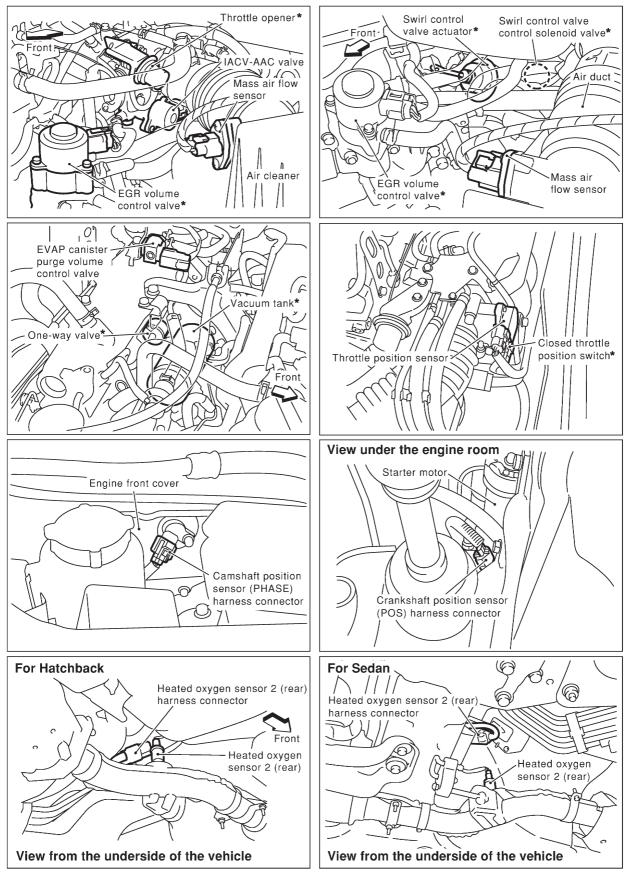
### Engine Control Component Parts Location

For more details of ECM location, refer to "ELECTRICAL UNIT LOCATION" in EL section (EL-517).



View with engine cover removed

Engine Control Component Parts Location (Cont'd)

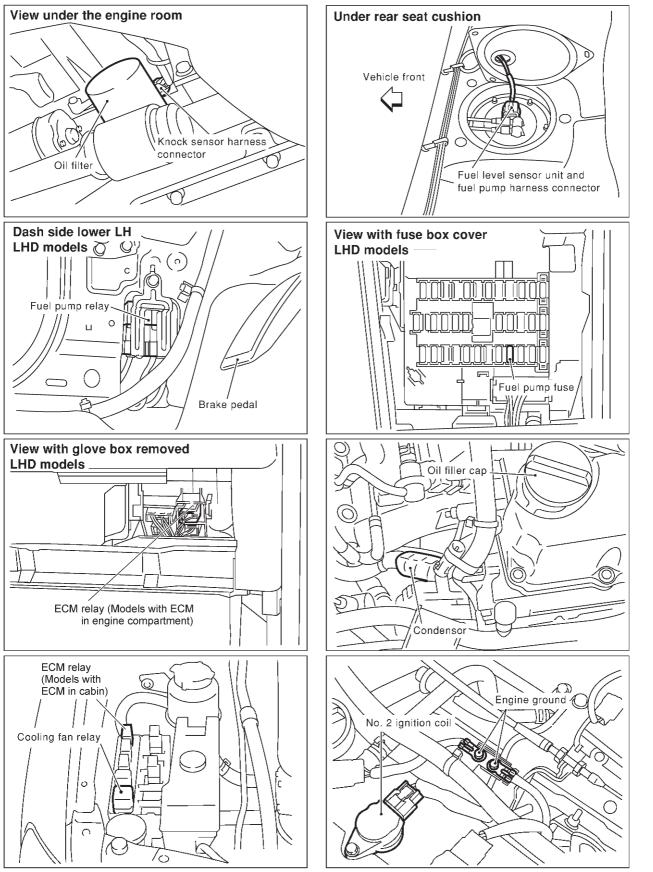


\*: where fitted NEF325A

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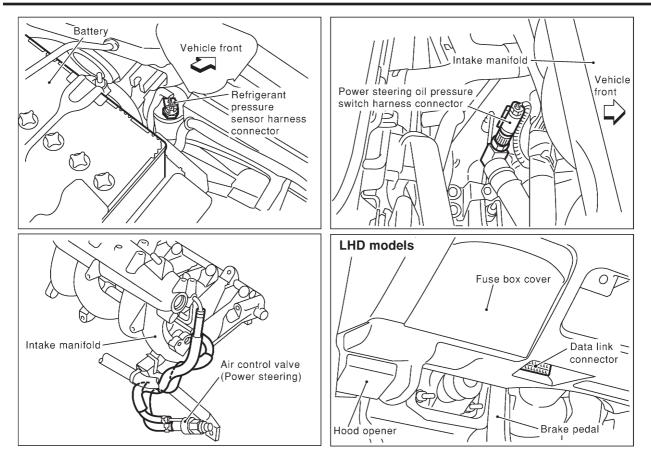
Engine Control Component Parts Location (Cont'd)

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Engine Control Component Parts Location (Cont'd)



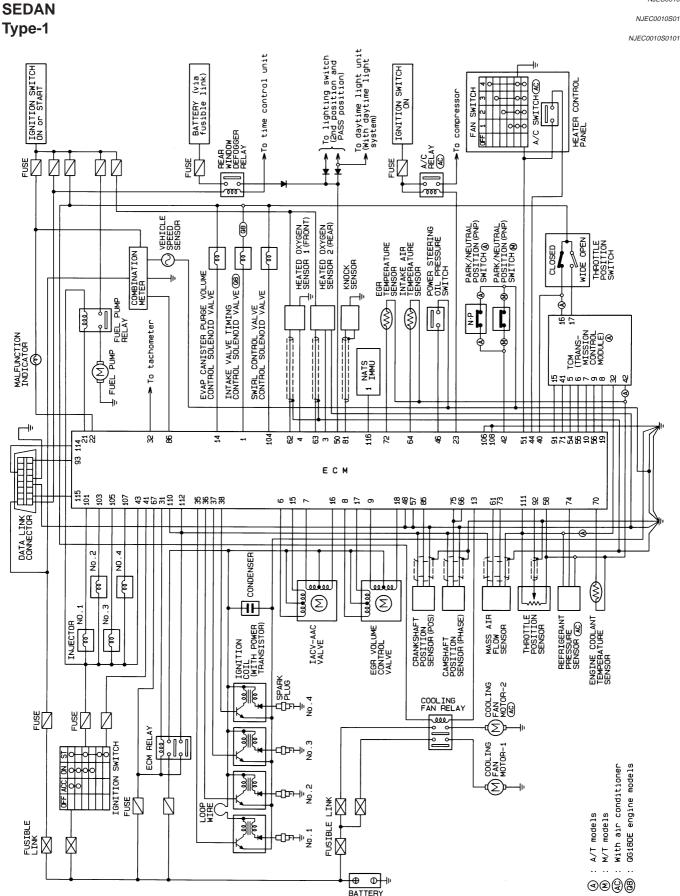
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QG Circuit Diagram



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Type-2 To daytime light unit (With daytime light system) ★To time control unit To lighting switch (2nd position and PASS position) IGNITION SWITCH ON OF START IGNITION SWITCH (via link) HEATER CONTROL PANEL 
 FAN SWITCH

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 A/C SWITCH AC ★To compressor BATTERY fusible 9 ODEFOGGER ¥ Contraction of the second seco Ø Ø ά¢ ЩŲ ШĻ . 1990 6 HEATED 0XYGEN SENSOR 1 (FRONT) PARK/NEUTRAL POSITION (PNP) SWITCH @ PARK/NEUTRAL POSITION (PNP) SWITCH @ ₿ HEATED OXYGEN SENSOR 2 (REAR) EGR TEMPERATURE SENSOR ENGINE COOLANT TEMPERATURE SENSOR POWER STEERING OIL PRESSURE SWITCH WIDE OPEN THROTTLE POSITION SWITCH @ INTAKE VALVE TIMING CONTROL SOLENOID VALVE (B) 700 E CLOSED COMBINATION METER KNOCK SENSOR EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [ Ĵ  $\square$ Г -11 B 16 17 To tachometer TCM (TRANS-MISSION CONTROL MODULE) @ MALFUNCTION INDICATOR ¢ FUEL PUMP 1 NATS I IMMU 4500×08 X 4 ŋ ģ Ľ ភស R 8 14 4 8 ы В 116 72 ß 999 244 95222568d 8.5 R 岛 4 -ECM 115 101 103 105 107 43 43 43 43 43 110 112 \*\*\*\* 1<u>5</u> 10 99 49 kg £18 £ 8 1 36 111 88 74 σ 2 DATA LINK / CONNECTOR / -0 No . 2 NO.4 CONDENSER k Ę INTAKE AIR TEMPERATURE \* E. ON MO.3 INJECTOR THROTTLE POSITION SENSOR CAMSHAFT POSITION SENSOR (PHASE) CRANKSHAFT POSITION SENSOR (POS) REFRIGERANT PRESSURE SENSOR (AC) IGNITION COIL (WITH POWER TRANSISTOR) IACV-AAC VALVE EGR VOLUME CONTROL VALVE MASS AIR FLOW SENSOR SPARK PLUG . Me 년 나 MOTOR-2 зя́Д <u>المع</u>  $\square$ ECM RELAY COOLING FAN RELAY . ۲ IGNITION SWITCH ۳. ۳₽ 0000 BL Ð COOLING FAN MOTOR-1 . ╝┲╍┤┉<sub>ᢓ</sub>

With air conditioner GG18DE engine models A/T models M/T models .. ..

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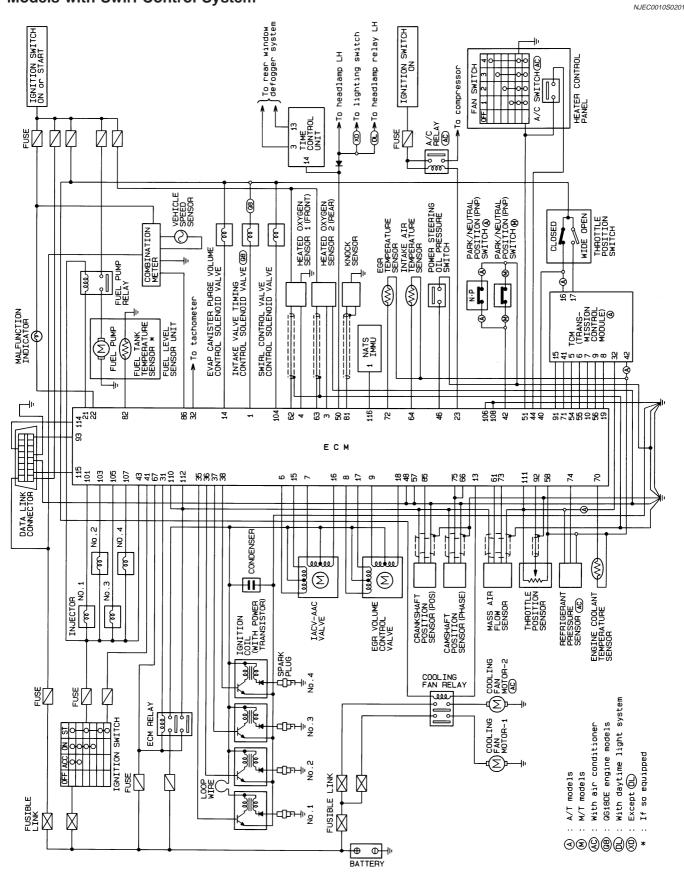
BATTERY

QG

NJEC0010S02

HATCHBACK

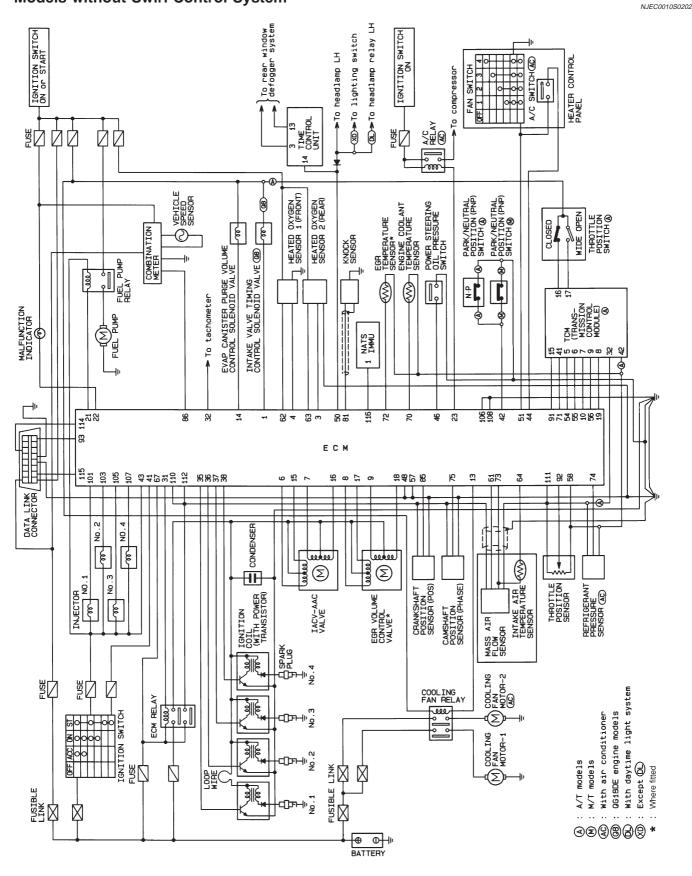
Models with Swirl Control System



HEC896

Circuit Diagram (Cont'd)

#### Models without Swirl Control System

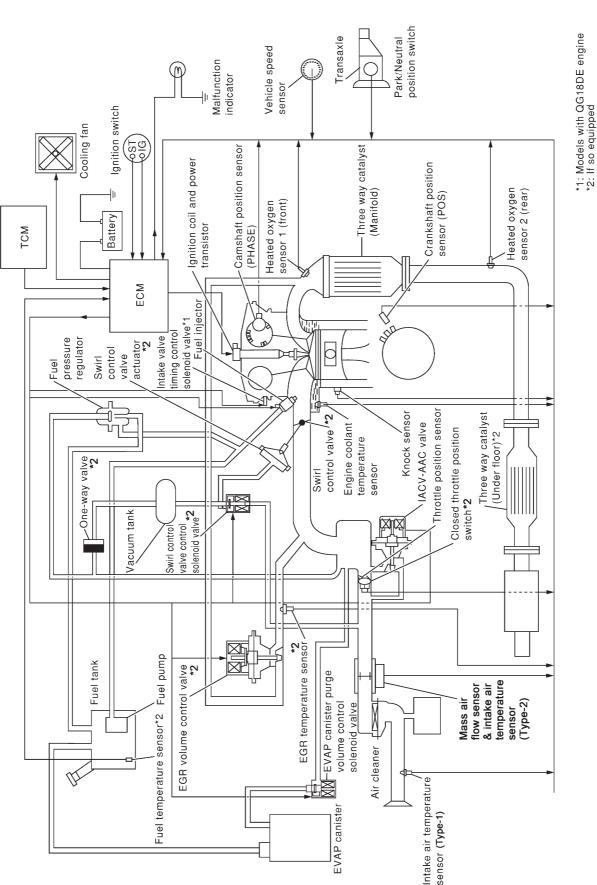


NEF327A

QG

## System Diagram



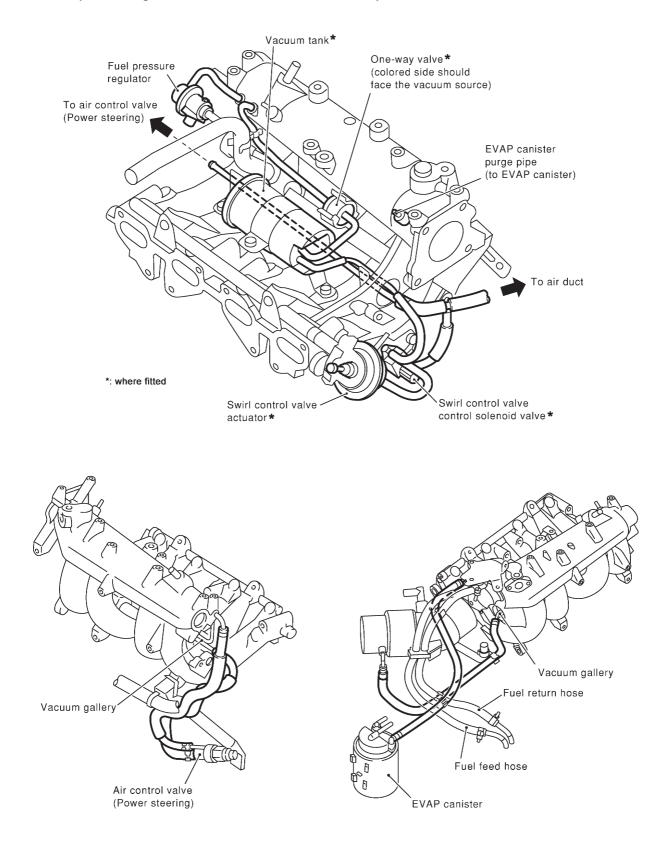


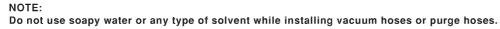
NEF328A

Vacuum Hose Drawing

## Vacuum Hose Drawing

Refer to "System Diagram" on EC-29 for vacuum control system.





EC-30

QG

NJEC0012

QG System Chart

## **System Chart**

	System Chart	NJEC0013
Input (Sensor)	ECM Function	Output (Actuator)
Camshaft position sensor (PHASE)	Fuel injection & mixture ratio control	Injectors
<ul><li>Crankshaft position sensor (POS)</li><li>Mass air flow sensor</li></ul>	Electronic ignition system	Power transistor
<ul> <li>Engine coolant temperature sensor</li> <li>Heated oxygen sensor 1 (front)</li> </ul>	Idle air control system	IACV-AAC valve
<ul><li>Ignition switch</li><li>Throttle position sensor</li></ul>	Intake valve timing control	Intake valve timing control sole- noid valve
<ul><li> PNP switch</li><li> Air conditioner switch</li></ul>	Fuel pump control	Fuel pump relay
<ul> <li>Knock sensor</li> <li>EGR temperature sensor*1, *4</li> <li>Fuel tank temperature sensor*1, *4</li> </ul>	On board diagnostic system	Malfunction indicator (On the instrument panel)
Battery voltage	EGR control*4	EGR volume control valve*4
<ul><li>Power steering oil pressure switch</li><li>Vehicle speed sensor</li><li>Intake air temperature sensor</li></ul>	Heated oxygen sensor 1/2 heater (front/ rear) control	Heated oxygen sensor 1/2 heater (front/rear)
<ul> <li>Heated oxygen sensor 2 (rear)*2</li> <li>TCM (Transmission Control Module)*3</li> <li>Closed throttle position switch</li> </ul>	EVAP canister purge flow control	EVAP canister purge volume con- trol solenoid valve
Electrical load	Cooling fan control	Cooling fan relay
Refrigerant pressure sensor	Air conditioning cut control	Air conditioner relay
	Swirl control valve control*4	Swirl control valve control sole- noid*4

\*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

\*2: Under normal conditions, this sensor is not for engine control operation.

\*3: The DTC related to A/T will be sent to ECM.

\*4: If so equipped

## ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Multiport Fuel Injection (MFI) System

## Multiport Fuel Injection (MFI) System

#### DESCRIPTION Input/Output Signal Chart

NJEC0014

			NJEC0014S01		
Sensor	Input Signal to ECM	ECM func- tion	Actuator		
Crankshaft position sensor (POS)	Engine speed				
Camshaft position sensor (PHASE)	Engine speed and cylinder number				
Mass air flow sensor	Amount of intake air				
Engine coolant temperature sensor	Engine coolant temperature				
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas				
Throttle position sensor	Throttle position Throttle valve idle position	Fuel injec- tion & mix- ture ratio control			
PNP switch	Gear position				
Vehicle speed sensor	Vehicle speed		Injector		
Ignition switch	Start signal				
Air conditioner switch	Air conditioner operation				
Knock sensor	Engine knocking condition				
Electrical load	Electrical load signal				
Battery	Battery voltage				
Power steering oil pressure switch	Power steering operation				
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas				

\* Under normal conditions, this sensor is not for engine control operation.

#### **Basic Multiport Fuel Injection System**

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 camshaft position sensor and the mass air flow sensor.

#### Various Fuel Injection Increase/Decrease Compensation

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

<Fuel increase>

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

<Fuel decrease>

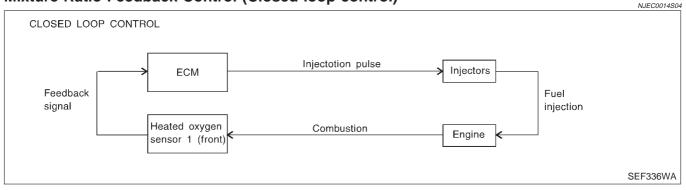
- During deceleration
- During high engine speed operation
- During high vehicle speed operation (M/T models)
- Extremely high engine coolant temperature

## ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Multiport Fuel Injection (MFI) System (Cont'd,

QG

#### Mixture Ratio Feedback Control (Closed loop control)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if 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 (front), refer to EC-216. 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 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

#### **Open Loop Control**

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

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

#### Mixture Ratio Self-learning Control

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). 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 film) 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 (front) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

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

## ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION QG

Multiport Fuel Injection (MFI) System (Cont'd)

#### **Fuel Injection Timing**

	NJEC0014S0
Sequential multiport fuel injection system	<ul> <li>Simultaneous multiport fuel injection system</li> </ul>
No. 1 cylinder	No. 1 cylinder
No. 2 cylinder	No. 2 cylinder
No. 3 cylinder	No. 3 cylinder
No. 4 cylinder1 engine cycle	No. 4 cylinder

Two types of systems are used.

#### Sequential Multiport Fuel Injection System

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

#### Simultaneous Multiport Fuel Injection System

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

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

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

#### **Fuel Shut-off**

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

## **Electronic Ignition (EI) System**

### DESCRIPTION Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM func- tion	Actuator	
Crankshaft position sensor (POS)	Engine speed			
Camshaft position sensor (PHASE)	Engine speed and cylinder number	-		
Mass air flow sensor	Amount of intake air	-		
Engine coolant temperature sensor	Engine coolant temperature	-		
Throttle position sensor	Throttle position Throttle valve idle position	Ignition tim-	Power transistor	
Vehicle speed sensor	Vehicle speed	ing control		
Ignition switch	Start signal	-		
Knock sensor	Engine knocking			
PNP switch	Gear position	-		
Battery	Battery voltage			

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

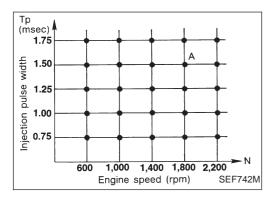
Electronic Ignition (EI) System (Cont'd)

#### **System Description**

NJEC0015S02

NJEC0016

NJEC0016S02



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 above. The ECM receives information such as the injection pulse width, crankshaft position sensor signal 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
- 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

			NJEC0016S01
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Air conditioner switch	Air conditioner "ON" signal		Air conditioner relay
PNP switch	Neutral position		
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS)	Engine speed	Air condi-	
Engine coolant temperature sensor	Engine coolant temperature	tioner cut	
Ignition switch	Start signal	control	
Refrigerant pressure sensor	Refrigerant pressure		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

#### **System Description**

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

- When the accelerator pedal is fully depressed.
- When cranking the engine.

## ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION QG

Air Conditioning Cut Control (Cont'd)

- 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 the refrigerant pressure is excessively high or low.

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

### DESCRIPTION Input/Output Signal Chart

NJEC0017

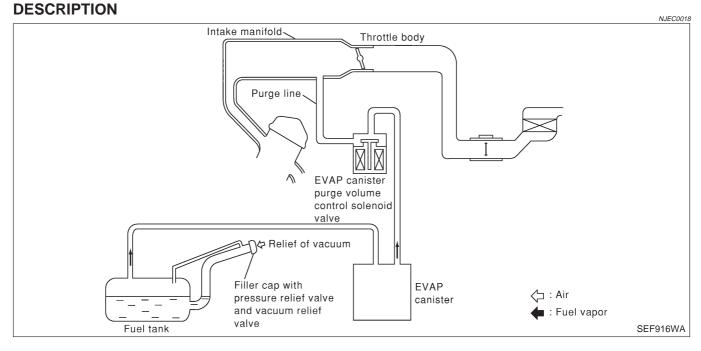
			NJEC0017S01
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder number		

If the engine speed is above 3,950 rpm with no load, (for example, in Neutral and engine speed over 4,000 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 operate until the engine speed reaches 1,150 rpm, then fuel cut is cancelled.

#### NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-32.

## **Evaporative Emission System**



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.

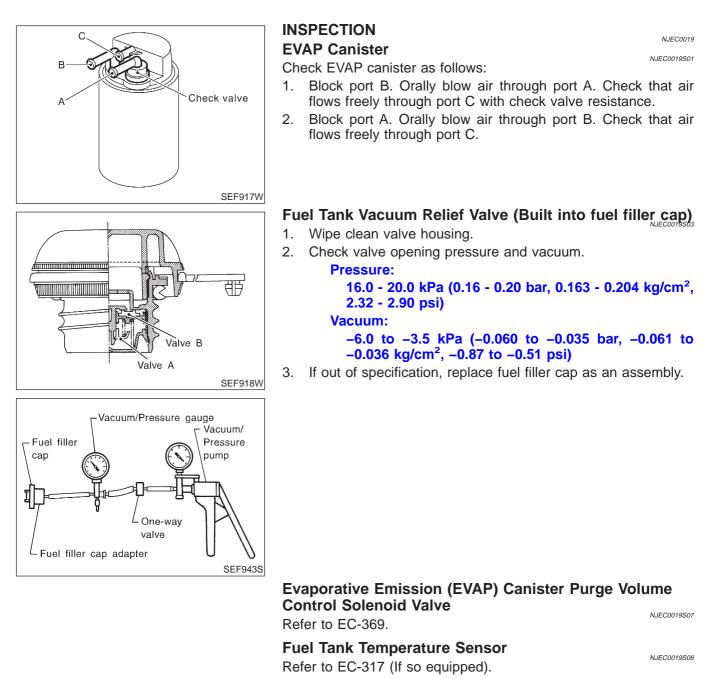
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating.

# ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION QG

Evaporative Emission System (Cont'd)

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.



# Checking EVAP Vapour Lines

- Visually inspect vapor lines for leaks, cracks, damage, loose connections, chafing and deterioration.
- 2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc. Refer to next page.

# ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

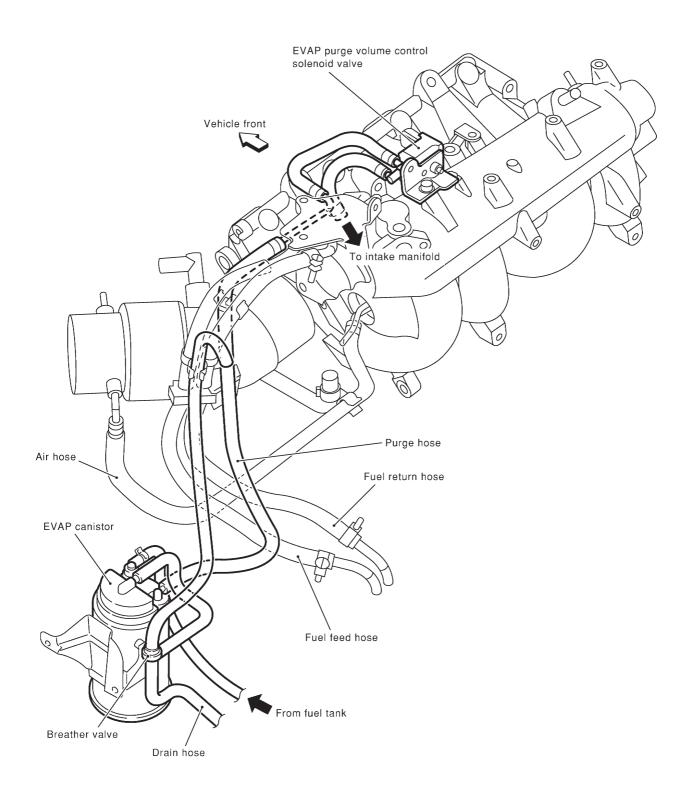
Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

NOTE:

NJEC0020

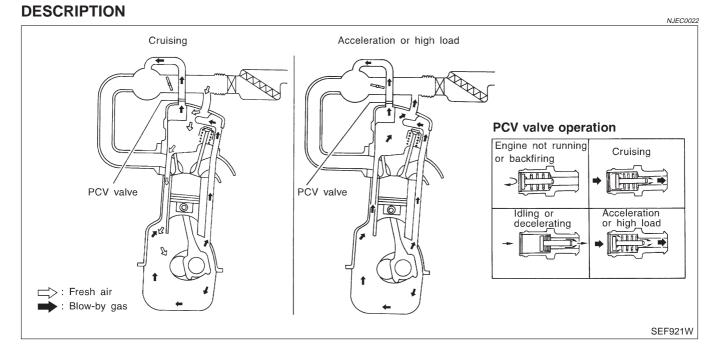
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.



# ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION QG

Positive Crankcase Ventilation

# **Positive Crankcase Ventilation**



This system returns blow-by gas to the intake collector.

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 duct 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 intake collector under all conditions.

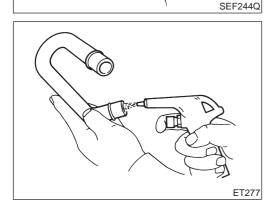
# INSPECTION

#### PCV (Positive Crankcase Ventilation) Valve

NJEC0023

NJEC0023S02

With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.



#### Ventilation Hose

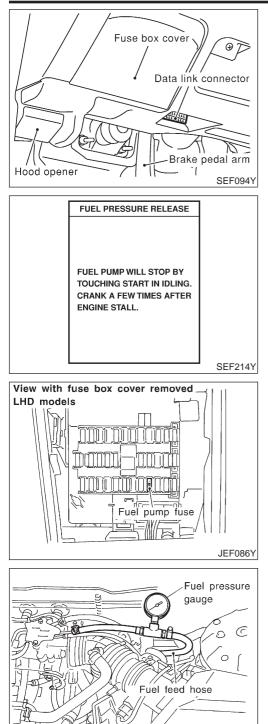
2.

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





NJEC0024S01



# Fuel Pressure Release

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

# B WITH CONSULT-II

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

# **WITHOUT CONSULT-II**

- Remove fuse for fuel pump. Refer to fuse block cover for fuse location.
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF and reconnect fuel pump fuse.

# **Fuel Pressure Check**

- 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 system operating. Fuel pressure gauge may indicate false readings.
- 1. Release fuel pressure to zero.
- 2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
- 3. Install pressure gauge between fuel filter and fuel tube.
- 4. Start engine and check for fuel leakage.
- 5. Read the indication of fuel pressure gauge.

At idle speed:

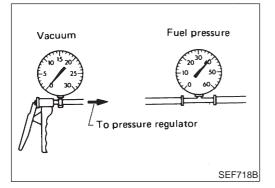
JEF087Y

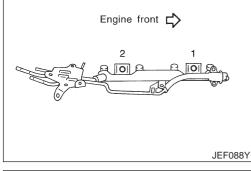
#### With vacuum hose connected

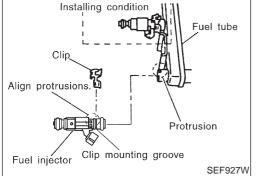
- Approximately 235 kPa (2.35 bar, 2.4 kg/cm<sup>2</sup>, 34 psi)
- With vacuum hose disconnected
  - Approximately 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)

N.IEC0027

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-41.







# **Fuel Pressure Regulator Check**

- 1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
- 2. Plug intake manifold with a rubber 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

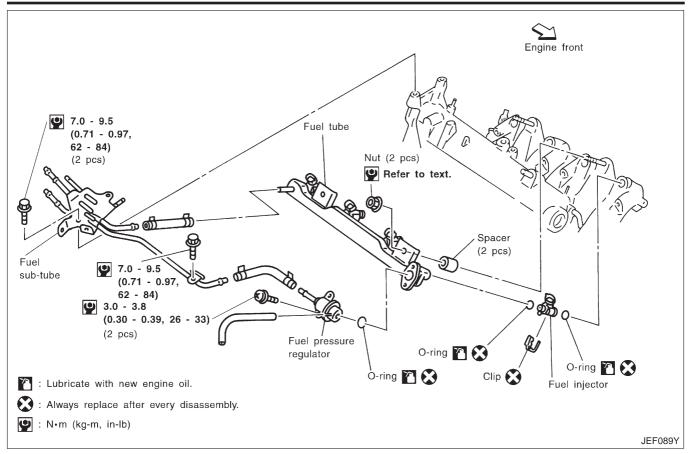
# **REMOVAL AND INSTALLATION**

- 1. Release fuel pressure to zero.
- 2. Remove fuel tube assemblies in numerical sequence as shown in the Figure at left.
- 3. Expand and remove clips securing fuel injectors.
- 4. Extract fuel injectors straight from fuel tubes.
- Be careful not to damage injector nozzles during removal.
- Do not bump or drop fuel injectors.
- 5. Install fuel injectors.

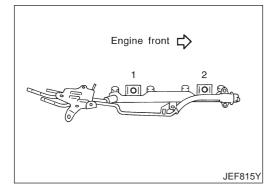
Carefully install O-rings, including the one used with the pressure regulator.

- Lubricate O-rings with a smear of engine oil.
- Be careful not to damage O-rings with service tools or finger nails or clips. Do not expand or twist O-rings.
- Discard old clips; replace with new ones.
- 6. Position clips in grooves on fuel injectors.
- Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.





- 7. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
- 8. 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.



9. 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:
 12 - 13 (1.2 - 1.4, 9 - 10)
 2nd stage:
 17 - 23 (1.7 - 2.4, 13 - 17)

10. Insert fuel hoses into fuel tubes so that ends of fuel hoses butt up against fuel tubes; fasten with clamps, avoiding bulges.

#### **CAUTION:**

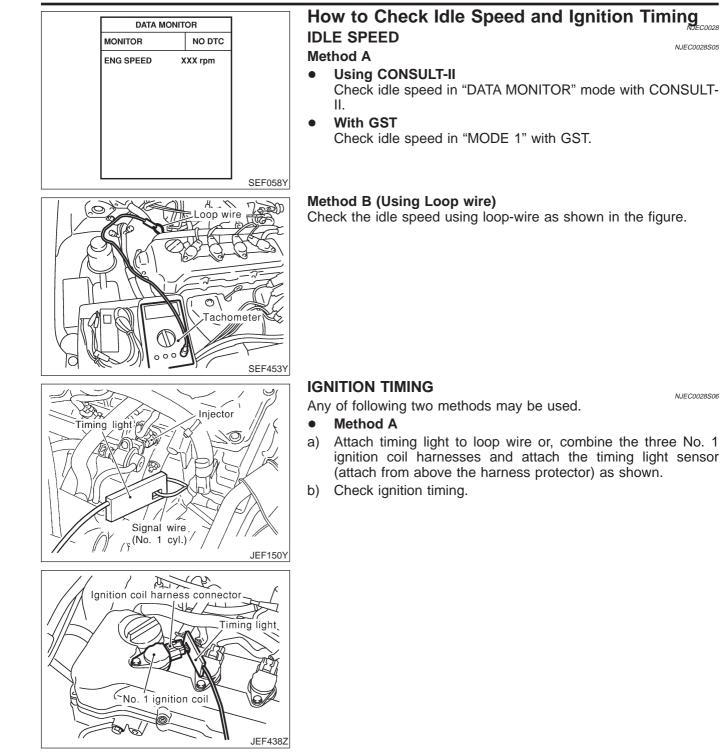
After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.

How to Check Idle Speed and Ignition Timing

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NJEC0028S05

NJEC0028S06



How to Check Idle Speed and Ignition Timing (Cont'd)

-No. 1 ignition coil

Timing light

Suitable high-tension wire |\_

SEF933W

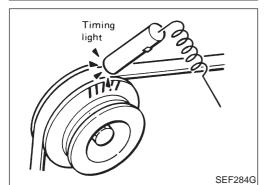
• Method B

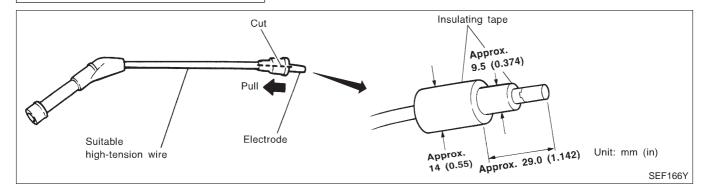
> Remove No. 1 ignition coil. a)

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.

QG

c) Check ignition timing.





# **Preparation**

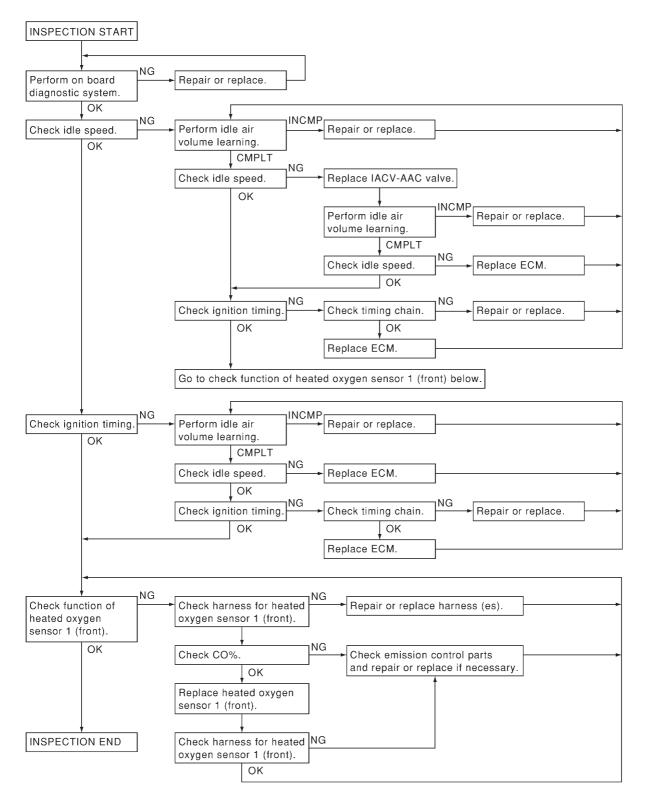
- Make sure that the following parts are in good order. ۲
- a) Battery
- b) Ignition system
- c) Engine oil and coolant levels
- d) Fuses
- e) ECM harness connector
- f) Vacuum hoses
- g) Air intake system (Oil filler cap, oil level gauge, etc.)

# **EC-44**

- h) Fuel pressure
- i) Engine compression
- j) EGR valve operation
- k) Throttle valve
- I) EVAP system
- On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
- When checking idle speed on models equipped with A/T, ignition timing and mixture ratio, checks should be carried out while shift lever is in "P" or "N" position.
- When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower, rear window defogger.
- On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Keep front wheels pointed straight ahead.
- If engine stops immediately after starting or idle condition is unstable, perform the following to initialize IACV-AAC valve:
- a) Stop engine and wait 9 seconds.
- b) Turn ignition "ON" and wait 1 second.
- c) Turn ignition "OFF" and wait 9 seconds.
- Make sure the cooling fan has stopped.

Preparation (Cont'd)

#### **OVERALL INSPECTION SEQUENCE**



#### 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.

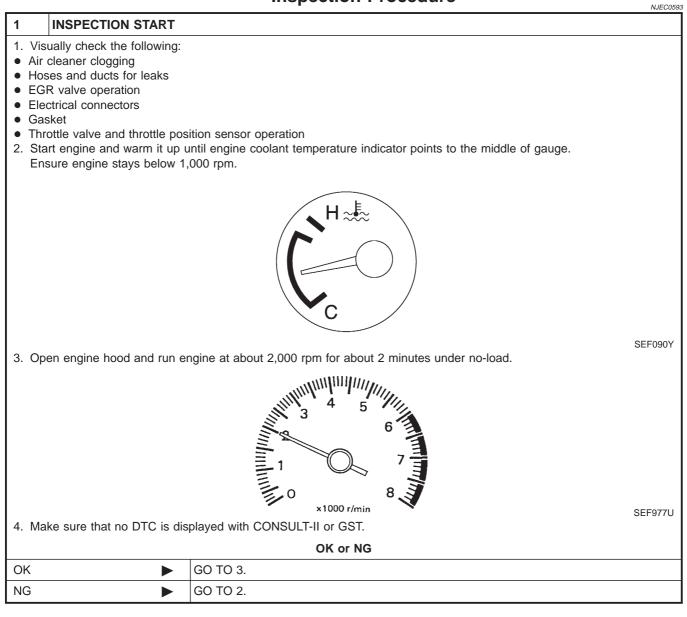
**EC-46** 

QG

NJEC0592S01

**QG** Inspection Procedure

# **Inspection Procedure**



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

Inspection Procedure (Cont'd)

3 CHECK TARGET IDLE SPEED			
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P"</li> </ul>	to normal operating temperature. or "N" position) OK or NG		
ОК	GO TO 12.		
NG	GO TO 4.		
4 PERFORM IDLE AIR	/OLUME LEARNING		
Refer to "Idle Air Volume Learn Which is the result CMPLT or			
	CMPLT or INCMP		
CMPLT 🕨	GO TO 5.		
INCMP <ul> <li>I. Follow the construction of "Idle Air Volume Leaning".</li> <li>2. GO TO 4.</li> </ul>			
<b></b>			
5 CHECK TARGET IDLE	SPEED AGAIN		
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
	OK or NG		
OK 🕨	GO TO 10.		
NG 🕨 GO TO 6.			
6 REPLACE IACV-AAC VALVE			
Replace IACV-AAC valve.			

► GO TO 7.

QG

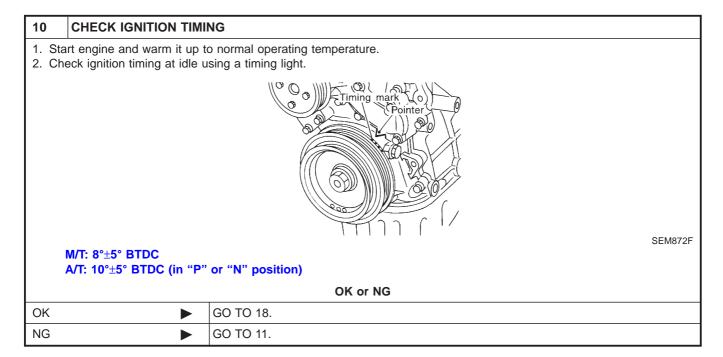
7	PERFORM IDLE AIR V	OLUME LEARNING	
	Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
	CMPLT or INCMP		
CMPL	г 🕨	GO TO 8.	
INCMF		<ol> <li>Follow the construction of "Idle Air Volume Learning".</li> <li>GO TO 4.</li> </ol>	

8 CHEC	<b>K TARGET IDLE</b>	SPEED AGAIN	
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
		OK or NG	
ОК	•	GO TO 10.	
NG		GO TO 9.	

NG		GO TO 9.
9	CHECK ECM FUNCTIO	N

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)
- 2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.

► GO TO 4.



Inspection Procedure (Cont'd)

11	CHECK TIMING CHAIN INSTALLATION			
Check	Check timing chain installation. Refer to EM-28, "Installation".			
	OK or NG			
OK		GO TO 9.		
NG		<ol> <li>Repair the timing chain installation.</li> <li>GO TO 4.</li> </ol>		

#### 12 CHECK IGNITION TIMING

1. Start engine and let it idle.

2. Check ignition timing at idle using a timing light.

M/T: 8°±5° BTI A/T: 10°±5° BT	r "N" position)		mark to Pointer	SEM872F
		OK or N	IG	
ОК	GO TO 18.			
NG	GO TO 13.			

13	PERFORM IDLE AIR VOLUME LEARNING		
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?			
	CMPLT or INCMP		
CMPL	т 🕨	GO TO 14.	
INCMF		<ol> <li>Follow the construction of "Idle Air volume Learning".</li> <li>GO TO 13.</li> </ol>	

14	CHECK TARGET IDLE	SPEED AGAIN	
1. Sta 2. Sel 3. Che	<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>		
1. Sta 2. Che	<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.         M/T: 700±50 rpm         A/T: 800±50 rpm (in "P" or "N" position)     </li> </ul>		
		OK or NG	
ОК		GO TO 16.	
NG		GO TO 15.	

QG

**QG** Inspection Procedure (Cont'd)

# 15 CHECK ECM FUNCTION 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)

- (ECM may be the cause of a problem, but this is rarely the case.)
- 2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.

► GO TO 13.

# 16 CHECK IGNITION TIMING AGAIN Check ignition timing again. Refer to Test No. 12. OK or NG OK Image: GO TO 18. NG Image: GO TO 17.

CHECK TIMING CHAIN INSTALLATION			
Check timing chain installation. Refer to EM-28, "Installation".			
OK or NG			
	GO TO 15.		
NG  1. Repair the timing chain installation. 2. GO TO 13.			
	νητο		
	timing chain installation. F		

After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-70 or EC-73 and AT-52, "HOW TO ERASE DTC".		
With CONSULT-II		GO TO 19.
Without CONSULT-II		GO TO 20.

Inspection Procedure (Cont'd)

19 CHECK HEATED OXY	GEN SENSOR 1 (FRONT) SIGNAL				
<ul> <li>With CONSULT-II</li> <li>Run engine at about 2,000 rpm for about 2 minutes under no-load.</li> <li>See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.</li> <li>Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</li> </ul>					
DATA MONITOR       MONITOR     NO DTC       ENG SPEED     XXX rpm       HO2S1 MNTR (B1)     RICH					
	1 time: RICH $\rightarrow$ LEAN $\rightarrow$ RICH 2 times: RICH $\rightarrow$ LEAN $\rightarrow$ RICH $\rightarrow$ LEAN $\rightarrow$ RICH OK or NG				
ОК	INSPECTION END				
NG (Monitor does not fluctuate.)	GO TO 23.				
NG (Monitor fluctuates less than 5 times.)	GO TO 21.				
20 CHECK HEATED OXY	GEN SENSOR 1 (FRONT) SIGNAL				
Without CONSULT-II 1. Run engine at about 2,000 r	rpm for about 2 minutes under no-load.				

- 1. 2. Set voltmeter probe between ECM terminal 62 and ground.
- 3. Make sure that the voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times during 10 seconds at 2,000 rpm.

1 time: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V

2 times: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V

OK or NG

ОК	INSPECTION END
NG (Voltage does not fluctuate.)	GO TO 23.
NG (Voltage fluctuates less than 5 times.)	GO TO 21.

	Inspection Proceaure (Cont a)			
21 CHECK HEATED OXY	GEN SENSOR 1 (FRONT) SIGNAL			
<ul> <li>(B) With CONSULT-II</li> <li>1. Stop engine.</li> <li>2. Replace heated oxygen sensor 1 (front).</li> <li>3. Start engine and warm it up to normal operating temperature.</li> <li>4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.</li> <li>5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.</li> <li>6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</li> <li>1 time: RICH → LEAN → RICH</li> <li>2 times: RICH → LEAN → RICH → LEAN → RICH</li> </ul>				
<ul> <li>Without CONSULT-II</li> <li>Stop engine.</li> <li>Replace heated oxygen sensor 1 (front).</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.</li> <li>Set voltmeter probe between ECM terminal 62 and ground.</li> <li>Make sure that the voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times during 10 seconds at 2,000 rpm.</li> <li>time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> <li>OK or NG</li> </ul>				
ОК	INSPECTION END			
NG	GO TO 22.			
22 DETECT MALFUNCTIONING PART				
<ul> <li>Check the following.</li> <li>1. Check fuel pressure regulator. Refer to EC-41.</li> <li>2. Check mass air flow sensor and its circuit. Refer to EC-187.</li> <li>3. Check injector and its circuit. Refer to EC-541. Clean or replace if necessary.</li> <li>4. Check engine coolant temperature sensor and its circuit. Refer to EC-201.</li> <li>5. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.)</li> </ul>				
	GO TO 3.			

# 23 CHECK HEATED OXYGEN SENSOR 1 (FRONT) HARNESS

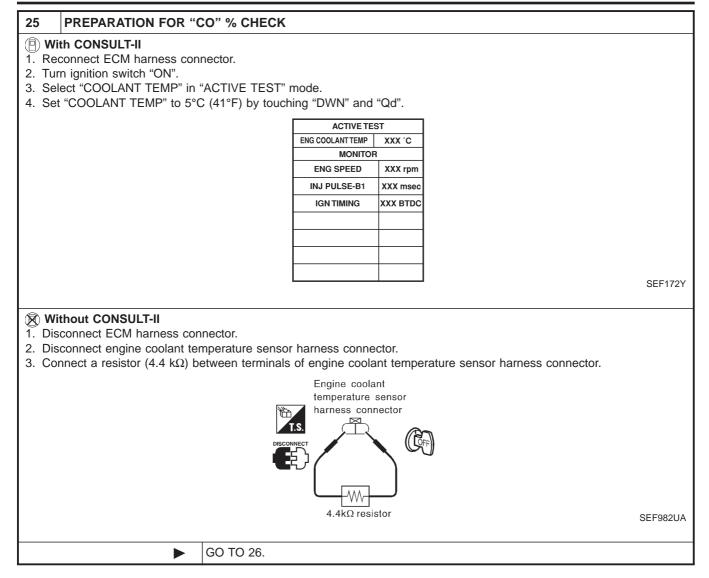
- 1. Turn off engine and disconnect battery ground cable.
- 2. Disconnect ECM harness connector.
- 3. Disconnect heated oxygen sensor 1 (front) harness connector.
- 4. Check harness continuity between ECM terminal 62 and heated oxygen sensor 1 (front) harness connector terminal 1. Refer to Wiring Diagram, EC-216.

#### Continuity should exist.

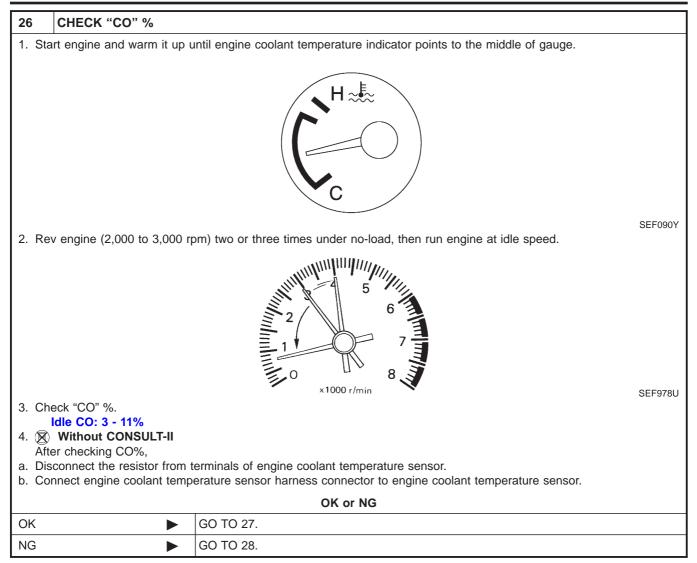
OK or NG			
ОК	GO TO 25.		
NG 🕨	GO TO 24.		

24	REPAIR OR REPLACE				
Repair	Repair or replace harness between ECM and heated oxygen sensor 1 (front).				
	► GO TO 3.				

Inspection Procedure (Cont'd)



QG



Inspection Procedure (Cont'd)

<u>المانية</u>	CHECK HEATED OXYO	EN SENSOR 1 (FRONT) SIGNAL		
<ul> <li>27 CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL</li> <li>(F) With CONSULT-II</li> <li>1. Stop engine.</li> <li>2. Replace heated oxygen sensor 1 (front).</li> <li>3. Start engine and warm it up to normal operating temperature.</li> <li>4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.</li> <li>5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.</li> <li>6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</li> <li>1 time: RICH → LEAN → RICH</li> </ul>				
<ol> <li>2 times: RICH → LEAN → RICH → LEAN → RICH</li> <li>Without CONSULT-II</li> <li>Stop engine.</li> <li>Replace heated oxygen sensor 1 (front).</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.</li> <li>Set voltmeter probe between ECM terminal 62 and ground.</li> <li>Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</li> <li>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> <li>2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> </ol>				
OK or NG				
		GO TO 3.		
OK	NG 🕨 GO TO 28.			

Check the following.

- Connect heated oxygen sensor 1 (front) harness connectors to heated oxygen sensors 1 (front).
- Check fuel pressure regulator. Refer to EC-41.
- Check mass air flow sensor and its circuit. Refer to EC-187.
- Check injector and its circuit. Refer to EC-541.
- Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-201.
- Check ECM function by substituting another known-good ECM.
  - (ECM may be the cause of a problem, but this is rarely the case.)

► GO TO 3.

QG

# SELECT WORK ITEM XXXXXXXXX XXXXXXXXXX IDLE AIR VOL LEARN XXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX WORK SUPPORT IDLE AIR VOL LEARN MONITOR ENG SPEED XXX rpm

MONITOR				
ENG SPEED	XXX rpm			
START				

SEF454Y

SEF217Z

WORK SUI IDLE AIR VOL LEARN MONIT ENG SPEED Result appea CMPLT: succ INCMP: unsu	CMPLT OR XXX rpm Irs. essful ccessful	
STAR	Т	
		SEF455Y

# Idle Air Volume Learning DESCRIPTION

NJEC0562

"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 IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.

# PRE-CONDITIONING

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 99°C (158 210°F)
- PNP switch: ON
- Electric load switch: OFF

(Air conditioner, headlamp, rear window defogger)

# On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

- Cooling fan motor: Not operating
- 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

For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

# **OPERATION PROCEDURE**

#### B With CONSULT-II

NJEC0562S03

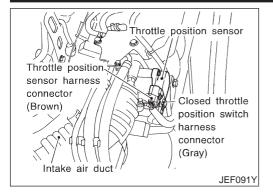
- 1. Turn ignition switch "ON" and wait at least 1 second.
- 2. Turn ignition switch "OFF" and wait at least 10 seconds.
- Start engine and warm it up to normal operating temperature.
   Check that all items listed under the topic "PRE-CONDITION-
- ING" (previously mentioned) are in good order.
- 5. Turn ignition switch "OFF" and wait at least 9 seconds.
- 6. Start the engine and let it idle for at least 28 seconds.
- 7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 8. Touch "START" and wait 20 seconds.
- Make sure that "CMPLT" is displayed on CONSULT-II screen. If "INCMP" is displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE below.
- 10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm
	A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 8±5° BTDC A/T: 10±5° BTDC (in "P" or "N" position)

# **Without CONSULT-II**

1. Turn ignition switch "ON" and wait at least 1 second.

#### Idle Air Volume Learning (Cont'd)



- 2. Turn ignition switch "OFF" and wait at least 10 seconds.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check that all items listed under the topic "PRE-CONDITION-ING" (previously mentioned) are in good order.
- 5. Turn ignition switch "OFF" and wait at least 9 seconds.
- 6. Start the engine and let it idle for at least 28 seconds.
- 7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
- 8. Wait 20 seconds.
- 9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
- 10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 8±5° BTDC A/T: 10±5° BTDC (in "P" or "N" position)

#### NOTE:

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) Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-100.)
- 5) When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem. It is useful to perform "TROUBLE DIAGNOSIS — SPECIFI-CATION VALVE", EC-173.
- 6) If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" all over again:
- Engine stalls.
- Erroneous idle.
- Blown fuses related to the IACV-AAC valve system.

QG

N.IEC0029

# Introduction

# MODELS WITH EURO-OBD SYSTEM

N.IEC0029501 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:

Diagnostic Trouble Code (DTC)	Mode 3 of ISO 15031-5
Freeze Frame data	Mode 2 of ISO 15031-5
System Readiness Test (SRT) code	Mode 1 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of ISO 15031-5
Calibration ID	Mode 9 of ISO 15031-5

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
ECM*3	Х	X*1				_
CONSULT-II	Х	Х	Х	Х	Х	_
GST	Х	X*2	Х	_	Х	Х

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

\*2: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

\*3: In diagnostic test mode II (Self-diagnostic results), DTC is displayed on MI. DTC uses a set of four digit numbers. (If so equipped) The malfunction indicator (MI) 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-154.)

# MODELS WITHOUT EURO-OBD SYSTEM

N.IEC0029502 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:

Diagnostic Trouble Code (DTC)

Freeze Frame data

1st Trip Diagnostic Trouble Code (1st Trip DTC)

1st Trip Freeze Frame data

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		
CONSULT-II	Х	Х	Х	X		
ECM*1	х	X*2	—	—		

\*1: In diagnostic test mode II (Self-diagnostic results), (1st trip) DTC is displayed on the MI by a set of four digit numbers.

\*2: When the DTC and the 1st trip DTC appear on the display simultaneously, it is difficult to clearly distinguish one from the other.

# Two Trip Detection Logic

NJEC0030

MODELS WITH EURO-OBD SYSTEM

NJEC0030S01

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 MI 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 MI lights up. The MI lights up at the same time when the DTC is stored <2nd trip>.

Two Trip Detection Logic (Cont'd)

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 MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

	MI				DTC		1st trip DTC	
Items	1st	trip	2nd	trip	1 of trip	2nd trip	1 of trip	Ond trip
	Blinking	Lighting up	Blinking	Lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	x	_	_	_	_	_	х	_
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	_	_	х	_	_	х	_	_
Fail-safe items (Refer to EC-154.)	_	х	_	_	X*1	_	X*1	_
Except above	_	_	_	Х	_	Х	Х	—

\*1: Except "ECM".

#### MODELS WITHOUT EURO-OBD SYSTEM

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. <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. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. When the ECM enters the fail-safe mode (Refer to EC-154), the DTC is stored in the ECM memory even in the 1st trip.

# **Emission-related Diagnostic Information**

# MODELS WITH EURO-OBD SYSTEM

#### DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI 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 MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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 MI 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". Refer to EC-70.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-68. 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 ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a problem. 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 page EC-98. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

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

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

With CONSULT-II/
 With GST

QG

NJEC0030S02

NJEC0031

NJEC0031S01

Emission-related Diagnostic Information (Cont'd)

QG

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc. These DTCs are prescribed by ISO 15031-6.

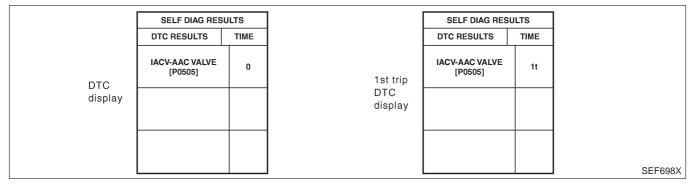
(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for 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]".



# Freeze Frame Data and 1st Trip Freeze Frame Data

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-86.

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/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority		Items		
1	Freeze frame data	Misfire — DTC: P0300 - P0304 (0300 - 0304) Fuel Injection System Function — DTC: P0171 (0171), P0172 (0172)		
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". Refer to EC-70.

Emission-related Diagnostic Information (Cont'd)

#### System Readiness Test (SRT) Code

System Readiness Test (SRT) code is specified in Mode 1 of ISO 15031-5.

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

#### SRT Item

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

NJEC0031S0107

SRT item (CONSULT-II indica- tion)	Perfor- mance Pri- ority*1	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132
		Heated oxygen sensor 1 (front) (response monitoring)	P0133
		Heated oxygen sensor 1 (front) (high voltage)	P0134
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139
		Heated oxygen sensor 2 (rear) (high voltage)	P0140
O2 SEN HEATER	3	Front heated oxygen sensor 1 heater (front)	P0135
		Rear heated oxygen sensor 1 heater (rear)	P0141
EGR SYSTEM	3	EGR function (close)	P0400
(If so equipped)	1	EGR function (open)	P1402

\*1: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.

#### SRT Set Timing

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

EC-62

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NJEC0031S0103

Emission-related Diagnostic Information (Cont'd)

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			Example							
Self-diagn	Self-diagnosis result		$\leftarrow ON \rightarrow OI$		ion cycle $OFF  \leftarrow ON \rightarrow$	$OFF  \leftarrow ON \rightarrow$				
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)				
		P0402	OK (1)	— (1)	— (1)	OK (2)				
		P1402	OK (1)	OK (2)	— (2)	— (2)				
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"				
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)				
		P0402	— (0)	— (0)	OK (1)	— (1)				
		P1402	OK (1)	OK (2)	— (2)	— (2)				
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"				
NG exists	Case 3	P0400	ОК	ОК	_	_				
		P0402	_	_	_	_				
		P1402	NG	_	NG	NG (Consecutive NG)				
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL "ON")				
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"				

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

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

-: Self-diagnosis is not carried out.

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

When all SRT related self-diagnoses 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.  $\rightarrow$  Case 2 above

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

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is 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".

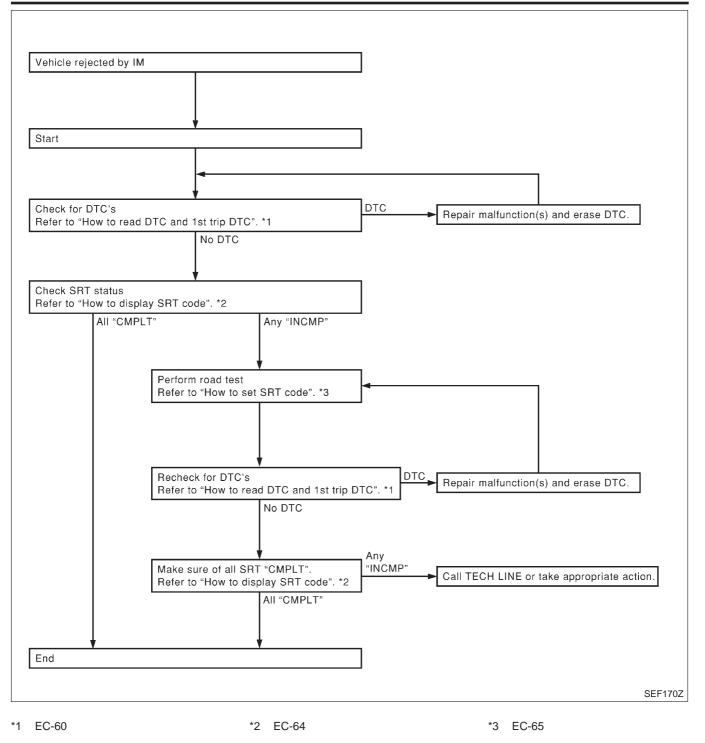
#### NOTE:

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**

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.

Emission-related Diagnostic Information (Cont'd)



#### How to Display SRT Code

NJEC0031S0110

1. (B) 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 as shown below.

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Emission-related Diagnostic Information (Cont'd)

QG

SRT STAT	rus	
CATALYST HO2S HTR HO2S EGR SYSTEM	CMPLT CMPLT CMPLT INCMP	SEF821Y

#### 2. (a) With GST

Selecting Mode 1 with GST (Generic Scan Tool)

#### How to Set SRT Code

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

#### With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-153.

#### **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**

					-					ſ
SRT item (CONSULT-II screen term)	Self-diagnostic test item (CONSULT-II screen term)	Pattern 1				Pattern 2				
CATALYST	TW CATALYST SYS									
HEATED OXYGEN	HO2S1 (FRONT)									
SENSOR (HO2S)	HO2S2 (REAR)									
HEATED OXYGEN	HO2S1 HTR (FRONT)									$\chi///\chi$
SENSOR (HO2S) HEATER	HO2S2 HTR (REAR)									())))
EGR SYSTEM (where fitted)	EGR SYSTEM (where fitted)				· · ·				• • •	
00 - 90 KIIIII (53 - 60 MPH)	(HdW									
4 O)	0 km/h (0 MPH) Keep idling				_			_	_	
			- 0	- 6 - 4	<u>م</u> –	6	- ∞		10	1
	Engine co	Engine coolant temperature	é	: Zone A	A VV : Zone B	œ			(minutes)	
	Engino heromes	becomes 70°C (158°E)		-	$\backslash$	1			1	llull

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Emission-related Diagnostic Information (Cont'd)

• 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<sup>\*</sup>, 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 terminals 70 and 58 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 terminals 70 and 58 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 82 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.

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

\*2: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested transmission gear position for A/T models

Set the selector lever in the "D" position with "OD" 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.

Gear change	ACCEL shift point km/h (MPH)
1st to 2nd	15 (9)
2nd to 3rd	35 (22)
3rd to 4th	50 (31)
4th to 5th	70 (43)

# Test Value and Test Limit (GST only — not applicable to CONSULT-II)

NJEC0031S0104

The following is the information specified in Mode 6 of ISO 15031-5.

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

Items for which these data (test value and test limit) are displayed are the same as SRT code items (14 test items).

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.

X: Applicable	-: Not applicable
---------------	-------------------

					. Hot applicable
SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		Application
CATALYST	Three way catalyst function	01H	01H	Max.	Х
GATALIST	Three way catalyst function	02H	81H	Min.	X

Emission-related Diagnostic Information (Cont'd)

SRT item	Calf diagnastic test its	Test value (	GST display)	<b>T</b>	Application
SKT lielli	Self-diagnostic test item	TID	CID	- Test limit	it Applicatio
		09H	04H	Max.	Х
		0AH	84H	Min.	Х
	Heated oxygen sensor 1 (front)	0BH	04H	Max.	Х
	()	0CH	04H	Max.	Х
HO2S		0DH	04H	Max.	Х
		19H	86H	Min.	Х
	Heated oxygen sensor 2	1AH	86H	Min.	Х
	(rear)	1BH	06H	Max.	Х
		1CH	06H	Max.	Х
	Heated oxygen sensor 1	29H	08H	Max.	Х
HO2S HTR	heater (front)	2AH	88H	Min.	Х
HO25 HTR	Heated oxygen sensor 2	2DH	0AH	Max.	Х
	heater (rear)	2EH	8AH	Min.	Х
		31H	8CH	Min.	Х
		32H	8CH	Min.	Х
EGR SYSTEM (where fitted)	EGR function	33H	8CH	Min.	Х
		34H	8CH	Min.	Х
		35H	0CH	Max.	Х

# **Emission-related Diagnostic Information Items**

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/Test limit (GST only)	1st trip DTC*1	Reference page
NO SELF DIAGNOSTIC FAIL- URE INDICATED	P0000	_	_	_	_
MAF SEN/CIRCUIT	P0100	_	_	Х	EC-187
AIR TEMP SEN/CIRC	P0110	_	_	Х	EC-194
COOLANT T SEN/CIRC	P0115	_	_	Х	EC-201
THRTL POS SEN/CIRC	P0120		_	Х	EC-207
HO2S1 (B1)	P0130	Х	Х	X*2	EC-216
HO2S1 (B1)	P0131	Х	Х	X*2	EC-224
HO2S1 (B1)	P0132	Х	Х	X*2	EC-230
HO2S1 (B1)	P0133	Х	Х	X*2	EC-236
HO2S1 (B1)	P0134	Х	Х	X*2	EC-245
HO2S1 HTR (B1)	P0135	Х	Х	X*2	EC-252
HO2S2 (B1)	P0137	х	х	X*2	EC-258
HO2S2 (B1)	P0138	х	х	X*2	EC-267
HO2S2 (B1)	P0139	Х	х	X*2	EC-275

QG

# EC-69

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/Test limit (GST only)	1st trip DTC*1	Reference page
HO2S2 (B1)	P0140	х	Х	X*2	EC-284
HO2S2 HTR (B1)	P0141	Х	Х	X*2	EC-291
FUEL SYS-LEAN/BK1	P0171		—	Х	EC-297
FUEL SYS-RICH/BK1	P0172		—	Х	EC-305
FUEL TEMP SEN/CIRC*3	P0180		—	Х	EC-313
MULTI CYL MISFIRE	P0300	_	—	Х	EC-318
CYL 1 MISFIRE	P0301		—	Х	EC-318
CYL 2 MISFIRE	P0302		—	Х	EC-318
CYL 3 MISFIRE	P0303		—	Х	EC-318
CYL 4 MISFIRE	P0304		—	Х	EC-318
KNOCK SEN/CIRC-B1	P0325		—	_	EC-324
CKP SEN/CIRCUIT (POS)	P0335		—	Х	EC-328
CMP SEN/CIRCUIT (PHS)	P0340		_	Х	EC-335
EGR SYSTEM*3	P0400	Х	X	X*2	EC-343
EGR VOL CONT/V CIRC*3	P0403		_	х	EC-352
TW CATALYST SYS-B1	P0420	Х	X	X*2	EC-359
PURG VOLUME CONT/V	P0443		_	Х	EC-364
VEH SPEED SEN/CIRC	P0500		_	Х	EC-370
IACV/AAC VLV/CIRC	P0505			Х	EC-376
CLOSED TP SW/CIRC*3	P0510		—	Х	EC-385
ECM	P0605		_	Х	EC-391
PNP SW/CIRC	P0705	_	_	х	Refer to AT sec- tion.
ATF TEMP SEN/CIRC	P0710	_	_	х	Refer to AT sec- tion.
VEH SPD SEN/CIR AT	P0720	_	_	х	Refer to AT sec- tion.
ENGINE SPEED SIG	P0725	_	_	х	Refer to AT sec- tion.
A/T 1ST GR FNCTN	P0731	_	_	х	Refer to AT sec- tion.
A/T 2ND GR FNCTN	P0732	_	_	х	Refer to AT sec- tion.
A/T 3RD GR FNCTN	P0733	_	—	х	Refer to AT sec- tion.
A/T 4TH GR FNCTN	P0734	_	_	х	Refer to AT sec- tion.
TCC SOLENOID/CIRC	P0740	—	-	х	Refer to AT sec- tion.
L/PRESS SOL/CIRC	P0745	_	_	х	Refer to AT sec- tion.

**ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION** 

Emission-related Diagnostic Information (Cont'd)

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/Test limit (GST only)	1st trip DTC*1	Reference page
SFT SOL A/CIRC	P0750	_	_	х	Refer to AT sec- tion.
SFT SOL B/CIRC	P0755	_	_	х	Refer to AT sec- tion.
INT/V TIM V/CIR-B1	P1111	_		Х	EC-393
SWIRL CONT SOL/V*3	P1131			х	EC-399
ENG OVER TEMP	P1217	_		Х	EC-406
EGR TEMP SEN/CIRC*3	P1401		_	Х	EC-418
EGR SYSTEM*3	P1402	Х	х	X*2	EC-425
A/T DIAG COMM LINE	P1605			Х	EC-434
TP SEN/CIRC A/T	P1705	_	_	х	Refer to AT sec- tion.
P-N POS SW/CIRCUIT	P1706	_	_	Х	EC-437
O/R CLTCH SOL/CIRC	P1760	_		х	Refer to AT sec- tion.

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

\*2: These are not displayed with GST.

\*3: If so equipped

#### How to Erase Emission-related Diagnostic Information

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# B How to Erase DTC (With CONSULT-II)

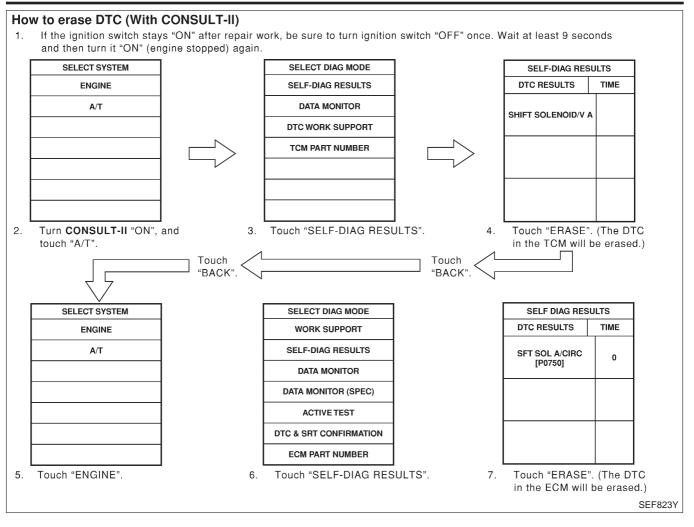
#### NOTE:

#### If the DTC is not for A/T related items (see EC-10), 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 9 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).

Emission-related Diagnostic Information (Cont'd)

QG



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

#### How to Erase DTC ( With GST)

NOTE:

#### If the DTC is not for A/T related items (see EC-10), skip step 2.

- 1) If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 9 seconds and then turn it "ON" (engine stopped) again.
- Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
- 3) Select Mode 4 with GST (Generic Scan Tool).

The emission-related diagnostic information can be erased by selecting Mode 4 with GST (Generic Scan Tool). **NOTE:** 

- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 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) Distance traveled while MI is activated
- 8) Others

Emission-related Diagnostic Information (Cont'd)

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.

# MODELS WITHOUT EURO-OBD SYSTEM

# DTC and 1st Trip DTC

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

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. 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. In other words, the DTC is stored in the ECM memory 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 fail-safe items, the DTC is stored in the ECM memory even in the 1st trip.

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-73.

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-98. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

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

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

#### **Without CONSULT-II**

ECM displays the DTC by a set of four digit numbers with MI illumination in the diagnostic test mode II (Selfdiagnostic results). Example: 0100, 0115, 0340, 1335, etc.

#### With CONSULT-II

CONSULT-II displays the DTC in "SELF-DIAG RESULTS" mode. Examples: P0100, P0115, P0340, P1335, etc.

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

#### • 1st trip DTC No. is the same as DTC No.

• Output of a DTC indicates a malfunction. However, ECM in the diagnostic test mode II (Self-diagnostic results) (If so equipped) 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, the use of CONSULT-II (if available) is recommended.

A sample CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in the 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]".

	SELF DIAG RESULTS			SELF DIAG RESULTS		
	DTC RESULTS	TIME		DTC RESULTS	TIME	
DTC display	MAF SEN/CIRCUIT [P0100]	0	1st trip	MAF SEN/CIRCUIT [P0100]	1t	
			DTC display			
						SEF992

#### Freeze Frame Data and 1st Trip Freeze Frame Data

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II. For details, see EC-86.



NJEC0031S07

# EC-73

## **ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION**

Emission-related Diagnostic Information (Cont'd)

SELF DIAG RESULTS

TIME

0

DTC RESULTS

COOLANT T SEN/CIBC

[P0115]

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 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.

If freeze frame data is stored in the ECM memory and another freeze frame data 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-73.

### How to Erase Emission-related Diagnostic Information

### 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 10 seconds and then turn it "ON" (engine stopped) again.

SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR ACTIVE TEST

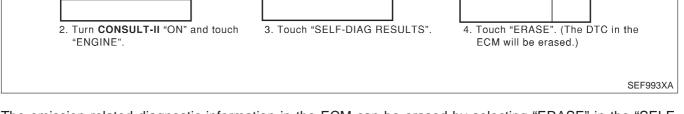
- 2) Touch "ENGINE".
- 3) Touch "SELF-DIAG RESULTS".
- 4) Touch "ERASE". (The DTC in the ECM will be erased.)

### How to erase DTC (With CONSULT-II)

SELECT SYSTEM

ENGINE

 If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 9 seconds and then turn it "ON" again.



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

### How to Erase DTC ( Without CONSULT-II)

- 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) Change the diagnostic test mode from Mode II to Mode I by using the data link connector. (See EC-76.)

The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode.

- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 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) 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.



NATS (Nissan Anti-theft System)

SELF DIAG RESU	JLTS	
DTC RESULTS	TIME	
NATS MALFUNCTION [P1610]	0	
-		SEF543X

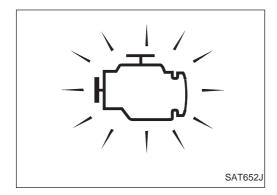
### NATS (Nissan Anti-theft System)

- 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 selfdiagnostic results mode with CONSULT-II using NATS program card. Refer to NATS (Nissan Anti-Theft System) in EL section.
- Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.
- When replacing ECM, initialization of NATS system and registration of all 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 procedure of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

## **Malfunction Indicator (MI)**

NJEC0032

NJEC0032S01



The MI is located on the instrument panel.

- 1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MI does not light up, refer to EL-184, "WARNING LAMPS" or see EC-591.
- 2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

## **On Board Diagnostic System Function**

The on board diagnostic system has the following four functions.

## Diagnostic Test Mode I

1. BULB CHECK:

DESCRIPTION

This function checks the MI bulb for damage (blown, open circuit, etc.).

If the MI does not come on, check MI circuit and ECM test mode selector. (See the following page.) 2. MALFUNCTION WARNING:

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

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### Diagnostic Test Mode II (If so equipped)

 SELF-DIAGNOSTIC RESULTS: This function allows DTCs and 1st trip DTCs to be read.
 HEATED OXYGEN SENSOR 1 MONITOR (FRONT):

This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1 (front), to be read.

### **MI Flashing without DTC**

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM test mode following "How to Switch Diagnostic Test Modes".

How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-76.)

Conc	lition	Diagnostic Test Mode I	Diagnostic Test Mode II	
Ignition switch in "ON" position	Engine stopped	BULB CHECK	SELF-DIAGNOSTIC RESULTS	
	Engine running	MALFUNCTION WARNING	HEATED OXYGEN SENSOR 1 MONITOR (FRONT)	

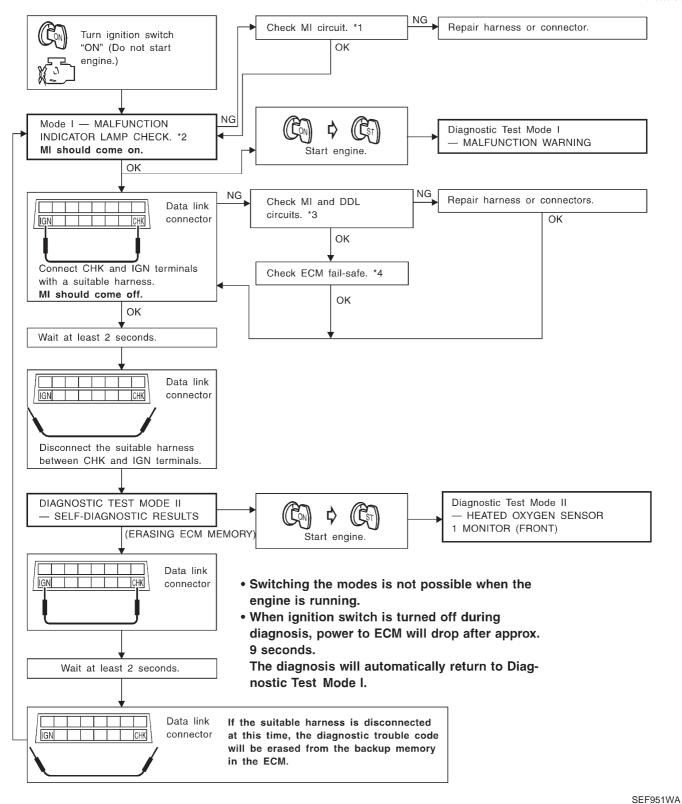
The following emission-related diagnostic information is cleared when the ECM memory is erased.

- 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) Distance traveled while MI is activated
- 8) Others

Malfunction Indicator (MI) (Cont'd)

## How to Switch Diagnostic Test Modes (If diagnostic test mode II is equipped)

NJEC0032S02



\*1: EC-591 \*2: EC-74 \*3: EC-591

\*4: EC-154

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NJEC0032S04

### Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the MI bulb. Refer to EL-184, "WARNING LAMPS" or see EC-591.

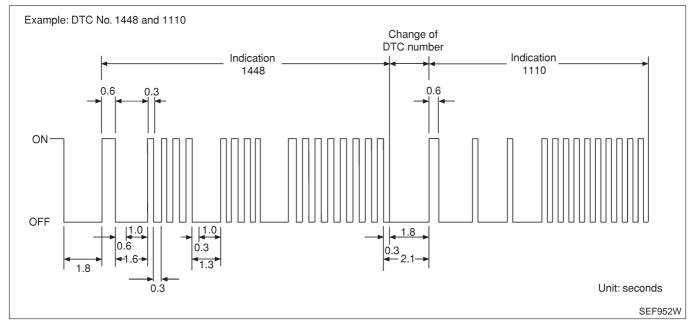
### Diagnostic Test Mode I — Malfunction Warning

MI	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 (If so equipped)

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MI 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 MI 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 1000th-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 latter 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-10.)

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

The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "How To Switch Diagnostic Test Modes", EC-76.)

### • If the battery is disconnected, the DTC will be lost from the backup memory after approx. 24 hours.

• Be careful not to erase the stored memory before starting trouble diagnoses.

### Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor (Front) (If so equipped)

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

Malfunction Indicator (MI) (Cont'd)

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

\*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 (front) 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 MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

#### **OBD System Operation Chart (With Euro-OBD** Models Only) NJEC0033

## **RELATIONSHIP BETWEEN MI, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS**

- N.IEC0033501 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 MI will come on. For details, refer to "Two Trip Detection Logic" on EC-59.
- The MI 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			NJEC0033S02
Items	Fuel Injection System	Misfire	Other
MI (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-80.

For details about patterns "A" and "B" under "Other", see EC-82.

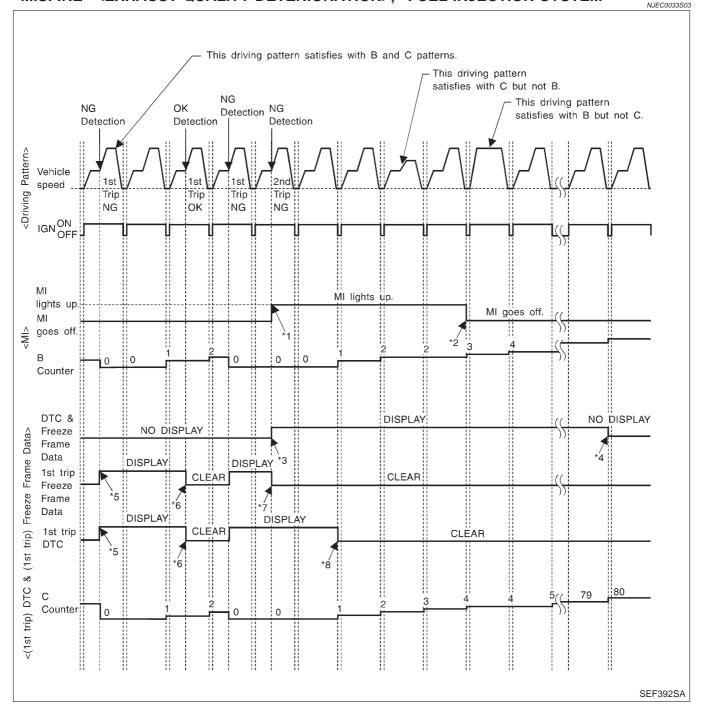
\*1: Clear timing is at the moment OK is detected.

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

OBD System Operation Chart (With Euro-OBD Models Only) (Cont'd)

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



- \*1: When the same malfunction is detected in two consecutive trips, MI will light up.
- \*2: MI 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.

OBD System Operation Chart (With Euro-OBD Models Only) (Cont'd)

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

## Driving Pattern B

Driving pattern B means the vehicle operation as follows:

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MI will go off when the B counter reaches 3. (\*2 in EC-79)

## **Driving Pattern C**

Driving pattern C means the vehicle operation as follows:

- The following conditions should be satisfied at the same time: Engine speed: (Engine speed in the freeze frame data) ±375 rpm Calculated load value: (Calculated load value in the freeze frame data) × (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 driving pattern C.
- The C counter will be counted up when driving pattern C 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.

NJEC0033S04

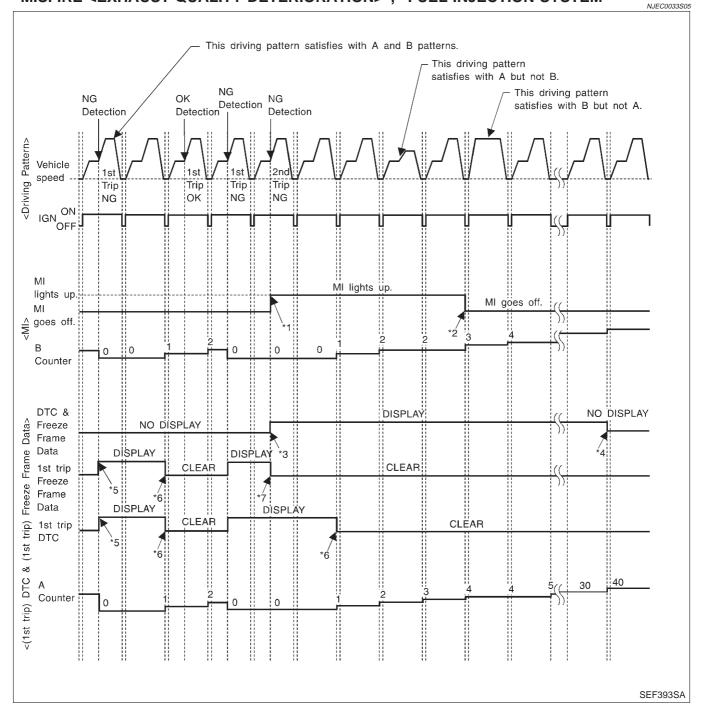
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NJEC0033S0401

OBD System Operation Chart (With Euro-OBD Models Only) (Cont'd)

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

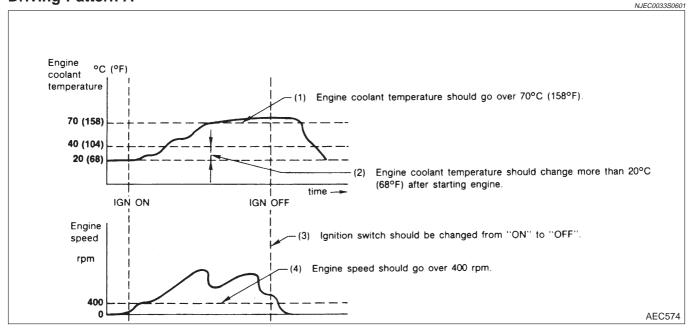


- \*1: When the same malfunction is detected in two consecutive trips, MI will light up.
- \*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- \*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored 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 <u>EXCEPT</u> FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM" Driving Pattern A



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

### Driving Pattern B

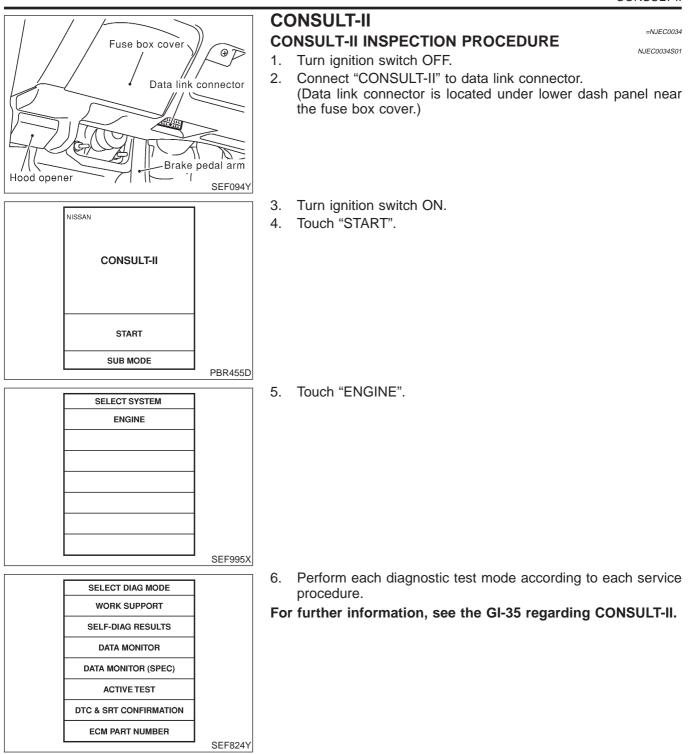
Driving pattern B means the vehicle operation as follows:

NJEC0033S0602

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 MI will go off when the B counter reaches 3 (\*2 in EC-81).





CONSULT-II (Cont'd)

# ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NJEC0034S02

			DIAGNOSTIC TEST MODE							
	Item				GNOSTIC	DATA	DATA			& SRT RMATION
			SUP- PORT	DTC*1	FREEZE FRAME DATA*2	DATA MONI- TOR	MONI- TOR (SPEC)	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT
		Camshaft position sensor (PHASE)		x	Engine speed X	Engine speed X	Engine speed X			
		Crankshaft position sensor (POS)		X*3						
		Mass air flow sensor		X		Х	х			
		Engine coolant temperature sensor		x	x	х	x	x		
		Heated oxygen sensor 1 (front)		x		х	x		X*3	X*3
		Heated oxygen sensor 2 (rear)		X*3		х	x		X*3	X*3
RTS		Vehicle speed sensor		х	X	Х	Х			
T PA		Throttle position sensor		X		Х	Х			
NEN		Fuel tank temperature sensor				Х	х			
NPO		EGR temperature sensor*4		X*3		Х	х			
CO	INPUT	Intake air temperature sensor		X*3	X	Х	х			
ROL		Knock sensor		x						
ONT		Ignition switch (start signal)				Х	Х			
ENGINE CONTROL COMPONENT PARTS		Closed throttle position switch*4		X*3		х	x			
ENG		Closed throttle position switch (throttle position sensor sig- nal)				х	x			
		Air conditioner switch				Х	х			
		Refrigerant pressure sensor				х	Х			
		Park/Neutral position (PNP) switch		X*3		х	x			
		Power steering oil pressure switch				х	x			
		Electrical load				Х	Х			
		Heater fan switch				Х	Х			
		Battery voltage				Х	Х			

CONSULT-II (Cont'd)

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NJEC0034S03

		DIAGNOSTIC TEST MODE								
	ltem		SELF-DIAGN RESUL			DATA	DATA		DTC & SRT CONFIRMATION	
			WORK SUP- PORT	DTC*1	FREEZE FRAME DATA*2	MONI- TOR	MONI- TOR (SPEC)	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT
		Injectors				Х	Х	Х		
		Power transistor (Ignition tim- ing)		X*3 (misfire)		х	х	х		
		IACV-AAC valve	Х	X*3		Х	Х	Х		
ENGINE CONTROL COMPONENT PARTS		Intake valve timing control solenoid valve				х	х	х		
NENT		EVAP canister purge volume control solenoid valve		X*3		х	х	х		
MPC		Air conditioner relay				Х	Х			
ပ္ပ	OUT- PUT	Fuel pump relay	Х			Х	Х	Х		
<b>L</b> ROI		EGR volume control valve*4		X*3		Х	Х	Х		X*3
		Heated oxygen sensor 1 heater (front)		X*3		х	х		X*3	
ENGINI		Heated oxygen sensor 2 heater (rear)		X*3		х	х		X*3	
		Cooling fan				Х	Х	Х		
		Swirl control valve control solenoid valve*4		X*3		х	х	х		
		Calculated load value			Х	Х	Х			

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-61, EC-72.

\*3: Not applicable for models without Euro-OBD system

\*4: If so equipped

### **FUNCTION**

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

\*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

1) Diagnostic trouble codes

CONSULT-II (Cont'd)

- 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) Distance traveled while MI is activated.
- 8) Others

### WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	• FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
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 clear the coefficient of self- learnign control value
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGNITION TIMING ADJ*	IDLE CONDITION	<ul> <li>When adjusting target ignition timing</li> <li>After adjustment, confirm target</li> <li>ignition timing with a timing light.</li> <li>If once the "TARGET IDLE</li> <li>RPM ADJ" has been done, the</li> <li>Idle Air Volume Learning procedure will not be completed.</li> </ul>

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

## SELF DIAGNOSTIC MODE

NJEC0034S05

DTC and 1st Trip DTC Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-10.

# Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	<ul> <li>Engine Control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "Alphabetical &amp; P No. Index for DTC", EC-10.)</li> </ul>
FUEL SYS-B1	<ul> <li>"Fuel injection system status" at the moment a malfunction is detected is displayed.</li> <li>One mode in the following is displayed.</li> <li>"MODE 2": Open loop due to detected system malfunction</li> <li>"MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment)</li> <li>"MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control</li> <li>"MODE 5": Open loop - has not yet satisfied condition to go to closed loop</li> </ul>
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B1 [%]	<ul> <li>"Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>

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NJEC0034S04

QG CONSULT-II (Cont'd)

Freeze frame data item*	Description
S-FUEL TRIM-B1 [%]	<ul> <li>"Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

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

## DATA MONITOR MODE

DATA MONITOR MODE				
Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	0	0	<ul> <li>Indicates the engine speed computed from the POS signal of the crankshaft position sensor.</li> </ul>	<ul> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be indicated.</li> </ul>
MAS A/F SE-B1 [V]	0	0	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a cer- tain value is indicated.
B/FUEL SCHDL [msec]			<ul> <li>"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correc- tion.</li> </ul>	
A/F ALPHA-B1 [%]		0	<ul> <li>Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.</li> </ul>	<ul> <li>When the engine is stopped, a certain value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>
COOLAN TEMP/S [°C] or [°F]	0	0	• The engine coolant temperature (deter- mined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant tempera- ture sensor is open or short- circuited, ECM enters fail-safe mode. The engine coolant tempera- ture determined by the ECM is dis- played.
HO2S1 (B1) [V]	0	0	<ul> <li>The signal voltage of the heated oxygen sensor 1 (front) is displayed.</li> </ul>	
HO2S2 (B1) [V]	0		<ul> <li>The signal voltage of the heated oxygen sensor 2 (rear) is displayed.</li> </ul>	
HO2S1 MNTR (B1) [RICH/LEAN]	0		<ul> <li>Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH means the mixture became "rich", and control is being affected toward a leaner mixture.</li> <li>LEAN means the mixture became "lean", and control is being affected toward a rich mixture.</li> </ul>	<ul> <li>After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins.</li> <li>When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.</li> </ul>

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
HO2S2 MNTR (B1) [RICH/LEAN]	0		<ul> <li>Display of heated oxygen sensor 2 (rear) signal: RICH means the amount of oxygen after three way catalyst is relatively small. LEAN means the amount of oxygen after three way catalyst is relatively large.</li> </ul>	<ul> <li>When the engine is stopped, a cer- tain value is indicated.</li> </ul>
VHCL SPEED SE [km/h] or [mph]	0	0	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	0		<ul> <li>The power supply voltage of ECM is dis- played.</li> </ul>	
THRTL POS SEN [V]	0	0	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]*			• The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	0		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EGR TEMP SEN [V]*	0	0	• The signal voltage of the EGR temperature sensor is displayed.	
START SIGNAL [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the starter signal.</li> </ul>	<ul> <li>After starting the engine, [OFF] is displayed regardless of the starter signal.</li> </ul>
CLSD THL POS [ON/OFF]	0	0	<ul> <li>Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.</li> </ul>	
CLSD THL/P SW [ON/OFF]*	0		<ul> <li>Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.</li> </ul>	
AIR COND SIG [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition of the air con- ditioner switch as determined by the air conditioning signal.</li> </ul>	
P/N POSI SW [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the PNP switch signal.</li> </ul>	
PW/ST SIGNAL [ON/OFF]	0	0	• Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.	
LOAD SIGNAL [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch.</li> <li>ON rear defogger is operating and/or lighting switch is on.</li> <li>OFF rear defogger is not operating and lighting switch is not on.</li> </ul>	
IGNITION SW [ON/OFF]	0		<ul> <li>Indicates [ON/OFF] condition from ignition switch.</li> </ul>	
HEATER FAN SW [ON/OFF]	0		<ul> <li>Indicates [ON/OFF] condition from the heater fan switch.</li> </ul>	
INJ PULSE-B1 [msec]		0	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	<ul> <li>When the engine is stopped, a cer- tain computed value is indicated.</li> </ul>

QG CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
IGN TIMING [BTDC]		0	<ul> <li>Indicates the ignition timing computed by ECM according to the input signals.</li> </ul>	
CAL/LD VALUE [%]			<ul> <li>"Calculated load value" indicates the value of the current airflow divided by peak air- flow.</li> </ul>	
ABSOL TH.P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [gm/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
IACV-AAC/V [step]		0	<ul> <li>Indicates the IACV-AAC valve control value computed by ECM according to the input signals.</li> </ul>	
PURG VOL C/V [%]			<ul> <li>Indicates the EVAP canister purge volume control solenoid valve computed by the ECM according to the inpuct signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>	
EGR VOL CON/V [step]*		0	<ul> <li>Indicates the EGR volume control valve computed by the ECM according to the input signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>	
SWRL CONT S/V [ON/OFF]*			<ul> <li>The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated.</li> <li>ON Swirl control valve is closed. OFF Swirl control valve is opened.</li> </ul>	
INT/V SOL-B1 [ON/OFF]			<ul> <li>The control condition of the valve timing solenoid valve (determined by ECM accord- ing to the input signal) is indicated.</li> <li>ON Intake valve timing control operating OFF Intake valve timing control not oper- ating</li> </ul>	
AIR COND RLY [ON/OFF]		0	<ul> <li>Indicates the air conditioner relay control condition determined by ECM according to the input signals.</li> </ul>	
FUEL PUMP RLY [ON/OFF]		0	<ul> <li>Indicates the fuel pump relay control condi- tion determined by ECM according to the input signals.</li> </ul>	
COOLING FAN [ON/OFF]		0	<ul> <li>Indicates [ON/OFF] control condition of the cooling fan determined by ECM according to the input signals.</li> </ul>	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxy- gen sensor 1 heater (front) determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxy- gen sensor 2 heater (rear) determined by ECM according to the input signals.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
IDL A/V LEARN			<ul> <li>Display the condition of idle air volume learning YET Idle air volume learning has not been performed yet.</li> <li>CMPLT Idle air volume learning has already been performed successfully.</li> <li>INCMP Idle air volume learning has not been performed successfully.</li> </ul>	
TRVL AFTER MIL [km] or [Mile]			Distance traveled while MI is activated	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			<ul> <li>Pulse width, frequency or duty cycle mea- sured by the pulse probe.</li> </ul>	<ul> <li>Only "#" is displayed if item is unable to be measured.</li> <li>Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.</li> </ul>

### \*: If so equipped

NOTE:

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

## DATA MONITOR (SPEC) MODE

			DATA MONITOR (SPEC) MC	NJEC0034S11
Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	0	0	• The signal voltage of the mass air flow sensor specification is displayed.	<ul> <li>When the engine is running, speci- fication range is indicated.</li> </ul>
B/FUEL SCHDL [msec]			<ul> <li>"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correc- tion.</li> </ul>	<ul> <li>When the engine is running, speci- fication range is indicated.</li> </ul>
A/F ALPHA-B1 [%]		0	<ul> <li>Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.</li> </ul>	<ul> <li>When the engine is running, specification range is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>

#### NOTE:

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

## ACTIVE TEST MODE

			10200004007
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul> <li>Harness and connector</li> <li>Fuel injectors</li> <li>Heated oxygen sensor 1 (front)</li> </ul>
IGNITION TIMING	<ul> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul> <li>"Idle Air Volume Leaning" (Refer to EC-57.)</li> <li>Camshaft position sensor (PHASE)</li> <li>Crankshaft position sensor (POS)</li> <li>Engine component parts and installing conditions</li> </ul>

NJEC0034S07

CONSULT-II (Cont'd)

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IACV-AAC/V OPENING	<ul> <li>Engine: After warming up, idle the engine.</li> <li>Change the IACV-AAC valve opening steps using CONSULT- II.</li> </ul>	Engine speed changes according to the opening steps.	<ul><li>Harness and connector</li><li>IACV-AAC valve</li></ul>
POWER BAL- ANCE	<ul> <li>Engine: After warming up, idle the engine.</li> <li>Air conditioner switch "OFF"</li> <li>Shift lever "N"</li> <li>Cut off each injector signal one at a time using CONSULT-II.</li> </ul>	Engine runs rough or dies.	<ul> <li>Harness and connector</li> <li>Compression</li> <li>Injectors</li> <li>Power transistor</li> <li>Spark plugs</li> <li>Ignition coils</li> </ul>
COOLING FAN	<ul> <li>Ignition switch: ON</li> <li>Turn the cooling fan "ON" and "OFF" using CONSULT-II.</li> </ul>	Cooling fan moves and stops.	<ul> <li>Harness and connector</li> <li>Cooling fan motor</li> </ul>
ENG COOLANT TEMP	<ul> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant temperature indication using CON-SULT-II.</li> </ul>	If trouble symptom disappears, see CHECK ITEM.	<ul> <li>Harness and connector</li> <li>Engine coolant temperature sensor</li> <li>Fuel injectors</li> </ul>
FUEL PUMP RELAY	<ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>	Fuel pump relay makes the operat- ing sound.	<ul><li>Harness and connector</li><li>Fuel pump relay</li></ul>
EGR VOL CONT/V (If so equipped)	<ul> <li>Engine: After warming up, idle the engine.</li> <li>Change the EGR volume control valve opening step using CON- SULT-II.</li> </ul>	Engine speed changes according to the opening step.	<ul> <li>Harness and connector</li> <li>EGR volume control valve</li> </ul>
VALVE TIMING SOL	<ul> <li>Ignition switch: ON</li> <li>Turn intake valve timing control solenoid valve "ON" and "OFF" using CONSULT-II and listen for operating sound.</li> </ul>	Intake valve timing control solenoid valve makes an operating sound.	<ul> <li>Harness and connector</li> <li>Intake valve timing control solenoid valve</li> </ul>
SWIRL CONT SOL VALVE (If so equipped)	<ul> <li>Ignition switch: ON</li> <li>Turn solenoid valve "ON" and "OFF" with CONSULT-II and lis- ten for operating sound.</li> </ul>	Solenoid valve makes an operating sound.	<ul><li>Harness and connector</li><li>Solenoid valve</li></ul>
PURG VOL CONT/V	<ul> <li>Engine: After warming up, idle the engine.</li> <li>Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.</li> </ul>	Engine speed changes according to the opening percent.	<ul> <li>Harness and connector</li> <li>EVAP canister purge volume control solenoid valve</li> </ul>

## DTC AND SRT CONFIRMATION MODE

This mode is not available for models without Euro-OBD system.

### SRT STATUS Mode

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-62.

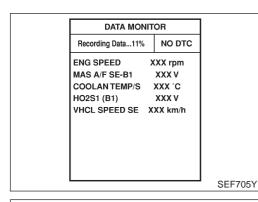
### SRT Work Support Mode

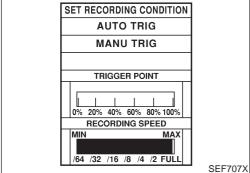
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

CONSULT-II (Cont'd)

	DIC Work Suppor	t Mode	NJEC0034S0802
TEST MODE	TEST ITEM	CONDITION	REFERENCE PAGE
	HO2S1 (B1) P0130		EC-216
HEATED OXYGEN SEN-	HO2S1 (B1) P0131		EC-224
SOR 1 (FRONT)	HO2S1 (B1) P0132		EC-230
	HO2S1 (B1) P0133	Refer to corresponding	EC-236
	HO2S2 (B1) P0137	trouble diagnosis for	EC-258
HEATED OXYGEN SEN- SOR 2 (REAR) EGR SYSTEM (If so equipped)	HO2S2 (B1) P0138	DTC.	EC-267
	HO2S2 (B1) P0139		EC-275
	EGR SYSTEM P0400		EC-343
	EGR SYSTEM P1402		EC-425





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

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:

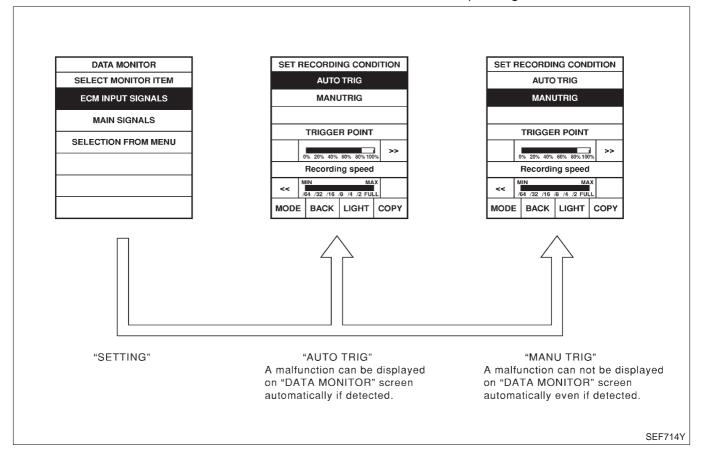
- 1) "AUTO TRIG"
- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA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

CONSULT-II (Cont'd)

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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-22, "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.



Generic Scan Tool (GST)

Generic Scan Tool (GST): Sample

## Generic Scan Tool (GST) DESCRIPTION

#### =NJEC0035

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Generic Scan Tool (OBDII scan tool) complying with ISO15031-4 has 9 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.

## **GST INSPECTION PROCEDURE**

Turn ignition switch OFF.

1.

NJEC0035S02

2. Connect "GST" to data link connector. (Data link connector is located under lower dash panel near the fuse box cover.)

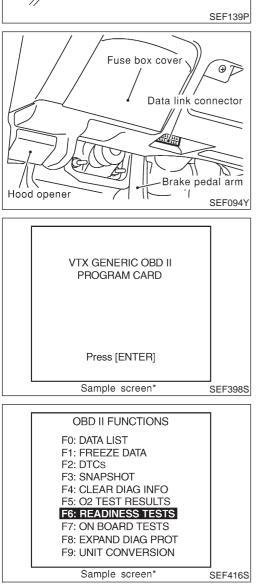
3. Turn ignition switch ON.

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.



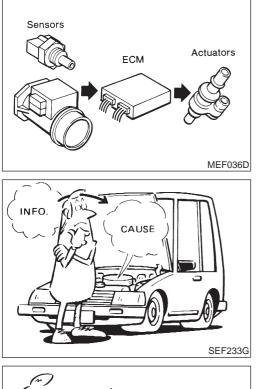
Generic Scan Tool (GST) (Cont'd)

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### FUNCTION

	FUNCTION			
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, distance traveled while MI is activated 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-86.)		
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.		
MODE 4	CLEAR DIAG INFO	<ul> <li>This mode can clear all emission-related diagnostic information. This includes:</li> <li>Clear number of diagnostic trouble codes (MODE 1)</li> <li>Clear diagnostic trouble codes (MODE 3)</li> <li>Clear trouble code for freeze frame data (MODE 1)</li> <li>Clear freeze frame data (MODE 2)</li> <li>Reset status of system monitoring test (MODE 1)</li> <li>Clear on board monitoring test results (MODE 6 and 7)</li> </ul>		
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 is not applicable on this vehicle.		
MODE 9	(CALIBRATION ID)	This mode enables the off-board (External test equipment) to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.		

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## Introduction

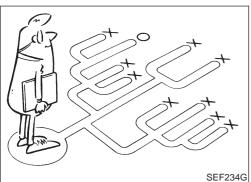
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that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

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems 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 problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-98.

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 problems, 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" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.



**KEY POINTS** 

WHEN ..... Date, Frequencies

WHERE ..... Road conditions

WHAT ..... Vehicle & engine model

HOW ..... Operating conditions.

Symptoms

Weather conditions.

# DIAGNOSTIC WORKSHEET

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 a problem. 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 malfunction indicator lamp to come on steady or blink and DTC to be detected.

Example:

SEF907L

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

# **TROUBLE DIAGNOSIS — INTRODUCTION**

QG Introduction (Cont'd)

## Worksheet Sample

NJEC0036S0101

Customer name MR/MS		Model & Year	VIN	
Engine #		Trans.	Mileage	
Incident Date		Manuf. Date	In Service Date	
Fuel		U Vehicle ran out of fuel causing misfire		
	☐ Startability	<ul> <li>Impossible to start I No combustion</li> <li>Partial combustion affected by throttle position</li> <li>Partial combustion NOT affected by throttle position</li> <li>Possible but hard to start Others [ ]</li> </ul>		
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [	ligh idle 🗌 Low idle ]	
- ,	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 cond	ditions 🗌 Sometimes	
Weather conditions		□ Not affected		
Weather		Fine     Raining     Snowing	Others [ ]	
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌	] Cold 🗌 Humid °F	
		Cold During warm-up	After warm-up	
Engine conditions		Engine speed 0 2,000	4,000 6,000 8,000 rpm	
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	hway 🛛 Off road (up/down)	
Driving conditions		<ul> <li>Not affected</li> <li>At starting</li> <li>While idling</li> <li>While accelerating</li> <li>While decelerating</li> <li>While turning</li> </ul>	•	
		Vehicle speed 0 20 40	<u>,   ,   ,  </u> 60 80 100 120 Km/h	
Malfunction ir	ndicator	Turned on Not turned on		

MTBL0658

# **TROUBLE DIAGNOSIS — INTRODUCTION**

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perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT",

EC-177.

Listen to customer complaints. (Get symptoms.)  CHECK DTC AND FREEZE FRAME DATA. Check and PRINT OUT (write down) (1st trip) DTC and Freeze Frame Data (Pre-check). Paste it on repair order sheet. Also check related service bulletins for information. If DTC is not available even if MI lights up, check ECM fail-safe. *1  Symptoms collected. No symptoms, except MI lights up, or (1st trip) DTC exists at STEP II.  Verify the symptom by driving in the condition the customer described. ormal Code (at STEP II)  Malfunction Code (at STEP II)  INCIDENT CONFIRMATION Verify the DTC by performing the "DTC Confirmation Procedure".  Choose the appropriate action.  Malfunction Code (at STEP II or IV)  BASIC INSPECTION  SYMPTOM BASIS (at STEP I or III)  With CONSULT-II  Perform TATA Malfunction is not detected.  TROUBLE DIAGNOSIS FOR DTC PXXXX.  Step C:  REPAIR/REPLACE  FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC	
Check INCIDENT CONDITIONS. Listen to customer complaints. (Get symptoms.) CHECK DTC AND FREEZE FRAME DATA. Check and PRINT OUT (write down) (1st trip) DTC and Freeze Frame Data (Pre-check), Paste it on repair order sheat. Then clear. Also check related service bulletins for information. If DTC is not available even if MI lights up, check ECM fail-safe. *1 Symptoms collected. Verify the symptom by driving in the condition the customer described. or (1st trip) DTC exists at STEP II. Verify the STEP II) Malfunction Code (at STEP II) Malfunction Code (at STEP II) Malfunction Code (at STEP II) Malfunction Code (at STEP II or IV) Malfunction Code (at STEP II or IV) Malfunction Code (at STEP II or IV) Malfunction is not detected. THOUBLE DIAGNOSIS FOR DTC PXXXX. THOUBLE DIAGNOSIS FOR DTC PXXXX. Malfunction is detected. REPAIR/REPLACE Malfunction is detected. Malfunction is detected. Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirm that the incident is completely fixed by performing the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). WCK	
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Check and PRINT OUT (write down) (1st trip) DTC and Freeze Frame Data (Pre-check). Paste it on repair order sheet. Then clear. Also check related service bulletins for information. If DTC is not available even if MI lights up, check ECM fail-safe. *1 Symptoms collected. Verify the symptom by driving in the condition the customer described. Drmal Code (at STEP II) Nalfunction Code (at STEP II) Nerify the DTC by performing the "DTC Confirmation Procedure". Choose the appropriate action. Malfunction Code (at STEP II or IV) Normal Code (at STEP I or III) With cONSULT-II Perform inspections according to Symptom Matrix Chart. Malfunction is not detected TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROU	
Choose the appropriate action. Malfunction Code (at STEP II or IV) Malfunction Symptom Matrix Chart. Malfunction is not detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXXX.	
or (1st trip) DTC exists at STEP II. Verify the symptom by driving in the condition the customer described. ormal Code (at STEP II) INCIDENT CONFIRMATION Verify the DTC by performing the "DTC Confirmation Procedure". Choose the appropriate action. Malfunction Code (at STEP II or IV) Malfunction Code (at STEP II or IV) Malfunction Code (at STEP II or IV) BASIC INSPECTION SYMPTOM BASIS (at STEP I or III) With CONSULT-II Perform inspections according to Symptom Matrix Chart. Malfunction is not detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXX	2- step II
Incident consistence       Malfunction Code (at STEP II)         Incident constraints       Malfunction Code (at STEP II)         Incident constraints       Malfunction Procedure".         Choose the appropriate action.       Malfunction Code (at STEP II or IV)         Malfunction Code (at STEP II or IV)       Normal Code (at both STEP II and IV)         BASIC INSPECTION       SYMPTOM BASIS (at STEP I or III)         Without CONSULT-II       Perform         Perform inspections according to Symptom Matrix Chart.       Malfunction is not detected.         Malfunction is detected.       Malfunction is detected.         TROUBLE DIAGNOSIS FOR DTC PXXXX.       *5         REPAIR/REPLACE       Malfunction is detected.         REPAIR/REPLACE       Perform         TROUBLE DIAGNOSIS FOR DTC PXXXX.       *5         Malfunction is detected.       "TROUBLE DIAGNOSIS FOR DTC PXXXX.         *5       Malfunction is detected.         *6       Consult-II.         *7       FINAL CHECK         Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC         Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (aready fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).         VOK       OK	
INCIDENT CONFIRMATION Verify the DTC by performing the "DTC Confirmation Procedure".	3 STEP III
Verify the DTC by performing the "DTC Confirmation Procedure".	
Verify the DTC by performing the "DTC Confirmation Procedure".	
Malfunction Code (at STEP II or IV) Normal Code (at both STEP II and IV) BASIC INSPECTION SYMPTOM BASIS (at STEP I or III) With CONSULT-II Perform inspections according to Symptom Matrix Chart. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROU	3. STEP IV
Malfunction Code (at STEP II or IV) Normal Code (at both STEP II and IV) BASIC INSPECTION SYMPTOM BASIS (at STEP I or III) With CONSULT-II Perform inspections according to Symptom Matrix Chart. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROU	
Malfunction Code (at STEP II or IV) Normal Code (at both STEP II and IV) BASIC INSPECTION Without CONSULT-II Perform inspections according to Symptom Matrix Chart. Perform "DATA Malfunction is not detected. MONITOR (SPEC)" mode with CONSULT-II. If NG, perform "TROUBLE DIAGNOSIS FOR DTC PXXXX. REPAIR/REPLACE REPAIR/REPLACE FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). OK CHECK OUT	4 STEP V
BASIC INSPECTION SYMPTOM BASIS (at STEP I or III) With CONSULT-II Perform inspections according to Symptom Matrix Chart. Perform "DATA Malfunction is not detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXXX. REPAIR/REPLACE REPAIR/REPLACE FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). OK CHECK OUT	0121 1
SYMPTOM BASIS (at STEP I or III) With CONSULT-II Without CONSULT-II Perform inspections according to Symptom Matrix Chart. Malfunction is not detected. Malfunction is detected. Malfunction is detected. Malfunction is detected. Malfunction is detected. Malfunction is detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. Specific ATION VALUE". *7 FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). CHECK OUT	
Without CONSULT-II Perform inspections according to Symptom Matrix Chart. Malfunction is not detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXXX. Malfunction is detected. REPAIR/REPLACE FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). OK CHECK OUT	
Perform inspections according to Symptom Matrix Chart. Malfunction is not detected. TROUBLE DIAGNOSIS FOR DTC PXXXX. TROUBLE DIAGNOSIS FOR DTC PXXXX. Malfunction is detected. REPAIR/REPLACE FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). OK CHECK OUT	
TROUBLE DIAGNOSIS FOR DTC PXXXX.       *5       MoNITOR (SPEC)" mode with CONSULT-II. If NG, perform "TROUBLE         REPAIR/REPLACE       *5       DIAM MONITOR (SPEC)"         FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).	
TROUBLE DIAGNOSIS FOR DTC PXXXX. Malfunction is detected. REPAIR/REPLACE FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). OK CHECK OUT	
Incodel Diadinocity For Dire FAXAX.       Malfunction is detected.       CONSULT-II.         If NG, perform       "TROUBLE         REPAIR/REPLACE       DIAGNOSIS –         SPECIFICATION       VALUE". *7         FINAL CHECK       Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC         Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).         VOK         CHECK OUT	
REPAIR/REPLACE       "TROUBLE         BIAGNOSIS –       SPECIFICATION         VALUE". *7       VALUE". *7         FINAL CHECK       Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC         Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).         VOK         CHECK OUT	STEP VI
REPAIR/REPLACE DIAGNOSIS – SPECIFICATION VALUE". *7 FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). VOK CHECK OUT	
FINAL CHECK         Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC         Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).         VOK         CHECK OUT	
FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module). VOK CHECK OUT	
Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC Confirmation Procedure (or OVERALL FUNCTION CHECK). Then, erase the unnecessary (already fixed) (1st trip) DTCs in ECM and TCM (Transmission control module).	]]
CHECK OUT	- STEP VII
a and templement of other to notated, and to temple and the opeonite antimity patterns of	
	SE
C 454 *4 If the on board discretion system	
C-154*4If the on board diagnostic system cannot be performed, check main power supply and ground circuit.detected, perfor DIAGNOSIS F TENT INCIDED to SIS FOR INTERMITTENTC-154*4If the on board diagnostic system cannot be performed, check main power supply and ground circuit.detected, perfor DIAGNOSIS F TENT INCIDED to SIS FOR INTERMITTENT	OR INTERM

Work Flow (Cont'd)

OG

NJEC0563S01

### DESCRIPTION FOR WORK FLOW

STEP DESCRIPTION Get detailed information about the conditions and the environment when the incident/symptom occurred using STEP I the "DIAGNOSTIC WORK SHEET", EC-97. 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-70, EC-73.) 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-177. STEP II 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-155.) Also check related service bulletins for information. 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 CON-STEP III SULT-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-177. If the malfunction code is detected, skip STEP IV and perform STEP V. 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. STEP IV If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177. 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. 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 refer to "BASIC INSPECTION", EC-100. If CONSULT-II is available, per-STEP V form "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS - SPECI-FICATION VALUE". (Refer to EC-173.) (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-155.) 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 CON-SULT-II. Refer to EC-164. STEP VI 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 section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177. 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 STEP VII 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-70, EC-73.)

OK

NG

## **Basic Inspection/Sedan**

#### Precaution:

NJEC1736

SEF850Y

QG

Perform Basic Inspection without electrical or mechanical loads applied;

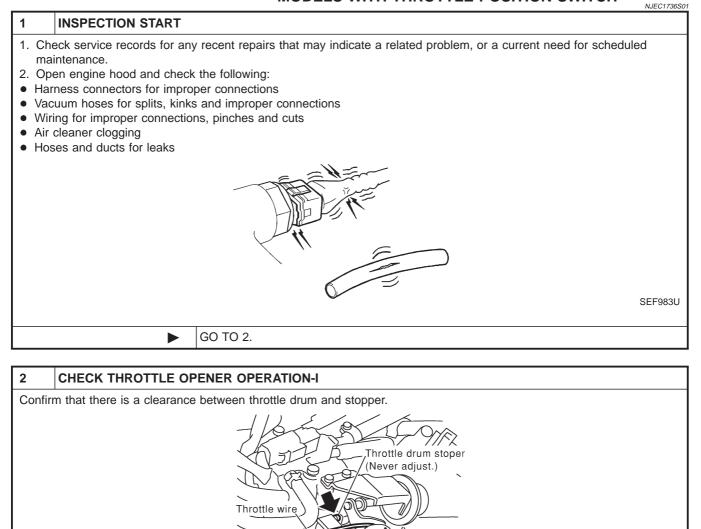
Headlamp switch is OFF,

On vehicle equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

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

### MODELS WITH THROTTLE POSITION SWITCH

Throttle drum



OK or NG

GO TO 4.

GO TO 3.

3	CHECK THROTTLE OPENER FIXING BOLTS				
Check	Check throttle opener fixing bolts for loosening.				
	OK or NG				
OK		<ol> <li>Repair or replace throttle body assembly.</li> <li>GO TO 2.</li> </ol>			
NG		<ol> <li>Retighten the fixing bolts.</li> <li>GO TO 2.</li> </ol>			

### 4 CHECK THROTTLE OPENER OPERATION-II

1. Start engine and let it idle.

2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.

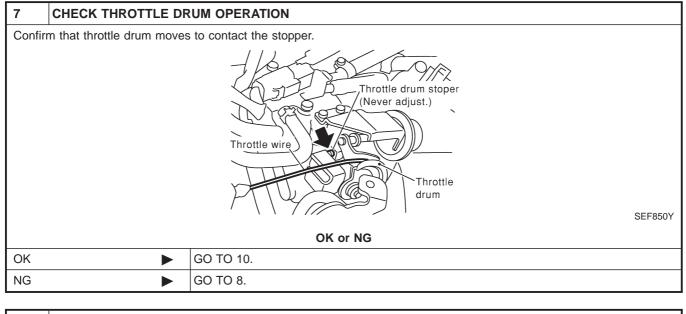
	Throttle drum stoper (Never adjust.) Throttle wire Throttle drum SEF850Y OK or NG
ОК	GO TO 7.
NG	GO TO 5.

5	CHECK VACUUM SOU	RCE FOR THROTTLE OPENER		
	<ol> <li>Disconnect vacuum hose connected to throttle opener.</li> <li>Check vacuum existance with engine running.</li> </ol>			
			Vacuum should exist.	SEF155Y
OK or NG				
ОК		<ol> <li>Repair or replace throttle body assemil</li> <li>GO TO 2.</li> </ol>	bly.	
NG		GO TO 6.		

## TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection/Sedan (Cont'd)

## 6 CHECK VACUUM HOSE 1. Stop engine. 2. Remove the vacuum hose. 3. Check the vacuum hose for splits, kinks and clogging. Split Clogging Improper connection SEF109L OK or NG OK 1. Clean vacuum port by blowing air. 2. GO TO 4. NG 1. Replace vacuum hose. 2. GO TO 4.



8	CHECK ACCELERATOR WIRE INSTALLATION			
<ol> <li>Stop engine.</li> <li>Check accelerator wire for slack.</li> </ol>				
OK or NG				
OK	•	GO TO 9.		
NG		<ol> <li>Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire".</li> <li>GO TO 7.</li> </ol>		

 9
 CHECK THROTTLE VALVE OPERATION

 1. Remove intake air ducts.
 2. Check throttle valve operation when moving throttle drum by hand.

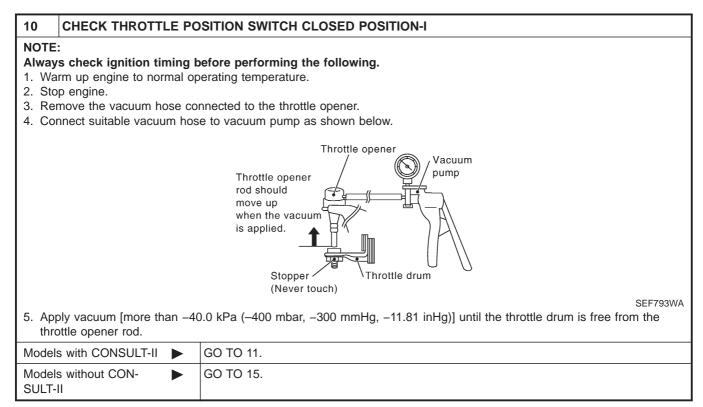
 2. Check throttle valve operation
 OK or NG

 OK
 1. Retighten the throttle drum fixing nuts.

 2. GO TO 7.
 1. Clean the throttle body and throttle valve.

 2. GO TO 7.
 1. Clean the throttle body and throttle valve.

 2. GO TO 7.
 2. GO TO 7.

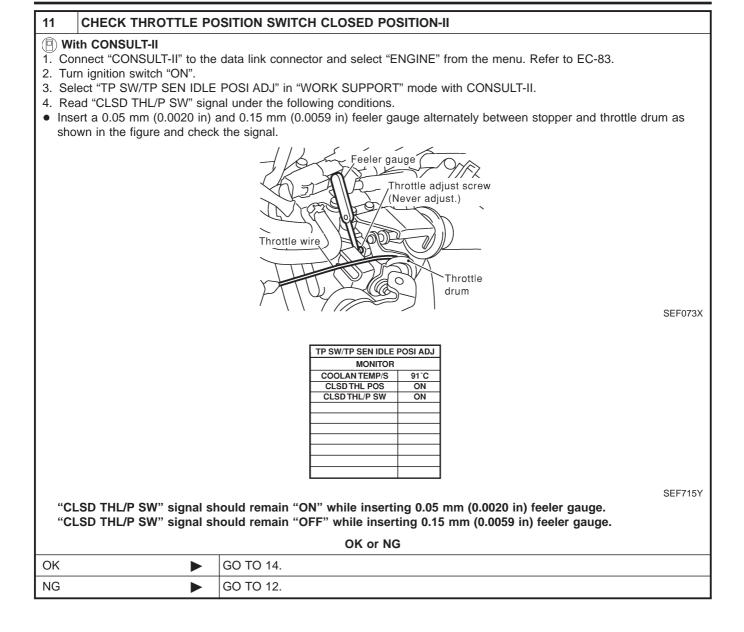


## EC-103

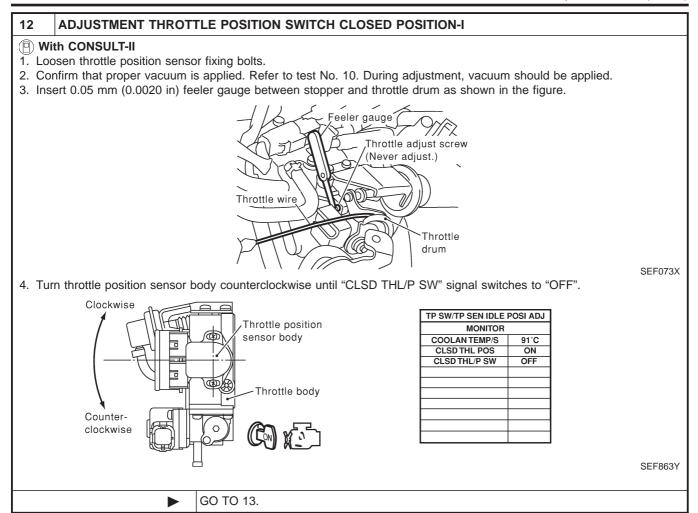
# **TROUBLE DIAGNOSIS — BASIC INSPECTION**

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Basic Inspection/Sedan (Cont'd)



Basic Inspection/Sedan (Cont'd)



## TROUBLE DIAGNOSIS — BASIC INSPECTION

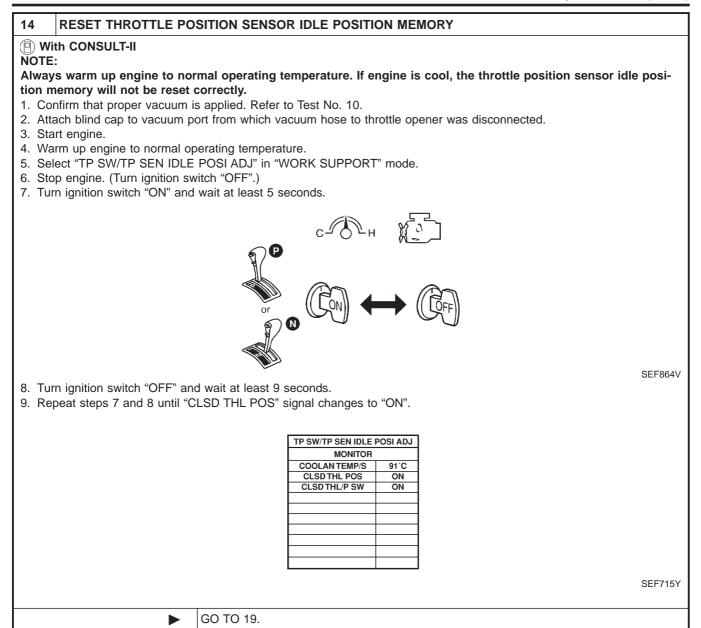
Basic Inspection/Sedan (Cont'd)

NG

13	ADJUSTMENT THROT	LE POSITION SWITCH CLOSED POSITION-II	
1. Te ● Gr	<ul> <li>With CONSULT-II</li> <li>Temporarily tighten sensor body fixing bolts as follows.</li> <li>Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.</li> </ul>		
3. Re 4. Ma 5. Tiç	<ul> <li>Clockwise Throttle position sensor body</li> <li>Counter-clockwise Counter-clockwise</li> <li>Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.</li> <li>Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.</li> <li>Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.</li> <li>Tighten throttle position sensor.</li> <li>Check the "CLSD THL/P SW" signal again.</li> </ul>		
		TP SW/TP SEN IDLE POSI ADJ MONITOR COOLAN TEMP/S 91 'C CLSD THL POS ON CLSD THL/P SW OFF 	
SEF716Y The signal remains "OFF" while closing throttle valve.			
	OK or NG		
ОК		GO TO 14.	

GO TO 12.

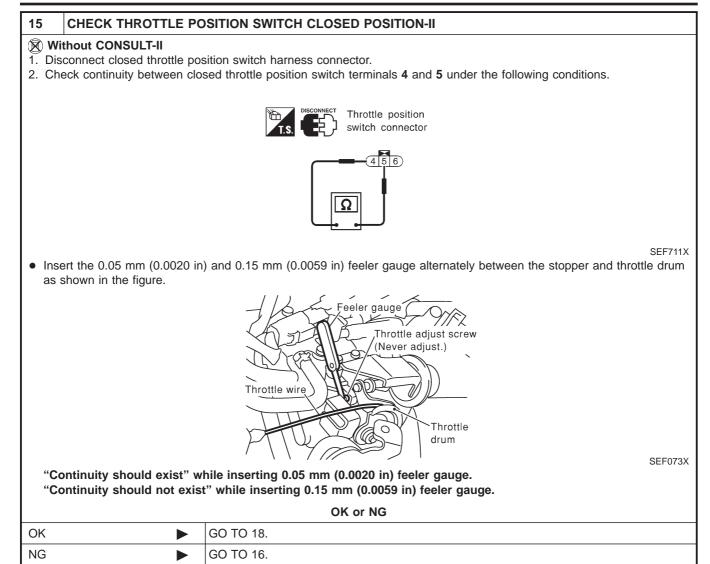
Basic Inspection/Sedan (Cont'd)



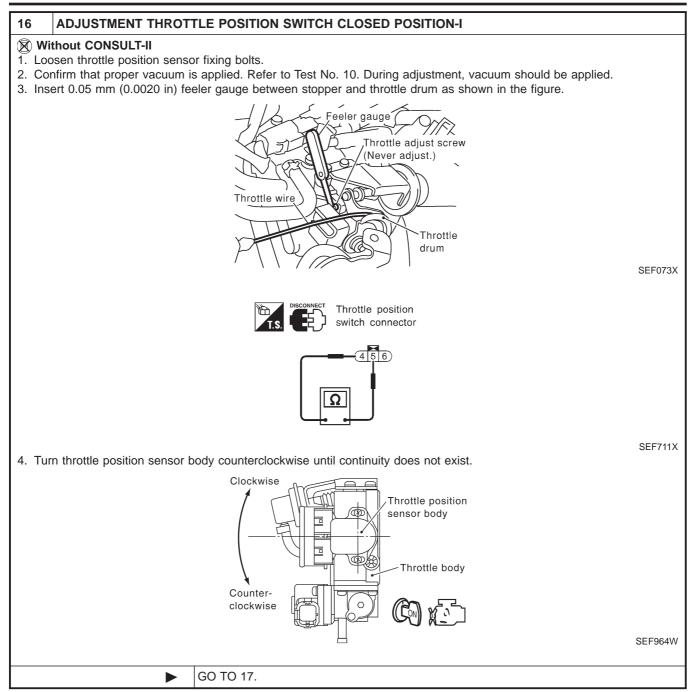
# TROUBLE DIAGNOSIS — BASIC INSPECTION

QG

Basic Inspection/Sedan (Cont'd)



Basic Inspection/Sedan (Cont'd)



Basic Inspection/Sedan (Cont'd)

Basic Inspection/Sedan (Cont'd)		
17 ADJUSTMENT THROT	TLE POSITION SWITCH CLOSED POSITION-II	
<ul> <li>Without CONSULT-II</li> <li>Temporarily tighten sensor body fixing bolts as follows.</li> <li>Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.</li> </ul>		
	Clockwise Counter- clockwise	
<ul> <li>when it is opened.</li> <li>3. Remove 0.05 mm (0.0020 in)</li> <li>4. Make sure two or three times</li> <li>5. Tighten throttle position sense</li> <li>6. Check the continuity again.</li> </ul>	s that the continuity exists when the throttle valve is closed and continuity does not exist ) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge. s that the continuity does not exist when the throttle valve is closed.	
	OK or NG	
OK 🕨	GO TO 18.	
NG	GO TO 16.	
<b>F</b>		
	OSITION SENSOR IDLE POSITION MEMORY	
tion memory will not be reset 1. Confirm that proper vacuum	is applied. Refer to Test No. 10. bort from which vacuum hose to throttle opener was disconnected. perating temperature. witch "OFF".)	
7. Turn ignition switch "OFF" and wait at least 9 seconds. 8. Repeat steps 6 and 7, 20 times.		
	nd wait at least 9 seconds.	
	nd wait at least 9 seconds.	

Basic Inspection/Sedan (Cont'd)

QG

#### 19 CHECK (1ST TRIP) DTC

- 1. Turn ignition switch "OFF".
- 2. Release vacuum from throttle opener.
- 3. Remove vacuum pump and vacuum hose from throttle opener.
- 4. Reinstall original vacuum hose to throttle opener securely.
- 5. Start engine and warm it up to normal operating temperature.
- 6. Rev (2,000 to 3,000 rpm) two or three times.
- 7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.

OK or NG	
OK 🕨	GO TO 21.
NG	GO TO 20.

#### 20 REPAIR MALFUNCTION

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

► GO TO 19.

21	CHECK TARGET IDLE	SPEED	
🕒 Wi	th CONSULT-II		
1. Sta	art engine and warm it up to	o normal operating temperature.	
2. Sel	lect "ENG SPEED" in "DAT	A MONITOR" mode with CONSULT-II.	
	eck idle speed.		
	M/T: 700±50 rpm		
	A/T: 800±50 rpm (in "P" o	or "N" position)	
1. Sta	<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> </ul>		
	M/T: 700±50 rpm		
	A/T: 800±50 rpm (in "P" or "N" position)		
	OK or NG		
ОК		GO TO 31.	
NG		GO TO 22.	

22	PERFORM IDLE AIR V	OLUME LEARNING	
	Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
	CMPLT or INCMP		
CMPL	г 🕨	GO TO 23.	
INCMF		<ol> <li>Follow the construction of "Idle Air Volume Leaning".</li> <li>GO TO 22.</li> </ol>	

Basic Inspection/Sedan (Cont'd)

23 C	HECK TARGET IDLE	SPEED AGAIN	
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 625±50 rpm</li> <li>A/T: 700±50 rpm (in "P" or "N" position)</li> </ul>			
1. Start e 2. Check M/1	<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>		
		OK or NG	
ОК		GO TO 29.	
NG (Mod OBD syst	els with Euro-	GO TO 25.	
	NG (Models without Euro-OBD system) GO TO 24.		
24 C	HECK IACV-AAC VA	LVE CIRCUIT FOR OPEN AND SHORT	
<ol> <li>Turn ignition switch "OFF".</li> <li>Check IACV-AAC valve circuit for open and short. Refer to "Diagnostic Procedure", EC-380.</li> </ol>			

OK or NG		
ОК		GO TO 25.
NG	►	<ol> <li>Repair or replace.</li> <li>GO TO 26.</li> </ol>

#### 25 REPLACE IACV-AAC VALVE

Replace IACV-AAC valve.

► GO TO 26.

26	PERFORM IDLE AIR VOLUME LEARNING			
	Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?			
		CMPLT or INCMP		
CMPL	CMPLT 🕨 GO TO 27.			
INCM		<ol> <li>Follow the construction of "Idle Air Volume Learning".</li> <li>GO TO 22.</li> </ol>		

Basic Inspection/Sedan (Cont'd)

27	27 CHECK TARGET IDLE SPEED AGAIN		
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
1. St	/ithout CONSULT-II art engine and warm it up t neck idle speed. M/T: 700±50 rpm A/T: 800±50 rpm (in "P"	o normal operating temperature.	
		OK or NG	
OK	•	GO TO 29.	
NG		GO TO 28.	
28	CHECK ECM FUNCTIO	DN	
th	e case.)	od ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely	
	erform initialization of NATS vstem)", EC-74.	system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft	
		GO TO 22.	
29	CHECK IGNITION TIM	NG	
	art engine and warm it up t neck ignition timing at idle u	o normal operating temperature. Ising a timing light.	
Timing light			
		SEF984U	
Ignition timing: M/T 8°±5° BTDC A/T 10°±5° BTDC (in "P" or "N" position)			
	OK or NG		
OK		GO TO 37.	
NG	►	GO TO 30.	
30			
Check timing chain installation. Refer to EM-28, "Installation".			
OK or NG			
OK		GO TO 28.	
NG	•	<ol> <li>Repair the timing chain installation.</li> <li>GO TO 22.</li> </ol>	

Basic Inspection/Sedan (Cont'd)		
31 CHECK I	GNITION TIMING	
<ol> <li>Start engine a</li> <li>Check ignition</li> </ol>	timing at idle using a timing light.	
	Timing light states	
Ignition timin M/T 8°±5° E	BTDC	
A/1 10°±5°	BTDC (in "P" or "N" position) OK or NG	
ОК	► GO TO 37.	
NG	► GO TO 22.	
Refer to "Idle Air	M IDLE AIR VOLUME LEARNING Volume Learning", EC-57. sult CMPLT or INCMP? CMPLT or INCMP	
CMPLT	GO TO 33.	
INCMP	<ul> <li>Follow the construction of "Idle Air volume Learning".</li> <li>2. GO TO 32.</li> </ul>	
33 CHECK T	ARGET IDLE SPEED AGAIN	
<ol> <li>Select "ENG S</li> <li>Check idle spe M/T: 700±5</li> </ol>	nd warm it up to normal operating temperature. SPEED" in "DATA MONITOR" mode with CONSULT-II. eed.	
<ol> <li>Check idle spe M/T: 700±5</li> </ol>	nd warm it up to normal operating temperature. eed.	

OK or NG	
OK 🕨	GO TO 35.
NG	GO TO 34.

#### CHECK ECM FUNCTION 34

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft

System)", EC-74.

GO TO 32. 

Basic Inspection/Sedan (Cont'd)

QG

35	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 31.		
		OK or NG
OK	•	GO TO 37.
NG		GO TO 36.

#### 36 CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation".

OK or NG		
ОК		GO TO 34.
NG		<ol> <li>Repair the timing chain installation.</li> <li>GO TO 32.</li> </ol>

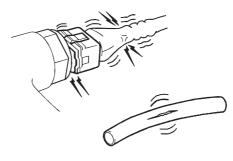
37	ERASE UNNECESSARY DTC	
Erase	After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "How to Erase Emission-Related Diagnostic Information", EC-70 and AT-52, "HOW TO ERASE DTC".	
		INSPECTION END

Basic Inspection/Sedan (Cont'd)

#### MODELS WITHOUT THROTTLE POSITION SWITCH

#### 1 INSPECTION START

- 1. Check service records for any recent repairs that may indicate a related problem, 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



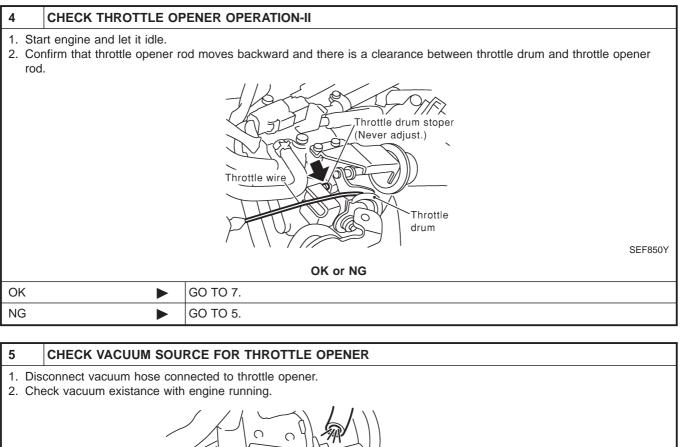
SEF983U

► GO TO 2.

#### 2 CHECK THROTTLE OPENER OPERATION-I Confirm that there is a clearance between throttle drum and stopper. Throttle drum stoper (Never adjust.) Throttle wire Throttle 0 drum SEF850Y OK or NG GO TO 4. OK GO TO 3. NG

3	CHECK THROTTLE OP	ENER FIXING BOLTS	
Check	Check throttle opener fixing bolts for loosening.		
	OK or NG		
ОК		<ol> <li>Repair or replace throttle body assembly.</li> <li>GO TO 2.</li> </ol>	
NG		<ol> <li>Retighten the fixing bolts.</li> <li>GO TO 2.</li> </ol>	

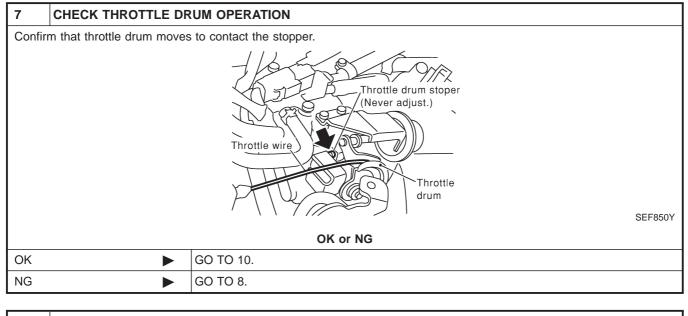
Basic Inspection/Sedan (Cont'd)



		Vacuum should exist. SEF155Y
	OK or NG	
ОК	<ol> <li>Repair or replace throttle body assembly.</li> <li>GO TO 2.</li> </ol>	
NG	GO TO 6.	

Basic Inspection/Sedan (Cont'd)

#### 6 CHECK VACUUM HOSE 1. Stop engine. 2. Remove the vacuum hose. 3. Check the vacuum hose for splits, kinks and clogging. Split Clogging Improper connection SEF109L OK or NG OK 1. Clean vacuum port by blowing air. 2. GO TO 4. NG 1. Replace vacuum hose. 2. GO TO 4.



8	CHECK ACCELERATOR WIRE INSTALLATION		
<ol> <li>Stop engine.</li> <li>Check accelerator wire for slack.</li> </ol>			
	OK or NG		
OK		GO TO 9.	
NG		<ol> <li>Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire".</li> <li>GO TO 7.</li> </ol>	

 9
 CHECK THROTTLE VALVE OPERATION

 1. Remove intake air ducts.
 .

 2. Check throttle valve operation when moving throttle drum by hand.
 .

 OK or NG

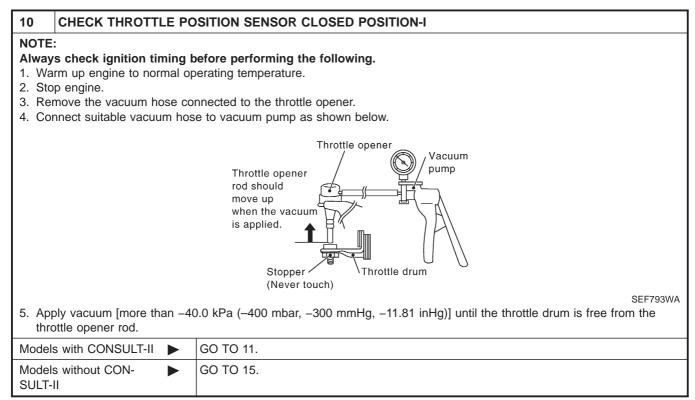
 OK
 ▶

 1. Retighten the throttle drum fixing nuts.
 .

 2. GO TO 7.
 .

 NG
 ▶
 1. Clean the throttle body and throttle valve.

 2. GO TO 7.
 .



Basic Inspection/Sedan (Cont'd)

11 CHECK THROTTLE P	POSITION SENSOR CLOSED POSITION-II	
<ol> <li>Turn ignition switch "ON".</li> <li>Select "THRTL POS SEN" in</li> </ol>	ne data link connector and select "ENGINE" from the menu. Refer to EC-83. n "DATA MONITOR" mode with CONSULT-II. f throttle position sensor is 0.45 to 0.55V. (Throttle valve fully closes.)	
	DATA MONITOR	
	MONITOR NO DTC	
	ENG SPEED XXX rpm VHCL SPEED SE XXX km/h THRTL POS SEN XXX V	
Throttle position senso	r voltage: 0.45 to 0.55V	SEF175Y
	OK or NG	
ОК	GO TO 14.	
NG	GO TO 12.	

#### 12 ADJUSTMENT THROTTLE POSITION SENSOR CLOSED POSITION-I

#### () With CONSULT-II

1. Loosen throttle position sensor fixing bolts.

2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.

3. Adjust output voltage to 0.45 to 0.55V by rotating throttle position sensor body.

4. Tighten throttle position sensor bolts.

5. Check the output voltage of throttle position sensor again.

DATA MONIT	OR
MONITOR	NO DTC
ENG SPEED	XX rpm
COOLAN TEMP/S	xxx °c
THRTL POS SEN	xxx v

#### Throttle position sensor voltage: 0.45 to 0.55V

OK or NG

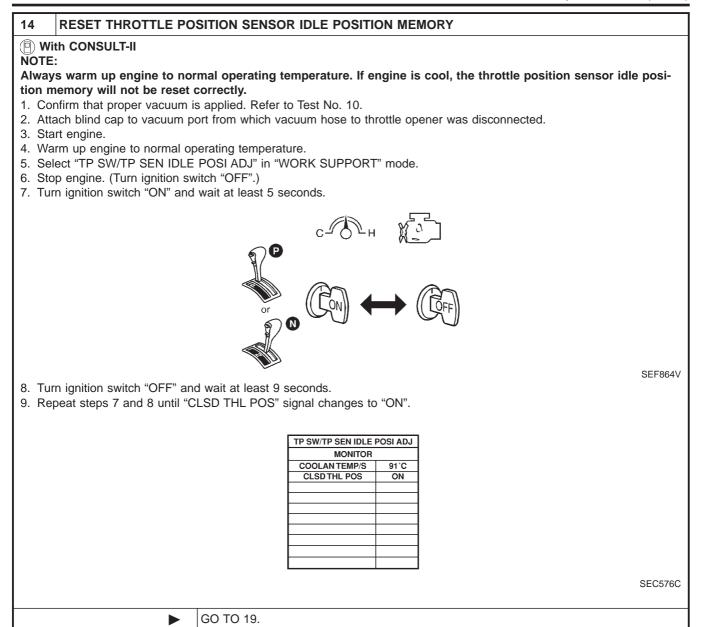
ОК	GO TO 14.
NG	GO TO 13.

13	DETECT MULFUNCTIONING PART			
Check the throttle position sensor component. Refer to EC-214.				
OK or NG				
ОК	OK 🕨 GO TO 10.			
NG		Replace throttle position sensor.		

QG

SEF179Y

Basic Inspection/Sedan (Cont'd)



Basic Inspection/Sedan (Cont'd)

15	CHECK THROTTLE POS	ITION SENSOR CLOSED	POSITION-II	
1. Tu 2. Ch NG	/ithout CONSULT-II urn ignition switch ON. heck voltage between ECM te OTE: bltage measurement must be			nder the following conditions.
		H.S.		
			NECTOR	
				SEF007X
		Throttle valve conditions	Voltage (V)	
		Completely closed	0.45 - 0.55 (a)	
		Partially open	Between (a) and (b)	
		Completely open	3.5 - 4.7 (b)	
				MTBL0660
		OK o	r NG	
OK		GO TO 17.		
		GO TO 16.		

16	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I	
1. Lo 2. Co 3. Ad 4. Tig	<b>/ithout CONSULT-II</b> bosen throttle position sensor fixing bolts. onfirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied. djust output voltage to 0.45 to 0.55V by rotating throttle position sensor body. ghten throttle position sensor bolts. neck the output voltage of throttle position sensor again.	
	H.S.	
	Throttle position sensor voltage: 0.45 to 0.55V	SEF007X
	OK or NG	
OK	► GO TO 17.	
NG	► GO TO 13.	

Basic Inspection/Sedan (Cont'd)

QG

# 

8. Repeat steps 6 and 7, 20 times.

► GO TO 18.

#### 18 CHECK (1ST TRIP) DTC

- 1. Turn ignition switch "OFF".
- 2. Release vacuum from throttle opener.
- 3. Remove vacuum pump and vacuum hose from throttle opener.
- 4. Reinstall original vacuum hose to throttle opener securely.
- 5. Start engine and warm it up to normal operating temperature.
- 6. Rev (2,000 to 3,000 rpm) two or three times.
- 7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.

OK or NG

ОК	GO TO 20.
NG	GO TO 19.

19	REPAIR MALFUNCTION		
Repair	Repair or replace components as necessary according to corresponding "Diagnostic Procedure".		
	► GO TO 18.		

Basic Inspection/Sedan (Cont'd)

Basic Inspection/Sedan (Cont'd)			
20 CHECK TARGET IDLE SPEED			
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
2. Check idle speed. M/T: 700±50 rpm	<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> </ol>		
	OK or NG		
OK •	GO TO 30.		
NG	GO TO 21.		
21 PERFORM IDLE AIR V			
Refer to "Idle Air Volume Learni Which is the result CMPLT or	-		
	CMPLT or INCMP		
CMPLT	GO TO 22.		
INCMP	<ol> <li>Follow the construction of "Idle Air Volume Leaning".</li> <li>GO TO 21.</li> </ol>		
22 CHECK TARGET IDLE	SPEED AGAIN		
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 625±50 rpm</li> <li>A/T: 700±50 rpm (in "P" or "N" position)</li> </ul>			
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.         <ul> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul> </li> </ul>			
OK or NG			
OK 🕨	GO TO 28.		
NG (Models with Euro- OBD system)	GO TO 24.		
NG (Models without Euro-OBD system) GO TO 23.			

Basic Inspection/Sedan (Cont'd)

QG

23	CHECK IACV-AAC VA	LVE CIRCUIT FOR OPEN AND SHORT		
	1. Turn ignition switch "OFF".			
2. Cł	neck IACV-AAC valve circu	uit for open and short. Refer to "Diagnostic Procedure", EC-380.		
		OK or NG		
ОК	►	GO TO 24.		
NG	►	1. Repair or replace.		
		2. GO TO 25.		
24	REPLACE IACV-AAC	VALVE		
Repla	ace IACV-AAC valve.			
	► GO TO 25.			
25	25 PERFORM IDLE AIR VOLUME LEARNING			
Refer	Refer to "Idle Air Volume Learning", EC-57.			
Which is the result CMPLT or INCMP?				
CMPLT or INCMP				
CMPI	T 🕨	GO TO 26.		
INCM	IP 🕨	1. Follow the construction of "Idle Air Volume Learning".		

26	CHECK TARGET IDLE	SPEED AGAIN
🕒 Wi	th CONSULT-II	
		o normal operating temperature.
		A MONITOR" mode with CONSULT-II.
	eck idle speed.	
	M/T: 700±50 rpm	
	A/T: 800±50 rpm (in "P" o	or "N" position)
🛛 🕱 Wi	thout CONSULT-II	
		o normal operating temperature.
	eck idle speed.	
	M/T: 700±50 rpm	
	A/T: 800±50 rpm (in "P" o	or "N" position)
		OK or NG
ОК		GO TO 28.
NG		GO TO 27.
27	CHECK ECM FUNCTIO	N

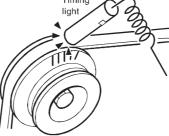
1.	. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a proble	m, but this is rarely
	the case.)	
2.	. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (I	√issan Anti-Theft
	Svstem)". EC-74.	

GO TO 21. 

2. GO TO 21.

Basic Inspection/Sedan (Cont'd)

28 CHECK	IGNITION TIMI	NG	
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check ignition timing at idle using a timing light.</li> </ol>			
2. Check ignitic	on timing at idle u		
		Timing light	05500411
Ignition t	imina:		SEF984U
M/T 8°	±5° BTDC		
A/T 10	°±5° BTDC (in "	P" or "N" position)	
		OK or NG	
OK		GO TO 36.	
NG		GO TO 29.	
29 CHECK	TIMING CHAIN	INSTALLATION	
		Refer to EM-28, "Installation".	
check uning of		OK or NG	
OK		GO TO 27.	
NG		1. Repair the timing chain installation.	
		2. GO TO 21.	
30 CHECK	IGNITION TIMI	NG	
<ol> <li>Start engine</li> <li>Check ignitic</li> </ol>		sing a timing light.	
Timing light			



SEF984U

Ignition timing: M/T 8°±5° BTDC A/T 10°±5° BTDC (in "P" or "N" position)

OK or NG

OK 🕨	GO TO 36.
NG	GO TO 21.

QG

31	PERFORM IDLE AIR V	OLUME LEARNING
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
CMPLT or INCMP		
CMPL	г 🕨	GO TO 32.
INCMF		<ol> <li>Follow the construction of "Idle Air volume Learning".</li> <li>GO TO 31.</li> </ol>

#### 32 CHECK TARGET IDLE SPEED AGAIN () With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. M/T: 700±50 rpm A/T: 800±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: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position) OK or NG OK GO TO 34. NG GO TO 33.

33	CHECK ECM FUNCTION		
(E0 2. Pe	<ol> <li>Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)</li> <li>Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.</li> </ol>		
		GO TO 31.	

CHECK IGNITION TIMI	NG AGAIN		
Check ignition timing again. Refer to Test No. 30.			
OK or NG			
	GO TO 36.		
	GO TO 35.		
	►		

35	CHECK TIMING CHAIN	INSTALLATION	
Check	Check timing chain installation. Refer to EM-28, "Installation".		
	OK or NG		
OK		GO TO 33.	
NG		<ol> <li>Repair the timing chain installation.</li> <li>GO TO 31.</li> </ol>	

Basic Inspection/Sedan (Cont'd)

36 I	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "How to Erase Emission-Related Diagnostic Information", EC-70 and AT-52, "HOW TO ERASE DTC".		
		INSPECTION END

#### Basic Inspection/Hatchback MODELS WITH THROTTLE POSITION SWITCH

NJEC1785 NJEC1785S01

QG

Precaution: Perform Basic Inspection without electrical or mechanical loads applied;

Headlamp switch is OFF,

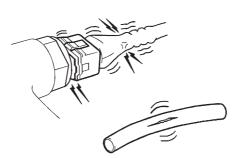
On vehicle equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

- 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 problem, or a current need for scheduled maintenance.

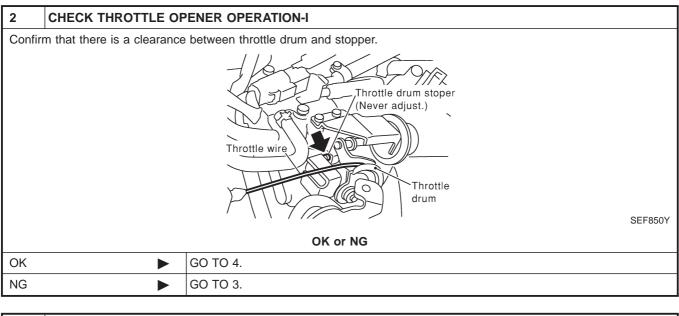
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- · Hoses and ducts for leaks



SEF983U

GO TO 2.

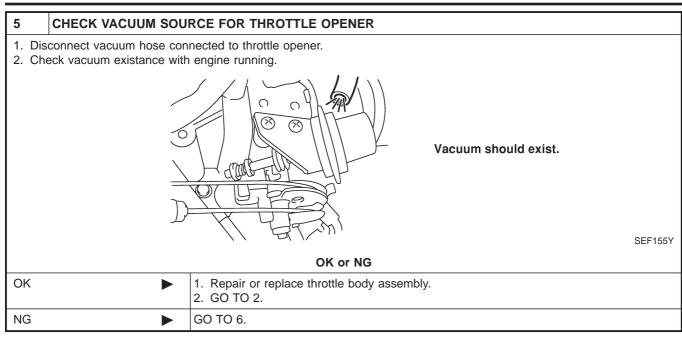
Basic Inspection/Hatchback (Cont'd)



3	CHECK THROTTLE OP	ENER FIXING BOLTS	
Check	Check throttle opener fixing bolts for loosening.		
	OK or NG		
ОК		<ol> <li>Repair or replace throttle body assembly.</li> <li>GO TO 2.</li> </ol>	
NG		<ol> <li>Retighten the fixing bolts.</li> <li>GO TO 2.</li> </ol>	

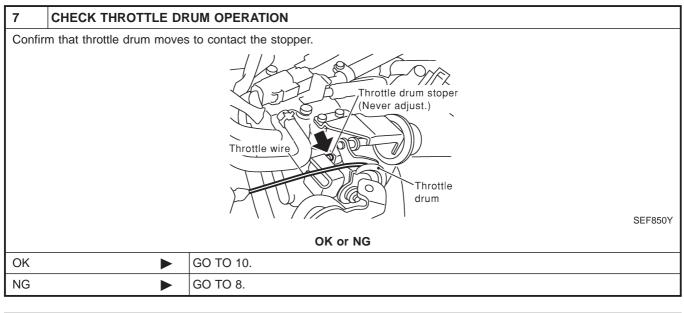
4 CHECK THROTTLE OI	PENER OPERATION-II
1. Start engine and let it idle.	od moves backward and there is a clearance between throttle drum and throttle opener Throttle drum stoper (Never adjust.) Throttle wire Throttle wire Throttle wire
	OK or NG
ОК	GO TO 7.
NG	GO TO 5.

Basic Inspection/Hatchback (Cont'd)



6	CHECK VACUUM HOS	E	
2. Re	<ol> <li>Stop engine.</li> <li>Remove the vacuum hose.</li> <li>Check the vacuum hose for splits, kinks and clogging.</li> </ol>		
		Clogging	
	Improper connection SEF109L		SEF109L
		OK or NG	
ОК	•	<ol> <li>Clean vacuum port by blowing air.</li> <li>GO TO 4.</li> </ol>	
NG	►	<ol> <li>Replace vacuum hose.</li> <li>GO TO 4.</li> </ol>	

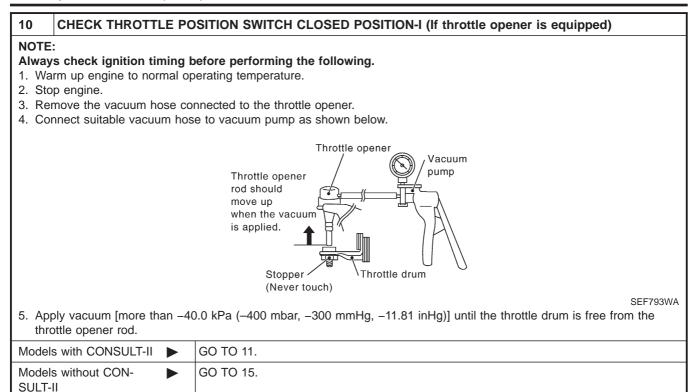
Basic Inspection/Hatchback (Cont'd)



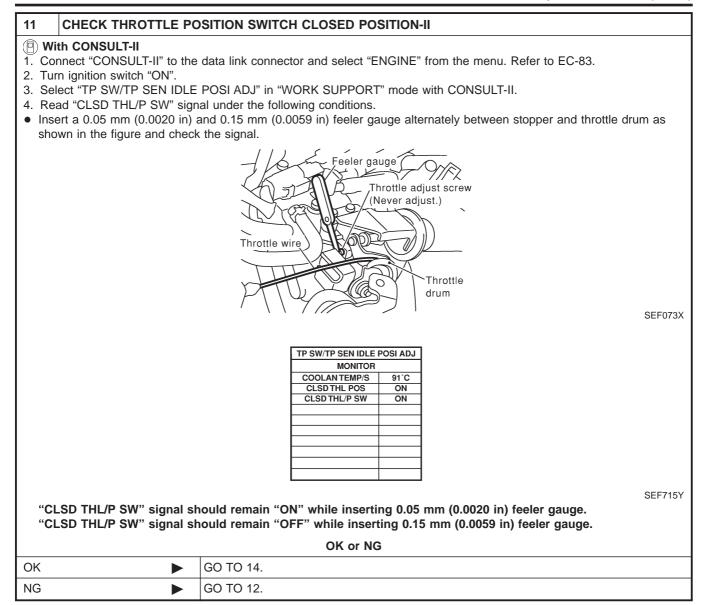
8	CHECK ACCELERATOR WIRE INSTALLATION		
<ol> <li>Stop engine.</li> <li>Check accelerator wire for slack.</li> </ol>			
	OK or NG		
OK	•	GO TO 9.	
NG	►	<ol> <li>Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire".</li> <li>GO TO 7.</li> </ol>	

9	CHECK THROTTLE VA	LVE OPERATION	
<ol> <li>Remove intake air ducts.</li> <li>Check throttle valve operation when moving throttle drum by hand.</li> </ol>			
	OK or NG		
OK	►	<ol> <li>Retighten the throttle drum fixing nuts.</li> <li>GO TO 7.</li> </ol>	
NG	►	<ol> <li>Clean the throttle body and throttle valve.</li> <li>GO TO 7.</li> </ol>	

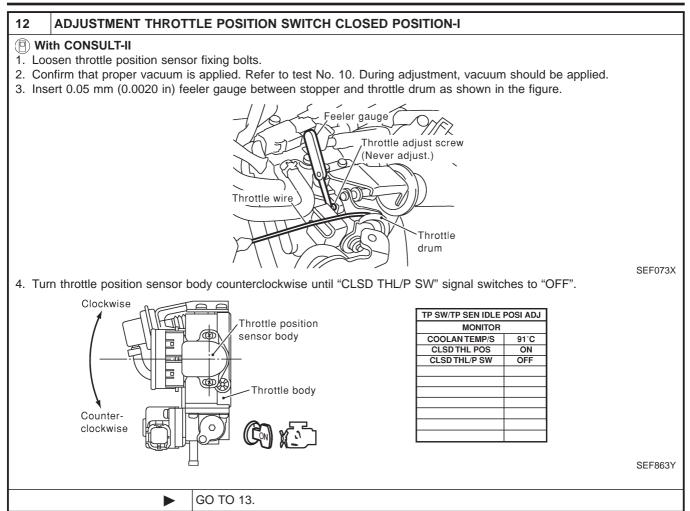
Basic Inspection/Hatchback (Cont'd)



Basic Inspection/Hatchback (Cont'd)

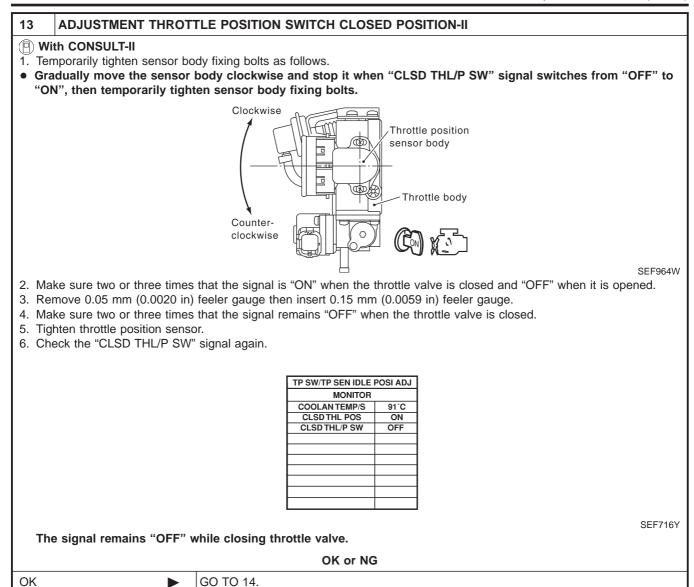


Basic Inspection/Hatchback (Cont'd)



Basic Inspection/Hatchback (Cont'd)

QG



GO TO 12.

NG

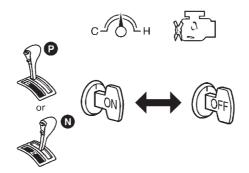
Basic Inspection/Hatchback (Cont'd)

#### 14 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

# () With CONSULT-II NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

- 1. Confirm that proper vacuum is applied. Refer to Test No. 10.
- 2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
- 3. Start engine.
- 4. Warm up engine to normal operating temperature.
- 5. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
- 6. Stop engine. (Turn ignition switch "OFF".)
- 7. Turn ignition switch "ON" and wait at least 5 seconds.



8. Turn ignition switch "OFF" and wait at least 9 seconds.

9. Repeat steps 7 and 8 until "CLSD THL POS" signal changes to "ON".

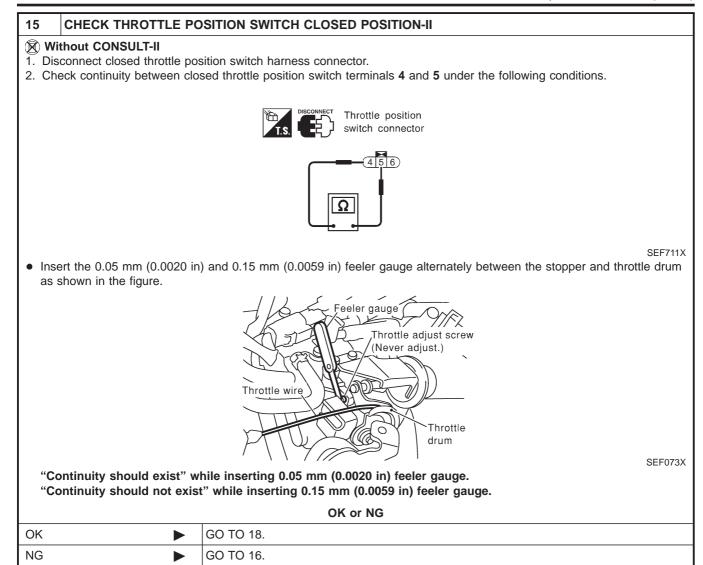
TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF864V

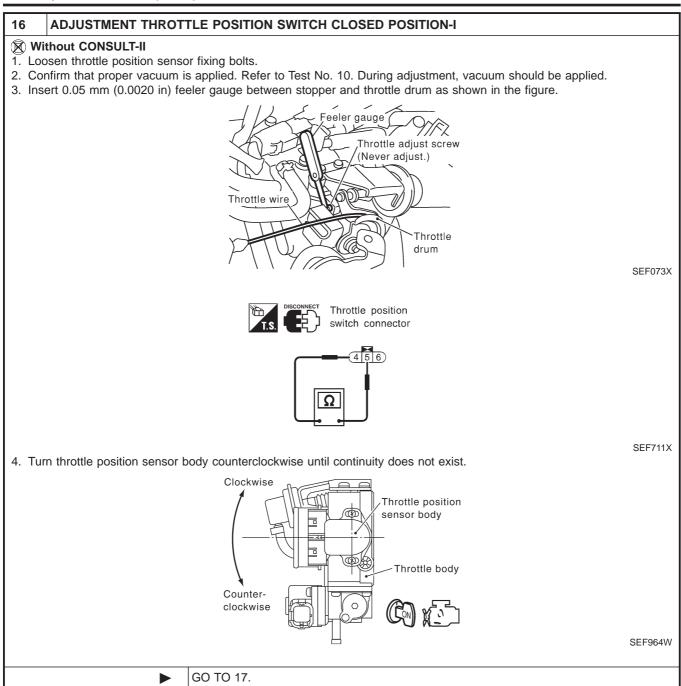
SEF715Y

GO TO 19.

Basic Inspection/Hatchback (Cont'd)



Basic Inspection/Hatchback (Cont'd)



Basic Inspection/Hatchback (Cont'd)

17 ADJUSTMENT THROT	ILE POSITION SWITCH CLOSED POSITION-II
<ul> <li>Without CONSULT-II</li> <li>Temporarily tighten sensor bo</li> <li>Gradually move the sensor tighten sensor body fixing b</li> </ul>	body clockwise and stop it when the continuity comes to exist, then temporarily
	Counter- clockwise
<ul> <li>when it is opened.</li> <li>3. Remove 0.05 mm (0.0020 in)</li> <li>4. Make sure two or three times</li> <li>5. Tighten throttle position sense</li> <li>6. Check the continuity again.</li> </ul>	that the continuity exists when the throttle valve is closed and continuity does not exist feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge. that the continuity does not exist when the throttle valve is closed. or. while closing the throttle valve. OK or NG
OK 🕨	GO TO 18.
NG	GO TO 16.
18 RESET THROTTLE PO	SITION SENSOR IDLE POSITION MEMORY
Without CONSULT-II NOTE: Always warm up engine to nor tion memory will not be reset of 1. Confirm that proper vacuum is	SITION SENSOR IDLE POSITION MEMORY mal operating temperature. If engine is cool, the throttle position sensor idle posi- correctly. s applied. Refer to Test No. 10. ort from which vacuum hose to throttle opener was disconnected. erating temperature. itch "OFF".)
Without CONSULT-II NOTE: Always warm up engine to nor tion memory will not be reset of 1. Confirm that proper vacuum is 2. Attach blind cap to vacuum po 3. Start engine. 4. Warm up engine to normal op 5. Stop engine. (Turn ignition sw	SITION SENSOR IDLE POSITION MEMORY mal operating temperature. If engine is cool, the throttle position sensor idle posi- correctly. s applied. Refer to Test No. 10. ort from which vacuum hose to throttle opener was disconnected. erating temperature. itch "OFF".)
Without CONSULT-II NOTE: Always warm up engine to nor tion memory will not be reset of 1. Confirm that proper vacuum is 2. Attach blind cap to vacuum po 3. Start engine. 4. Warm up engine to normal op 5. Stop engine. (Turn ignition sw	SITION SENSOR IDLE POSITION MEMORY mal operating temperature. If engine is cool, the throttle position sensor idle posi- correctly. Is applied. Refer to Test No. 10. ort from which vacuum hose to throttle opener was disconnected. erating temperature. itch "OFF".) wait at least 5 seconds. $C \longrightarrow H \qquad C \longrightarrow C$ or $C \longrightarrow H \qquad C \longrightarrow C$ We wait at least 9 seconds. SEF864V the wait at least 9 seconds.
<ul> <li>Without CONSULT-II NOTE:</li> <li>Always warm up engine to nor tion memory will not be reset of 1. Confirm that proper vacuum por 3. Start engine.</li> <li>4. Warm up engine to normal op 5. Stop engine. (Turn ignition sw 6. Turn ignition switch "ON" and</li> </ul>	SITION SENSOR IDLE POSITION MEMORY mal operating temperature. If engine is cool, the throttle position sensor idle posi- correctly. Is applied. Refer to Test No. 10. ort from which vacuum hose to throttle opener was disconnected. erating temperature. itch "OFF".) wait at least 5 seconds. $C \longrightarrow H \qquad C \longrightarrow C$ or $C \longrightarrow H \qquad C \longrightarrow C$ We wait at least 9 seconds. SEF864V d wait at least 9 seconds.

Basic Inspection/Hatchback (Cont'd)

#### 19 CHECK (1ST TRIP) DTC

- 1. Turn ignition switch "OFF".
- 2. Release vacuum from throttle opener.
- 3. Remove vacuum pump and vacuum hose from throttle opener.
- 4. Reinstall original vacuum hose to throttle opener securely.
- 5. Start engine and warm it up to normal operating temperature.
- 6. Rev (2,000 to 3,000 rpm) two or three times.
- 7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST.

OK or NG	
OK 🕨	GO TO 21.
NG	GO TO 20.

#### 20 REPAIR MALFUNCTION

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

► GO TO 19.

21	CHECK TARGET IDLE	SPEED
🕒 Wi	th CONSULT-II	
1. Sta	art engine and warm it up to	o normal operating temperature.
2. Sel	lect "ENG SPEED" in "DAT	A MONITOR" mode with CONSULT-II.
	eck idle speed.	
	M/T: 700±50 rpm	
	A/T: 800±50 rpm (in "P" o	or "N" position)
🛛 🕅 Wi	thout CONSULT-II	
1. Sta	1. Start engine and warm it up to normal operating temperature.	
2. Ch	2. Check idle speed.	
	M/T: 700±50 rpm	
	A/T: 800±50 rpm (in "P" or "N" position)	
OK or NG		
OK		GO TO 31.
NG		GO TO 22.

22	PERFORM IDLE AIR V	OLUME LEARNING	
	Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
	CMPLT or INCMP		
CMPL	г 🕨	GO TO 23.	
INCMF		<ol> <li>Follow the construction of "Idle Air Volume Learning".</li> <li>GO TO 22.</li> </ol>	

Basic Inspection/Hatchback (Cont'd)

QG

23 CHECK TARGET ID		
With CONSULT-II		
	up to normal operating temperature.	
	DATA MONITOR" mode with CONSULT-II.	
3. Check idle speed.		
M/T: 700±50 rpm		
A/T: 800±50 rpm (in "	P of N position)	
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "</li> </ul>	up to normal operating temperature. P" or "N" position) OK or NG	
OK	► GO TO 29.	
	GO TO 25.	
OBD system)		
	► GO TO 24.	
Euro-OBD system)		
24 CHECK IACV-AAC	VALVE CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF	· · · · · · · · · · · · · · · · · · ·	

Turn ignition switch "OFF".
 Check IACV-AAC valve circuit for open and short. Refer to "Diagnostic Procedure", EC-376.

	OK or NG	
ОК		GO TO 25.
NG		<ol> <li>Repair or replace.</li> <li>GO TO 26.</li> </ol>

#### 25 REPLACE IACV-AAC VALVE

Replace IACV-AAC valve.

► GO TO 26.

26	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57 Which is the result CMPLT or INCMP?		
	CMPLT or INCMP	
CMPL	Т	GO TO 27.
INCM		<ol> <li>Follow the construction of "Idle Air Volume Learning".</li> <li>GO TO 22.</li> </ol>

QG

Basic Inspection/Hatchback (Cont'd)

27 CHECK TARGET IDLE SPEED AGAIN				
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>				
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>				
ОК	GO TO 29.			
NG	GO TO 28.			
28 CHECK ECM FUNCTION	N			
<ol> <li>Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)</li> <li>Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.</li> </ol>				
	GO TO 22.			
29 CHECK IGNITION TIM	ING			
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check ignition timing at idle using a timing light.</li> </ol>				
SEF984U Ignition timing:				
M/T 8°±5° BTDC A/T 10°±5° BTDC (in "P" or "N" position)				
	OK or NG			
OK 🕨	GO TO 37.			
NG	GO TO 30.			
30 CHECK TIMING CHAIN INSTALLATION				
Check timing chain installation. Refer to EM-28, "Installation". OK or NG				
ОК	GO TO 28.			
NG	<ol> <li>Repair the timing chain installation.</li> <li>GO TO 22.</li> </ol>			

Basic Inspection/Hatchback (Cont'd)

QG

		Basic Inspection/Hatchback (Cont'd)	
31	CHECK IGNITION TIMI	NG	
	art engine and let it idle.		
2. Ch	eck ignition timing at idle u		
	Ignition timing:	SEF984U	
M/T 8°±5° BTDC A/T 10°±5° BTDC (in "P" or "N" position)			
		OK or NG	
OK	•	GO TO 37.	
NG	• • • • • • • • • • • • • • • • • • •	GO TO 22.	
32	PERFORM IDLE AIR V	OLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?			
		CMPLT or INCMP	
CMPL	T	GO TO 33.	
INCM	P ►	<ol> <li>Follow the construction of "Idle Air Volume Learning".</li> <li>GO TO 32.</li> </ol>	
33	CHECK TARGET IDLE	SPEED AGAIN	
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed. M/T: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>			
1. Sta 2. Ch	<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.         <ul> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul> </li> </ul>		
	OK or NG		
OK		GO TO 35.	

#### 34 CHECK ECM FUNCTION

NG

 Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.)
 Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft

2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.

▶ GO TO 32.

GO TO 34.

Basic Inspection/Hatchback (Cont'd)

35	CHECK IGNITION TIMING AGAIN			
Check ignition timing again. Refer to Test No. 31.				
	OK or NG			
OK	►	GO TO 37.		
NG	•	GO TO 36.		

#### 36 CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-28, "Installation".

OK or NG		
OK 🕨	GO TO 34.	
NG	<ol> <li>Repair the timing chain installation.</li> <li>GO TO 32.</li> </ol>	

#### 37 ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.

Erase the stored memory in ECM and TCM (Transmission control module).

Refer to "How to Erase Emission-Related Diagnostic Information", EC-70 or EC-77 and AT-52, "HOW TO ERASE DTC".

#### OK or NG

#### ► INSPECTION END

# MODELS WITHOUT THROTTLE POSITION SWITCH

#### Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

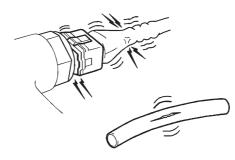
• Headlamp switch is OFF,

On vehicle equipped with daytime light system, set lighting switch to the 1st position to light only small lamps.

- 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 problem, 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.

Basic Inspection/Hatchback (Cont'd)

QG

2	CHECK THROTT	LE DF	RUM OPERATION-I
Confirr	n that throttle drum	is in c	ontact with the stopper.
	OK or NG		
OK (w	ith CONSULT-II)		GO TO 5.
OK (wi II)	ithout CONSULT-		GO TO 8.
NG			GO TO 3.

#### 3 CHECK ACCELERATOR WIRE INSTALLATION

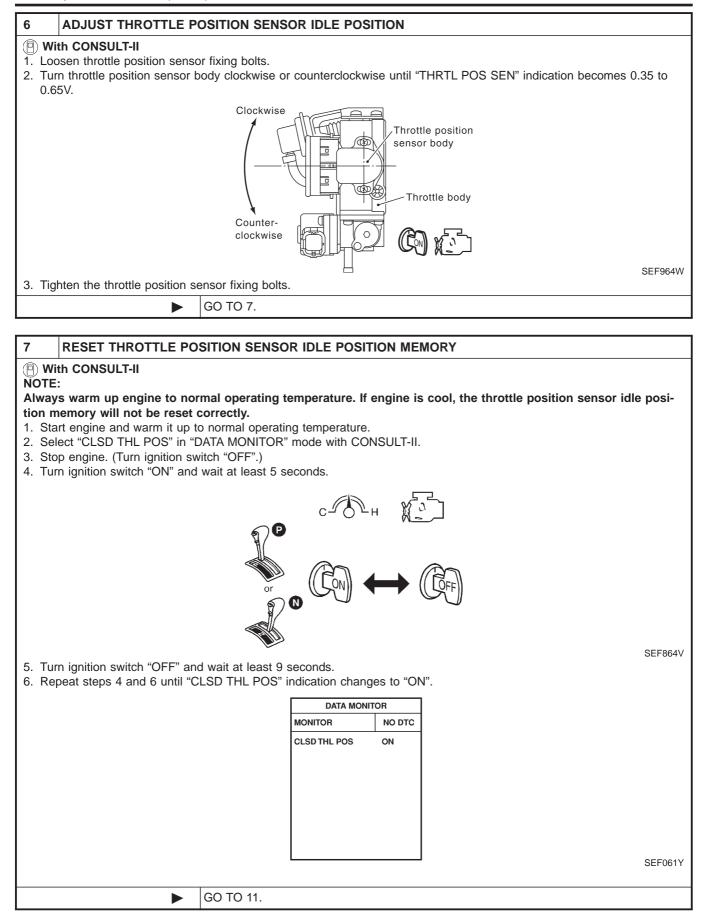
Check accelerator wire for slack.

OK or NG	
ОК	GO TO 4.
NG	Adjust accelerator wire. Refer to FE section, "Adjusting Accelerator Wire".

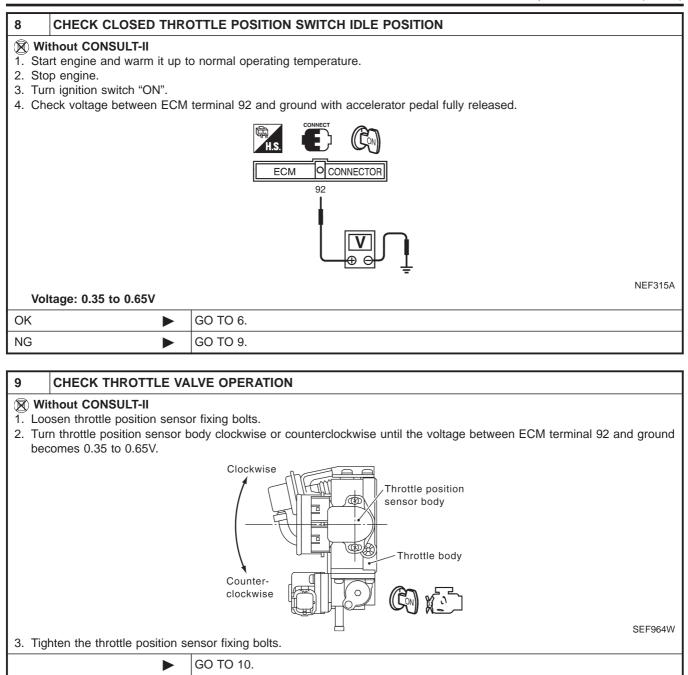
4	CHECK THROTTLE VA	LVE OPERATION
<ol> <li>Remove intake air ducts.</li> <li>Check throttle valve operation when moving throttle drum by hand.</li> </ol>		
OK or NG		
ОК		Retighten the throttle drum fixing nuts.
NG		Clean the throttle body and throttle valve.

5	CHECK CLOSED THRC	OTTLE POSITION SWITCH IDLE POSITION	
(E) W	(iii) With CONSULT-II		
	1. Start engine and warm it up to normal operating temperature.		
2. Sto	2. Stop engine.		
3. Tu	3. Turn ignition switch "ON".		
4. Se	4. Select "THRTL POS SEN" and "CLSD THL POS" in "DATA MONITOR" mode with CONSULT-II.		
	<ol> <li>Make sure that "THRTL POS SEN" indicates 0.35 to 0.65V, and "CLSD THL POS" indicates "ON". (Accelerator pedal is fully released).</li> </ol>		
OK or NG			
ОК		GO TO 11.	
NG	NG 🕨 GO TO 6.		

Basic Inspection/Hatchback (Cont'd)



Basic Inspection/Hatchback (Cont'd)



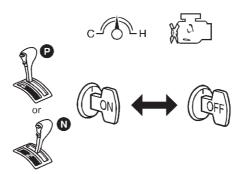
Basic Inspection/Hatchback (Cont'd)

#### 10 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

## Without CONSULT-II NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine. (Turn ignition switch "OFF").
- 3. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

- 4. Turn ignition switch "OFF" and wait at least 9 seconds.
- 5. Repeat steps 4 and 6, 20 times.

► GO TO 11.

### 11 CHECK (1ST TRIP) DTC

- 1. Start engine and warm it up to normal operating temperature.
- 2. Rev (2,000 to 3,000 rpm) two or three times.
- 3. Make sure no (1st trip) DTC is displayed with CONSULT-II GST or Diagnostic Test Mode II (Self-diagnostic Results).

OK or NG	
ОК 🕨	GO TO 13.
NG	GO TO 12.

# 12 REPAIR MALFUNCTION Repair or replace components as necessary Image: Second second

#### 13 CHECK TARGET IDLE SPEED (P) With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. M/T: 700±50 rpm A/T: 800±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: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position) OK or NG OK GO TO 22. NG GO TO 14.

Basic Inspection/Hatchback (Cont'd)

QG

14	PERFORM IDLE AIR VOLUME LEARNING			
	Refer to "Idle Air Volume Learning", EC-57 Which is the result CMPLT or INCMP?			
		CMPLT or INCMP		
CMPL	Т 🕨	GO TO 15.		
INCMP		<ol> <li>Follow the instruction of "Idle Air Volume Learning".</li> <li>GO TO 14.</li> </ol>		
15	CHECK TARGET IDLE	SPEED AGAIN		
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>				

Without CONSULT-II1. Start engine and warm it up to normal operating temperature.

2.	Check idle speed.	
	M/T: 700±50 rpm	
	A/T: 800±50 rpm (in "P" or "N" position)	

OK or NG
----------

ОК	GO TO 29.
NG (Models with Euro- OBD system)	GO TO 17.
NG (Models without Euro-OBD system)	GO TO 16.

16	CHECK IACV-AAC VAL	VE CIRCUIT FOR OPEN AND SHORT	
	<ol> <li>Turn ignition switch "OFF".</li> <li>Check IACV-AAC valve circuit for open and short. Refer to "Diagnostic Procedure", EC-376.</li> </ol>		
	OK or NG		
ОК	•	GO TO 17.	
NG		<ol> <li>Repair or replace.</li> <li>GO TO 18.</li> </ol>	

17	REPLACE IACV-AAC V	ALVE	
Replac	Replace IACV-AAC valve.		
	► GO TO 18.		

18	PERFORM IDLE AIR V	OLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57 Which is the result CMPLT or INCMP?			
	CMPLT or INCMP		
CMPL	.T 🕨	GO TO 19.	
INCM	P 🕨	<ol> <li>Follow the instruction of "Idle Air Volume Learning".</li> <li>GO TO 14.</li> </ol>	

asic Inspection/Hatchback (Cont'd)										
19 CHECK TARGET IDLE	SPEED AGAIN									
<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>										
<ul> <li>Without CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> <li>M/T: 700±50 rpm</li> <li>A/T: 800±50 rpm (in "P" or "N" position)</li> </ul>										
	OK or NG									
OK 🕨	GO TO 21.									
NG	GO TO 20.									
20 CHECK ECM FUNCTION	ON bod ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely									
<ul> <li>the case.)</li> <li>2. Perform initialization of NATS system)", EC-74.</li> </ul>	S system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft GO TO 14.									
21 CHECK IGNITION TIM	ING									
<ol> <li>Perform initialization of NATS System)", EC-74.</li> <li>Ignition timing: M/T 8°±5° BTDC</li> </ol>	to normal operating temperature. S system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft									
A/T 10°±5° BTDC (in	"P" or "N" position)									
ОК	GO TO 29.									
NG	GO TO 22.									

22	CHECK TIMING CHAIN	HECK TIMING CHAIN INSTALLATION										
Check	Check timing chain installation. Refer to EM section.											
	OK or NG											
OK		GO TO 20.										
NG	►	<ol> <li>Repair the timing chain installation.</li> <li>GO TO 14</li> </ol>										

Basic Inspection/Hatchback (Cont'd)

QG

23 CHECK IGNITION TIM	ING									
1. Start engine and let it idle.										
2. Check ignition timing at idle										
	SEM872F									
Ignition timing:										
M/T 8°±5° BTDC A/T 10°±5° BTDC (in	"P" or "N" position)									
ОК	GO TO 29.									
NG	GO TO 24.									
24 PERFORM IDLE AIR \										
Refer to "Idle Air Volume Lea Which is the result CMPLT or	-									
	CMPLT or INCMP									
CMPLT	GO TO 25.									
INCMP	<ol> <li>Follow the construction of "Idle Air Volume Leaning".</li> <li>GO TO 24.</li> </ol>									
25 CHECK TARGET IDLE	SPEED AGAIN									
	to normal operating temperature. TA MONITOR" mode with CONSULT-II. or "N" position)									
2. Check idle speed. M/T: 700±50 rpm	<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> </ol>									
	OK or NG									
OK 🕨	GO TO 27.									
NG	GO TO 26.									
26 CHECK ECM FUNCTION	ON									

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case).

2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to "NATS (Nissan Anti-Theft System)", EC-74.

► GO TO 24.

QG

Basic Inspection/Hatchback (Cont'd)

27	CHECK IGNITION TIMI	NG AGAIN									
Check	Check ignition timing again. Refer to Test No. 23.										
OK	•	GO TO 29.									
NG	•	GO TO 28.									

28	CHECK TIMING CHAIN	CHECK TIMING CHAIN INSTALLATION											
Check	Check timing chain installation. Refer to EM section.												
	OK or NG												
ОК <b>Б</b> О ТО 26.													
NG  1. Repair the timing chain installation. 2. GO TO 24.													
20													

29	ERASE UNNECESSAR	Y DTC									
After t	After this inspection, unnecessary DTC No. might be displayed.										
Erase	Erase the stored memory in ECM.										
Refer	Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-70.										
		INSPECTION END									

DTC Inspection Priority Chart

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## DTC Inspection Priority Chart

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

Priority	Detected items (DTC)
1	<ul> <li>P0100 Mass air flow sensor</li> <li>P0110 Intake air temperature sensor</li> <li>P0115 Engine coolant temperature sensor</li> <li>P0120 Throttle position sensor</li> <li>P0180 Fuel tank temperature sensor*1</li> <li>P0325 Knock sensor</li> <li>P0340 Camshaft position sensor (PHASE) circuit</li> <li>P0403 EGR volume control valve*1</li> <li>P0500 Vehicle speed sensor</li> <li>P0605 ECM</li> <li>P0335 Crankshaft position sensor (POS)</li> <li>P1605 A/T diagnostic communication line</li> <li>P1706 Park/Neutral position switch</li> </ul>
2	<ul> <li>P0130 - P0134 Heated oxygen sensor 1 (front)</li> <li>P0135 Heated oxygen sensor 1 heater (front)</li> <li>P0137 - P0140 Heated oxygen sensor 2 (rear)</li> <li>P0141 Heated oxygen sensor 2 heater (rear)</li> <li>P0443 EVAP canister purge volume control solenoid valve</li> <li>P0510 Closed throttle position switch*1</li> <li>P0705 - P0725, P0740 - P1760 A/T related sensors, solenoid valves and switches</li> <li>P1217 Overheat (Cooling system)</li> <li>P1401 EGR temperature sensor*1</li> </ul>
3	<ul> <li>P0171, P0172 Fuel injection system function</li> <li>P0300 - P0304 Misfire</li> <li>P0400, P1402 EGR function*1</li> <li>P0420 Three way catalyst function</li> <li>P0505 IACV-AAC valve</li> <li>P0731 - P0734, P0744 A/T function</li> <li>P1111 Intake valve timing control</li> <li>P1131 Swirl control valve control solenoid*1</li> </ul>

\*1: If so equipped

#### **Fail-safe Chart**

The ECM enters fail-safe mode if any of the following malfunctions is detected due to the open or short cir-cuit. When the ECM enters the fail-safe mode, the MI illuminates.

DTC	C No.											
CON- SULT-II GST	ECM*1	Detected items	Engine operating condition in fail-safe mode									
P0100	0100	Mass air flow sensor circuit	Engine speed will not rise more	than 2,400 rpm due to the fuel cut.								
P0115	0115	Engine coolant tempera- ture sensor circuit	<ul> <li>Engine coolant temperature will be determined by ECM based on the t after turning ignition switch "ON" or "START".</li> <li>CONSULT-II displays the engine coolant temperature decided by ECM The radiator fan operates.</li> </ul>									
			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)								
P0120	0120	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount the engine speed. Therefore, acceleration will be poor.									
			Condition	Driving condition								
			When engine is idling	Normal								
			When accelerating	Poor acceleration								
Unable to access ECM	Unable to access Diagnostic Test Mode II	ECM	When the fail-safe system activa condition in the CPU of ECM), th the driver. However it is not possible to acc Engine control with fail-safe When ECM fail-safe is operating	tion CM was judged to be malfunctioning. ates (i.e., if the ECM detects a malfunction he MI on the instrument panel lights to warn cess ECM and DTC cannot be confirmed. g, fuel injection, ignition timing, fuel pump operation are controlled under certain limita								
				ECM fail-safe operation								
			Engine speed	Engine speed will not rise more than 3,000 rpm								
			Fuel injection	Simultaneous multiport fuel injection sys- tem								
			Ignition timing	Ignition timing is fixed at the preset value								
			Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls								
			IACV-AAC valve	Full open								
			Cooling fans	Cooling fan relay "ON" (High speed condi- tion) when engine is running, and "OFF" when engine stalls.								

\*: In Diagnostic Test Mode II (Self-diagnostic results) (If so equipped)

Symptom Matrix Chart

#### Symptom Matrix Chart SYSTEM — ENGINE CONTROL SYSTEM

NJEC0041 NJEC0041S01

QG

															NJEC0041S
			SYMPTOM												
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	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-561
	Fuel pressure regulator sys- tem	3	3	4	4	4	4	4	4	4		4			EC-41
	Injector circuit	1	1	2	3	2		2	2			2			EC-542
	Evaporative emission sys- tem	3	3	4	4	4	4	4	4	4		4			EC-36
Air	Positive crankcase ventila- tion system	3	3	4	4	4	4	4	4	4		4	1		EC-39
	Incorrect idle speed adjust- ment	3	3				1	1	1	1		1			EC-43
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-376
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-43
	Ignition circuit	1	1	2	2	2		2	2			2			EC-547
EGR	EGR volume control valve circuit		2	2	3	3						3			EC-352
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-343, 352, 425
Main pow	ver supply and ground circuit	2	2	3	3	3		3	3		2	3		2	EC-178
Air condit	ioner circuit	2	2	3	3	3	3	3	3	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												
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												EC-328
Camshaft position sensor (PHASE) circuit	3	2									3			EC-335
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-187
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-216, 224
Engine coolant temperature sen- sor circuit	1	1	2	3	2	3	2	2	3		2			EC-201, 203
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-207
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-519
Vehicle speed sensor circuit		2	3		3						3			EC-370
Knock sensor circuit			2								3			EC-324
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-391, 154
Start signal circuit	2													EC-558
PNP switch circuit			3		3		3	3			3			EC-437
Power steering oil pressure switch circuit		2					3	3						EC-568
Electrical load signal circuit							3	3						EC-578

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

QG

NJEC0041S03

SYSTEM — ENGINE MECHANICAL & OTHER

							SY	МРТС	M						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	- 5													FE section
	Fuel piping	5		5	5	5		5	5			5			
	Vapor lock		5												
	Valve deposit														
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_
Air	Air duct														
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5		5		5	5			5			
	Throttle body, Throttle wire	5			5		5			5					FE section
	Air leakage from intake manifold/Collector/Gasket														_
Cranking	anking Battery	- 1	1	1		1		1	1			1		1	
	Alternator circuit														EL section
	Starter circuit	3													
	Flywheel/drive plate	6													EM section

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

							SY	MPTC	M						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDTE/TOM IDTE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА	
Engine	Cylinder head	5	5	F	5	5		5	F			F			
	Cylinder head gasket	5	5	5	b	5		р С	5		4	5	3		
	Cylinder block					6									
	Piston				6							6	4		EM section
	Piston ring	6	6	6				6	6						
	Connecting rod		0	0		0									
	Bearing														
	Crankshaft														
Valve	Timing chain			5	5	5		5	5						
mecha- nism	Camshaft	5	5									5			EM section
	Intake valve					5							3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/ Muffler/Gasket	5	5	5	5	5		5	5			5			FE section
	Three way catalyst														
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM and LC sections
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap														
	Thermostat									5					LC section
	Water pump	_	E	E	_	E		E	5		1	E			
	Water gallery	- 5	5	5	5	5		5	C		4	5			
	Cooling fan									5					EC-406
	Coolant level (low)/ Contaminated coolant														MA section

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

CONSULT-II Reference Value in Data Monitor Mode

# **CONSULT-II** Reference Value in Data Monitor Mode

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. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the crankshaft position sensor and other ignition timing related sensors.)

• If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	100	NDITION	SPECIFICATION
ENG SPEED	<ul> <li>Tachometer: Connect</li> <li>Run engine and compare tachor value.</li> </ul>	neter indication with the CONSULT-II	Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> </ul>	Idle	1.0 - 1.7V
MAS A/F SE-DI	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,500 rpm	1.5 - 2.1V
B/FUEL SCHDL	<ul><li>Engine: After warming up</li><li>Air conditioner switch: OFF</li></ul>	Idle	1.5 - 3.0 msec
B/FUEL SCHUL	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	1.2 - 3.0 msec
A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)			$0 - 0.3V \leftrightarrow 0.6 - 1.0V$
HO2S1 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)		Revving engine from idle to 3,000 rpm quickly	$0 - 0.3V \leftrightarrow 0.6 - 1.0V$
HO2S2 MNTR (B1)	• Engine: After warming up		$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	<ul> <li>Turn drive wheels and compare speedometer indication with the CON- SULT-II value</li> </ul>		Almost the same speed as the CONSULT-II value
BATTERY VOLT	Ignition switch: ON (Engine stop	ped)	11 - 14V
	Engine: Idle	Throttle valve fully closed	0.15 - 0.85V
THRTL POS SEN	Ignition switch: ON     (Engine stopped)	Throttle valve fully opened	3.5 - 4.7V
EGR TEMP SEN*	Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow$	$OFF\toON\toOFF$	
	Engine: Idle	Throttle valve: Idle position	ON
CLSD THL POS CLSD THL/P SW*	Ignition switch: ON     (Engine stopped)	Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF
		A/C switch "ON" (Compressor operates)	ON
	a locition quitab. Obl	Shift lever "P" or "N"	ON
P/N POSI SW	Ignition switch: ON	Except above	OFF

NJEC0042

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

MONITOR ITEM	COM	NDITION	SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle	Steering wheel in neutral position (forward direction)	OFF
	the engine	The steering wheel is turned	ON
LOAD SIGNAL	Engine: running	Rear window defogger or headlamp "ON"	ON
		Except the above	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF$		$ON \rightarrow OFF$
HEATER FAN SW	Heater fan switch is "ON"		ON
HEATER TAN SW	Heater fan switch is "OFF"		OFF
INJ PULSE-B1	Engine: After warming up     Air conditioner switch: OFF	Idle	2.0 - 3.5 msec
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	1.5 - 3.5 msec
IGN TIMING	Engine: After warming up     Air conditioner switch: OFF     Shift lawar (%)	Idle	M/T: 8°±5° BTDC A/T: 10°±5° BTDC
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	Approx. 30° BTDC
CAL/LD VALUE	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Shift lever: "N"</li> <li>No-load</li> </ul>	Idle	Not used
		2,500 rpm	Not used
	Engine: Idle	Throttle valve fully closed	0.0°
ABSOL TH-P/S	Ignition switch: ON     (Engine stopped)	Throttle valve fully opened	Approx. 80°
MASS AIRFLOW	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Shift lever: N</li> <li>No-load</li> </ul>	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g⋅m/s
IACV-AAC/V	Engine: After warming up     Air conditioner switch: OFF	Idle	5 - 25 steps
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	_
	<ul> <li>Engine: After warming up</li> </ul>	Idle	0%
PURG VOL C/V	No-load	Revving engine	
	Engine: After warming up	Idle	0 step
EGR VOL CON/V*	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	Revving engine up to 3,000 rpm quickly	1 - 10 steps
SWRL CONT S/V*	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 40°C (104°F)	ON
		Engine coolant temperature is above 40°C (104°F)	OFF
		Idle	OFF
INT/V SOL-B1	<ul><li>Engine: After warming up</li><li>Lift up drive wheels</li></ul>	Suitable gear position except "P" or "N" and revving engine	ON (Momentarily)
AIR COND RLY	• Air conditioner switch: OFF $\rightarrow$ O	N	$OFF \rightarrow ON$

QG

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

MONITOR ITEM	CON	NDITION	SPECIFICATION
FUEL PUMP RLY	<ul> <li>Ignition switch is turned to ON (0</li> <li>Engine running and cranking</li> <li>When engine is stopped (stops i</li> </ul>		ON
	Except as shown above		OFF
	• After warming up engine, idle	Engine coolant temperature is 99°C (210°F) or less	OFF
COOLING FAN	<ul><li>the engine.</li><li>Air conditioner switch: OFF</li></ul>	Engine coolant temperature is 100°C (212°F) or more	ON
	Engine speed: Below 3,200 rpm		ON
HO2S1 HTR (B1)	Engine speed: Above 3,200 rpm		OFF
HO2S2 HTR (B1)	Engine speed	Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
		Above 3,600 rpm	OFF
	Ignition switch ON (Engine stopped)		OFF
TRVL AFTER MI			0 - 65,535 km (0 - 40,723 mile)

\*: If so equipped

#### Major Sensor Reference Graph in Data Monitor Mode

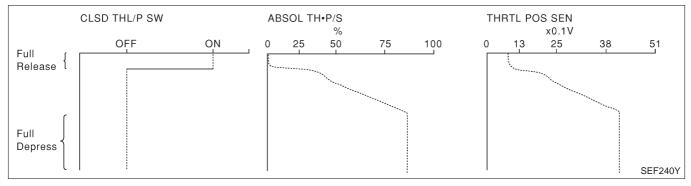
The following are the major sensor reference graphs in "DATA MONITOR" mode.

NJEC0043

#### THRTL POS SEN, ABSOL TH-P/S, CLSD THL/P SW

Below is the data for "THRTL POS SEN", "ABSOL TH-P/S" and "CLSD THL/P SW" when depressing the accelerator pedal with the ignition switch "ON".

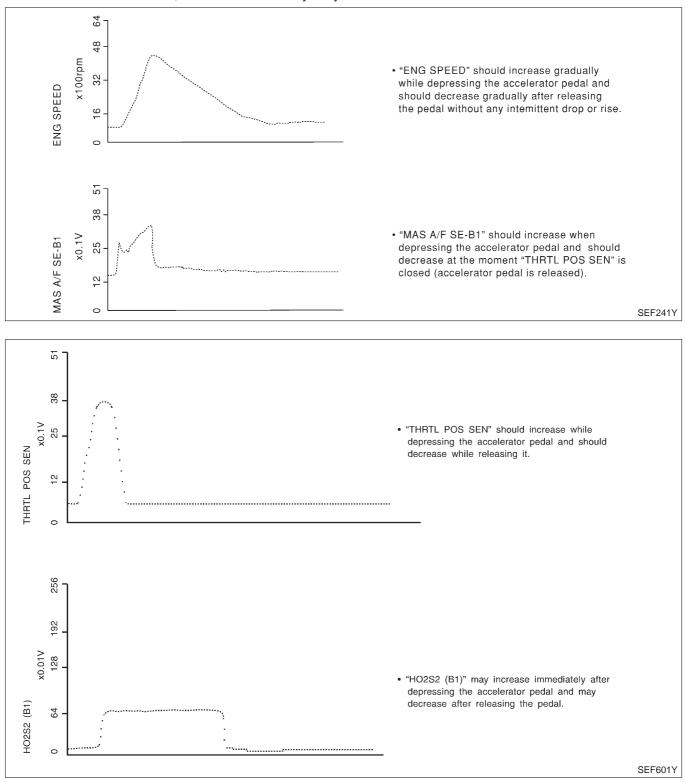
The signal of "THRTL POS SEN" and "ABSOL TH-P/S" should rise gradually without any intermittent drop or rise after "CLSD THL/P SW" is changed from "ON" to "OFF".

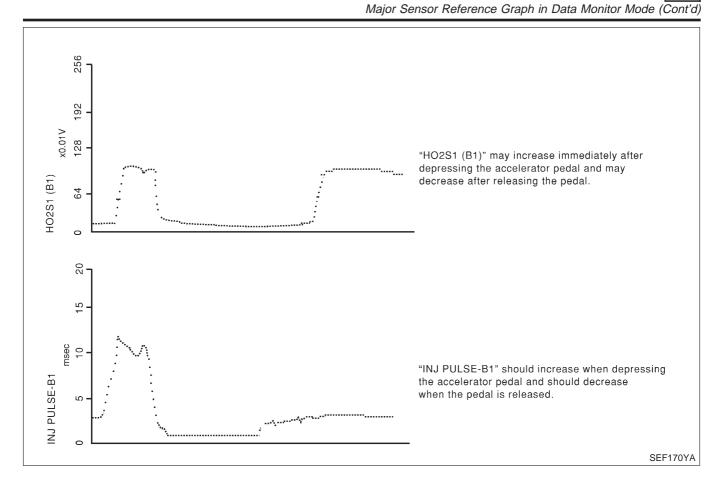


Major Sensor Reference Graph in Data Monitor Mode (Cont'd)

**ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1** Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.

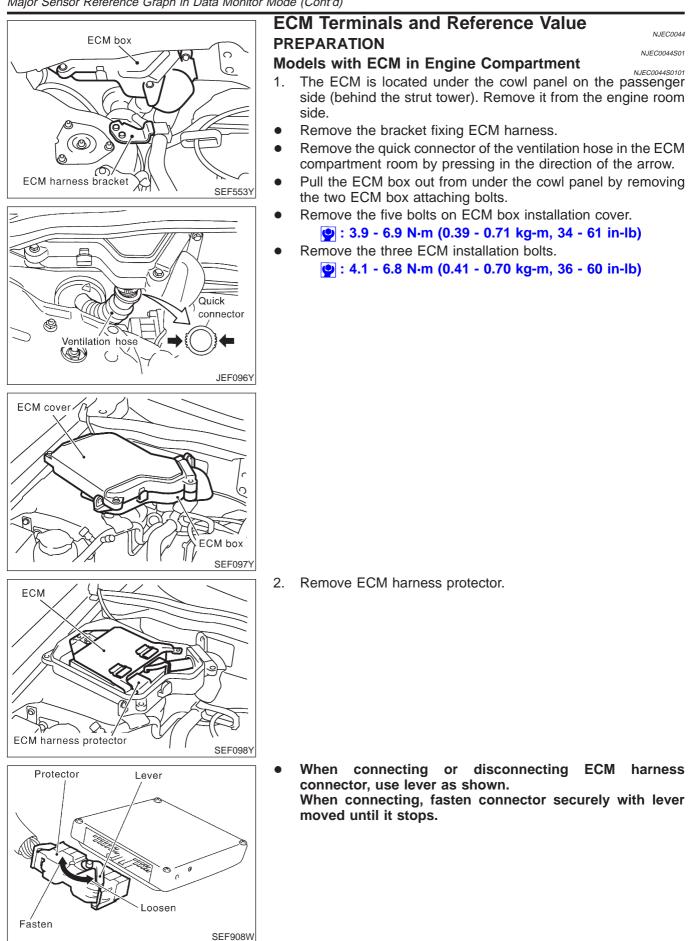
Each value is for reference, the exact value may vary.





QG

Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



QG ECM Terminals and Reference Value (Cont'd)

F Tester probe-Thin wire

Perform all voltage measurements with the connector con-3. nected. Extend tester probe as shown to perform tests easily.

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

#### **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.

#### Models with ECM in cabin

moved until it stops.

ECM is locating beside of blower unit. Remove the ECM bracket fixing.

Remove ECM harness protector.

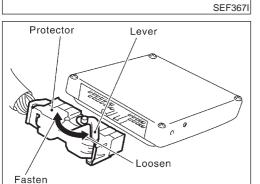
connector, use lever as shown.

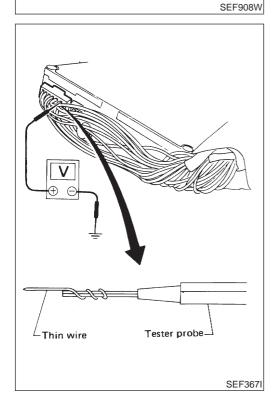
When connecting or disconnecting

NJEC0044S0102

harness

ECM





Perform all voltage measurements with the connector con-3. nected. Extend tester probe as shown to perform tests easily.

When connecting, fasten connector securely with lever

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

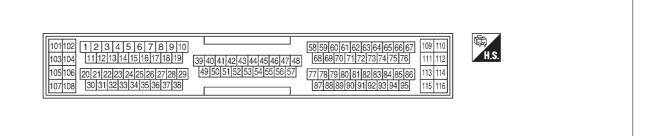
#### **CAUTION:**

1.

2.

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

## 



SEF970W

#### ECM INSPECTION TABLE

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
1	Y/R	Intake valve timing con- trol solenoid valve	<ul> <li>[Engine is running]</li> <li>Lift up drive wheels and suitable gear position</li> <li>Rev engine from 2,000 to 3,000 rpm</li> </ul>	Approximately 0V
3	W/R	Heated oxygen sensor 2 heater (rear)	<ul> <li>[Engine is running]</li> <li>Engine speed is below 3,600 rpm</li> <li>After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more</li> </ul>	Approximately 0.7V
			[Ignition switch "ON"] • Engine stopped • Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
4	R/B	Heated oxygen sensor 1 heater (front)	<ul><li>[Engine is running]</li><li>Engine speed is below 3,200 rpm</li></ul>	Approximately 0V
4	N/B		<ul><li>[Engine is running]</li><li>Engine speed is above 3,200 rpm</li></ul>	BATTERY VOLTAGE (11 - 14V)
6 7 15 16	BR L/G P OR	IACV-AAC valve	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.1 - 14V
8* 9* 17* 18*	SB W/B R/Y BR/R	EGR volume control valve	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Rev engine from 2,000 to 4,000 rpm</li> </ul>	0 - 14V
10	Y/B	A/T signal No. 3	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

G	QG	
(0		

TERMI-				
NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	13 LG/R	Cooling fan relay	<ul><li>[Engine is running]</li><li>Cooling fan is not operating</li></ul>	BATTERY VOLTAGE (11 - 14V)
			<ul><li>[Engine is running]</li><li>Cooling fan is operating</li></ul>	Approximately 0V
14	GY/L	EVAP canister purge volume control valve (ON/OFF duty)	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Accelerator pedal depressed</li> </ul>	5 - 12V
19	BR/W	A/T signal No. 5	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Approximately 8V
21	B/P	Fuel pump relay	<ul> <li>[Ignition switch "ON"]</li> <li>For 1 second after turning ignition switch "ON"</li> <li>[Engine is running]</li> </ul>	0 - 1V
			<ul> <li>[Ignition switch "ON"]</li> <li>More than 1 second after turning ignition switch "ON"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1V
22	OR/L	Malfunction indicator	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14V)
		Air conditioner relay	<ul><li>[Engine is running]</li><li>Both A/C switch and blower switch are "ON"</li></ul>	Approximately 0V
23	L		[Engine is running] • A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
		ECM relay (Self shut-off)	<ul> <li>[Ignition switch "OFF"]</li> <li>For 9 seconds after turning ignition switch "OFF"</li> </ul>	0 - 1V
31	W/G		<ul> <li>[Ignition switch "OFF"]</li> <li>9 seconds passed after turning ignition switch "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
	1/05	Tashamatar	[Engine is running] • Warm-up condition • Idle speed	7 - 8V (V) 20 10 20 ms SEF928X
32	L/OR	Tachometer	[Engine is running] • Engine speed is 2,000 rpm	7 - 8V (V) 20 10 0 20 ms SEF929X

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35 36		Ignition signal (No. 1)	[Engine is running] • Warm-up condition • Idle speed	0 - 0.2V
37 38	L/R GY/R	Ignition signal (No. 2) Ignition signal (No. 3) Ignition signal (No. 4)	<ul> <li>[Engine is running]</li> <li>Engine speed is 2,000 rpm</li> </ul>	0.2 - 0.4V
40*		Throttle position switch	<ul><li>[Engine is running]</li><li>Accelerator pedal released</li></ul>	BATTERY VOLTAGE (11 - 14V)
40*	Y/PU	(Closed position)	[Engine is running] • Accelerator pedal depressed	Approximately 0V
41	B/Y	Start signal	[Ignition switch "ON"]	Approximately 0V
41	D/ I	Start Signal	[Ignition switch "START"]	9 - 12V
			<ul> <li>[Ignition switch "ON"]</li> <li>Gear position is "Neutral position" (M/T models)</li> <li>Gear position is "P" or "N" (A/T models)</li> </ul>	Approximately 0V
42	42 G/OR PNP switch	PNP switch	<ul> <li>[Ignition switch "ON"]</li> <li>Except the above gear position</li> </ul>	A/T models BATTERY VOLTAGE (11 - 14V) M/T models Approximately 5V
			[Ignition switch "OFF"]	OV
43	B/R	Ignition switch	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
44	L/R	/R Air conditioner switch	<ul> <li>[Engine is running]</li> <li>Both air conditioner switch and blower switch are "ON" (Compressor operates)</li> </ul>	Approximately 0V
			<ul><li>[Engine is running]</li><li>Air conditioner switch is "OFF"</li></ul>	Approximately 5V
40	DUAA	/W Power steering oil pres- sure switch	<ul><li>[Engine is running]</li><li>Steering wheel is fully turned</li></ul>	Approximately 0V
46	PU/W		<ul><li>[Engine is running]</li><li>Steering wheel is not turned</li></ul>	Approximately 5V
48	В	ECM ground	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Engine ground

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	L/B	Electrical load signal (Headlamp and	<ul> <li>[Engine is running]</li> <li>Headlamp switch or rear defogger switch is "ON"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
50	L/D	Rear defogger)	<ul> <li>[Engine is running]</li> <li>Headlamp switch and rear defogger switch are "OFF"</li> </ul>	Approximately 0V
			[Ignition switch "ON"] ● Blower fan switch is "ON"	Approximately 0V
51	LG/B	Blower fan SW	[Ignition switch "ON"] ● Blower fan switch is "OFF"	Approximately 5V
54	Y/R	A/T signal No. 1	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Approximately 0V
55	Y/G	A/T signal No. 2	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Approximately 0V
56	G/Y	A/T signal No. 4	[Engine is running] • Idle speed	Approximately 0V
57	в	ECM ground	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	Engine ground
58	В	Sensors' ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0V
61	G	Mass air flow sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	1.0 - 1.7V
01	G	Mass all now sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,500 rpm</li> </ul>	1.5 - 2.1V
62	W	Heated oxygen sensor 1 (front)	[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	0 - Approximately 0.7V (V) 2 1 0 1 1 5 SEF008W
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 3,000 rpm</li> </ul>	0 - Approximately 1.0V
64	Y/B	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66	R	Camshaft position sen- sor (PHASE)	[Engine is running] • Warm-up condition • Idle speed	2.0 - 3.0V (V) 15 10 5 0 20 ms SEF977W
75	R		[Engine is running] • Engine speed is 2,000 rpm	2.0 - 3.0V (V) 15 10 5 0 10 ms SEF978W
67	W/L	Power supply for ECM (Back-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
70	BR/W	Engine coolant tempera- ture sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
71	GY	GY Throttle position sensor signal output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Accelerator pedal fully released</li> </ul>	Approximately 0.4V
			[Ignition switch "ON"] • Accelerator pedal fully depressed	Approximately 4V
70*	D/P		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Less than 4.5V
12	72* P/B		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>EGR system is operating</li> </ul>	0 - 1.0V
73	в	Mass air flow sensor ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0V
			<ul> <li>[Engine is running]</li> <li>Air conditioner switch is "ON" (Compressor operates)</li> </ul>	1.0 - 4.0V
74	R/L	Refrigerant pressure sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>Air conditioner switch is turned from "ON" to "OFF"</li> </ul>	Voltage is gradually decreasing.
81	w	Knock sensor	[Engine is running] ● Idle speed	1.0 - 4.0V
82*	L/W	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature

ECM Terminals and Reference Value (Cont'd)

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85		Crankshaft position sen-	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	3.0 - 4.0V
63	R	sor (POS)	[Engine is running] • Engine speed is 2,000 rpm	3.0 - 4.0V
86	PU/R	Vehicle speed sensor	<ul> <li>[Engine is running]</li> <li>Lift up the vehicle</li> <li>Vehicle speed is 40 km/h (25 MPH)</li> </ul>	2.5 - 3V
91	PU	A/T check signal	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	0 - Approximately 5V
92	Y	Throttle position sensor	[Engine is running] • Accelerator pedal released	0.15 - 0.85V
			[Ignition switch "ON"] • Accelerator pedal fully depressed	3.5 - 4.7V
93	G/R	Data link connector	<ul> <li>[Engine is running]</li> <li>Idle speed (CONSULT-II or GST is disconnected)</li> </ul>	Approximately 0V
101 103	,		[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V) (V) 40 20 0 0 20 ms SEF011W
105		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,000 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14V) (V) 40 20 0 20 ms 20 ms SEF012W	

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
104*	104* SB Swirl control valve con- trol solenoid valve	Swirl control valve con-	<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is between 15°C (59°F) to 40°C (104°F)</li> <li>Idle speed</li> </ul>	0 - 1V
104		trol solenoid valve	<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is above 40°C (104°F)</li> <li>Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
106 108	B/Y	ECM ground	[Engine is running] • Idle speed	Engine ground
110 112	W W	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	R	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V
114	GY/R	Adjust switch	[Engine is running] • Idle speed	0V
115	LG	Data link connector	<ul> <li>[Engine is running]</li> <li>Idle speed (CONSULT-II or GST is disconnected)</li> </ul>	0 - 10V

\* If so equipped

QG Description

NJEC1266

#### Description

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 MONI-TOR (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 (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**

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 104.3 kPa (0.983 1.043 bar, 1.003 1.064 kg/cm<sup>2</sup>, 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up\*1
- Electrical load: Not applied\*2
- Engine speed: Idle

\*1: For A/T or CVT models, after the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (A/T or CVT fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

\*2: Rear window defogger switch, air conditioner switch, lighting switch are "OFF". Cooling fans are not operating. Steering wheel is straight ahead.

D	DATA MONITOR (SPEC)				
MONI	MONITOR		NO DTC		
ENG	ENG SPEED		813 rpm		
0	1600	1 3200	ı 4800	6400	
B/FUI	B/FUEL SCHDL		2.9 msec		
0.0	1.3	2.5	3.8	5.0	
A/F A	A/F ALPHA-B1		105 %		
<u>ا</u>	75	100	125	150	
					SEF601

#### **Inspection Procedure**

NOTE:

NJEC1267

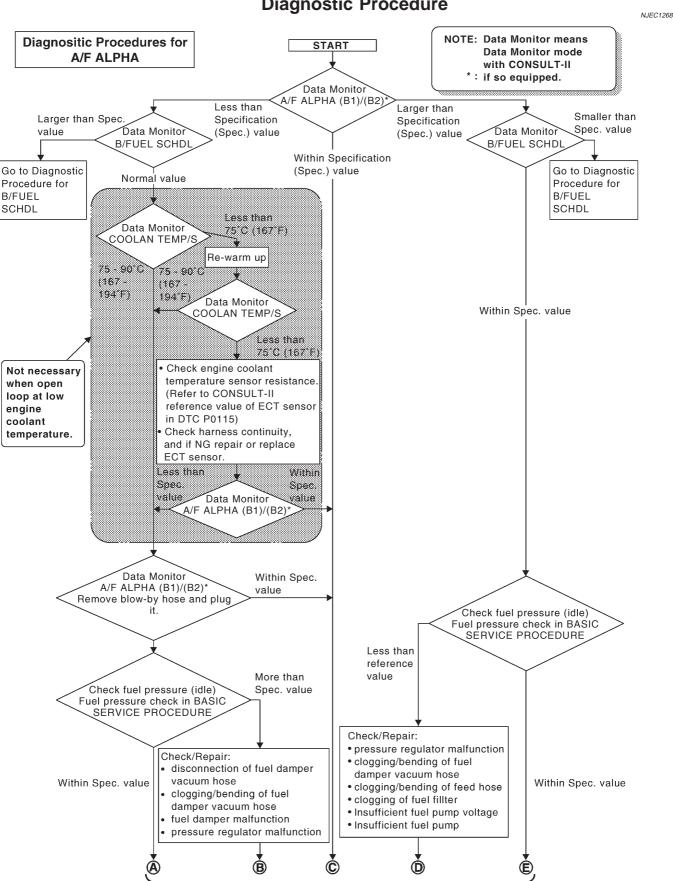
Perform "DATA MONITOR (SPEC)" mode in maximum scale display.

- 1. Perform "Basic Inspection", EC-100.
- 2. Confirm that the testing conditions indicated above are met.
- 3. Select "B/FUEL SCHDL", "A/F ALPHA-B1" 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-174.

## **TROUBLE DIAGNOSIS — SPECIFICATION VALUE**

Diagnostic Procedure

## **Diagnostic Procedure**



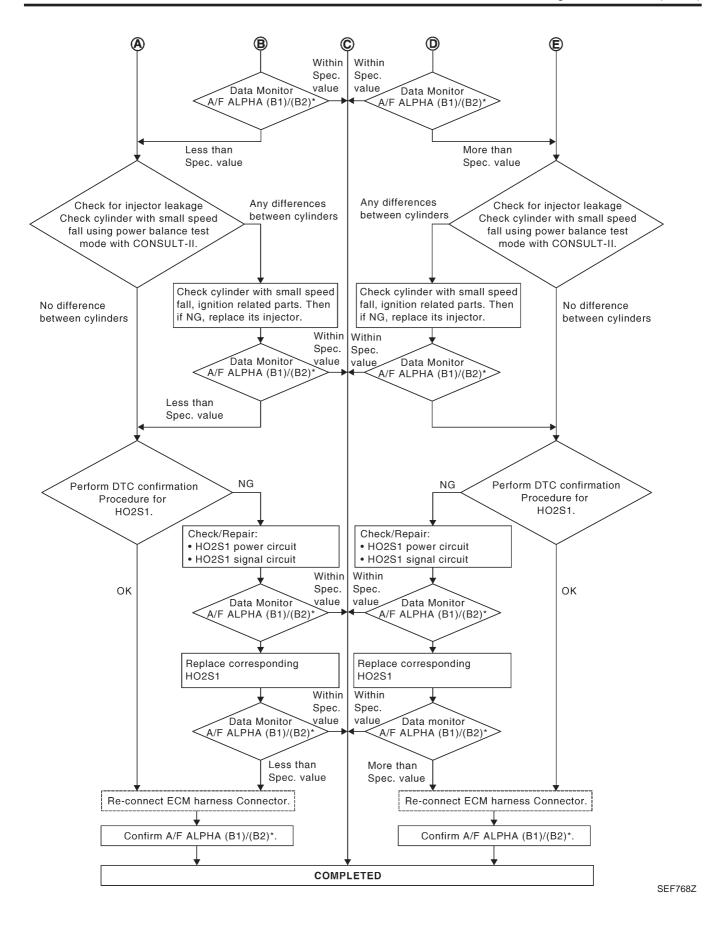
(Go to next page.)

SEF613ZA

EC-174

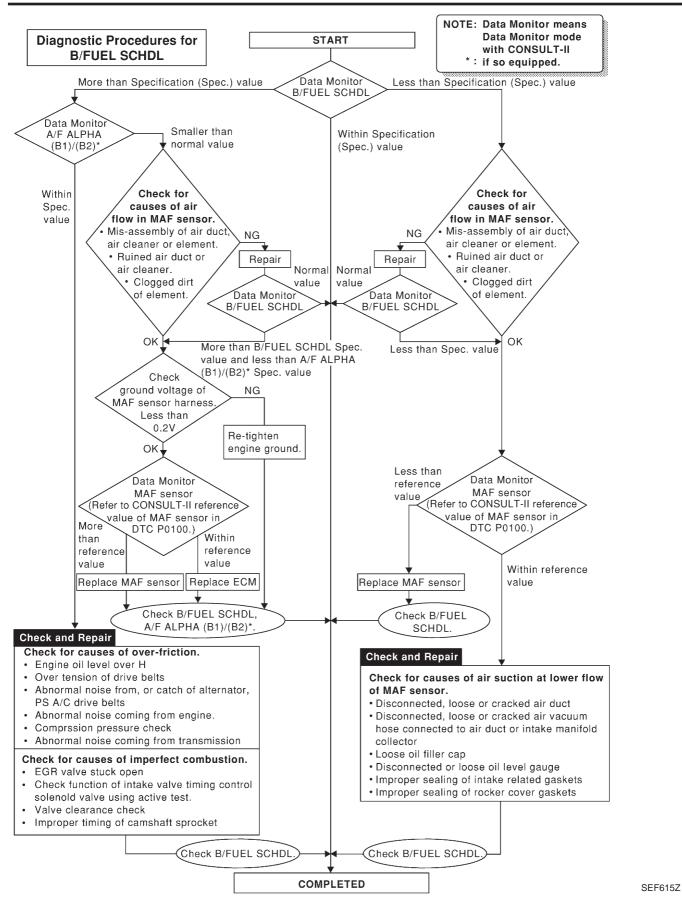
## **TROUBLE DIAGNOSIS — SPECIFICATION VALUE**

Diagnostic Procedure (Cont'd)



## **TROUBLE DIAGNOSIS — SPECIFICATION VALUE**

Diagnostic Procedure (Cont'd)



**QG** Description

NJEC0046

#### Description

Intermittent incidents (I/I) may occur. In many cases, the problem 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 DTC (1st trip) 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 problem area.

#### COMMON I/I REPORT SITUATIONS

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

## **Diagnostic Procedure**

1	INSPECTION START			
Erase (1st trip) DTCs. Refer to "How to Erase Emission-related Diagnostic Information", EC-70, EC-73.				
		GO TO 2.		

2	CHECK GROUND TERMINALS				
Check ground terminals for corroding or loose connection. Refer to GI-27, "GROUND INSPECTION".					
OK or NG					
OK		GO TO 3.			
NG		Repair or replace.			

3	SEARCH FOR ELECTRICAL INCIDENT		
Perfor	Perform GI-22, "Incident Simulation Tests".		
OK or NG			
OK		INSPECTION END	
NG	•	Repair or replace.	

#### TROUBLE DIAGNOSIS FOR POWER SUPPLY

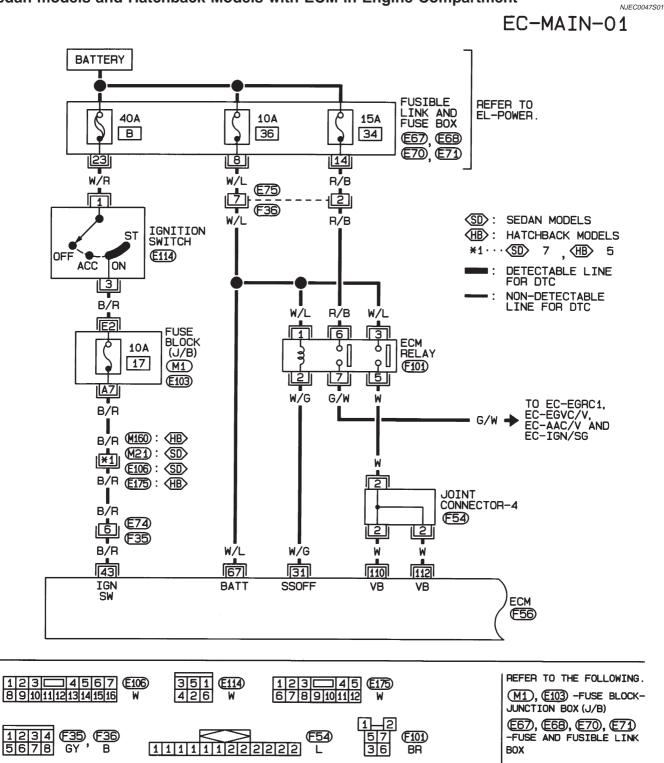
Main Power Supply and Ground Circuit

#### Main Power Supply and Ground Circuit

#### WIRING DIAGRAM

Sedan models and Hatchback Models with ECM in Engine Compartment

NJEC0047

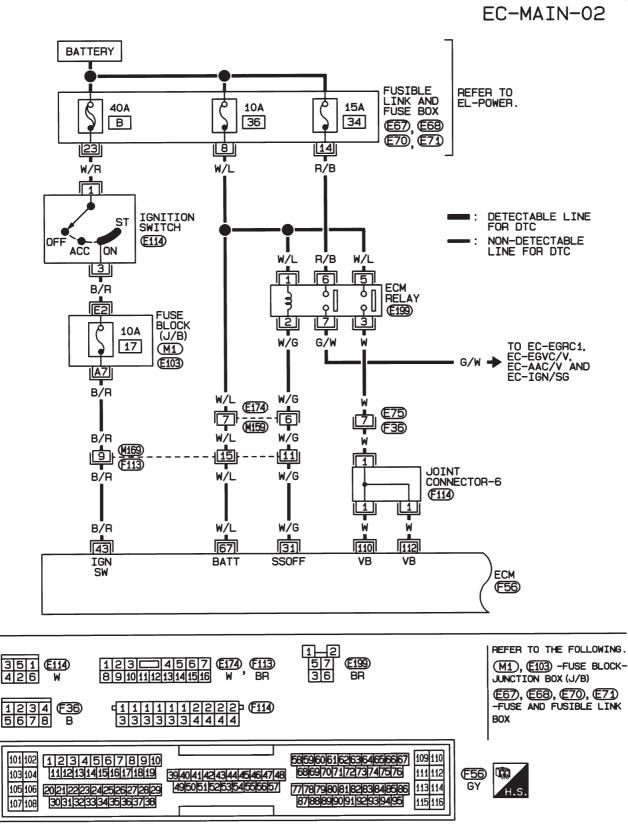


Main Power Supply and Ground Circuit (Cont'd)

#### Hatchback Models with ECM in Cabin

NJEC0047S02

QG

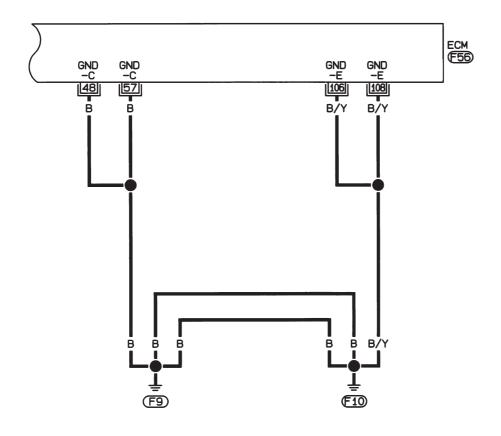


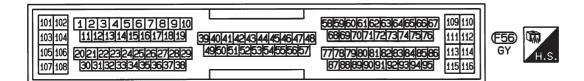
HEC972

Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-03

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





HEC955

Main Power Supply and Ground Circuit (Cont'd)

#### ECM TERMINALS AND REFERENCE VALUE

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
		FOM relay (Dalf about off)	<ul> <li>[Engine is running]</li> <li>[Ignition switch "OFF"]</li> <li>For 9 seconds after turning ignition switch "OFF"</li> </ul>	0 - 1V
31 V	W/G	ECM relay (Self shut-off)	<ul> <li>[Ignition switch "OFF"]</li> <li>9 seconds passed after turning ignition switch "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
43 B/R		Ignition switch	[Ignition switch "OFF"]	0V
	B/R		[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
48	В	ECM ground	[Engine is running] • Idle speed	Engine ground
57	В	ECM ground	[Engine is running] • Idle speed	Engine ground
67	W/L	Power supply for ECM (Back-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
106 108	B/Y B/Y	ECM ground	[Engine is running] • Idle speed	Engine ground
110 112	W W	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

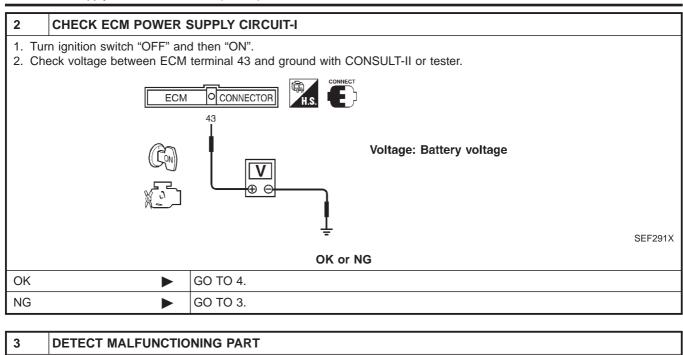
#### DIAGNOSTIC PROCEDURE

1	INSPECTION START				
Start e Is eng	Start engine. Is engine running?				
		Yes or No			
Yes		GO TO 9.			
No		GO TO 2.			

NJEC0048

NJEC0565

Main Power Supply and Ground Circuit (Cont'd)



Check the following.

- Harness connectors E74, F35 (If so equipped)
- Harness connectors M21, E106 (Sedan), M160, E175 or M169, F113 (Hatchback)
- Fuse block (J/B) connector M1, E103
- 10A fuse
- Harness for open or short between ECM and ignition switch

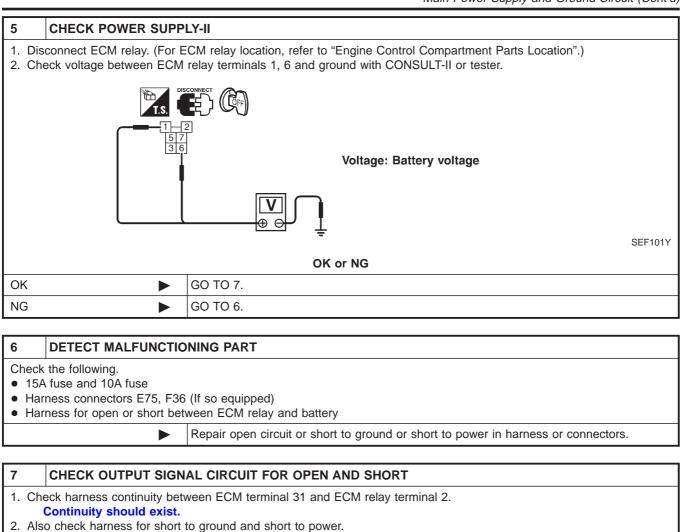
Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I				
2. Di 3. Ch Re	efer to WIRING DIAGRAM. Continuity should exist.	nector. ween ECM terminals 48, 57, 106, 108 and engine ground. to ground and short to power.			
	OK or NG				
OK		GO TO 5.			
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.				

EC-182

Main Power Supply and Ground Circuit (Cont'd)

QG

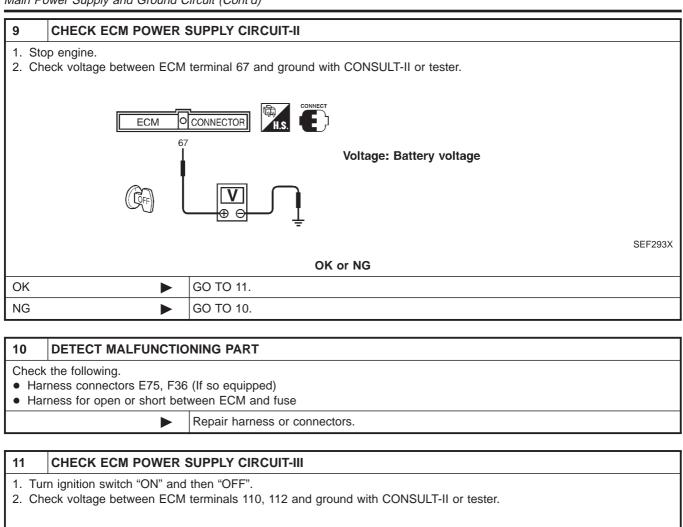


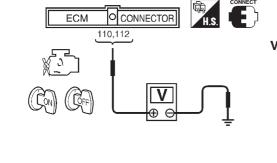
2. Also check namess for short to ground and short to power.

OK or NG		
OK 🕨	Go to "IGNITION SIGNAL", EC-547.	
NG DO TO 8.		

8	DETECT MALFUNCTIONING PART			
Check	Check the 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.			

Main Power Supply and Ground Circuit (Cont'd)





#### Voltage:

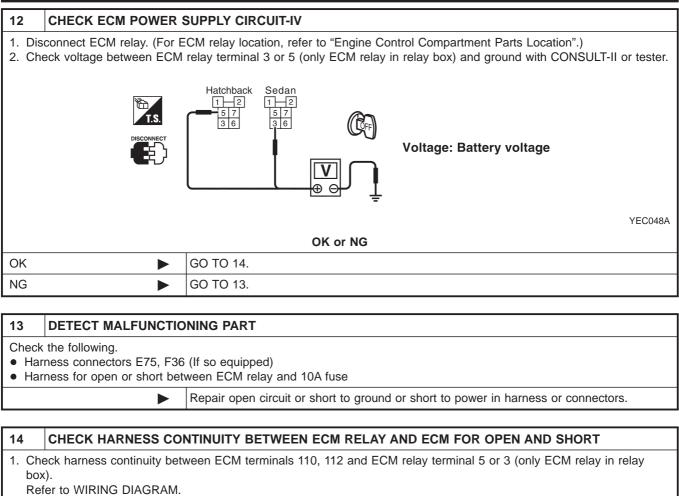
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop approximately 0V.

SEF294X

	OK or NG
ОК	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.

Main Power Supply and Ground Circuit (Cont'd)

QG



Continuity should exist.

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

OK or NG

ОК	GO TO 16.
NG	GO TO 15.

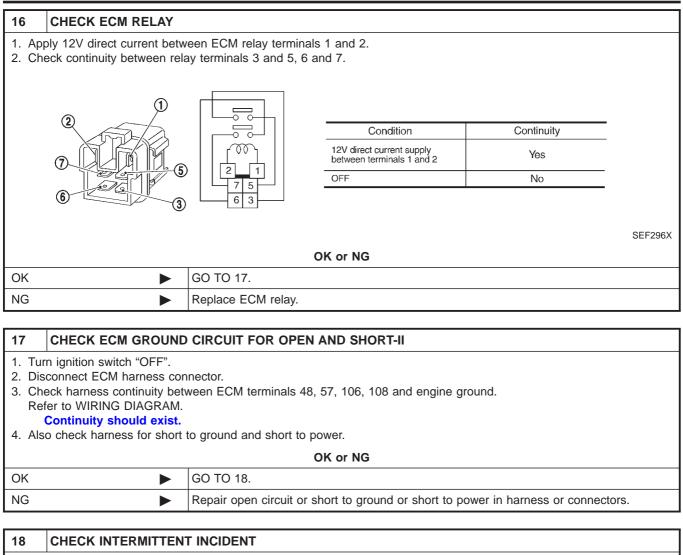
#### 15 DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-4 (If so equipped)
- Joint connector-6 (If so equipped)
- Harness connector E75, F36 (If so equipped)
- Harness for open or short between ECM and ECM relay
   Repair open circuit or short

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

Main Power Supply and Ground Circuit (Cont'd)

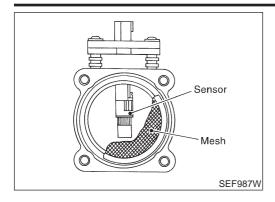


Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

NJEC0052

NJEC0053



#### **Component Description**

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. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more electric current 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

#### Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: "OFF"</li> </ul>	Idle	1.0 - 1.7V
MAS A/F SE-DI	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,500 rpm	1.5 - 2.1V
MASS AIRFLOW	<ul><li>Engine: After warming up</li><li>Air conditioner switch: "OFF"</li></ul>	Idle	1.0 - 4.0 g·m/s
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,500 rpm	5.0 - 10.0 g·m/s

# ECM Terminals and Reference Value

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

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

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	G	Mass air flow sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	1.0 - 1.7V
			<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,500 rpm</li> </ul>	1.5 - 2.1V
73	В	Mass air flow sensor ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0V

# **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when		Check Items (Possible Cause)	
P0100 0100	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> </ul>	
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> </ul>	

\*: When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Fail-safe Mode

3

Fail-safe Mode

	NJEC0589
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**

#### CAUTION:

NJEC0054

## 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 9 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) Wait at least 2 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-191.

#### With GST

Follow the procedure "With CONSULT-II" above.

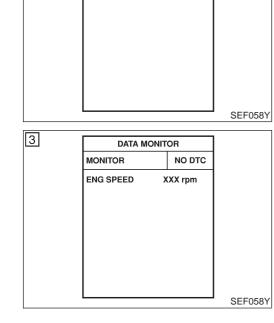
## PROCEDURE FOR MALFUNCTION B

#### (B) With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 2 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-191.

#### With GST

Follow the procedure "With CONSULT-II" above.



DATA MONITOR

NO DTC

XXX rpm

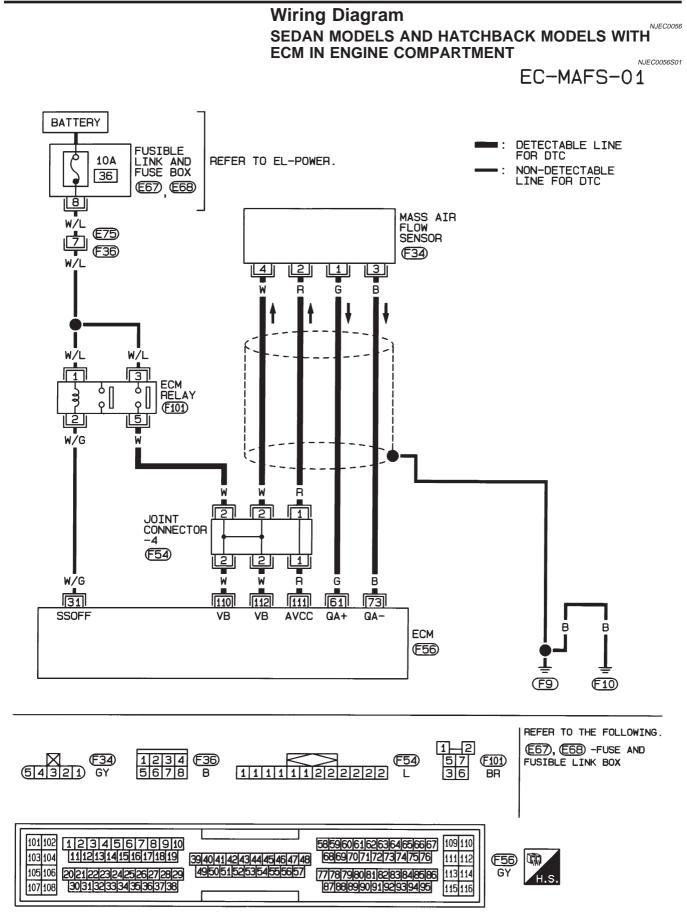
MONITOR

ENG SPEED

NJEC0054S02

NJEC0054S01

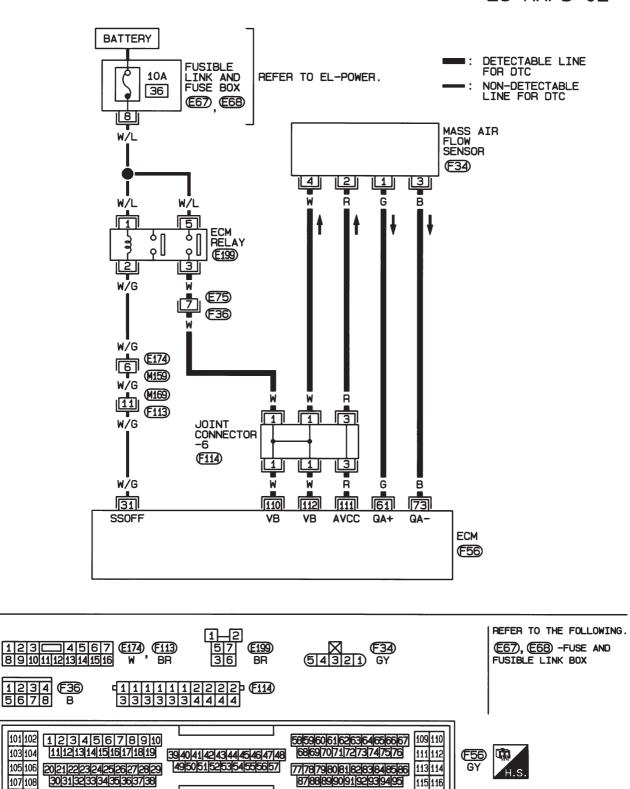
**QG** Wiring Diagram



Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN

EC-MAFS-02



HEC973

QG

NJEC0056S02

JEF104Y

## **Diagnostic Procedure**

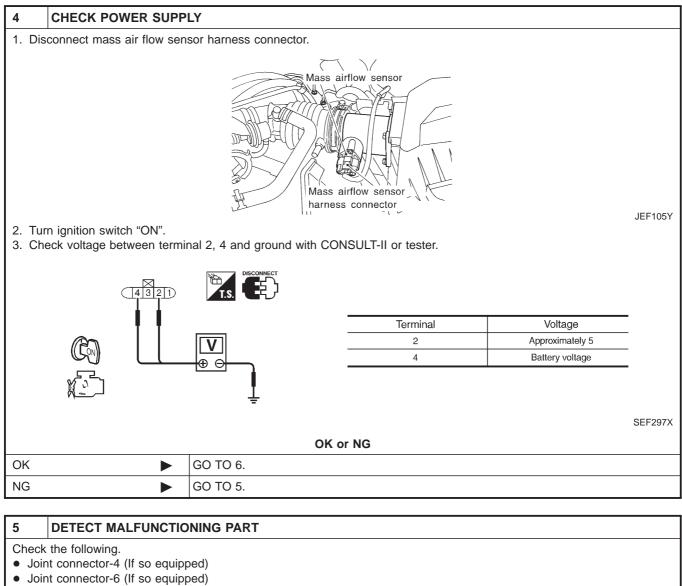
		<b>J</b>	NJEC0057
1	INSPECTION START		
Which	malfunction (A, or B) is de	uplicated?	
		Malfunction A or B	
А		GO TO 3.	
В		GO TO 2.	
2	CHECK INTAKE SYST	FM	
<ul><li>Air</li><li>Va</li></ul>	cuum hoses		
<ul> <li>Inta</li> </ul>	ake air passage between a	ir duct to collector	
		OK or NG	
ОК		GO TO 3.	
NG		Reconnect the parts.	
3	RETIGHTEN GROUND	SCREWS	
	rn ignition switch "OFF". osen and retighten engine	ground screws.	
		Engine ground No. 2 ignition coil	

6

GO TO 4.

# DTC P0100 MASS AIR FLOW SENSOR (MAFS)

Diagnostic Procedure (Cont'd)



- 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 GROUND CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- Check harness continuity between mass air flow sensor harness connector terminal 3 and ECM terminal 73. Refer to wiring diagram.

#### Continuity should exist.

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

OK or NG

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

# DTC P0100 MASS AIR FLOW SENSOR (MAFS)

QG

7	CHECK INPUT SIGNAL	
<ol> <li>Check harness continuity between mass air flow sensor harness connector terminal 1 and ECM terminal 61. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>		
OK or NG		
OK	•	GO TO 8.
NG		Repair open circuit or short to ground or short to power in harness or connectors.
•		

8	3 CHECK MASS AIR FLOW SENSOR		
Refer to "Component Inspection", EC-193.			
OK or NG			
OK	OK 🕨 GO TO 9.		
NG		Replace mass air flow sensor.	

9	CHECK INTERMITTENT INCIDENT
---	-----------------------------

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

#### INSPECTION END

# Component Inspection MASS AIR FLOW SENSOR

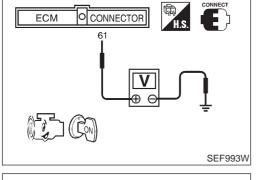
NJEC0058 NJEC0058S01

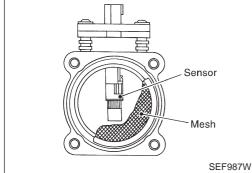
- 1. Turn ignition switch "ON".
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.2
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal oper- ating temperature.)	1.7 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

 $^{\ast}:$  Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

- 4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
- 5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.





Component Description

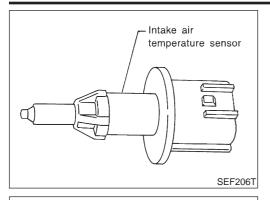
20 10 6

Gy <sup>4</sup>

2 0.1 8.0 8.0 4.0

0.2

0.1



Acceptable

) 20 40 60 80 100 2) (68) (104) (140) (176) (212) Temperature °C (°F)



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>

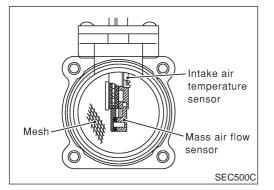
Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

\*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and ground.

#### **CAUTION:**

SEF012P

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.



#### MODELS WITH INTAKE AIR TEMPERATURE SENSOR IN MASS AIR FLOW SENSOR

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

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

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance $k\Omega$
25 (77)	3.3	1.9 - 2.1
80 (176)	1.28	0.31 - 0.37

\*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and ground.

Component Description (Cont'd)

QG

#### **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**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0110 0110	An excessively low or high voltage from the sensor is sent to ECM.	<ul><li>Harness or connectors (The sensor circuit is open or shorted.)</li><li>Intake air temperature sensor</li></ul>

# **DTC Confirmation Procedure**

NJEC0068

NJEC0067

**NOTE:** If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

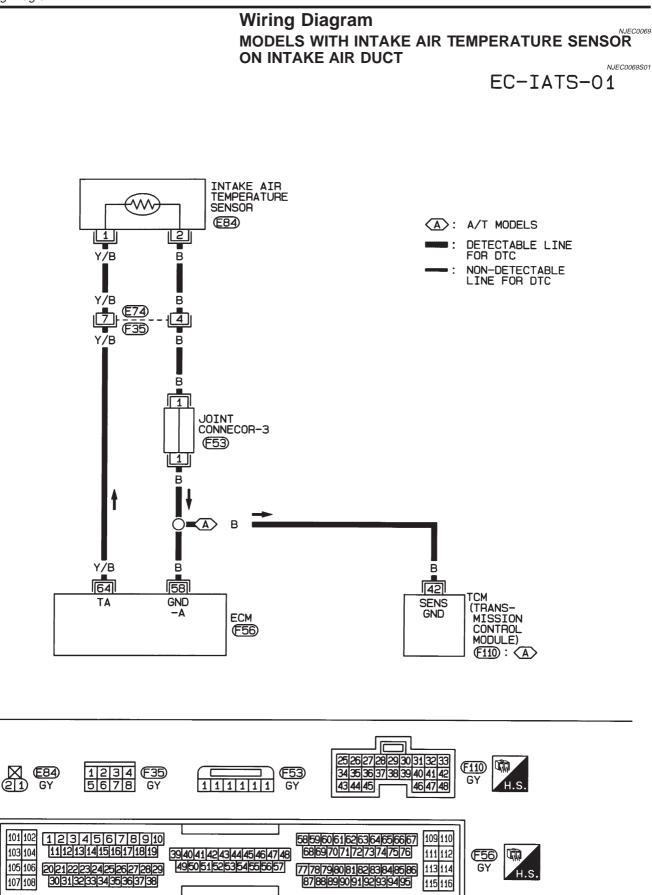
3	DATA MONI		
	DAIA MON		
	MONITOR	NO DTC	
	ENG SPEED	XXX rpm	
			SEF058Y

#### With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-198.

#### (a) With GST

Follow the procedure "With CONSULT-II" above.

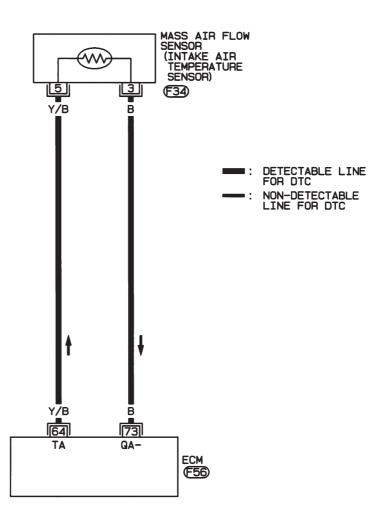


Wiring Diagram (Cont'd)

QG

## MODELS WITH INTAKE AIR TEMPERATURE SENSOR IN MASS AIR FLOW SENSOR

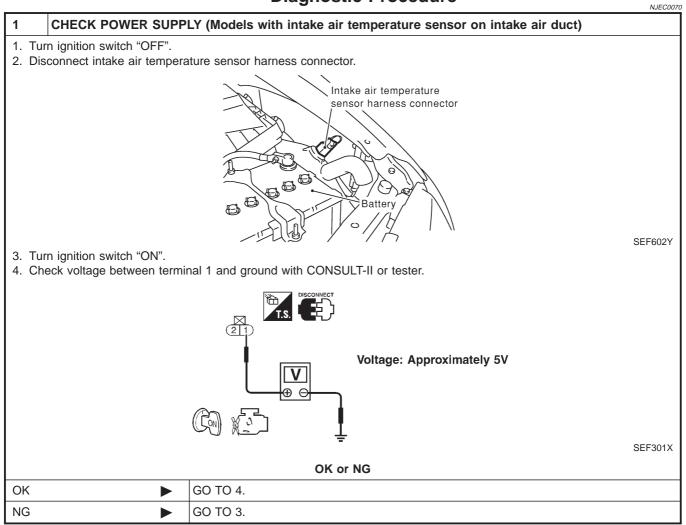
EC-IATS-01





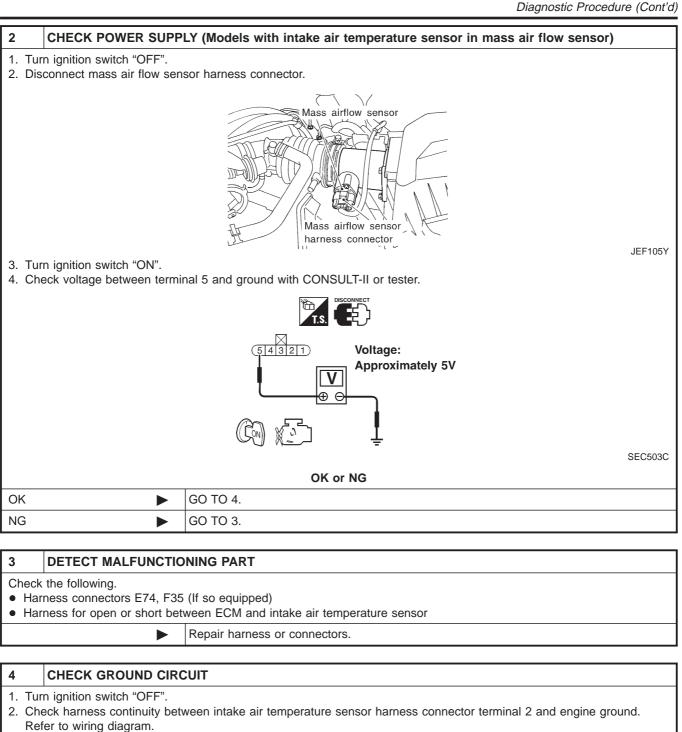
# DTC P0110 INTAKE AIR TEMPERATURE SENSOR

# **Diagnostic Procedure**



# DTC P0110 INTAKE AIR TEMPERATURE SENSOR

QG



#### Continuity should exist.

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

OK or NG

OK 🕨	GO TO 6.
NG 🕨	GO TO 5.

# DTC P0110 INTAKE AIR TEMPERATURE SENSOR

Diagnostic Procedure (Cont'd)

#### 5 DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3Harness connectors E74, F35
- Harness connectors E74, F35
   Harness for open or short between ECM and in
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and intake air temperature sensor

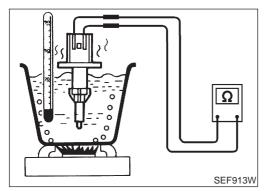
Repair open circuit or short to ground or short to power in harness or connectors.

#### 6 CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-201.

OK or NG		
ОК		GO TO 7.
NG		Replace intake air temperature sensor.

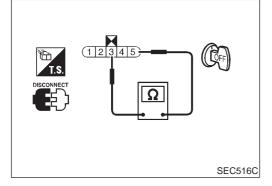
7	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END		



# **Component Inspection**

INTAKE AIR TEMPERATURE SENSOR Models with Intake Air Temperature Sensor on Intake Air Duct Check resistance as shown in the figure.

20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -10 -20 -20 -10 -20 -



<Reference data>

Intake air temperature °C (°F)	Resistance k $\Omega$
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.

#### Models with Intake Air Temperature Sensor in Mass Air Flow Sensor

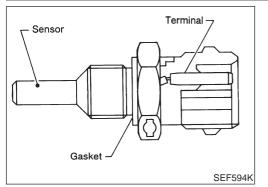
Check resistance between mass air flow sensor harness connector terminals 3 and 5. <Reference data>

<Reference data:

Intake air temperature °C (°F)	Resistance $k\Omega$	
25 (77)	1.9 - 2.1	

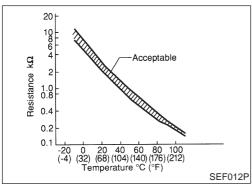
If NG, replace intake air temperature sensor.

Component Description



#### **Component Description**

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



#### <Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

\*: These data are reference values and are measured between ECM terminal 70 (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.

# CONSULT-II Reference Value in Data Monitor Mode

		NJEC0073
MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	Engine: After warming up	More than 70°C (158°F)

## **On Board Diagnosis Logic**

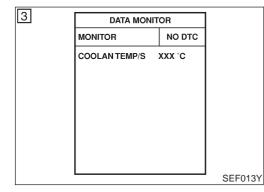
DTC No.	Malfunction is detected when	Check Items (Possible Cause)			
P0115 0115	<ul> <li>An excessively high or low voltage from the sensor is sent to ECM.*</li> </ul>	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Engine coolant temperature sensor</li> </ul>			

\*: When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Fail-safe Mode

#### Fail-safe Mode

NJEC0566 Detected items Engine operating condition in fail-safe mode 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. Engine coolant temperature decided (CONSULT-II Condition display) Just as ignition switch is turned ON or Start 40°C (104°F) Engine coolant temperature sensor circuit More than approx. 4 minutes after ignition ON or 80°C (176°F) Start 40 - 80°C (104 - 176°F) Except as shown above (Depends on the time) When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running



# **DTC Confirmation Procedure**

NJEC0075

QG

**NOTE:** If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

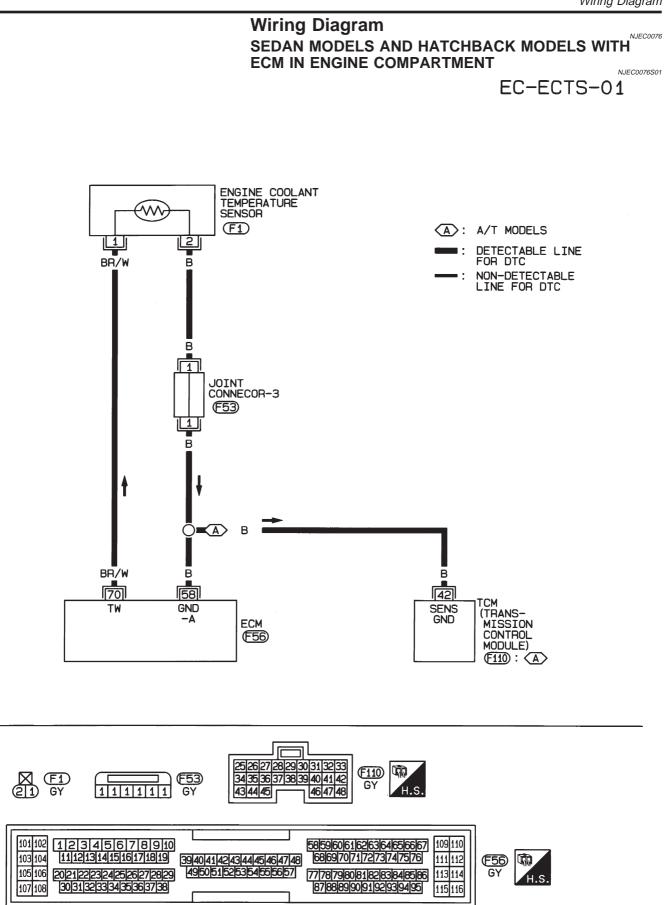
#### () With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-205.

#### With GST

Follow the procedure "With CONSULT-II" above.

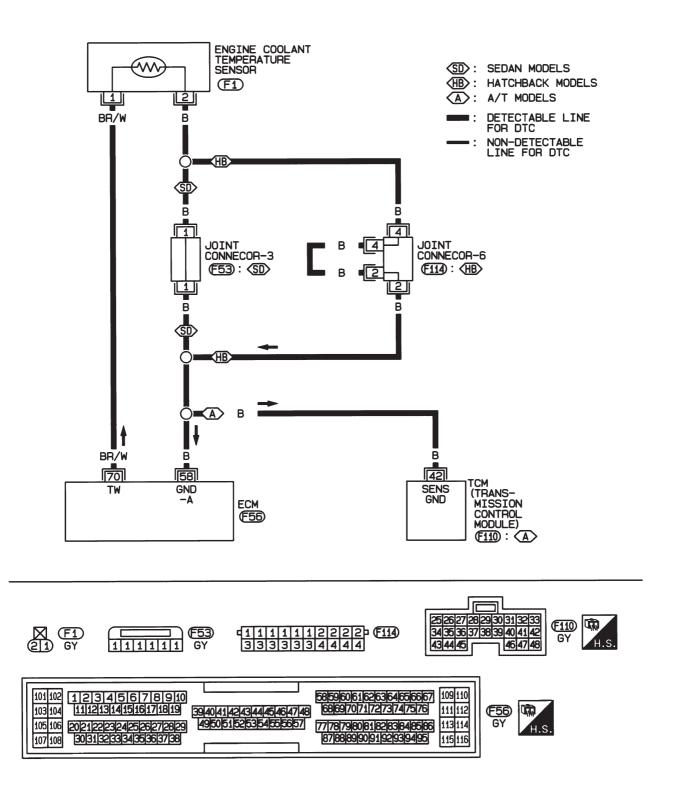
**QG** Wiring Diagram



Wiring Diagram (Cont'd)

# HATCHBACK MODELS WITH ECM IN CABIN

EC-ECTS-01



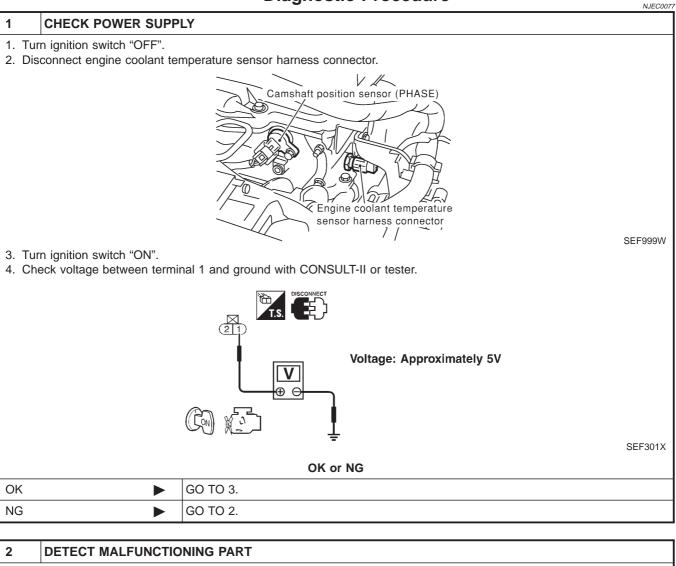
HEC956

QG

NJEC0076S02

QG Diagnostic Procedure

# **Diagnostic Procedure**



Check the harness for open or short between ECM and engine coolant temperature sensor.

Repair harness or connectors.

3	CHECK GROUND C	CIRC	UIT	
2. Che gro Ref	<ol> <li>Turn ignition switch "OFF".</li> <li>Check harness continuity between engine coolant temperature sensor harness connector terminal 2 and engine ground. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
OK or NG				
OK			GO TO 5.	
NG			GO TO 4.	

Diagnostic Procedure (Cont'd)

#### DETECT MALFUNCTIONING PART 4

Check the following.

- Joint connector-3 (If so equipped)
- Joint connector-6 (If so equipped) ۲
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between engine coolant temperature sensor and TCM (Transmission Control Module)

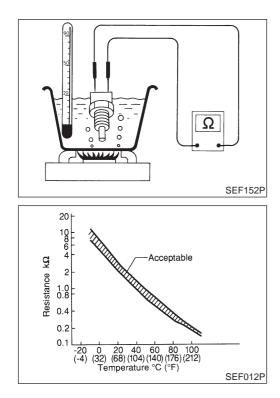
Repair open circuit or short to ground or short to power in harness or connectors.

#### 5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-206.

OK or NG		
ОК		GO TO 6.
NG   Replace engine coolant temperature sensor.		

6	CHECK INTERMITTENT INCIDENT		
Perfor	form "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	► INSPECTION END		



# **Component Inspection**

**ENGINE COOLANT TEMPERATURE SENSOR** 

NJEC0078 NJEC0078S01

Check resistance as shown in the figure. <Reference data>

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

If NG, replace engine coolant temperature sensor.

QG Component Description

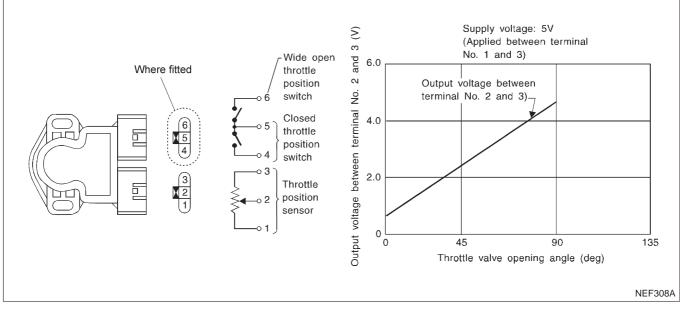
# **Component Description**

N.IEC0079

#### If DTC P0120 (0120) is displayed with DTC P0510 (0510), first perform trouble diagnosis for DTC P0510, EC-385.

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



#### **CONSULT-II Reference Value in Data Monitor** Mode NJEC0080

#### Specification data are reference values.

NOTE:

MONITOR ITEM CONDITION **SPECIFICATION** · Engine: Idle Throttle valve: fully closed 0.15 - 0.85V THRTL POS SEN Ignition switch: ON 3.5 - 4.7V Throttle valve: fully opened (Engine stopped) • Engine: Idle Throttle valve: fully closed 0.0° ABSOL TH-P/S Ignition switch: ON Throttle valve: fully opened Approx. 80° (Engine stopped)

# **DTC P0120 THROTTLE POSITION SENSOR**

ECM Terminals and Reference Value

# **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	В	Sensors' ground	<ul><li>[Engine is running]</li><li>Warm up condition</li><li>Idle speed</li></ul>	Approximately 0V
	Y	Throttle position sensor	<ul><li>[Engine is running]</li><li>Accelerator pedal fully released</li></ul>	0.15 - 0.85V
92			[Ignition switch "ON"] • Accelerator pedal fully depressed	3.5 - 4.7V
111	R	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V

# On Board Diagnosis Logic

 DTC No.
 Malfunction is detected when ...
 Check Items (Possible Cause)

 P0120
 An excessively low or high voltage from the sensor is sent to ECM\* while driving.

 • Harness or connectors (The throttle position sensor circuit is open or shorted.)

 • Throttle position sensor

\*: When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

#### Fail-safe Mode

Detected items	Engine operating condition in fail-safe mode		
	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.		
Throttle position sensor circuit	Condition	Driving condition	
circuit	When engine is idling	Normal	
	When accelerating	Poor acceleration	

# **DTC Confirmation Procedure**

NOTE:

NJEC0083

NJEC0567

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in

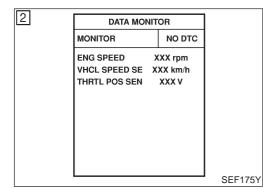
# EC-208

QG

=N.JEC0081

NSOR QG DTC Confirmation Procedure (Cont'd)

the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.



#### () With CONSULT-II

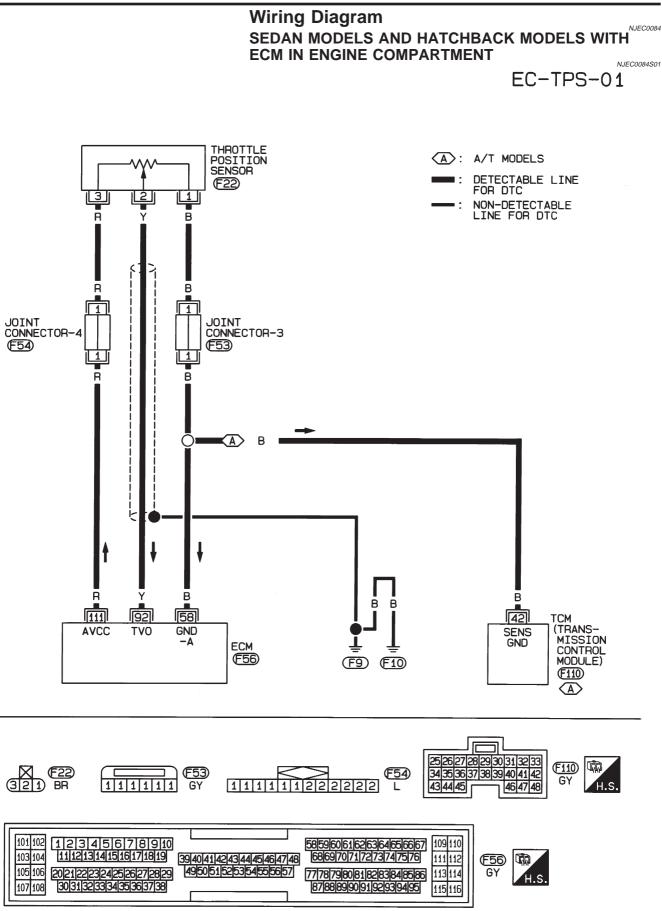
- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

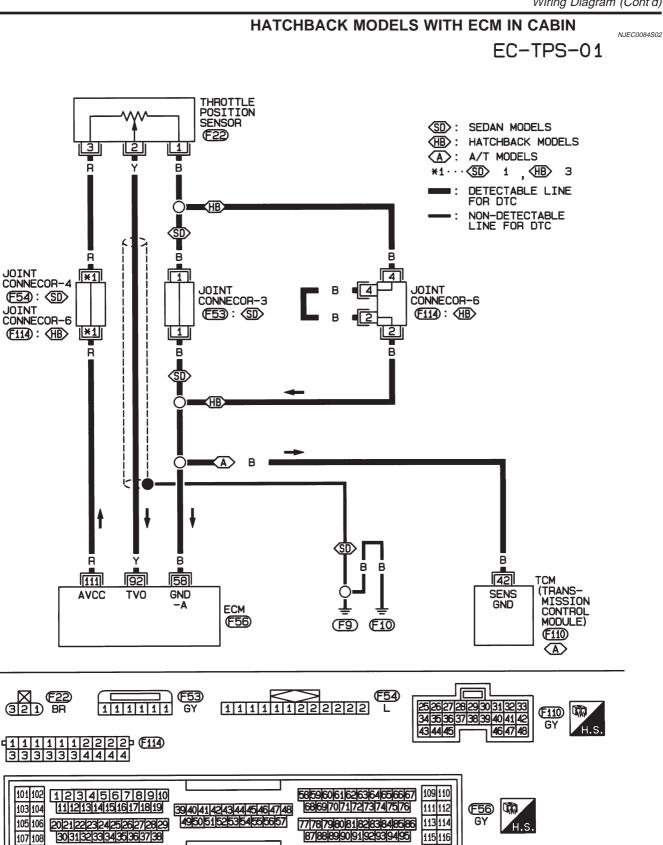
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-212.

#### With GST

Follow the procedure "With CONSULT-II" above.



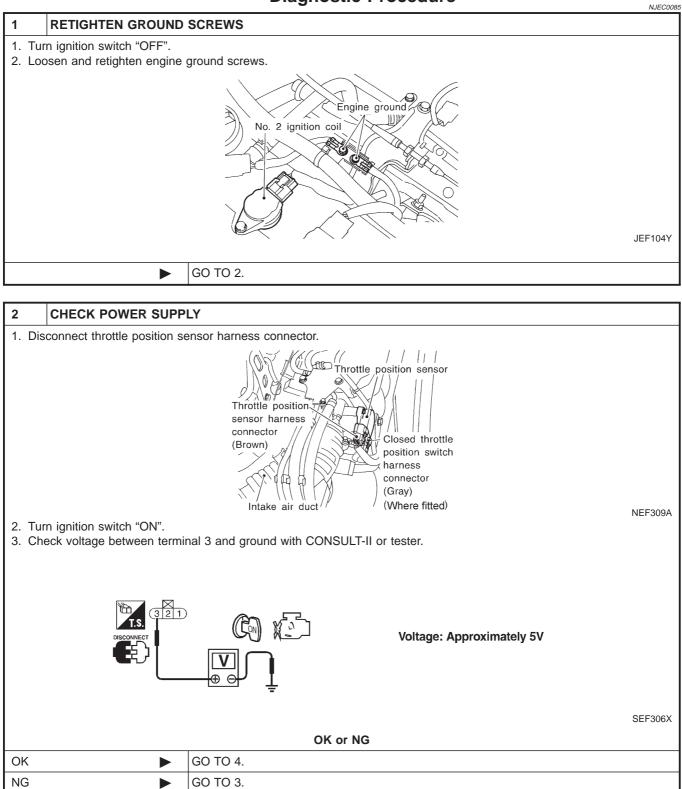
QG Wiring Diagram (Cont'd)



107 108

# **DTC P0120 THROTTLE POSITION SENSOR**

## **Diagnostic Procedure**



#### 3 DETECT MALFUNCTIONING PART

#### Check the following.

- Joint connector-4 (If so equipped)
- Joint connector (If so equipped)
- Harness for open or short between throttle position sensor terminal 3 and ECM terminal 111

Repair harness or connectors.

#### 4 CHECK GROUND CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Check harness continuity between throttle position sensor harness connector terminal 1 and engine ground. Refer to wiring diagram.

Continuity should exist.

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

#### OK or NG

OK 🕨	GO TO 6.
NG	GO TO 5.

#### DETECT MALFUNCTIONING PART

Check the following.

5

- Joint connector-3 (If so equipped)
- Joint connector-6 (If so equipped)
- Harness for open or short between ECM terminal 58 and throttle position sensor
- Harness for open or short between ECM terminal 58 and TCM (Transmission Control Module)

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

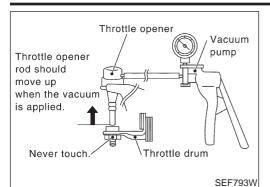
# 6 CHECK INPUT SIGNAL CIRCUIT 1. Disconnect ECM harness conjector. 1. Disconnect ECM harness conjector. 2. Check harness continuity between ECM terminal 92 and throttle position sensor harness connector terminal 2. Refer to wiring diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK ● GO TO 7. NG ● Repair open circuit or short to ground or short to power in harness or connectors.

CHECK THROTTLE POSITION SENSOR				
Refer to "Component Inspection", EC-214.				
OK or NG				
OK 🕨 GO TO 8.				
NG  Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-100.				
	o "Component Inspection"			

8	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

# **DTC P0120 THROTTLE POSITION SENSOR**

#### Component Inspection



DATA MON	DATA MONITOR	
MONITOR	NO DTC	
ENG SPEED	XXX rpm	
COOLAN TEMP/S	XXX °C	
THRTL POS SEN	xxx v	

# Component Inspection THROTTLE POSITION SENSOR Models with Throttle Opener



QG

NJEC0086

NJEC0086S01

NJEC0086S0101

- Start engine and warm it up to normal operating temperature.
- 2) Stop engine (ignition switch OFF).
- 3) Remove the vacuum hose connected to the throttle opener.
- 4) Connect suitable vacuum hose to the vacuum pump and the opener.
- Apply vacuum [more than -40.0 kPa (-400 mbar, -300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
- 6) Turn ignition switch ON.
- 7) Select "DATA MONITOR" mode with CONSULT-II.
- 8) Check voltage of "THRTL POS SEN" under the following conditions.

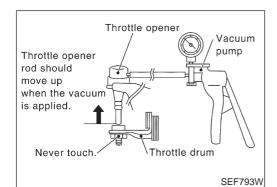
#### NOTE:

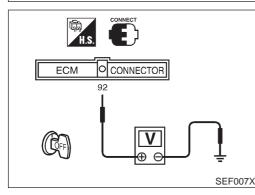
# Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage (V)	
Completely closed	0.15 - 0.85 (a)	
Partially open	Between (a) and (b)	
Completely open	3.5 - 4.7 (b)	

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

9) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.





#### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine (ignition switch OFF).
- 3) Remove the vacuum hose connected to the throttle opener.
- 4) Connect suitable vacuum hose to the vacuum pump and the opener.
- 5) Apply vacuum [more than -40.0 kPa (-400 mbar, -300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
- 6) Turn ignition switch ON.
- 7) Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

#### NOTE:

# Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage (V)	
Completely closed	0.15 - 0.85 (a)	
Partially open	Between (a) and (b)	
Completely open	3.5 - 4.7 (b)	

R QG Component Inspection (Cont'd)

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

8) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

DATA MONITOR	
MONITORING NO FAIL	MONITORING
ENG SPEED XXX rpm	ENG SPEED
COOLAN TEMP/S XXX °C	COOLAN TEMP/S
THRTL POS SEN XXX V	THRTL POS SEN

# Models without Throttle Opener (P) With CONSULT-II

NJEC0086S0102

- 1) Stop engine (ignition switch OFF).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check voltage of "THRTL POS SEN" under the following conditions.

#### NOTE:

Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage (V)	
Completely closed	0.35 - 0.65 (a)	
Partially open Between (a) and (b)		
Completely open	3.7 - 4.5 (b)	

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

5) If it is impossible to adjust closed throttle position sensor idle position in "Basic Inspection", replace throttle position sensor.



- 1) Stop engine (ignition switch OFF).
- 2) Turn ignition switch ON.
- Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground under the following conditions.

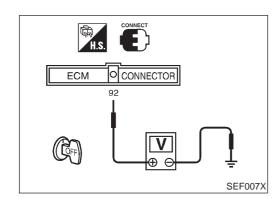
#### NOTE:

# Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage (V)	
Completely closed	0.35 - 0.65 (a)	
Partially open	Between (a) and (b)	
Completely open	3.7 - 4.5 (b)	

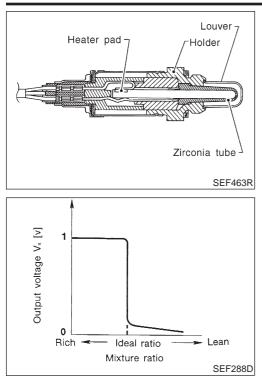
If NG, adjust throttle position sensor idle position. Refer to "Basic Inspection", EC-100.

4) If it is impossible to adjust throttle position sensor idle position in "Basic Inspection", replace throttle position sensor.



# DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT)

Component Description



#### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

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

# **ECM Terminals and Reference Value**

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

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

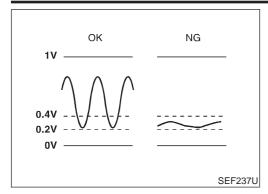
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 s SEF008W

NJEC0095

NJEC0096

On Board Diagnosis Logic

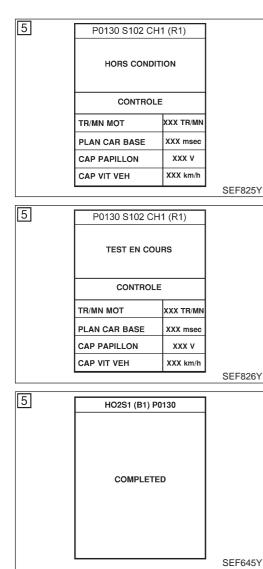
QG



### **On Board Diagnosis Logic**

Under the condition in which the heated oxygen sensor 1 (front) 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.	Malfunction is detected when	Check Items (Possible Cause)
P0130 0130	• The voltage from the sensor is constantly approx. 0.3V.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Heated oxygen sensor 1 (front)</li> </ul>



### DTC Confirmation Procedure

NJEC0098

### 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 9 seconds before conducting the next test.

### **TESTING CONDITION:**

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

### With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1) P0130" of "HO2S1 (B1)" 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 3,200 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	1,700 - 2,600 rpm
Vehicle speed	64 - 100 km/h (40 - 62 MPH)
B/FUEL SCHDL	3.0 - 5.2 msec
Selector lever	Suitable position

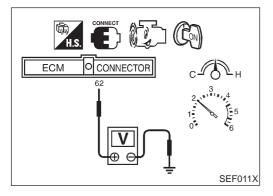
If "TESTING" is not displayed after 5 minutes, retry from step 2.

6) Make sure that "OK" is displayed after touching "SELF-DIAG

Overall Function Check

RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-221.

QG



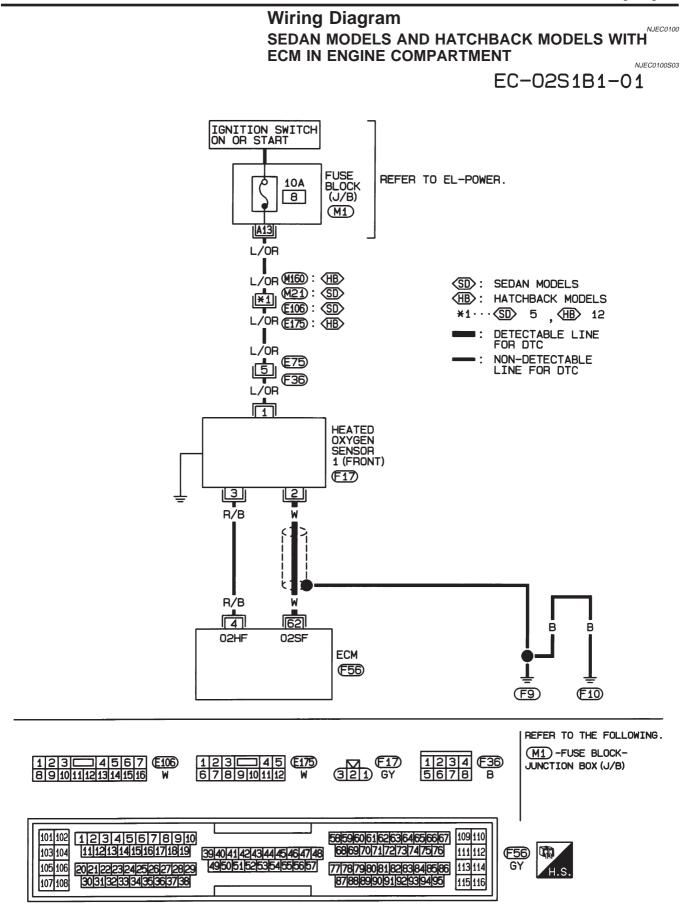
### **Overall Function Check**

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

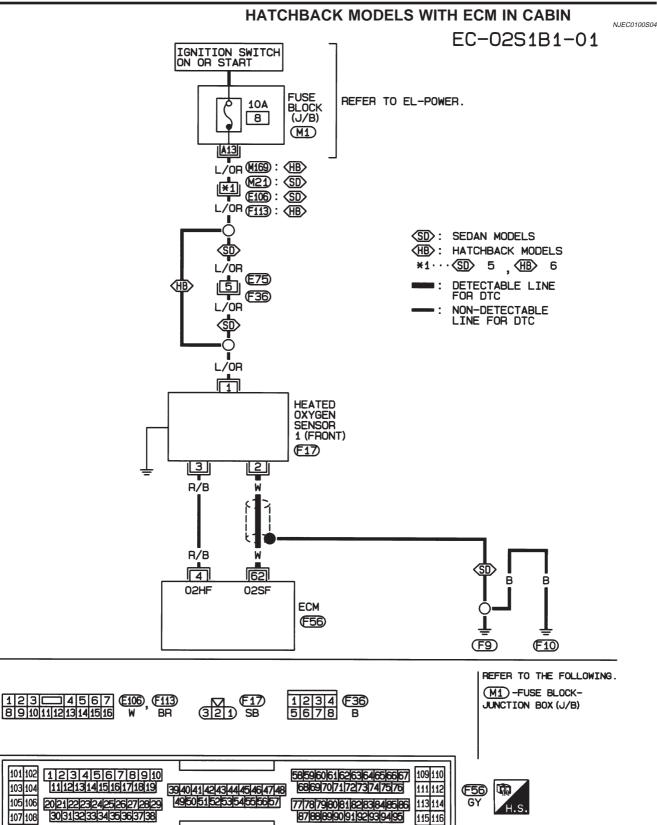
### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-221.

Wiring Diagram



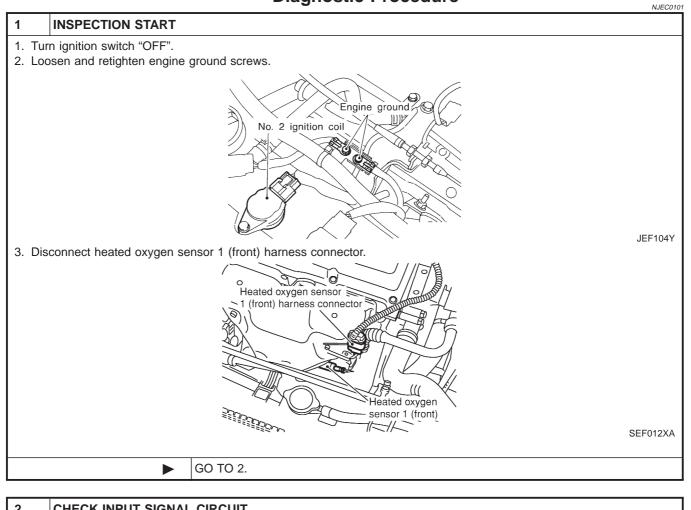
Wiring Diagram (Cont'd)



Diagnostic Procedure

QG

### **Diagnostic Procedure**



2	CHECK INPUT SIGNAL CIRCUIT		
2. Cho Ref 3. Cho	<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 62 and heated oxygen sensor 1 (front) harness connector terminal 2. Refer to wiring diagram. Continuity should exist.</li> <li>Check harness continuity between ECM terminal 62 (or terminal 2) and ground. Continuity should not exist.</li> <li>Also check harness for short to power.</li> </ol>		
	OK or NG		
ОК	рк 🕨 GO TO 3.		
NG		Repair open circuit or short to ground or short to power in harness or connectors.	

CHECK HEATED OXYGEN SENSOR 1 (FRONT)		
Refer to "Component Inspection", EC-222.		
OK or NG		
	GO TO 4.	
NG   Replace heated oxygen sensor 1 (front).		
	to "Component Inspection"	

4	CHECK INTERMITTENT INCIDENT			
Perforr	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

Component Inspection

Componen	i mopoodon		
4	DATA MONI	TOR	
	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	
			SEF646
5 Bank 1			
	cycle	2   3	4 5
HO2S	1 MNTR (B1) R-I	-R-L-R-L-I	R-L-R-L-R
Bank 2			
	cycle 1	2   3	4   5
HO2S	1 MNTR (B2) R-	L-R-L-R-L-	R-L-R-L-R
R means			
	B1)/(B2) indicates	RICH	
L means	HO2S1		
MNTR (B	81)/(B2) indicates	LEAN	

### Component Inspection HEATED OXYGEN SENSOR 1 (FRONT)

$\sim$	NICI		
Lυ	INDU	JLT-I	

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 3) Hold engine speed at 2,000 rpm under no load during the following steps.
- 4) Touch "RECORD" on CONSULT-II screen.
- 5) Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:
  - R = "HO2S1 MNTR (B1)", "RICH"
  - L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

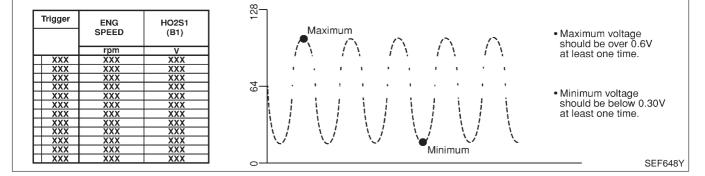
### **CAUTION:**

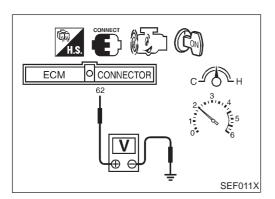
(P) With

Y

SEF647Y

- 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 and approved anti-seize lubricant.





### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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.

NJEC0102 NJEC0102S01

Component Inspection (Cont'd)

1 time: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V 2 times: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  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 and approved anti-seize lubricant.

Component Description

# Louver Heater pad Holder Zirconia tube SEF463R

### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			$0 - 0.3V \leftrightarrow Approx. 0.6 - 1.0V$
HO2S1 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.

### **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 s SEF008W

\_\_\_\_\_

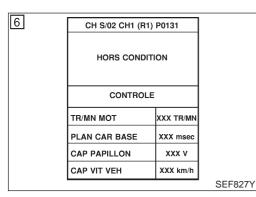
NJEC0105

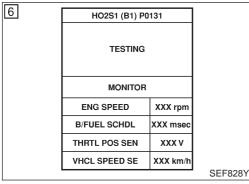
### **On Board Diagnosis Logic**

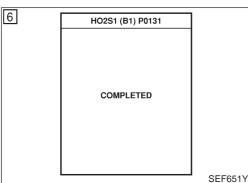
To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

SEF300U

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0131 0131	• The maximum and minimum voltages from the sensor are not reached to the specified voltages.	<ul> <li>Heated oxygen sensor 1 (front)</li> <li>Heated oxygen sensor 1 heater (front)</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li> </ul>







### **DTC Confirmation Procedure**

NJEC0107

QG

On Board Diagnosis Logic

### Always drive vehicle at a safe speed.

#### NOTE:

**CAUTION:** 

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 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.

### (I) With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 9 seconds.
- Turn ignition switch "ON" and select "HO2S1 (B1) P0131" 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 3,200 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	1,700 - 2,600 rpm
Vehicle speed	64 - 100 km/h (40 - 62 MPH)
B/FUEL SCHDL	3.0 - 5.2 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

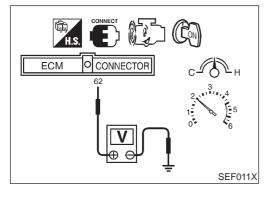
**EC-225** 

DTC Confirmation Procedure (Cont'd)

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-226.

QG

NJEC0109



### **Overall Function Check**

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

### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine ground.
- 3) Check 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-226.

### **Diagnostic Procedure**

		10200100		
1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)			
1. Tur	1. Turn ignition switch "OFF".			
2. Loc	osen and retighten heated	oxygen sensor 1 (front).		
1	Tightening torque:			
	40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)			
		GO TO 2.		

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEA	RNING DATA	
1. Sta 2. Sel	ect "SELF-LEARN CONTF	CO normal operating temperature. COL" in "WORK SUPPORT" mode with CONSULT-II. coefficient by touching "START". WORK SUPPORT SELF-LEARNING CONT 100%	
		CLEAR SEF215Z	
	4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 detected? Is it difficult to start engine?		
<ol> <li>Sta</li> <li>Tur</li> <li>Dis</li> <li>Sto</li> <li>Sto</li> <li>Sto</li> <li>Ma</li> <li>Run</li> </ol>	n ignition switch "OFF". connect mass air flow sen op engine and reconnect m ke sure 1st trip DTC P010 use the 1st trip DTC memo ke sure DTC P0000 is disp n engine for at least 10 mi	ry. Refer to "How to Erase Emission-related Diagnostic Information", EC-70. played.	
		Yes or No	
Yes		Perform trouble diagnosis for DTC P0171. Refer to EC-297.	
No		GO TO 3.	
3	CHECK HEATED OXYC	GEN SENSOR 1 HEATER (FRONT)	
Refer	to "Component Inspection"	, EC-257.	
		OK or NG	
ОК		GO TO 4.	
NG	•	Replace heated oxygen sensor 1 (front).	

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)		
Refer	Refer to "Component Inspection", EC-228.		
	OK or NG		
OK	►	GO TO 5.	
NG		Replace heated oxygen sensor 1 (front).	

5	CHECK INTERMITTEN	CHECK INTERMITTENT INCIDENT		
	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177. Refer to "Wiring Diagram", EC-219, for circuit.			
	► INSPECTION END			

Component Inspection

			1
	DATA MONIT	OR	
	MONITOR	NO DTC	
	ENG SPEED	(XX rpm	
	MAS A/F SE-B1	xxx v	
	COOLAN TEMP/S	xxx °c	
	HO2S1 (B1)	xxx v	
	HO2S1 MNTR (B1)	LEAN	
			SEF646Y
			GELOIOI
Bank 1			
	cycle 1	2   3	4   5
HO2S1	MNTR (B1) R-L	-R-L-R-L-I	R-L-R-L-R
Bank 2			
	cycle 1	2 3	4 5
HO2S1	I MNTR (B2) R-L		
R means			
MNTR (B	1)/(B2) indicates	RICH	
L means	HO2S1		

MNTR (B1)/(B2) indicates LEAN

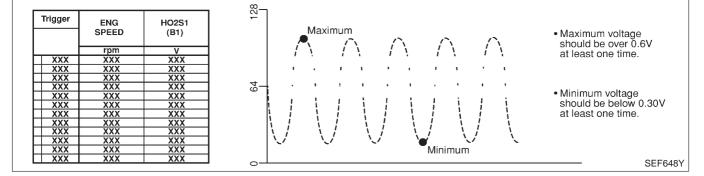
Component Inspection HEATED OXYGEN SENSOR 1 (FRONT)

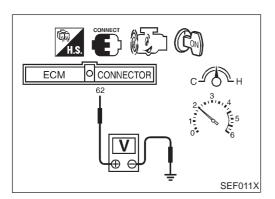
- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 3) Hold engine speed at 2,000 rpm under no load during the following steps.
- 4) Touch "RECORD" on CONSULT-II screen.
- 5) Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:
  - R = "HO2S1 MNTR (B1)", "RICH"
  - L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

### **CAUTION:**

SEF647Y

- 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 and approved anti-seize lubricant.





### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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.

NJEC0110 NJEC0110S02

Component Inspection (Cont'd)

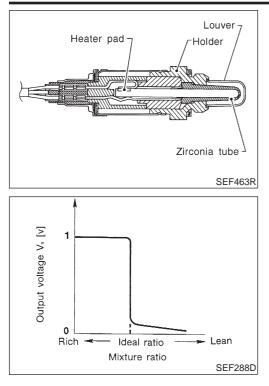
QG

1 time: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V 2 times: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  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 and approved anti-seize lubricant.

Component Description



### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
HO2S1 (B1)			$0 - 0.3V \leftrightarrow Approx. 0.6 - 1.0V$
HO2S1 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.

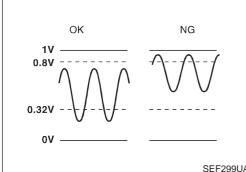
### **ECM Terminals and Reference Value**

NJEC0113

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 5 SEF008W

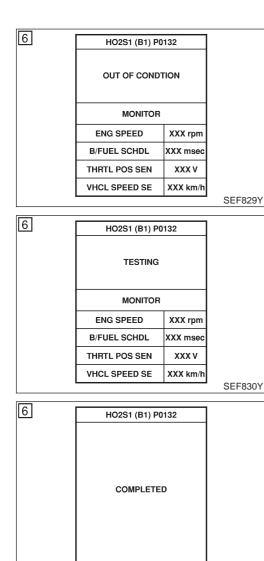


**On Board Diagnosis Logic** 

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the "rich" output is sufficiently high. The "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

SEF299UA

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0132 0132	<ul> <li>The maximum and minimum voltages from the sensor are beyond the specified voltages.</li> </ul>	<ul> <li>Heated oxygen sensor 1 (front)</li> <li>Heated oxygen sensor 1 heater (front)</li> <li>Fuel pressure</li> <li>Injectors</li> </ul>



### DTC Confirmation Procedure

NJEC0115

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On Board Diagnosis Logic

### 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 9 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.

### (I) With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 9 seconds.
- Turn ignition switch "ON" and select "HO2S1 (B1) P0132" 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:

SEF655Y

### Never raise engine speed above 3,200 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	1,700 - 2,600 rpm	
Vehicle speed	64 - 100 km/h (40 - 62 MPH)	
B/FUEL SCHDL	3.0 - 5.2 msec	
Selector lever	Suitable position	

If "TESTING" is not displayed after 5 minutes, retry from step 2.

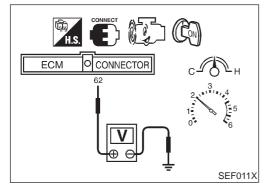
EC-231

DTC Confirmation Procedure (Cont'd)

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-232.

QG

N.IEC0117



### **Overall Function Check**

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

### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine ground.
- 3) Check 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 0.3V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-232.

### **Diagnostic Procedure**

		NoEcon		
1	RETIGHTEN HEATED C	ITEN HEATED OXYGEN SENSOR 1 (FRONT)		
1. Tur	1. Turn ignition switch "OFF".			
2. Loc	osen and retighten heated	oxygen sensor 1 (front).		
I .	Tightening torque:			
	40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)			
	►	GO TO 2.		

Diagnostic Procedure (Cont'd)

QG

2	CLEAR THE SELF-LEA	RNING DATA			
1. Sta 2. Sel	th CONSULT-II rt engine and warm it up to ect "SELF-LEARN CONTR ar the self-learning control	ROL" in "WORK S	SUPPORT" mode with CO	ONSULT-II.	
	-		WORK SUPPORT SELF-LEARNING CONT B1 100%		
			01545		
	4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 detected? Is it difficult to start engine?				
<ol> <li>Sta</li> <li>Tur</li> <li>Dis</li> <li>Sto</li> <li>Sto</li> <li>Mai</li> <li>Era</li> <li>Rur</li> </ol>	p engine and reconnect m ke sure 1st trip DTC P010	sor harness conn ass air flow sense 0 is displayed. ry. Refer to "How played. nutes at idle spee	ector, and restart and run or harness connector. to Erase Emission-relate	n engine for at least 5 seconds at idle speed. ed Diagnostic Information", EC-70.	
			Yes or No		
Yes	•	Perform trouble	diagnosis for DTC P0172	2. Refer to EC-305.	
No		GO TO 3.			
3	CHECK HARNESS COI	NNECTOR			
2. Dis 3. Che	n ignition switch "OFF". connect heated oxygen se eck harness connector for <b>ter should not exit.</b>	· · ·	ness connector. OK or NG		
ОК		GO TO 4.			
NG		Repair or replac	e harness connector.		

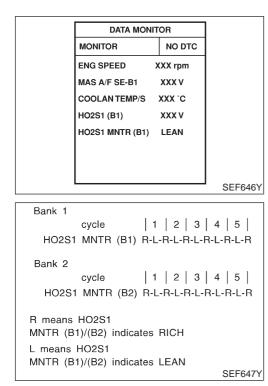
4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)				
Refer	Refer to "Component Inspection", EC-257.				
		OK or NG			
OK	OK 🕨 GO TO 5.				
NG		Replace heated oxygen sensor 1 (front).			

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)			
Refer	Refer to "Component Inspection", EC-234.			
	OK or NG			
OK		GO TO 6.		
NG		Replace heated oxygen sensor 1 (front).		
NG	►	Replace heated oxygen sensor 1 (front).		
6	CHECK INTERMITTEN	TINCIDENT		

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177. Refer to "Wiring Diagram", EC-219, for circuit.

### ► INSPECTION END



### Component Inspection HEATED OXYGEN SENSOR 1 (FRONT)

NJEC0118

NJEC0118S02

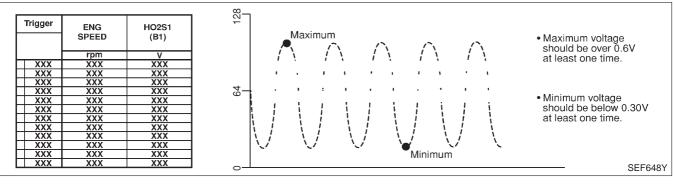
- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 3) Hold engine speed at 2,000 rpm under no load during the following steps.
- 4) Touch "RECORD" on CONSULT-II screen.
- 5) Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:
  - R = "HO2S1 MNTR (B1)", "RICH"
  - L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

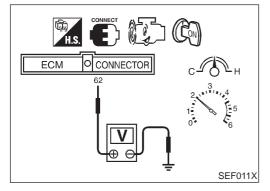
### **CAUTION:**

- 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 and approved anti-seize lubricant.

Component Inspection (Cont'd)

QG





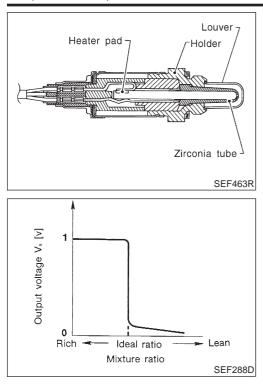
### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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 and approved anti-seize lubricant.

Component Description



### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			$0 - 0.3V \leftrightarrow Approx. 0.6 - 1.0V$
HO2S1 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.

### **ECM Terminals and Reference Value**

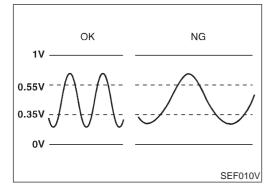
NJEC0121

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 5 SEF008W

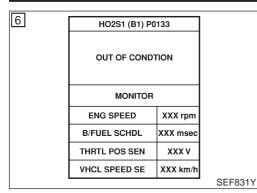
QG On Board Diagnosis Logic

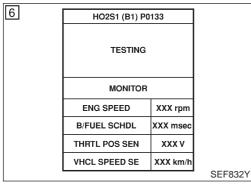


**On Board Diagnosis Logic** 

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

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0133 0133	• The response of the voltage signal from the sensor takes more than the specified time.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Heated oxygen sensor 1 (front)</li> <li>Heated oxygen sensor 1 heater (front)</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> <li>PCV</li> <li>Mass air flow sensor</li> </ul>





6	HO2S1 (B1) P0133	
	COMPLETED	SEF658Y
1		000001

**DTC Confirmation Procedure CAUTION:** Always drive vehicle at a safe speed.

NJEC0123

### NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 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.

### (P) With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 9 seconds. 2)
- Turn ignition switch "ON" and select "HO2S1 (B1) P0133" of 3) "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START" 4)
- 5) Start engine and let it idle for at least 3 minutes.

### NOTE:

### Never raise engine speed above 3,200 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.)

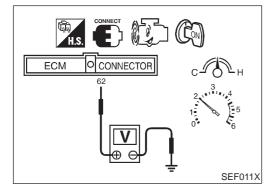
ENG SPEED	2,100 - 3,100 rpm
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	3.8 - 7.6 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

EC-237

DTC Confirmation Procedure (Cont'd)

 Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-241.



### **Overall Function Check**

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

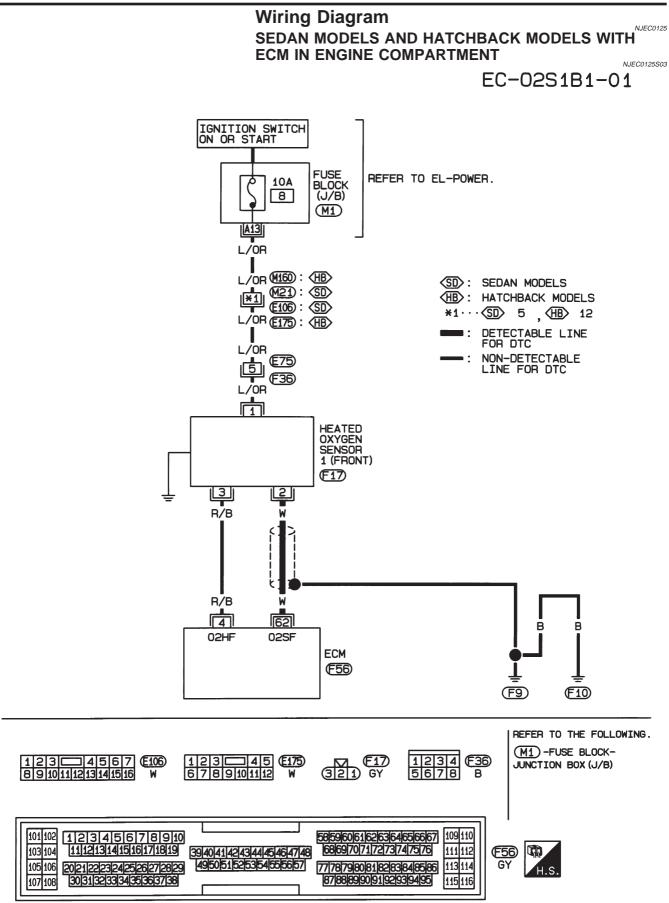
### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.

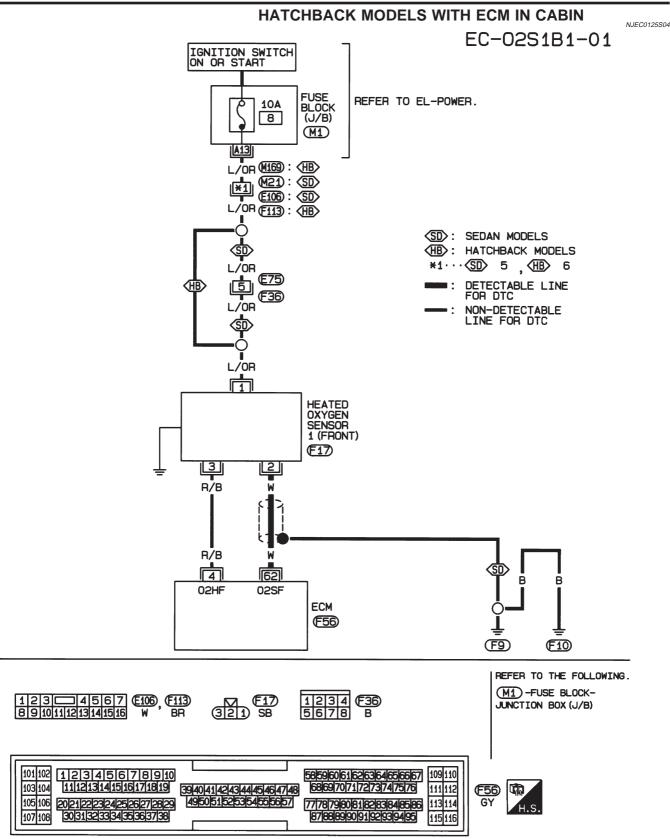
1 time: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V

- 2 times: 0 0.3V  $\rightarrow$  0.6 1.0V  $\rightarrow$  0 0.3V  $\rightarrow$  0.6 1.0V  $\rightarrow$  0 0.3V
- 4) If NG, go to "Diagnostic Procedure", EC-241.

Wiring Diagram



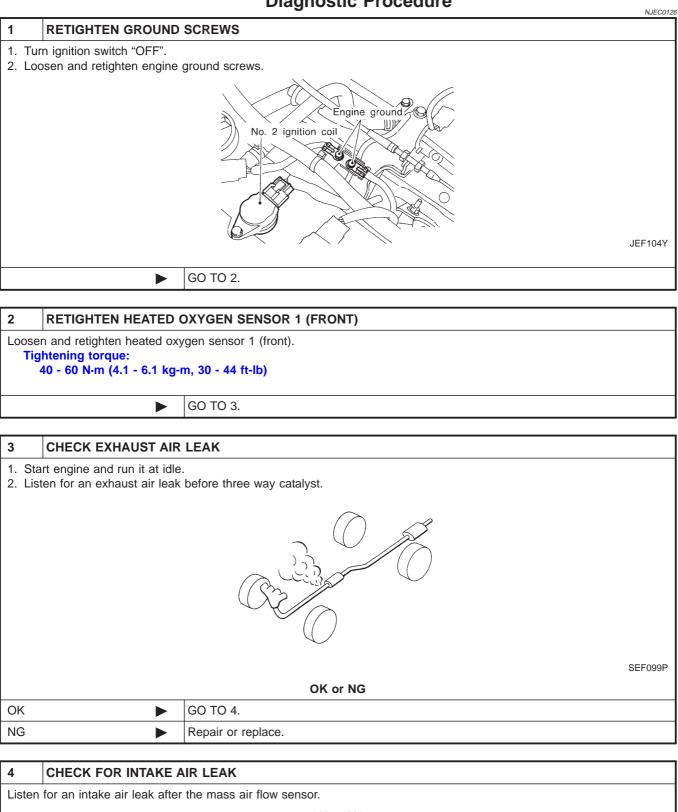
Wiring Diagram (Cont'd)



HEC936

QG Diagnostic Procedure

### **Diagnostic Procedure**



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

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEA	RNING DATA	
1. Sta 2. Sel	<ul> <li>With CONSULT-II</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.</li> <li>Clear the self-learning control coefficient by touching "START".</li> </ul>		
		WORK SUPPORT	
		SELF-LEARNING CONT B1	
		100%	
		CLEAR	
		SEF215Z	
	n engine for at least 10 mil		
L	•	P0172 detected? Is it difficult to start engine?	
	thout CONSULT-II		
	ift engine and warm it up to in ignition switch "OFF".	o normal operating temperature.	
	0	sor harness connector, and restart and run engine for at least 5 seconds at idle speed.	
		ass air flow sensor harness connector.	
	ke sure 1st trip DTC P010		
		ry. Refer to "How to Erase Emission-related Diagnostic Information", EC-70.	
	ke sure DTC P0000 is disp n engine for at least 10 mi		
		0172 detected? Is it difficult to start engine?	
		Yes or No	
Yes			
No		GO TO 6.	
6	6 CHECK INPUT SIGNAL CIRCUIT		
		nsor 1 (front) harness connector and ECM harness connector. ween ECM terminal 62 and heated oxygen sensor 1 (front) harness connector terminal 2.	
	fer to wiring diagram.	ween Low terminal of and heated oxygen sensor i (nont) harness tormettor terminal 2.	
	Continuity should exist.		
	3. Check harness continuity between ECM terminal 62 (or terminal 2) and ground.		

- Check harness continuity between ECM Continuity should not exist.
   Also check harness for 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 HEATED OXYGEN SENSOR 1 HEATER (FRONT)		
Refer to "Component Inspection", EC-257.			
	OK or NG		
OK		GO TO 8.	
NG	•	Replace heated oxygen sensor 1 (front).	

Diagnostic Procedure (Cont'd)

QG

8	CHECK HEATED OXYO	EN SENSOR 1 (FRONT)
Refer t	Refer to "Component Inspection", EC-243.	
	OK or NG	
OK		GO TO 9.
NG		Replace heated oxygen sensor 1 (front).

### 9 CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-193.

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

10	CHECK PCV VALVE	
Refer to "Positive Crankcase Ventilation", EC-39.		
OK or NG		
OK	•	GO TO 11.
NG		Repair or replace PCV valve.

# 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177. INSPECTION END

	DATA MONIT	OR	
	MONITOR	NO DTC	
	ENG SPEED	CXX rpm	
	MAS A/F SE-B1	xxx v	
	COOLAN TEMP/S	XXX °C	
	HO2S1 (B1)	XXX V	
	HO2S1 MNTR (B1)	LEAN	
			SEF646
Bank 1			
Bunk	cycle 1	2 3	4 5
HO2S1	I MNTR (B1) R-L	-R-L-R-L-I	R-L-R-L-R
Bank 2			
Editit E	cycle   1	2   3	4 5
HO2S	1 MNTR (B2) R-L	-R-L-R-L-	R-L-R-L-R
R means	40281		
	1)/(B2) indicates	RICH	
L means	HO2S1		
MNTR (B	1)/(B2) indicates	LEAN	000047
			SEF647

### Component Inspection HEATED OXYGEN SENSOR 1 (FRONT) With CONSULT-II

NJEC0127

NJEC0127S02

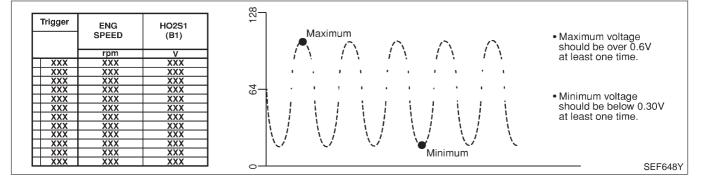
- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" in "DATA MONITOR" mode, and select "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 3) Hold engine speed at 2,000 rpm under no load during the following steps.
- 4) Touch "RECORD" on CONSULT-II screen.
- 5) Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" five times in 10 seconds.
   5 times (cycles) are counted as shown below:
  - R = "HO2S1 MNTR (B1)", "RICH"
  - L = "HO2S1 MNTR (B1)", "LEAN"
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

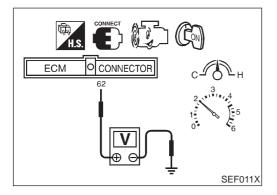
### **CAUTION:**

• 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.

Component Inspection (Cont'd)

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.





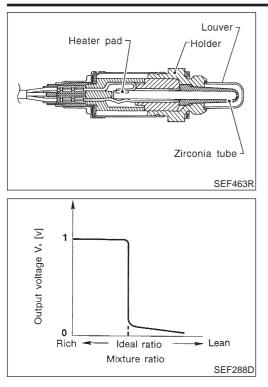
### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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 and approved anti-seize lubricant.

Component Description



### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			$0 - 0.3V \leftrightarrow Approx. 0.6 - 1.0V$
HO2S1 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.

### **ECM Terminals and Reference Value**

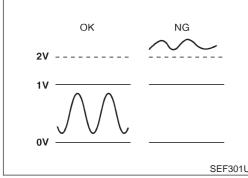
NJEC0130

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	W	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 s SEF008W

On Board Diagnosis Logic

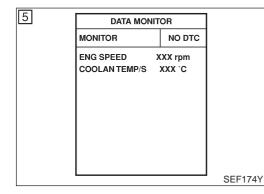


### **On Board Diagnosis Logic**

NJEC013 To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high.

SEF301U

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0134	<ul> <li>An excessively high voltage from the sensor is sent to</li></ul>	<ul> <li>Harness or connectors</li></ul>
0134	ECM.	(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 1 (front)</li>



### **DTC Confirmation Procedure**

NJEC0132

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

### (P) With CONSULT-II

NOTE:

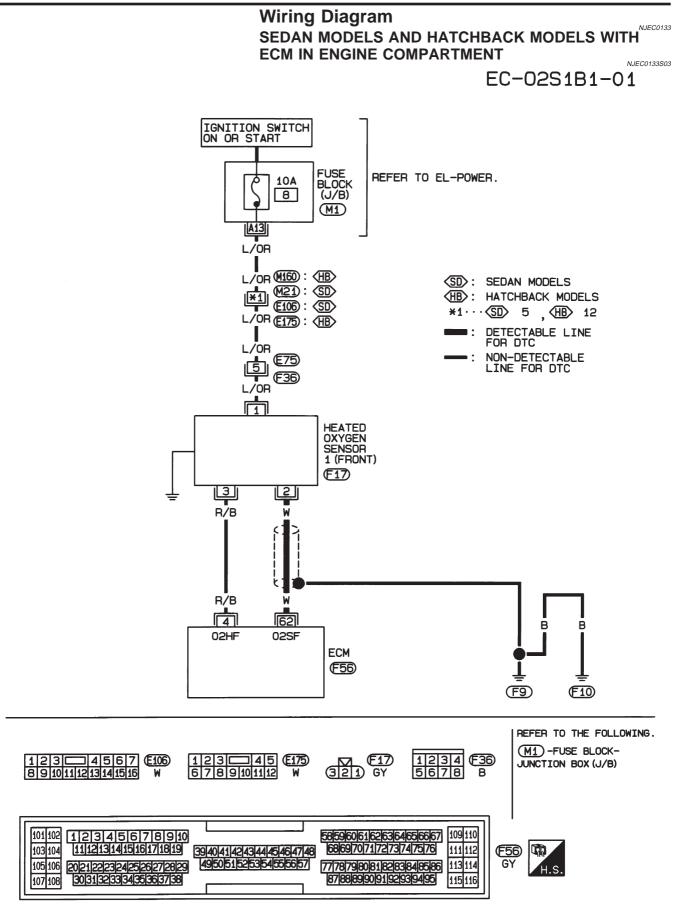
2)

- Start engine and warm it up to normal operating temperature. 1)
  - Turn ignition switch "OFF" and wait at least 9 seconds.
- 3) Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II. 4)
- 5) Restart engine and let it idle for 2 minutes.
- If 1st trip DTC is detected, go to "Diagnostic Procedure", 6) EC-249.

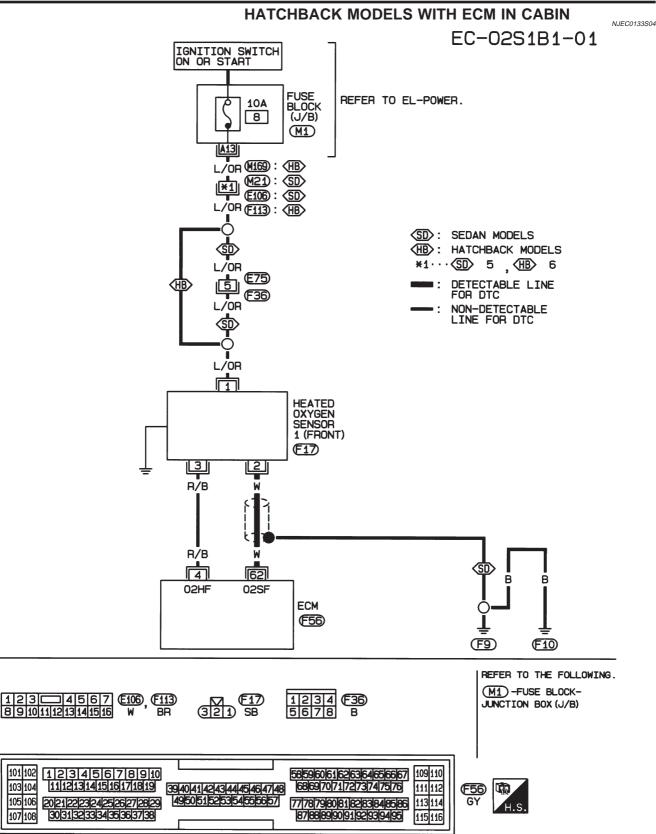
### With GST

- 1) Start engine and warm it up to normal operating temperature.
- Turn ignition switch "OFF" and wait at least 9 seconds. 2)
- 3) Restart engine and let it idle for 2 minutes.
- Turn ignition switch "OFF" and wait at least 9 seconds. 4)
- 5) Restart engine and let it idle for 2 minutes.
- Select "MODE 3" with GST. 6)
- If DTC is detected, go to "Diagnostic Procedure", EC-249. 7)
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE) QG Wiring Diagram

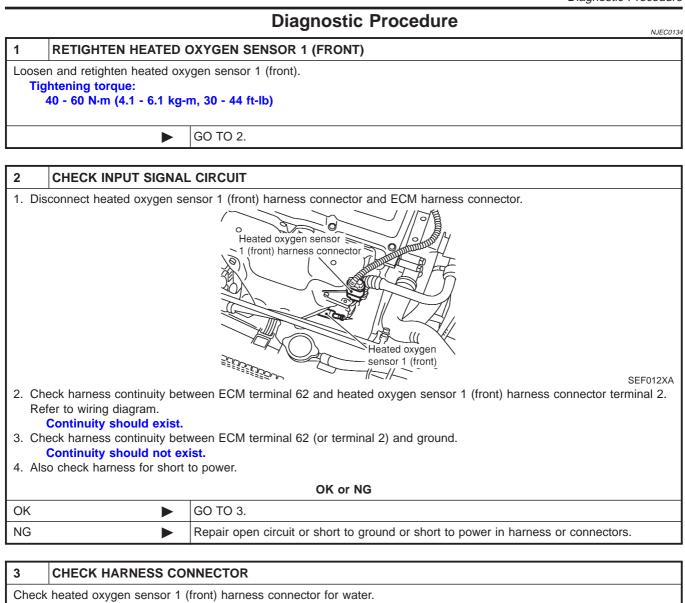


Wiring Diagram (Cont'd)



HEC936

Diagnostic Procedure



Water should not exist.

 OK or NG

 OK
 GO TO 4.

 NG
 Repair or replace harness connector.

CHECK HEATED OXYG	GEN SENSOR 1 (FRONT)			
Refer to "Component Inspection", EC-250.				
OK or NG				
ОК 🕨 GO TO 5.				
NG  Replace heated oxygen sensor 1 (front).				
_	o "Component Inspection"			

5	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	•	INSPECTION END	

Component Inspection

		1
DATA N	IONITOR	
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
		02.0.01
Bank 1		
	1   2   3	• • •
HO2S1 MNTR (B1)	K-L-K-L-K-L-	K-L-K-L-K
Bank 2		
cycle	1   2   3	4   5
HO2S1 MNTR (B2)	R-L-R-L-R-L-	R-L-R-L-R
B means HO2S1		
MNTR (B1)/(B2) indica	ates RICH	
L means HO2S1		
MNTR (B1)/(B2) indica	ates LEAN	
		SEF647Y

### **Component Inspection HEATED OXYGEN SENSOR 1 (FRONT)**

NJEC0135

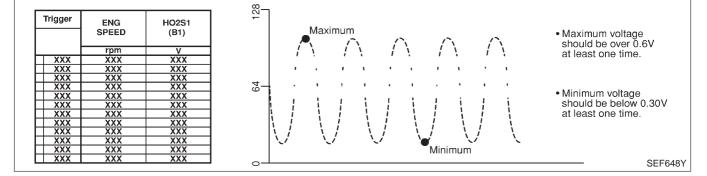
NJEC0135S01

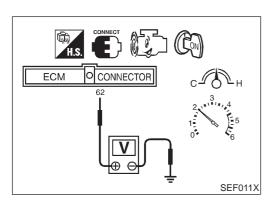
### (P) With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- Select "MANU TRIG" in "DATA MONITOR" mode, and select 2) "HO2S1 (B1)" and "HO2S1 MNTR (B1)".
- 3) Hold engine speed at 2,000 rpm under no load during the following steps.
- Touch "RECORD" on CONSULT-II screen. 4)
- 5) Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" five times in 10 seconds. 5 times (cycles) are counted as shown below:
  - R = "HO2S1 MNTR (B1)", "RICH"
- L = "HO2S1 MNTR (B1)", "LEAN" "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

### 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 and approved anti-seize lubricant.





### **Without CONSULT-II**

- Start engine and warm it up to normal operating temperature. 1)
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine ground.
- Check the following with engine speed held at 2,000 rpm con-3) stant under no load.
- 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.

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE) QG Component Inspection (Cont'd)

1 time: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V 2 times: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  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 and approved anti-seize lubricant.

### DTC P0135 HEATED OXYGEN SENSOR 1 (FRONT) HEATER

Description

Description NJEC0136 SYSTEM DESCRIPTION NJEC0136S01 ECM func-Sensor Input Signal to ECM Actuator tion Heated oxygen Camshaft position sensor (PHASE) sensor 1 Heated oxygen sensor 1 heater Engine speed Crankshaft position sensor (POS) heater (front) (front) control

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater (front) corresponding to the engine operating condition.

### **OPERATION**

	NJEC0136S02
Engine speed	Heated oxygen sensor 1 heater (front)
Above 3,200 rpm	OFF
Below 3,200 rpm	ON

#### **CONSULT-II** Reference Value in Data Monitor Mode NJEC0137

#### Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	• Engine speed: Below 3,200 rpm	ON
	Engine speed: Above 3,200 rpm	OFF

### ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4 R/B	Heated oxygen sensor 1	<ul><li>[Engine is running]</li><li>Engine speed is below 3,200 rpm.</li></ul>	Approximately 0V	
	heater (front)	<ul><li>[Engine is running]</li><li>Engine speed is above 3,200 rpm.</li></ul>	BATTERY VOLTAGE (11 - 14V)	

### **On Board Diagnosis Logic**

DTC No. Malfunction is detected when ... Check Items (Possible Cause) P0135 The current amperage in the heated oxygen sensor 1 Harness or connectors 0135 heater (front) circuit is out of the normal range. (The heated oxygen sensor 1 heater (front) cir-[An improper voltage drop signal is sent to ECM through cuit is open or shorted.) the heated oxygen sensor 1 heater (front).] Heated oxygen sensor 1 heater (front) 

NJEC0138

NJEC0139

DTC P0135 HEATED OXYGEN SENSOR 1 (FRONT) HEATER

DTC Confirmation Procedure

#### **DTC Confirmation Procedure**

#### NOTE:

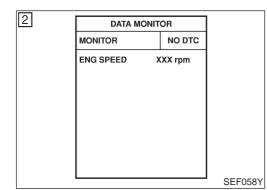
NJEC0140

QG

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.



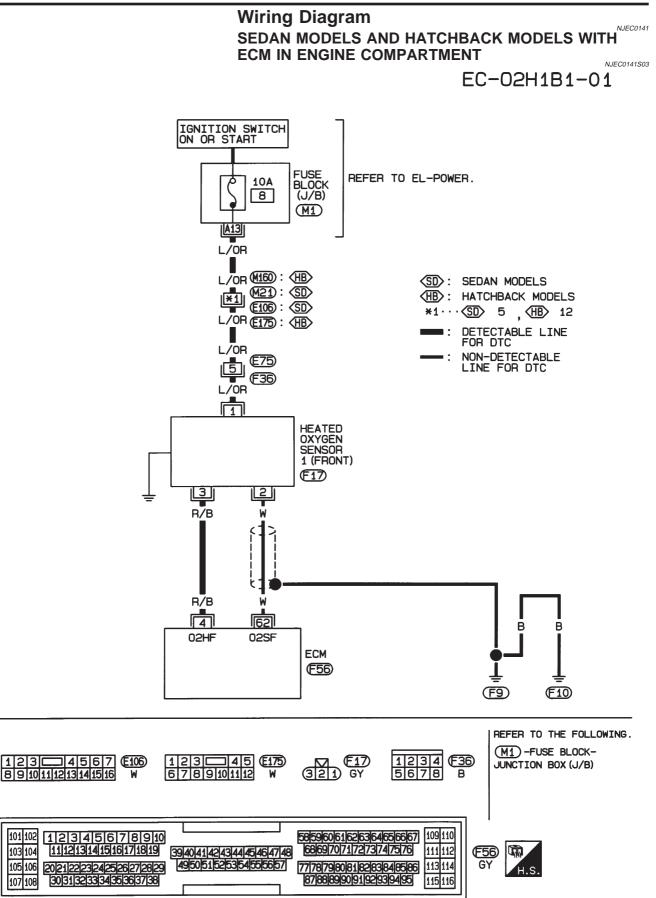
#### (I) With CONSULT-II

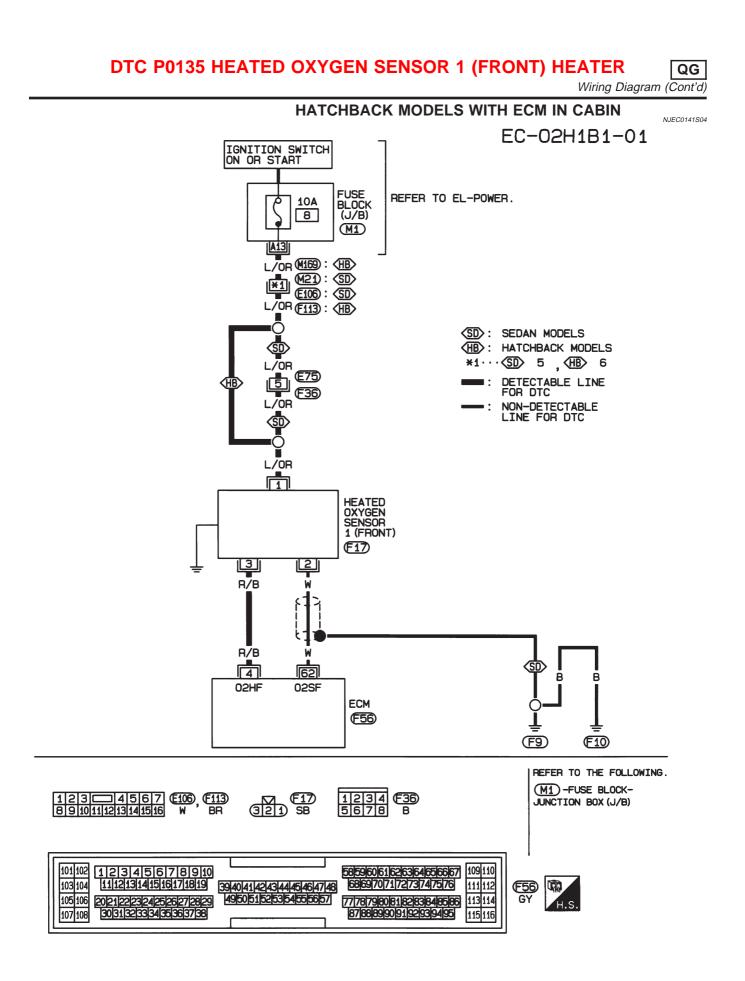
- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-256.

#### With GST

- 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- 3) Start engine and run it for at least 5 seconds at idle speed.
- 4) Select "MODE 3" with GST.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-256.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram

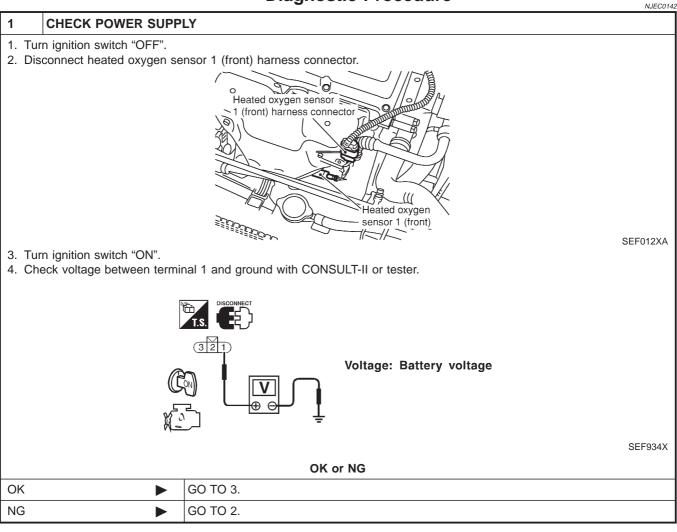




# DTC P0135 HEATED OXYGEN SENSOR 1 (FRONT) HEATER

Diagnostic Procedure

**Diagnostic Procedure** 



#### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, E75 (If so equipped)
- Harness connectors E106, M21 (Sedan), E175, M160 or F113, M169 (Hatchback)
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse
  - Repair harness or connectors.

# 3 CHECK GROUND CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between heated oxygen sensor 1 (front) harness connector terminal 3 and ECM terminal 4. Refer to wiring diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

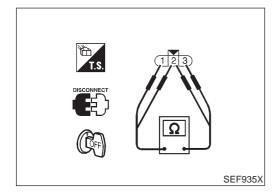
# DTC P0135 HEATED OXYGEN SENSOR 1 (FRONT) HEATER

Diagnostic Procedure (Cont'd)

QG

4	CHECK HEATED OXY	GEN SENSOR 1 HEATER (FRONT)			
Refer	to "Component Inspection	", EC-257.			
	OK or NG				
OK		GO TO 5.			
NG	NG  Replace heated oxygen sensor 1 (front).				
5	CHECK INTERMITTENT INCIDENT				
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". EC-177.				

► INSPECTION END



## Component Inspection

HEATED OXYGEN SENSOR 1 HEATER (FRONT)

NJEC0143 NJEC0143S01

#### Check resistance between terminals 3 and 1. Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

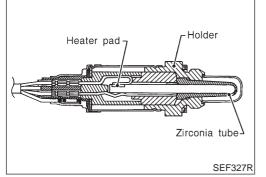
Check continuity between terminals 2 and 1, 3 and 2. Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

#### **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 and approved anti-seize lubricant.

Component Description



## **Component Description**

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

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

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 (rear) is not used for engine control operation.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0145

NJEC0146

Specification data are reference values.

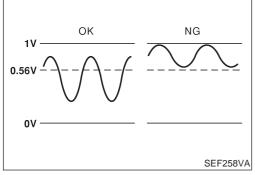
MONITOR ITEM	CONE	DITION	SPECIFICATION
HO2S2 (B1)		Revving engine from idle to 3,000	0 - 0.3V $\leftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	rpm	$LEAN \leftarrow \rightarrow RICH$

# **ECM Terminals and Reference Value**

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 3,000 rpm</li> </ul>	0 - Approximately 1.0V

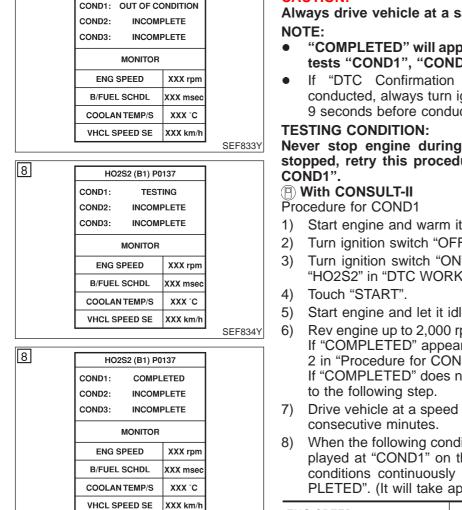


# **On Board Diagnosis Logic**

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0137	<ul> <li>The minimum voltage from the sensor does not reach</li></ul>	<ul> <li>Harness or connectors</li></ul>
0137	the specified voltage.	(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 2 (rear)</li> <li>Fuel pressure</li> <li>Injectors</li>

On Board Diagnosis Logic (Cont'd)



SEF835Y

8

HO2S2 (B1) P0137

NJEC0594

QG

#### **CAUTION:**

Always drive vehicle at a safe speed.

DTC Confirmation Procedure

- "COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch "OFF" and wait at least 9 seconds.
- Turn ignition switch "ON" and select "HO2S2 (B1) P0137" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Start engine and let it idle for at least 30 seconds.
- Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".

If "COMPLETED" does not appear on CONSULT-II screen, go

- Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2
- 8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COM-PLETED". (It will take approximately 60 seconds.)

ENG SPEED	1,500 - 3,600 rpm	
Vehicle speed	Above 70 km/h (43 MPH)	
Selector lever	Suitable position	

NOTE:

- If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".
- If "COMPLETED" already appears at "COND2" on CON-SULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".

1	HO2S2 (B1) P	0137	
	COND1: COMP	LETED	
	COND2: COMP	LETED	
	COND3: INCOM	PLETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
		•	SEF836Y

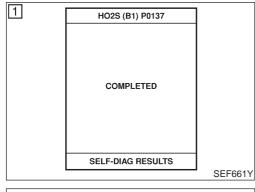
Procedure for COND2

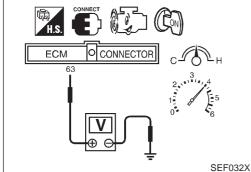
While driving, release accelerator pedal completely with "OD" OFF (A/T models), or 4th gear position (M/T models) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

#### NOTE:

If "COMPLETED" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

DTC Confirmation Procedure (Cont'd)





Procedure for COND3

- 1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-263.

# **Overall Function Check**

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.

#### **Without CONSULT-II**

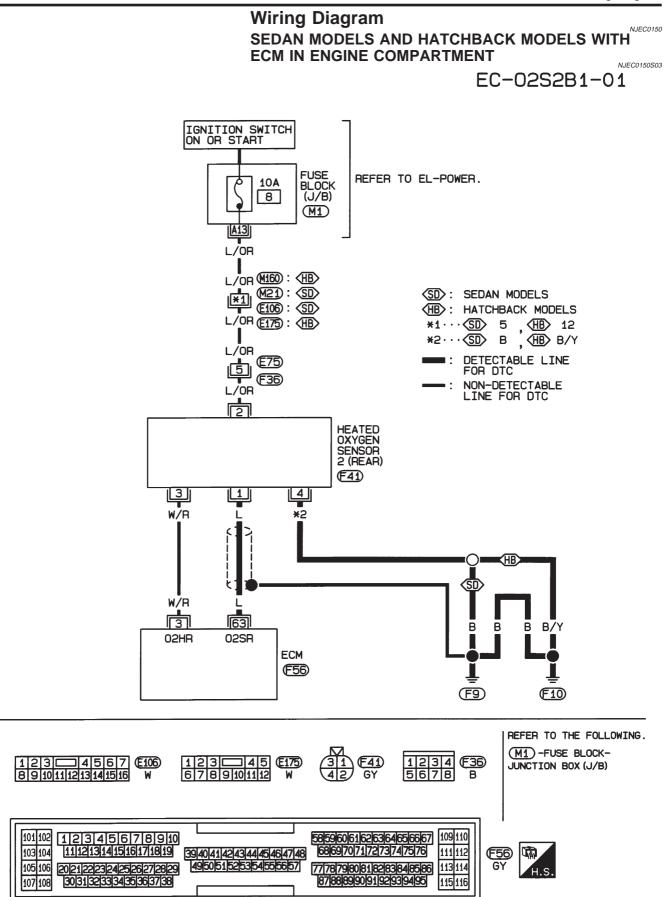
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.) The voltage should be below 0.56V at least once during this procedure.

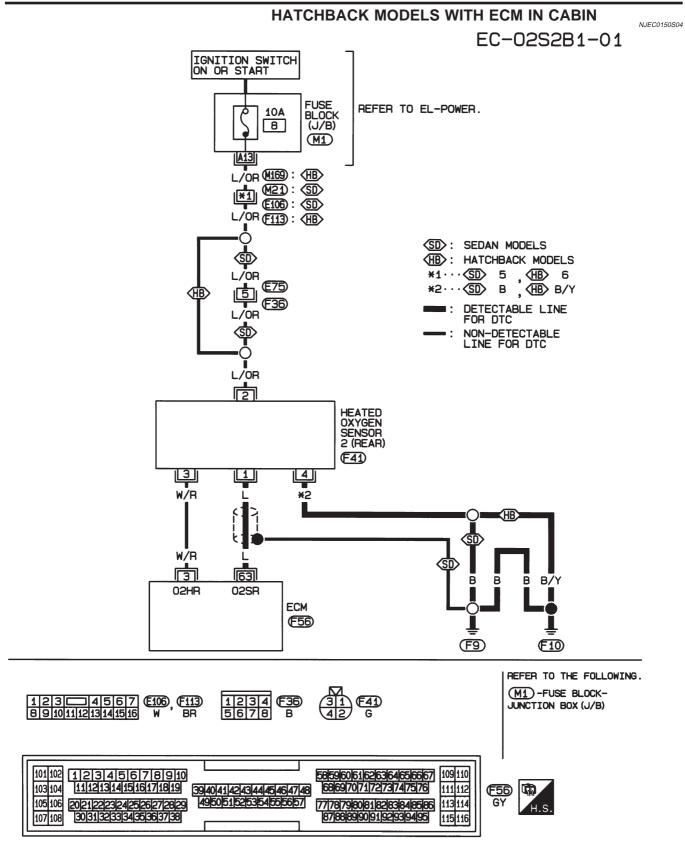
If the voltage can be confirmed in step 4, step 5 is not necessary.

- 5) 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 0.56V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-263.

**QG** Wiring Diagram



Wiring Diagram (Cont'd)



QG Diagnostic Procedure

# **Diagnostic Procedure**

	Diagnostic Procedure	NJEC0151	
1 RETIGHTEN GROUND	SCREWS		
1. Turn ignition switch "OFF".			
2. Loosen and retighten engine	ground screws.		
	No. 2 ignition coil	JEF104Y	
	1		
	GO TO 2.		
2 CLEAR THE SELF-LEA	ARNING DATA		
	ROL" in "WORK SUPPORT" mode with CONSULT-II.         I coefficient by touching "START".         WORK SUPPORT         SELF-LEARNING CONT         B1         100%         CLEAR	SEF215Z	
4. Run engine for at least 10 mi			
Is the 1st trip DTC P0172 detected? Is it difficult to start engine?  Without CONSULT-II  Start engine and warm it up to normal operating temperature. Turn ignition switch "OFF". Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0100 is displayed. Erase the 1st trip DTC memory. Refer to "How to Erase Emission-related Diagnostic Information", EC-70. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC 0172 detected? Is it difficult to start engine? Yes or No			
Yes	1		
•			
No	GO TO 3.		

Diagnostic Procedure (Cont'd)

3 CHECK INPL	T SIGNAL CIRCUIT					
1. Turn ignition switcl	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.</li> </ol>					
For Sedan       For Hatchback       Heated oxygen sensor 2 (rear)         Heated oxygen sensor 2 (rear)       Front       Heated oxygen sensor 2 (rear)         Heated oxygen       Sensor 2 (rear)       Front         View from the underside of the vehicle       View from the underside of the vehicle       SEF160Z         3. Check harness continuity between ECM terminal 63 and heated oxygen sensor 2 (rear) harness connector terminal 1.       Sensor 2 (rear) harness connector terminal 1.						
and ground. Continuity sho	uld not exist					
	s for short to ground and short to power.					
	OK or NG					
ОК	► GO TO 5.					
NG	► GO TO 4.					
4 DETECT MALFUNCTIONING PART						
Charle the horness fo	Check the horness for even or short between bested everyon concert? (rear) and ECM					

Check the harness for open or short between heated oxygen sensor 2 (rear) and ECM.

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

CHECK GROUND CIRCUIT				
<ol> <li>Check harness continuity between heated oxygen sensor 2 (rear) harness connector terminal 4 and body ground. Refer to wiring diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
OK or NG				
OK 🕨 GO TO 6.				
NG  Repair open circuit or short to ground or short to power in harness or connectors.				
	ess continuity betw ing diagram. ity should exist.			

CHECK HEATED OXYG	GEN SENSOR 2 (REAR)		
Refer to "Component Inspection", EC-265.			
OK or NG			
ОК 🕨 GO TO 7.			
NG  Replace heated oxygen sensor 2 (rear).			
	to "Component Inspection"		

7	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

Component Inspection

	ACTIVE TES		
	FUEL INJECTION	25 %	
	MONITOR		
	ENG SPEED	XXX rpm	
	HO2S1 (B1)	XXX V	
	HO2S2 (B1)	XXX V	
	HO2S1 MNTR (B1)	RICH	
	HO2S2 MNTR (B1)	RICH	
1			SEF662Y

#### Component Inspection HEATED OXYGEN SENSOR 2 (REAR)

NJEC0152

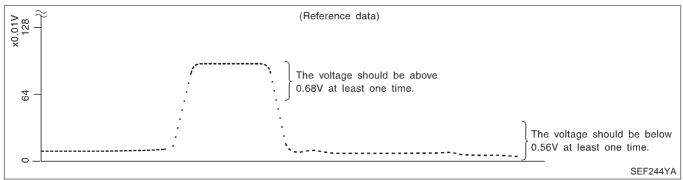
QG

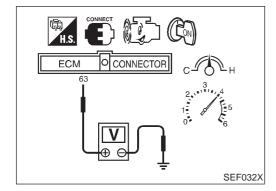
NJEC0152S01

- (I) With CONSULT-II
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
- 4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%.$ 
  - "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.56V 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 and approved anti-seize lubricant.





#### **Without CONSULT-II**

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once. If the voltage is above 0.68V at step 4, step 5 is not nec-

# essary.

5) Check the voltage when revving up to 6,000 rpm under no load. Or 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 0.56V at least once.

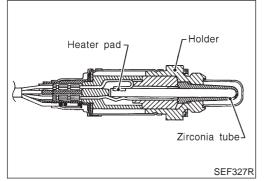
#### **CAUTION:**

• 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.

Component Inspection (Cont'd)

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Component Description



#### **Component Description**

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

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

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 (rear) is not used for engine control operation.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0154

NJEC0155

Specification data are reference values.

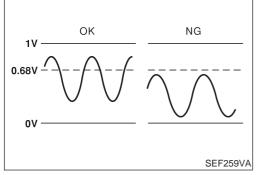
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)		Revving engine from idle to 3,000	0 - 0.3V $\leftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	• Engine: After warming up	rpm	$LEAN \leftarrow \rightarrow RICH$

# ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V



# **On Board Diagnosis Logic**

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0138	<ul> <li>The maximum voltage from the sensor does not reach</li></ul>	<ul> <li>Harness or connectors</li></ul>
0138	the specified voltage.	(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 2 (rear)</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li>

On Board Diagnosis Logic (Cont'd)

8 HO2S2 (B1) P0138 COND1: OUT OF CONDITION COND2: INCOMPLETE COND3: INCOMPLETE MONITOR ENG SPEED XXX rpm **B/FUEL SCHDL** XXX mse COOL AN TEMP/S XXX °C VHCL SPEED SE XXX km/h SEF837Y 8 HO2S2 (B1) P0138 COND1: TESTING COND2: INCOMPLETE COND31 INCOMPLETE MONITOR ENG SPEED XXX rpm **B/FUEL SCHDL** XXX msec COOLAN TEMP/S XXX .C VHCL SPEED SE XXX km/h SEF838Y

8	HO2S2 (B1) P0	138	
	COND1: COMPL	ETED.	
	COND2: INCOMI	PLETE	
	COND3: INCOMI	PLETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
			SEF839Y

## **DTC Confirmation Procedure**

#### CAUTION:

Always drive vehicle at a safe speed.

#### NOTE:

- "COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

#### With CONSULT-II

Procedure for COND1

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- Turn ignition switch "ON" and select "HO2S2 (B1) P0138" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 30 seconds.
- Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
  - If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
- 7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COM-PLETED". (It will take approximately 60 seconds.)

ENG SPEED	1,500 - 3,600 rpm
Vehicle speed	Above 70 km/h (43 MPH)
Selector lever	Suitable position

NOTE:

- If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".
- If "COMPLETED" already appears at "COND2" on CON-SULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".

1	HO2S2 (B1) P0	138	
	COND1: COMPL	ETED	
	COND2: COMPL	ETED.	
	COND3: INCOM	PLETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
			SEF840Y

Procedure for COND2

 While driving, release accelerator pedal completely with "OD" OFF (A/T models), or 4th gear position (M/T models) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT-II screen is turned to "COMPLETED". (It will take approximately 4 seconds.)

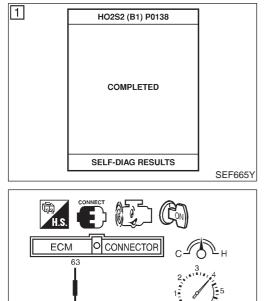
#### NOTE:

If "COMPLETED" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

NJEC0596

DTC Confirmation Procedure (Cont'd)

QG



Procedure for COND3

- 1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
- 2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
  - If "NG" is displayed, refer to "Diagnostic Procedure", EC-272.

# **Overall Function Check**

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.

#### **Without CONSULT-II**

SEF032X

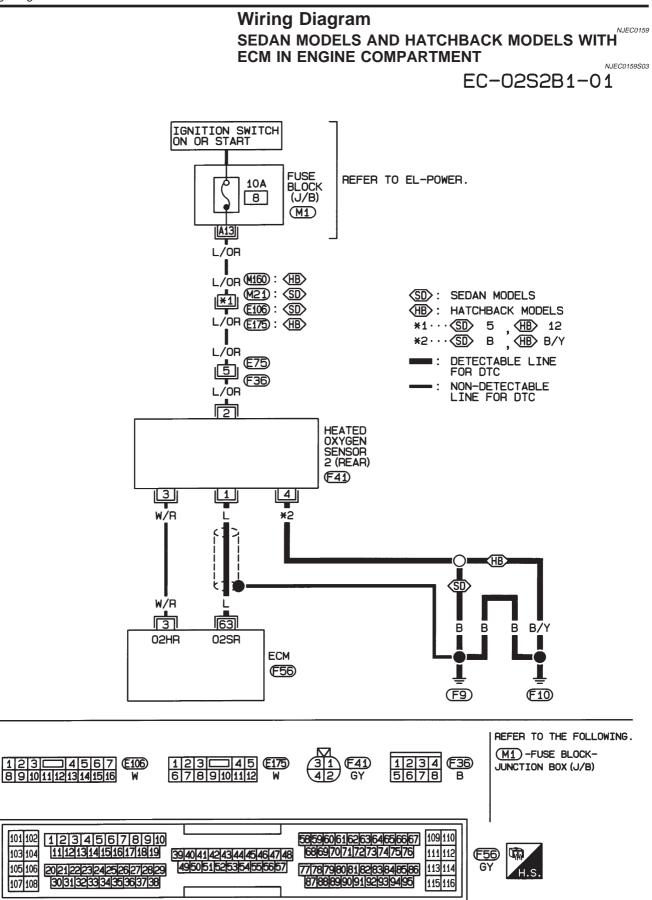
- 1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 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 4, step 5 is not necessary.

- 5) 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.
- 6) If NG, go to "Diagnostic Procedure", EC-272.

Wiring Diagram

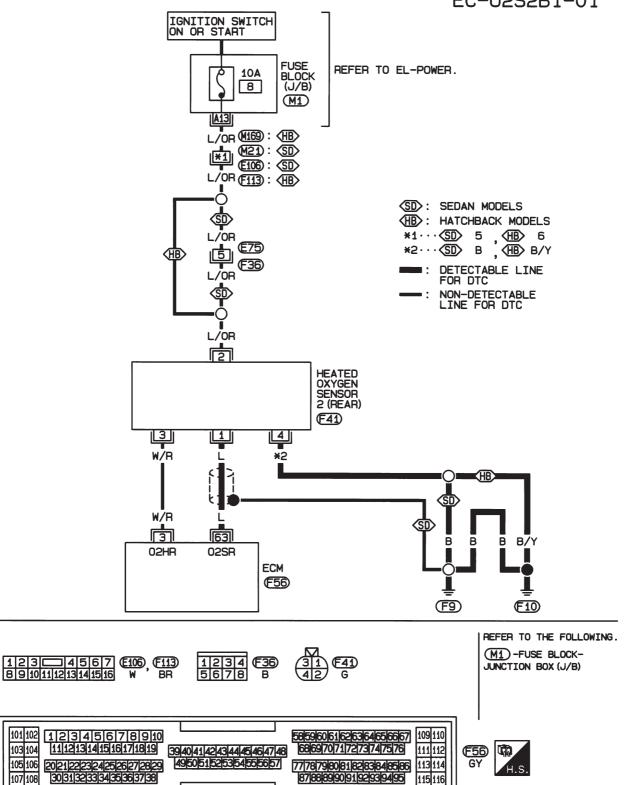


Wiring Diagram (Cont'd)

NJEC0159S04







Diagnostic Procedure

# **Diagnostic Procedure**

		NJEC0160
1 RETIGHTEN GROUND	SCREWS	
1. Turn ignition switch "OFF".		
2. Loosen and retighten engine	ground screws.	
	Engine ground No. 2 ignition coil	JEF104Y
	GO TO 2.	
r	1	
2 CLEAR THE SELF-LEA	RNING DATA	
(P) With CONSULT-II		
3. Clear the self-learning control	CLEAR	SEF215Z
4. Run engine for at least 10 mir Is the 1st trip DTC P0171 de	nutes at idle speed. etected? Is it difficult to start engine?	
<ol> <li>Stop engine and reconnect m.</li> <li>Make sure 1st trip DTC P0100</li> <li>Erase the 1st trip DTC memory</li> <li>Make sure DTC P0000 is disp</li> <li>Run engine for at least 10 min</li> </ol>	sor harness connector, and restart and run engine for at least 5 seconds at idle specass air flow sensor harness connector. 0 is displayed. ry. Refer to "How to Erase Emission-related Diagnostic Information", EC-70. Dayed.	ed.
Yes	Perform trouble diagnosis for DTC P0171. Refer to EC-297.	
No	GO TO 3.	

Diagnostic Procedure (Cont'd)

QG

3	CHECK INPUT SIGNAL			
2. Che Ref 3. Che and	<ol> <li>Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.</li> <li>Check harness continuity between ECM terminal 63 and heated oxygen sensor 2 (rear) harness connector terminal 1. Refer to wiring diagram. Continuity should exist.</li> <li>Check harness continuity between ECM terminal 63 [or heated oxygen sensor 2 (rear) harness connector terminal 1] and ground. Continuity should not exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
	OK or NG			
ОК	ОК <b>Б</b> О ТО 5.			
NG		GO TO 4.		

#### 4 DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and heated oxygen sensor 2 (rear).		
•	Repair open circuit or short to ground or short to power in harness or connectors.	

5 CHE		CUIT	
<ol> <li>Check harness continuity between heated oxygen sensor 2 (rear) harness connector terminal 4 and engine ground. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
OK or NG			
	DК ► GO TO 6.		
OK		GO TO 6.	

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)		
Refer to "Component Inspection", EC-273.			
OK or NG			
OK	OK 🕨 GO TO 7.		
NG	NG  Replace heated oxygen sensor 2 (rear).		

7	CHECK INTERMITTENT INCIDENT	
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.	
	► INSPECTION END	

-		
ACTIVE TES		
FUEL INJECTION	25 %	
MONITOR		
ENG SPEED	XXX rpm	
HO2S1 (B1)	XXX V	
HO2S2 (B1)	XXX V	
HO2S1 MNTR (B1)	RICH	
HO2S2 MNTR (B1)	RICH	
		SEF662

# Component Inspection HEATED OXYGEN SENSOR 2 (REAR)

NJEC0161 NJEC0161S01

## (I) With CONSULT-II

$\bigcirc$	
1)	Start engine and drive vehicle at a speed of more than 70 km/h
	(43 MPH) for 2 consecutive minutes

- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
- 4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%.$

EC-273

<sup>&</sup>quot;HO2S2 (B1)" should be above 0.68V at least once when

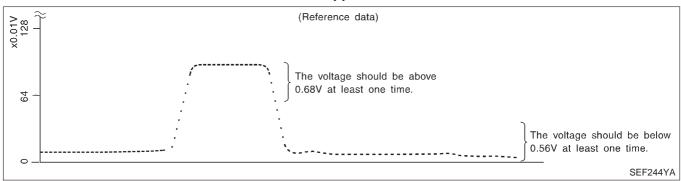
IONITORING)

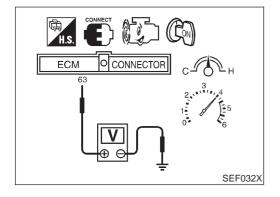
QG

#### the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.56V 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 and approved anti-seize lubricant.





#### **Without CONSULT-II**

- 1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)

The voltage should be above 0.68V at least once.

#### If the voltage is above 0.68V at step 4, step 5 is not necessary.

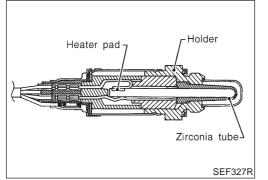
5) Check the voltage when revving up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T).

The voltage should be below 0.56V at least once.

#### **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 and approved anti-seize lubricant.

QG



## **Component Description**

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

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

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 (rear) is not used for engine control operation.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0163

NJEC0164

Specification data are reference values.

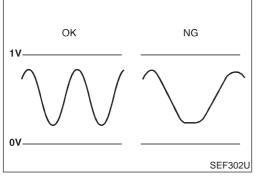
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up		0 - 0.3V $\leftrightarrow \rightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		Revving engine from idle to 3,000 rpm	$LEAN \leftarrow \rightarrow RICH$

# ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and revving engine from idle to 2,000 rpm</li> </ul>	0 - Approximately 1.0V



# **On Board Diagnosis Logic**

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0139	<ul> <li>It takes more than the specified time for the sensor to</li></ul>	<ul> <li>Harness or connectors</li></ul>
0139	respond between rich and lean.	(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 2 (rear)</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li>

On Board Diagnosis Logic (Cont'd)

On Doard L	Diagnosis Logic	(00/// 0)	
8			1
	HO2S2 (B1) P0		
	COND1: OUT OF CO		
	COND2: INCOMI COND3: INCOMI		
		-LETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
			SEF841Y
8	HO2S2 (B1) P0	130	
	COND1: TEST		
	COND1: TEST		
	COND2: INCOM		
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
			SEF842Y
8	HO2S2 (B1) P0	139	
	COND1: COMPL		
	COND2: INCOMI	PLETE	
	COND3: INCOMI	PLETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	xxx °c	
	VHCL SPEED SE	XXX km/h	

# **DTC Confirmation Procedure**

#### CAUTION:

Always drive vehicle at a safe speed.

#### NOTE:

- "COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.
- If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

#### With CONSULT-II

Procedure for COND1

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- Turn ignition switch "ON" and select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 30 seconds.
- Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
  - If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
- 7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COM-PLETED". (It will take approximately 60 seconds.)

ENG SPEED 1,500 - 3,600		1,500 - 3,600 rpm
	Vehicle speed	Above 70 km/h (43 MPH)
	Selector lever	Suitable position

#### NOTE:

SEF843Y

- If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".
- If "COMPLETED" already appears at "COND2" on CON-SULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".

1	HO2S2 (B1) PC	139	
	COND1: COMPL	.ETED	
	COND2: COMPL	ETED	
	COND3: INCOM	PLETE	
	MONITOR		
	ENG SPEED	XXX rpm	
	B/FUEL SCHDL	XXX msec	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XXX km/h	
			SEF844Y

Procedure for COND2

 While driving, release accelerator pedal completely with "OD" OFF (A/T models), or 4th gear position (M/T models) from the above condition [step 8] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

#### NOTE:

If "COMPLETED" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

NJEC0598

 DTC Confirmation Procedure (Cont'd)

 DTC Confirmation Procedure (Cont'd)

 Procedure for COND3

 1)
 Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)

 2)
 Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".

If "NG" is displayed, refer to "Diagnostic Procedure", EC-280.

# **Overall Function Check**

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.

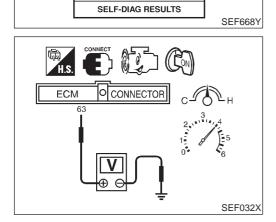
## Without CONSULT-II

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.) The voltage should change at more than 0.06V for 1 second during this procedure.

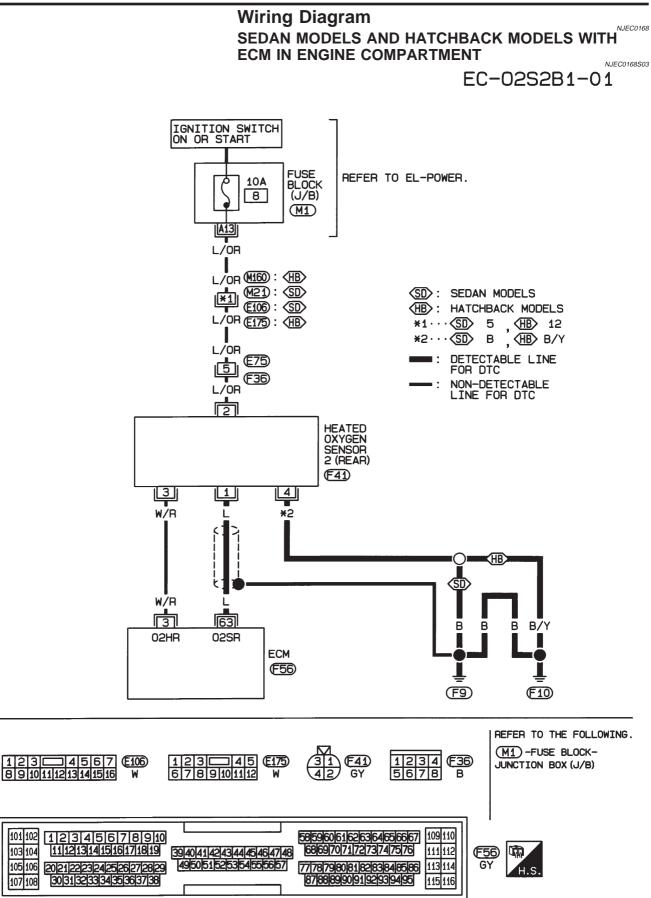
If the voltage can be confirmed in step 4, step 5 is not necessary.

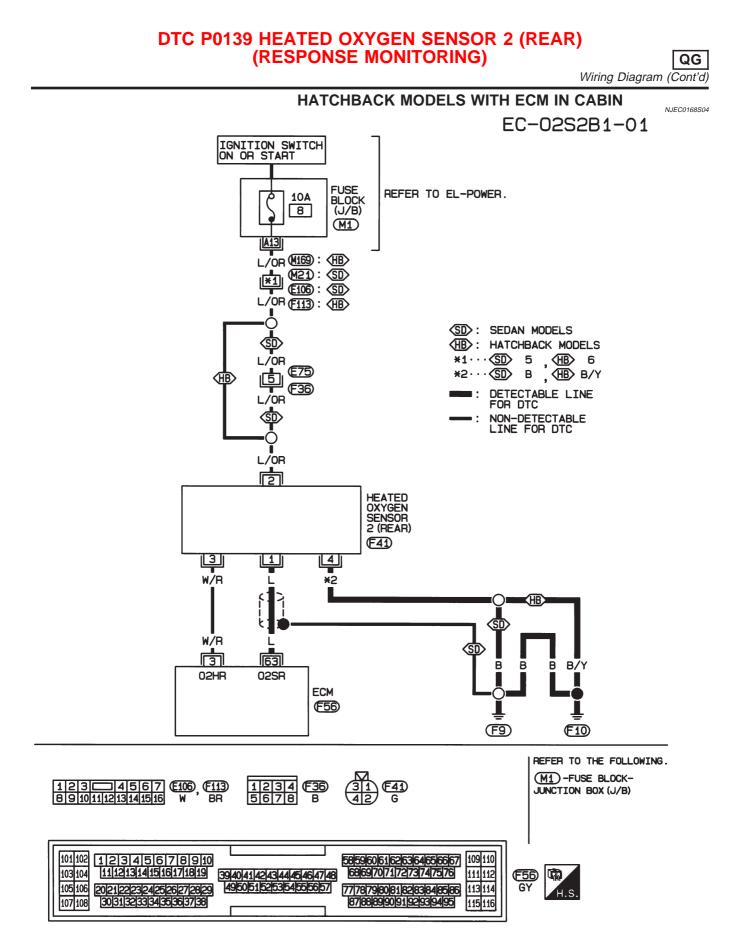
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "OD" OFF (A/T). The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-280.



1

Wiring Diagram



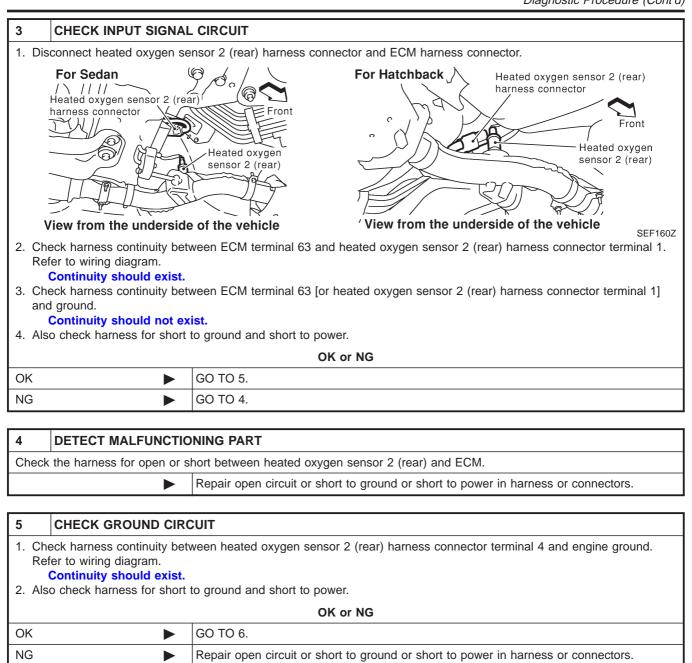


Diagnostic Procedure

# Diagnostic Procedure

	Diagnostic Procedure	NJEC0169
1 RETIGHTEN GROUND	D SCREWS	
<ol> <li>Turn ignition switch "OFF".</li> <li>Loosen and retighten engine</li> </ol>	e ground screws.	
	No. 2 ignition coil	JEF104Y
•	GO TO 2.	
2 CLEAR THE SELF-LE	EARNING DATA	
<ol> <li>Select "SELF-LEARN CONT</li> <li>Clear the self-learning control</li> </ol>	b to normal operating temperature. TROL" in "WORK SUPPORT" mode with CONSULT-II. rol coefficient by touching "START".           WORK SUPPORT           SELF-LEARNING CONT           B1           100%           CLEAR	SEF215Z
4. Run engine for at least 10 m Is the 1st trip DTC P0172 of	minutes at idle speed. detected? Is it difficult to start engine?	
<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect mass air flow set</li> <li>Stop engine and reconnect if</li> <li>Make sure 1st trip DTC P01</li> <li>Erase the 1st trip DTC mem</li> <li>Make sure DTC P0000 is di</li> <li>Run engine for at least 10 m</li> </ol>	nory. Refer to "How to Erase Emission-related Diagnostic Information", EC-70. isplayed.	peed.
Yes	Perform trouble diagnosis for DTC P0172. Refer to EC-305.	
No	GO TO 3.	

Diagnostic Procedure (Cont'd)



6	CHECK HEATED OXYGEN SENSOR 2 (REAR)			
Refer	Refer to "Component Inspection", EC-282.			
	OK or NG			
OK	ОК 🕨 GO TO 7.			
NG	NG   Replace heated oxygen sensor 2 (rear).			

7	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	► INSPECTION END		

Component Inspection

ACTIVE TES	ACTIVE TEST	
FUEL INJECTION	25 %	
MONITOF	1	
ENG SPEED	XXX rpm	
HO2S1 (B1)	XXX V	
HO2S2 (B1)	XXX V	
HO2S1 MNTR (B1)	RICH	
HO2S2 MNTR (B1)	RICH	
L	1	SEF662

## Component Inspection HEATED OXYGEN SENSOR 2 (REAR)

NJEC0170

QG

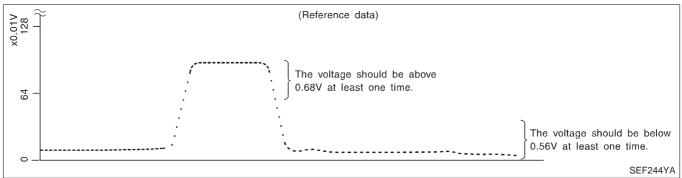
NJEC0170S01

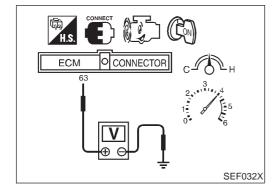
- (B) With CONSULT-II
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
- 4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%.$ 
  - "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

"HO2S2 (B1)" should be below 0.56V 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 and approved anti-seize lubricant.





#### **Without CONSULT-II**

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once. If the voltage is above 0.68V at step 4, step 5 is not nec-

- essary.
- 5) Check the voltage when revving up to 6,000 rpm under no load. Or 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 0.56V at least once.

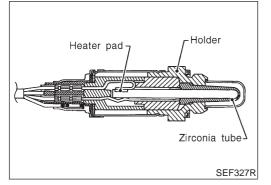
#### **CAUTION:**

• 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.

QG Component Inspection (Cont'd)

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Component Description



#### **Component Description**

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

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

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 (rear) is not used for engine control operation.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0172

NJEC0173

#### Specification data are reference values.

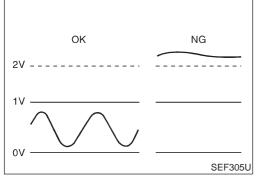
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	Engine: After warming up	Revving engine from idle to 3,000	0 - 0.3V $\leftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			$LEAN \leftarrow \rightarrow RICH$

# **ECM Terminals and Reference Value**

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and revving engine from idle to 2,000 rpm</li> </ul>	0 - Approximately 1.0V



# **On Board Diagnosis Logic**

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0140	<ul> <li>An excessively high voltage from the sensor is sent to</li></ul>	<ul> <li>Harness or connectors</li></ul>
0140	ECM.	(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 2 (rear)</li>

DTC Confirmation Procedure

5	DATA MON	ITOR	
	MONITOR	NO DTC	
	ENG SPEED	XXX rpm	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE		
	B/FUEL SCHDL	XXX msec	
			SEF189

#### **DTC Confirmation Procedure**

#### NJEC0175

If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

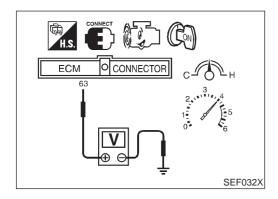
#### () With CONSULT-II

NOTE:

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive minutes.

ENG SPEED	Above 1,500 rpm
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-288.



# **Overall Function Check**

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

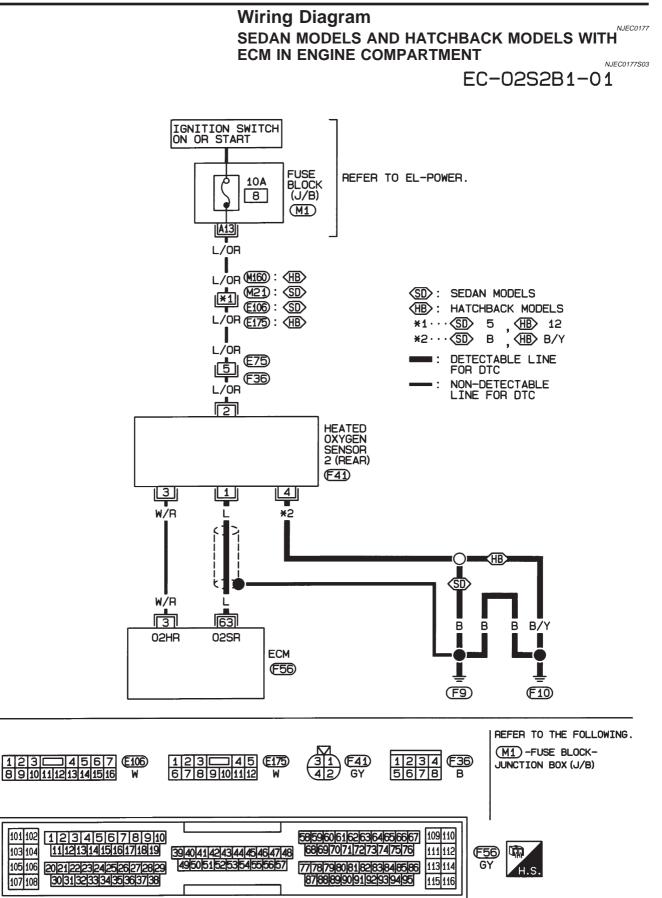
#### **Without CONSULT-II**

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.

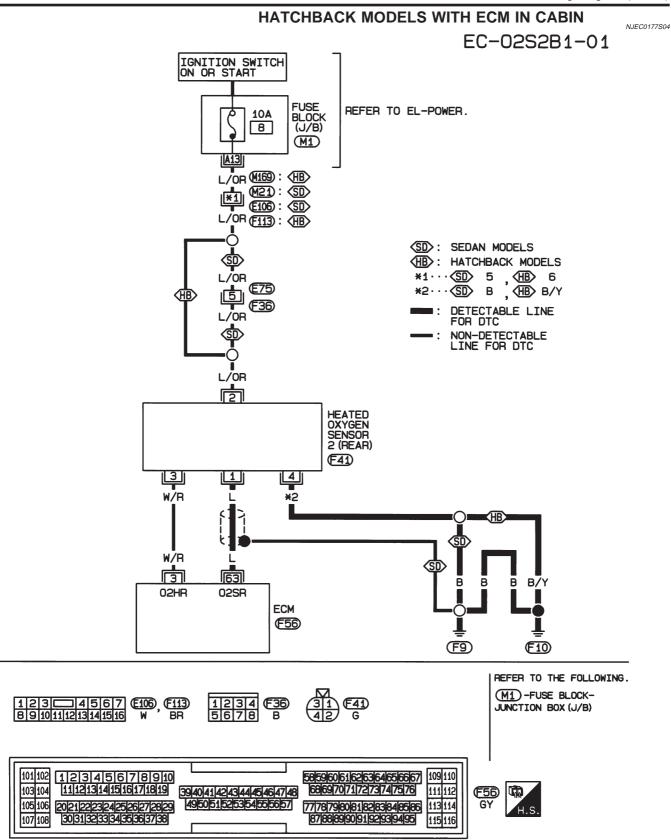
(Depress and release accelerator pedal as soon as possible.) The voltage should be below 2V during this procedure.

5) If NG, go to "Diagnostic Procedure", EC-288.

Wiring Diagram

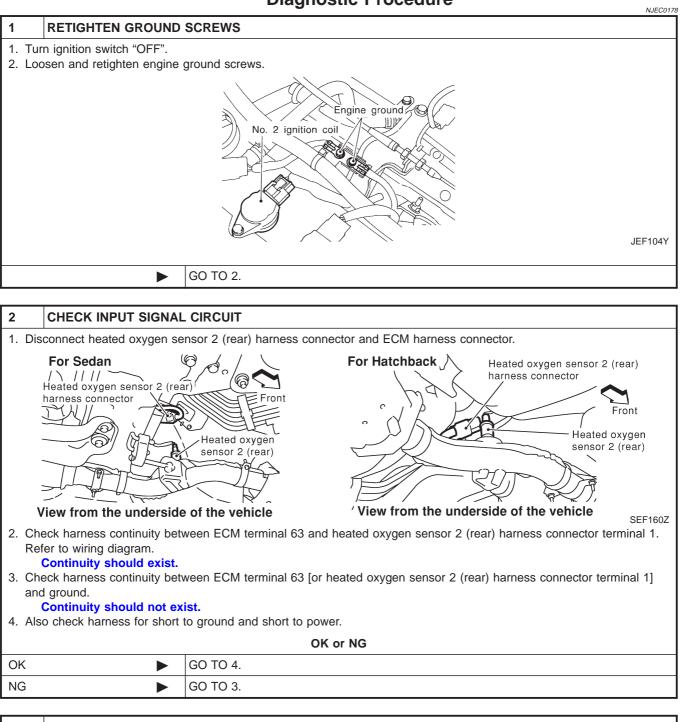


## DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE) QG Wiring Diagram (Cont'd)



Diagnostic Procedure

```
Diagnostic Procedure
```



3	DETECT MALFUNCTIONING PART	
Check the harness for open or short between heated oxygen sensor 2 (rear) and ECM.		
		Repair open circuit or short to ground or short to power in harness or connectors.

# DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE) QG

Diagnostic	Procedure	(Cont'd)	

4	CHECK GROUND CIRC	CUIT
Re	fer to wiring diagram. Continuity should exist.	ween heated oxygen sensor 2 (rear) harness connector terminal 4 and engine ground. 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 HARNESS CO	NNECTOR
	heated oxygen sensor 2 ( should not exist.	(rear) harness connector for water.
		OK or NG
OK		GO TO 6.
NG	•	Repair or replace harness connector.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
Refer to "Component Inspection", EC-289.		
OK or NG		
OK		GO TO 7.
NG		Replace heated oxygen sensor 2 (rear).

7	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	►	INSPECTION END	

ACTIVE TES	т
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH
	I

# **Component Inspection** HEATED OXYGEN SENSOR 2 (REAR)

NJEC0179

NJEC0179S01

# (P) With CONSULT-II

- Start engine and drive vehicle at a speed of more than 70 km/h 1) (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
- Check "HO2S2 (B1)" at idle speed when adjusting "FUEL 4) INJECTION" to ±25%.
  - "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%.

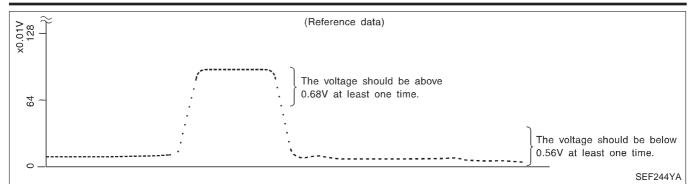
"HO2S2 (B1)" should be below 0.56V at least once when the "FUEL INJECTION" is -25%.

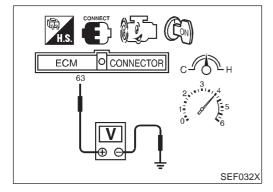
#### **CAUTION:**

- 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 and approved anti-seize lubricant.

# DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE) QG

Component Inspection (Cont'd)





#### **Without CONSULT-II**

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
  (Depress and release accelerator pedal as soon as possible.)
  The voltage should be above 0.68V at least once.
  If the voltage is above 0.68V at step 4, step 5 is not necessary.
- 5) Check the voltage when revving up to 6,000 rpm under no load. Or 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 0.56V at least once.

#### **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 and approved anti-seize lubricant.



NJEC0182

Description NUECOI			
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater (rear) con- trol	Heated oxygen sensor 2 heater (rear)

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater (rear) corresponding to the engine speed.

#### **OPERATION**

		NJEC0180S02
Engine condition		Heated oxygen sensor 2 heater (rear)
Engine stopped		OFF
Engine is running.	After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	ON
	Engine speed above 3,600 rpm	OFF

# CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 HTR (B1)	Engine speed	Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
		Above 3,600 rpm	OFF
	Ignition switch ON (E	ngine stopped)	OFF

# ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
		<ul> <li>[Engine is running]</li> <li>Engine speed is below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]</li> </ul>	Approximately 0.7V	
3	W/R	heater (rear)       [Engine is running]         • Engine speed is above 3,600 rpm	BATTERY VOLTAGE	
			[Ignition switch "ON"] • Engine stopped	(11 - 14V)

**On Board Diagnosis Logic** 

	en Beard Bragh	NJEC0183
DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0141	<ul> <li>The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range.</li> <li>[An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]</li> </ul>	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater (rear) cir- cuit is open or shorted.)</li> <li>Heated oxygen sensor 2 heater (rear)</li> </ul>

# **DTC Confirmation Procedure**

NJEC0184

If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

NOTE:

Before performing the following procedure, confirm that battery voltage is in between 10.5V and 16V at idle.

2	DATA MON	IITOR	
	MONITOR	NO DTC	
	ENG SPEED VHCL SPEED SE THRTL POS SEN		
			SEF175

#### (B) With CONSULT-II

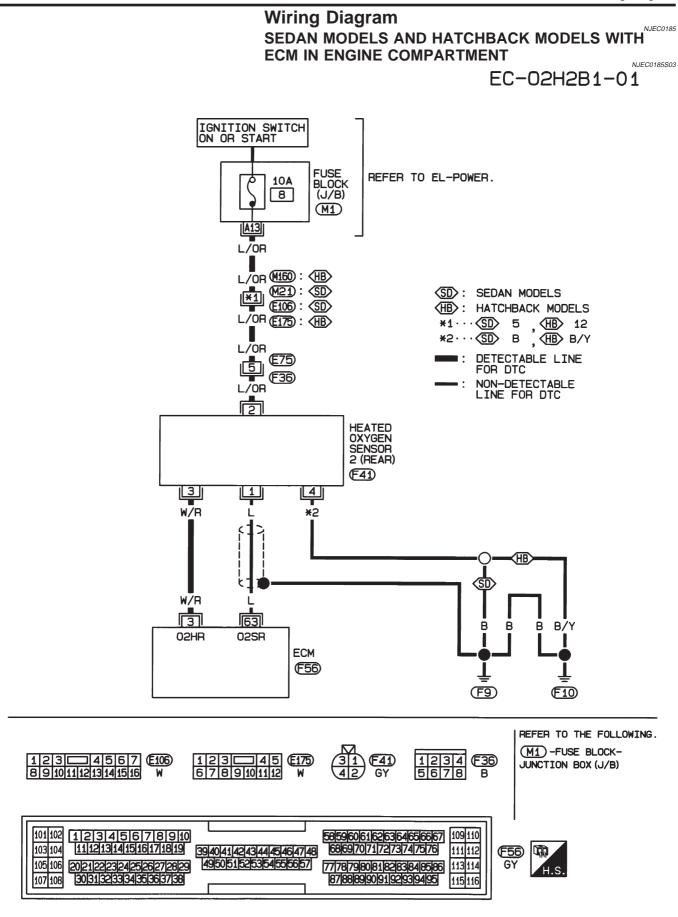
- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Engine speed must be maintained at speeds of 3,600 rpm or less during vehicle operations.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-295.

#### With GST

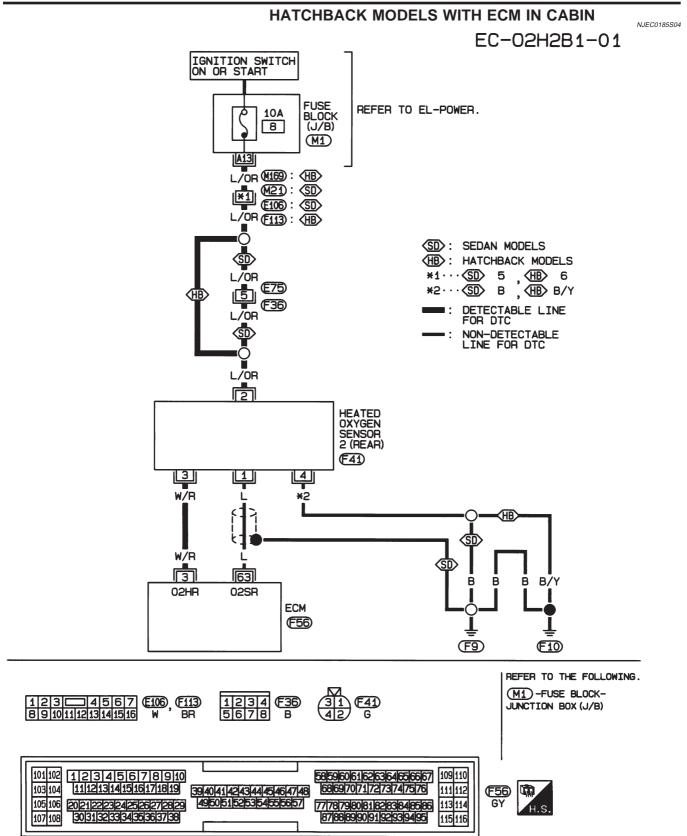
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Engine speed must be maintained at speeds of 3,600 rpm or less during vehicle operations.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Select "MODE 3" with GST.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-295.

When using GST, "DTC Confirmation Procedure " should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram



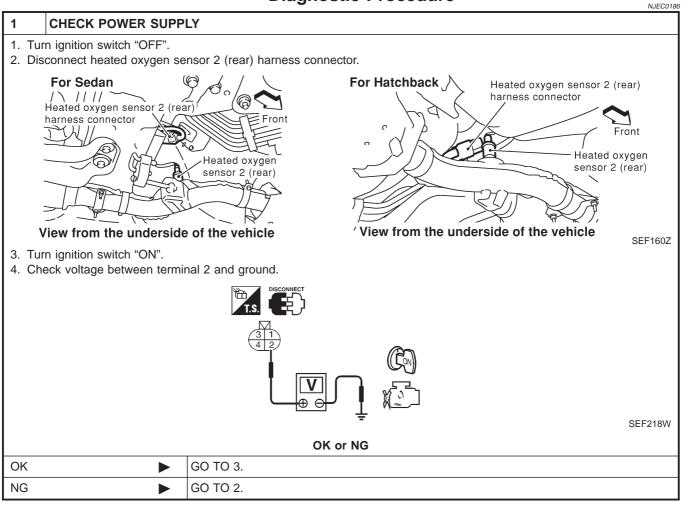
Wiring Diagram (Cont'd)



Diagnostic Procedure

QG

# **Diagnostic Procedure**



#### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36
- Harness connectors M21, E106 (Sedan), M160, E175 or M169, F113 (Hatchback)
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

• 10A fuse

Repair harness or connectors.

#### 3 CHECK GROUND CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- Check harness continuity between heated oxygen sensor 2 (rear) harness connector terminal 3 and ECM terminal 3. Refer to wiring diagram.

#### Continuity should exist.

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

OK or NG

ОК	GO TO 5.
NG	GO TO 4.

Diagnostic Procedure (Cont'd)

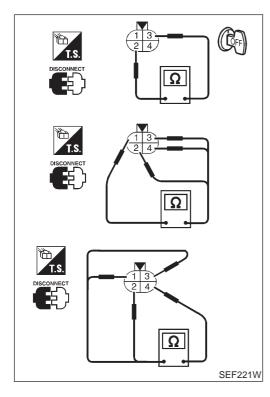
4	4 DETECT MALFUNCTIONING PART		
Cheo	Check the harness for open or short between heated oxygen sensor 2 heater (rear) and ECM.		
	Repair open circuit or short to ground or short to power in harness or connectors.		

5 CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)				
Refer to "Component Inspection", EC-296.				
OK or NG				
OK		GO TO 6.		
NG   Replace heated oxygen sensor 2 (rear).				

#### 6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END



# Component Inspection

#### **HEATED OXYGEN SENSOR 2 HEATER (REAR)** Check the following.

NJEC0187 NJEC0187S01

QG

- Check resistance between terminals 1 and 4. Resistance: 2.3 - 4.3Ω at 25°C (77°F)
  - Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	INU

If NG, replace the heated oxygen sensor 2 (rear).

#### **CAUTION:**

2.

- 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 and approved anti-seize lubricant.

On Board Diagnosis Logic

QG

# **On Board Diagnosis Logic**

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). 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).

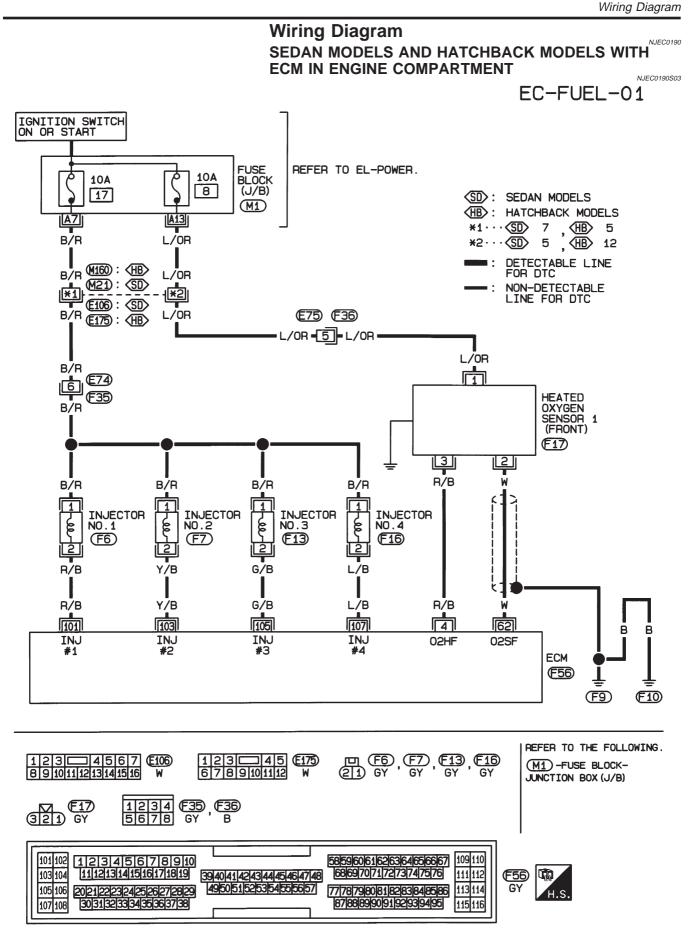
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injec- tion & mix- ture ratio control	Injectors

	1		
DTC No.	Malfunction is det	ected when	Check Items (Possible Cause)
P0171 0171	<ul> <li>Fuel injection system does not</li> <li>The amount of mixture ratio of (The mixture ratio is too lean)</li> </ul>	compensation is too large.	<ul> <li>Intake air leaks</li> <li>Heated oxygen sensor 1 (front)</li> <li>Injectors</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> </ul>
4		DTC Confirmati	on Procedure
		<ul> <li>always turn ignition before conducting the</li> <li>With CONSULT-II</li> <li>Start engine and</li> <li>Turn ignition swit</li> <li>Clear the self-lea</li> <li>Select "DATA MC</li> <li>Start engine aga The 1st trip DTC malfunction exis EC-301.</li> <li>If it is difficult to tem has a malfur</li> <li>Crank engine wi starts, go to "Dia</li> </ul>	warm it up to normal operating temperature. ch "OFF" and wait at least 9 seconds. itch "ON" and select "SELF-LEARN CON- K SUPPORT" mode with CONSULT-II. rning control coefficient by touching "START". DNITOR" mode with CONSULT-II. in and let it idle for at least 10 minutes. P0171 should be detected at this stage, if a sts. If so, go to "Diagnostic Procedure", start engine at step 6, the fuel injection sys-
		With GST	
	Aass airflow sensor Mass airflow sensor Mass airflow sensor marness connector JEF105Y	<ol> <li>Turn ignition swit</li> <li>Disconnect mass restart and run e</li> <li>Stop engine and nector.</li> <li>Select "MODE 7" detected.</li> </ol>	warm it up to normal operating temperature. ch "OFF" and wait at least 9 seconds. s air flow sensor harness connector. Then ngine for at least 3 seconds at idle speed. reconnect mass air flow sensor harness con- ' with GST. Make sure 1st trip DTC P0100 is with GST and erase the 1st trip DTC P0100.
		EC-297	

DTC Confirmation Procedure (Cont'd)

7) Start engine again and run it for at least 10 minutes at idle speed.

- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-301.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, visually check for exhaust and intake air leak.



Wiring Diagram (Cont'd)

107 108

30 31 32 33 34 35 36 37 38

HATCHBACK MODELS WITH ECM IN CABIN

EC-FUEL-01 IGNITION SWITCH FUSE BLOCK (J/B) REFER TO EL-POWER. 10A 10A 8 17 SD: SEDAN MODELS (M1)(HB): HATCHBACK MODELS AIS AZ \*1····SD 7 ,HB 9 \*2····SD 5 ,HB 6 B/R (169) : (HB) L/OR ×2 DETECTABLE LINE B/R (113) : (HB) FOR DTC L/OR NON-DETECTABLE LINE FOR DTC HB **S** E75 F36 B/R SD /OR = 5 = L/OR = (SD) (E74) 6 HB (F35) L/OR B/R SD HEATED OXYGEN SENSOR 1 Ō ĭ B/R (FRONT) (F17) 2 3 R/B B∕R W B/R B/R B/R 1 1 **[**] INJECTOR NO.1 INJECTOR INJECTOR NO.3 INJECTOR NO.4 6 R le Le **E16** (F6) **F13** (F7) R/B Y7B G/B L/B Ł. R/B Y/B G/B L/B R/B Ŵ SD 101 103 105 107 62 В R INJ INJ INJ INJ 02HF 02SF #1 #2 #3 #4 ECM **F56** (F9) **F10** REFER TO THE FOLLOWING. 123 4567 E106, F113 8910111213141516 W BR (21) (F6), (F7), (F13), (F16) (21) (GY), (GY), (GY), (GY) (M1)-FUSE BLOCK-JUNCTION BOX (J/B) 1234 E35, E36 **E17** <u>321</u> SB GY 12345678910 111213141516171819 58596061626364656667 686970717273747576 109110 101 102 103 104 111 112 **N** 39 40 41 42 43 44 45 46 47 48 F56 105 106 20212223242526272829 495051525354555657 77787980818283848586 113 114 GY H.S

HEC944

NJEC0190S04

878889909192939495

115 116

Diagnostic Procedure

QG

# **Diagnostic Procedure**

	NJECO191			
1 CHECK EXHAUST AIR	LEAK			
<ol> <li>Start engine and run it at idle.</li> <li>Listen for an exhaust air leak before three way catalyst.</li> </ol>				
	SEF099P			
	OK or NG			
OK 🕨	GO TO 2.			
NG	Repair or replace.			
2 CHECK FOR INTAKE A				
Listen for an intake air leak after	the mass air flow sensor.			
	OK or NG			
OK 🕨	GO TO 3.			
NG	Repair or replace.			
	GEN SENSOR 1 (FRONT) CIRCUIT			
<ol> <li>Check harness continuity betw Refer to wiring diagram.</li> </ol>	nsor 1 (front) harness connector and ECM harness connector.			
<ul> <li>Continuity should exist.</li> <li>Check harness continuity between ECM terminal 62 [or heated oxygen sensor 1 (front) harness connector terminal 2] and ground.</li> <li>Continuity should not exist.</li> <li>Also check harness for short to ground and short to power.</li> </ul>				
	OK or NG			
OK 🕨	GO TO 4.			

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

QG

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSU	RE		
Ref 2. Inst	<ol> <li>Release fuel pressure to zero. Refer to EC-40.</li> <li>Install fuel pressure gauge and check fuel pressure. At idling: When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.35 bar, 2.4 kg/cm<sup>2</sup>, 34 psi) When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)</li> </ol>			
OK or NG				
ОК		GO TO 6.		
NG	•	GO TO 5.		

5	DETECT MALFUNCTIO	NING PART
<ul><li>Fue</li><li>Fue</li><li>Fue</li></ul>	Check the following. • Fuel pump and circuit (Refer to EC-561.) • Fuel pressure regulator (Refer to EC-41.) • Fuel lines (Refer to "ENGINE MAINTENANCE" in MA section.) • Fuel filter for clogging	
		Repair or replace.

6 CHECK MASS A	IR FLO	W SENSOR	
With CONSULT-II Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. at idling: 1.0 - 4.0 g-m/sec at 2,500 rpm: 5.0 - 10.0 g-m/sec			
With GST Check mass air flow sensor signal in MODE 1 with GST. at idling: 1.0 - 4.0 g-m/sec at 2,500 rpm: 5.0 - 10.0 g-m/sec			
OK or NG			
ОК		GO TO 7.	
NG		Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-187.	

Diagnostic Procedure (Cont'd)

QG

7	CHECK FUNCTION OF	INJECTORS			
	ith CONSULT-II				
	stall all parts removed. art engine.				
		" in "ACTIVE TEST" mode with C	ONSULT	F-II.	
		ACTIVE TES		1	
		POWER BALANCE	,		
		MONITOR	1		
		ENG SPEED	XXX rpm		
		MAS A/F SE-B1	xxx v		
		IACV-AAC/V	XXX step		
				SEF190Y	
4. Ma	ake sure that each circuit p	roduces a momentary engine spe	ed drop.		
1. Ins	ithout CONSULT-II stall all parts removed. art engine.				
	sten to each injector operat	ing sound.			
	At idle At idle Suitable tool				
	C <sub>lick</sub>				
	MEC703B				
	Clicking noise should be heard.				
		OK or N	G		
OK		GO TO 8.			
NG	▶	Perform trouble diagnosis for "IN	JECTO	RS", EC-541.	
8	<b>REMOVE INJECTOR</b>				
2. Tu 3. Re Ke	rn ignition switch "OFF". move injector with fuel tub	oled down and there are no fire h e assembly. Refer to EC-41. ors connected to injector gallery. T		near the vehicle. otor harness connectors should remain con-	

► GO TO 9.

Diagnostic Procedure (Cont'd)

Fuel should be sprayed evenly for each cylinder.         OK or NG         OK <ul> <li>GO TO 10.</li> <li>NG</li> <li>Replace injectors from which fuel does not spray out. Always replace O-ring with new one.</li> </ul>	9	CHECK INJECTOR					
Fuel should be sprayed evenly for each cylinder.         OK or NG         OK <ul> <li>GO TO 10.</li> <li>NG</li> <li>Replace injectors from which fuel does not spray out. Always replace O-ring with new one.</li> </ul>	2. Pl	2. Place pans or saucers under each injector.					
OK or NG         OK       GO TO 10.         NG       Replace injectors from which fuel does not spray out. Always replace O-ring with new one.			SEF595Q				
OK <ul> <li>GO TO 10.</li> <li>NG</li> <li>Replace injectors from which fuel does not spray out. Always replace O-ring with new one.</li> </ul>	F						
NG Replace injectors from which fuel does not spray out. Always replace O-ring with new one.		OK or NG					
one.	OK	K 🕨 GO TO 10.					
	NG		spray out. Always replace O-ring with new				
10 CHECK INTERMITTENT INCIDENT	10	0 CHECK INTERMITTENT INCIDENT					

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

EC-304

On Board Diagnosis Logic

QG

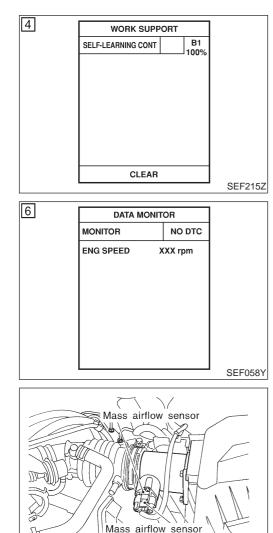
# **On Board Diagnosis Logic**

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). 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 func- tion	Actuator
Heated oxygen s	eensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injec- tion & mix- ture ratio control	Injectors
DTC No.	Malfunction is detected when		Check It	ems (Possible Cause)

P0172 0172	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul>	<ul> <li>Heated oxygen sensor 1 (front)</li> <li>Injectors</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Mass air flow sensor</li> </ul>



harness connector

JEF105Y

# **DTC Confirmation Procedure**

NJEC0193

If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (I) With CONSULT-II

NOTE:

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CON-TROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "START".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-309.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-309. If engine does not start, remove ignition plugs and check for fouling, etc.

#### With GST

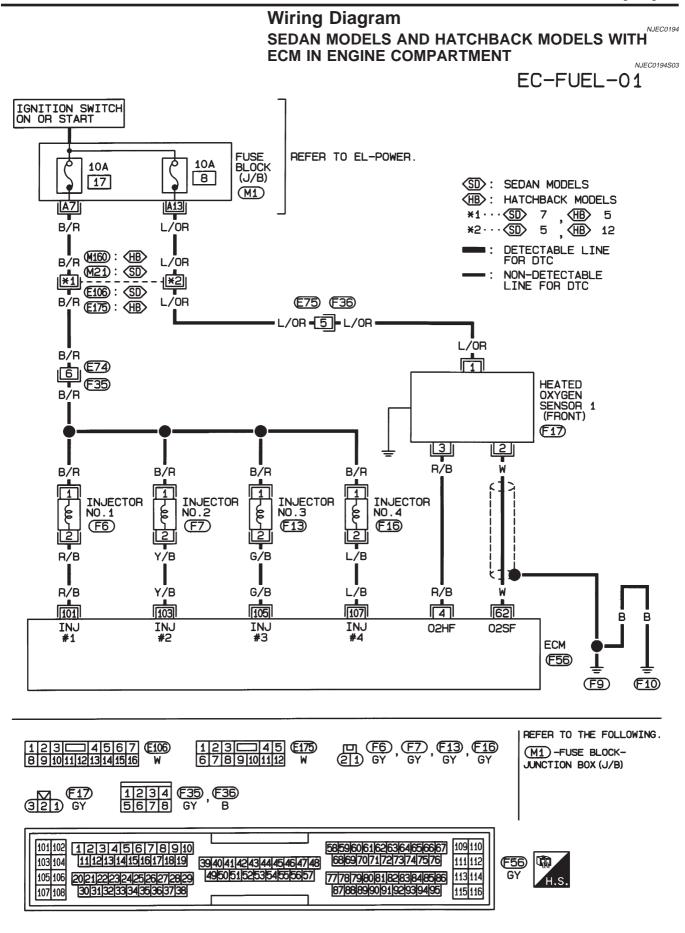
- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
- 6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

DTC Confirmation Procedure (Cont'd)

7) Start engine again and run it for at least 10 minutes at idle speed.

- 8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-309.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-309. If engine does not start, remove ignition plugs and check for fouling, etc.





Wiring Diagram (Cont'd)

HATCHBACK MODELS WITH ECM IN CABIN

EC-FUEL-01 IGNITION SWITCH FUSE BLOCK (J/B) REFER TO EL-POWER. 10A 10A 8 17 SD: SEDAN MODELS (M1)(HB): HATCHBACK MODELS AI AZ \*1····SD 7 ,HB 9 \*2····SD 5 ,HB 6 B/R (169) : (HB) L/OR ×2 DETECTABLE LINE B/R (113) : (HB) FOR DTC L/OR NON-DETECTABLE LINE FOR DTC HB **S** E75 F36 B/R SD /OR = 5 = L/OR = (SD) (E74) 6 HB (F35) L/OR B/R SD HEATED OXYGEN SENSOR 1 Ō ĭ B/R (FRONT) (F17) 2 3 R/B B∕R W B/R B/R B/R **F** 1 **[**] INJECTOR NO.1 INJECTOR INJECTOR NO.3 INJECTOR NO.4 6 E le Le **E16** (F6) **F13** (F7) R/B Y7B G/B L/B Ł. R/B Y/B G/B L/B R/B Ŵ SD 101 103 105 107 62 В R INJ INJ INJ INJ 02HF 02SF #1 #2 #3 #4 ECM **F56** (F9) **F10** REFER TO THE FOLLOWING. 123 4567 E106, F113 8910111213141516 W BR (21) (F6), (F7), (F13), (F16) (21) (GY), (GY), (GY), (GY) (M1)-FUSE BLOCK-JUNCTION BOX (J/B) 1234 (F35), (F36) GY , B **E17** <u>321</u> SB 12345678910 111213141516171819 58596061626364656667 686970717273747576 109110 101 102 103 104 111 112 **N** 39 40 41 42 43 44 45 46 47 48 F56 105 106 20212223242526272829 495051525354555657 77787980818283848586 113 114 GY H.S 107 108 30 31 32 33 34 35 36 37 38 878889909192939495 115 116

NJEC0194S04

Diagnostic Procedure

QG

# Diagnostic Procedure

	Diagnostic Procedule	NJEC0195
1 CHECK FOR	EXHAUST AIR LEAK	
<ol> <li>Start engine and r</li> <li>Listen for an exha</li> </ol>	run it at idle. rust air leak before the three way catalyst.	
	OK or NG	SEF099P
ОК	► GO TO 2.	
NG	<ul> <li>Repair or replace.</li> </ul>	
2 CHECK HEA	TED OXYGEN SENSOR 1 (FRONT) CIRCUIT	
<ol> <li>Turn ignition switc</li> <li>Disconnect heated</li> </ol>	th "OFF". d oxygen sensor 1 (front) harness connector and ECM harness connector.	

SEF012XA 3. Check harness continuity between ECM terminal 62 and heated oxygen sensor 1 (front) harness connector terminal 2. Refer to wiring diagram.

2

sensor 1 (front) -1F 1/-

Continuity should exist. 4. Check harness continuity between ECM terminal 62 [or heated oxygen sensor 1 (front) harness connector terminal 2] and ground.

#### Continuity should not exist.

5. 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 FUEL PRESSU	RE
Re 2. Ins	Approximately 235 When fuel pressure re	
		OK or NG
ОК		GO TO 5.
NG		GO TO 4.

#### DETECT MALFUNCTIONING PART

Check the following.

4

- Fuel pump and circuit (Refer to EC-561.)
- Fuel pressure regulator (Refer to EC-41.)

Repair or replace.

5	CHECK MASS AIR FLO	DW SENSOR
Check at i	th CONSULT-II (*MASS AIR FLOW" in "D/ idling: 1.0 - 4.0 g·m/sec 2,500 rpm: 5.0 - 10.0 g·m/	ATA MONITOR" mode with CONSULT-II. / <mark>sec</mark>
Check at i	ith GST c mass air flow sensor sign idling: 1.0 - 4.0 g·m/sec 2,500 rpm: 5.0 - 10.0 g·m/	/sec
		OK or NG
OK		GO TO 6.
NG		Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-191.

Diagnostic Procedure (Cont'd)

QG

6 CHECK FUNCTION O	F INJECTORS		
(I) With CONSULT-II			
1. Install all parts removed.			
2. Start engine.	" in "ACTIVE TEST" mode with C		- 11
3. Perform POWER BALANCE			-11.
	ACTIVE TES POWER BALANCE	т	
	MONITOR		
	ENG SPEED	XXX rpm	
	MAS A/F SE-B1	xxx v	
	IACV-AAC/V	XXX step	
A Make sure that each circuit r	produces a momentary engine spe	ed drop	SEF190Y
Without CONSULT-II	siduces a momentary engine spe	eu ulop.	
1. Install all parts removed.			
2. Start engine.			
3. Listen to each injector opera	ting sound.		
	(TON () P	~	
	At idle		Click
		m	Clich
			*#
	and the second s		
	s	uitable too	
	Click Click		
	i'ch		MEC703B
Clicking noise should be h	eard.		WECTOSE
	OK or N	G	
ОК	GO TO 7.		
NG	Perform trouble diagnosis for "IN	IJECTO	RS", EC-542.
7 REMOVE INJECTOR			
	poled down and there are no fire h	azards r	ear the vehicle.
<ol> <li>Turn ignition switch "OFF".</li> <li>Remove injector assembly. F</li> </ol>	Refer to EC-41		
	ors connected to injector gallery.		
	GO TO 8.		
8 CHECK INJECTOR			
<ol> <li>Disconnect all injector harnes</li> <li>Disconnect all ignition coil harnes</li> </ol>			

- 3. Prepare pans or saucers under each injectors.
- 4. 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.

QG

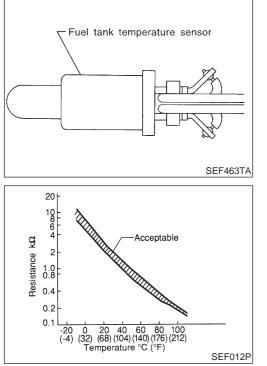
Diagnostic Procedure (Cont'd)

9 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

# DTC P0180 FUEL TANK TEMPERATURE SENSOR (WHERE FITTED) QG

Component Description



#### **Component Description**

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

#### <Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

\*: These data are reference values and are measured between ECM terminal 82 (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**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0180 0180	<ul> <li>An excessively high or low voltage is sent to ECM.</li> </ul>	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Fuel tank temperature sensor</li> </ul>

MONITOR NO DTC ENG SPEED XXX rpm	
COOLAN TEMP/S XXX °C	
FUELT/TMP SE XXX 'C	
	F194Y

# **DTC Confirmation Procedure**

NJEC0198

NJEC0197

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (I) With CONSULT-II

NOTE:

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.

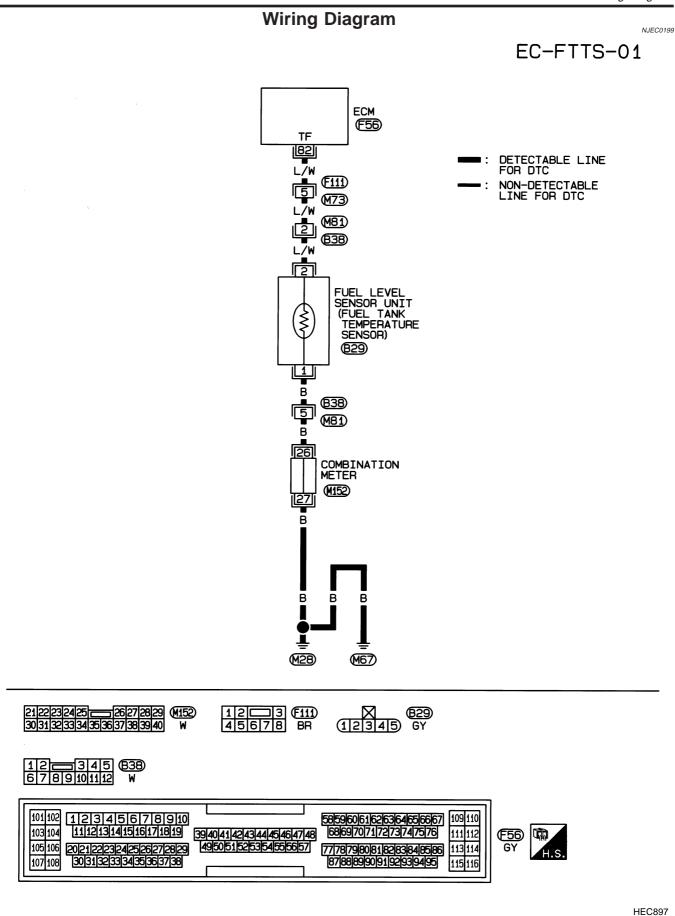
If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-316.

EC-313

# DTC P0180 FUEL TANK TEMPERATURE SENSOR (WHERE FITTED) QG

DTC Confirmation Procedure (Cont'd)

With GST Follow the procedure "With CONSULT-II" above. DTC P0180 FUEL TANK TEMPERATURE SENSOR (WHERE FITTED) QG Wiring Diagram

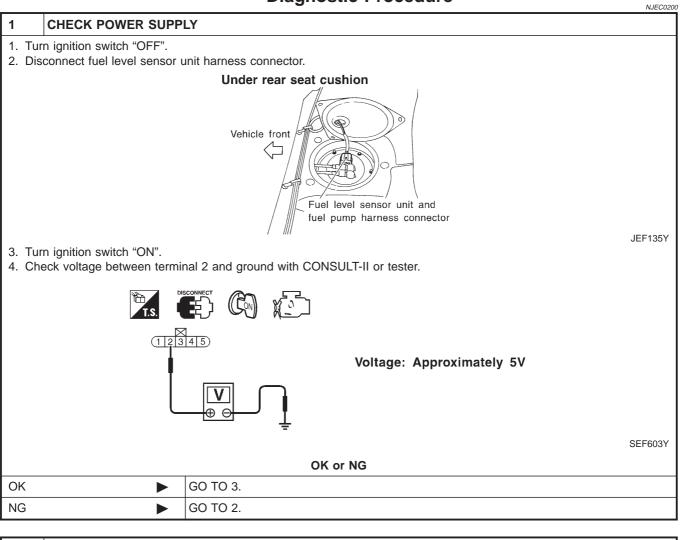


EC-315

# DTC P0180 FUEL TANK TEMPERATURE SENSOR (WHERE FITTED) QG

Diagnostic Procedure

**Diagnostic Procedure** 



2	DETECT MALFUNCTIO	NING PART	
Check the following.			
Harness connectors F111, M73			
• Har	Harness connectors M81, B38		
<ul> <li>Harness for open or short between ECM and fuel level sensor unit</li> </ul>			
		Repair harness or connector.	

3	CHECK GROUND C	RCUIT	
2. Che Ref	<ol> <li>Turn ignition switch "OFF".</li> <li>Check harness continuity between fuel level sensor unit harness connector terminal 1 and body ground. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>		
	OK or NG		
ОК		GO TO 5.	
NG (S	edan)	Repair open circuit or short to ground or short to power in harness or connectors.	
NG (H	atchback)	GO TO 4.	

# DTC P0180 FUEL TANK TEMPERATURE SENSOR (WHERE FITTED) QG

Diagnostic Procedure (Cont'd)

#### 4 DETECT MALFUNCTIONING PART

Check the following.

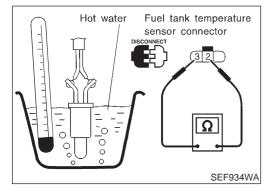
- COMBINATION METER connectors
- Harness connectors B38, M81
- Harness for open or short between fuel level sensor unit to ground

Repair harness or connector.

\_\_\_\_

CHECK FUEL TANK TEMPERATURE SENSOR		
Refer to "Component Inspection", EC-317.		
OK or NG		
►	GO TO 6.	
	Replace fuel tank temperature sensor.	
	to "Component Inspection"	

6	CHECK INTERMITTENT INCIDENT		
Perfor	form "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	•	INSPECTION END	



# Component Inspection

FUEL TANK TEMPERATURE SENSOR

NJEC0201

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance $k\Omega$
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel tank temperature sensor.

On Board Diagnosis Logic

# On Board Diagnosis Logic

If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (POS), the misfire is diagnosed.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

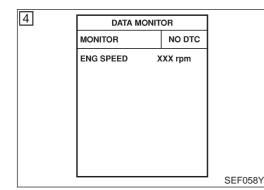
The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

When a misfire is detected which will overheat and damage the three way catalyst, the MI will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 revolutions. If the misfire frequency decreases to a level that will not damage the three way catalyst, the MI will change from blinking to lighting up. (After the first trip detection, the MI will light up from engine starting. If a mis-

- fire is detected that will cause three way catalyst damage, the MI will start blinking.)
- Two Trip Detection Logic (Exhaust quality deterioration) When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the MI will light up based on two trip detection logic. In this condition, ECM monitors the misfire for every 1,000 revolutions of the engine.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0300 0300	Multiple cylinders misfire.	<ul><li>Improper spark plug</li><li>Insufficient compression</li></ul>
P0301 0301	No. 1 cylinder misfires.	<ul> <li>Incorrect fuel pressure</li> <li>EGR volume control valve</li> <li>The injector circuit is open or shorted</li> </ul>
P0302 0302	No. 2 cylinder misfires.	<ul> <li>Injectors</li> <li>Intake air leak</li> <li>Insufficient ignition spark</li> </ul>
P0303 0303	No. 3 cylinder misfires.	<ul> <li>Lack of fuel</li> <li>Heated oxygen sensor 1 (front)</li> </ul>
P0304 0304	No. 4 cylinder misfires.	



# **DTC Confirmation Procedure**

N.IEC0203

#### Always drive vehicle at a safe speed.

#### NOTE:

CAUTION:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (I) With CONSULT-II

- 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 9 seconds.
- 4) Start engine again and drive at 1,500 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

#### NOTE:

#### Refer to the freeze frame data for the test driving conditions.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-319.

#### With GST

Follow the procedure "With CONSULT-II" above.

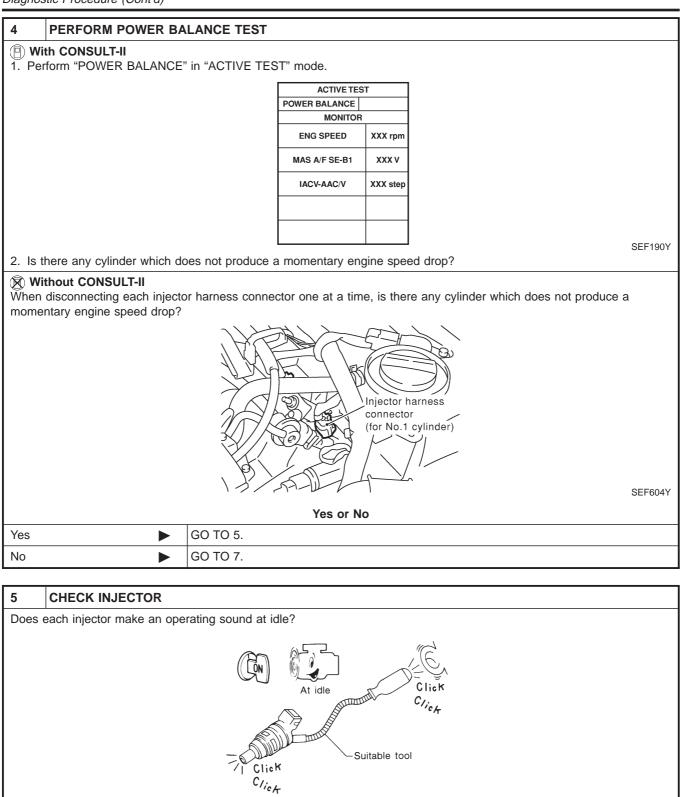
Diagnostic Procedure

# **Diagnostic Procedure**

		NJEC0204		
1	CHECK FOR INTAKE AIR LEAK			
	<ol> <li>Start engine and run it at idle speed.</li> <li>Listen for the sound of the intake air leak.</li> </ol>			
		OK or NG		
ОК	•	GO TO 2.		
NG	►	Discover air leak location and repair.		
2	CHECK FOR EXHAUS	T SYSTEM CLOGGING		
Stop e	Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.			
	OK or NG			
ОК		GO TO 3.		
NG		Repair or replace it.		

3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-425.		
OK or NG		
OK	•	GO TO 4.
NG		Repair EGR system.

Diagnostic Procedure (Cont'd)



 MEC703B

 Yes or No

 Yes
 GO TO 6.

 No
 Check injector(s) and circuit(s). Refer to EC-542.

Diagnostic Procedure (Cont'd)

# 6 **CHECK IGNITION SPARK** 1. Turn Ignition switch "OFF". 2. Disconnect ignition coil assembly from rocker cover. 3. Connect a known good spark plug to the ignition coil assembly. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. Ignition coil - Aller SEF575Q OK or NG OK GO TO 7. NG Check ignition coil, power transistor and their circuits. Refer to EC-547.

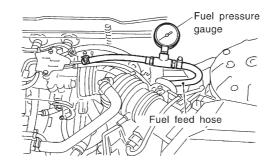
# 7 CHECK SPARK PLUGS Remove the spark plugs and check for fouling, etc. Image: Check for fouling, etc. Image: SEF1561 Image: Check for NG OK MG Image: NG Image: Check for NG OK Image: Check for NG Image: NG Image: Check for NG Image: NG Image: Check for NG Image: NG Image: Check for NG Image: Check compression pressure Image: Check for NG Image: Check compression pressure Image: Check for NG Image: Check compression pressure Image: Check for NG

Ĭ					
Refer	Refer to EM section.				
• Ch	neck compression pressure.				
	Standard:				
	1,324 kPa (13.24 bar, 13.5 kg/cm², 192 psi)/350 rpm				
	Minimum:				
	1,128 kPa (11.28 bar, 11.5 kg/cm², 164 psi)/350 rpm				
	Difference between each cylinder:				
	98 kPa (0.98 bar, 1.0 k	g/cm², 14 psi)/350 rpm			
	OK or NG				
ОК		GO TO 9.			
NG		Check pistons, piston rings, valves, valve seats and cylinder head gaskets.			

Diagnostic Procedure (Cont'd)

# 9 CHECK FUEL PRESSURE

- 1. Install any parts removed.
- 2. Release fuel pressure to zero. Refer to EC-40.
- 3. Install fuel pressure gauge and check fuel pressure.



JEF087Y

#### At idle: Approx. 235 kPa (2.35 bar, 2.4 kg/cm<sup>2</sup>, 34 psi)

OK or NG		
ОК		GO TO 11.
NG		GO TO 10.

# 10 DETECT MALFUNCTIONING PART Check the following. • Fuel pump and circuit (Refer to EC-561.) • Fuel pressure regulator (Refer to EC-41.) • Fuel lines • Fuel filter for clogging

11	CHECK IGNITION TIMI	NG	
Perform "Basic Inspection". Refer to <u>EC-10</u> 0.			
	OK or NG		
OK	►	GO TO 12.	
NG		<ol> <li>Perform "Idle Air Volume Learning". Refer to EC-57.</li> <li>Check camshaft position sensor (PHASE) (EC-335) and crankshaft position sensor (POS) (EC-328).</li> </ol>	

12	12 CHECK HEATED OXYGEN SENSOR 1 (FRONT)		
Refer	Refer to "Component Inspection", EC-222.		
	OK or NG		
ОК		GO TO 13.	
NG		Replace heated oxygen sensor 1 (front).	

Diagnostic Procedure (Cont'd)

13 CHECK MASS AIR FI	OW SENSOR				
With CONSULT-II Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. at idling: 1.0 - 4.0 g-m/sec at 2,500 rpm: 5.0 - 10.0 g-m/sec					
With GST Check mass air flow sensor signal in MODE 1 with GST. at idling: 1.0 - 4.0 g-m/sec at 2,500 rpm: 5.0 - 10.0 g-m/sec					
	OK or NG				
ОК	GO TO 15.				
NG	GO TO 14.				
14 CHECK CONNECTOR	4 CHECK CONNECTORS				
Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-187.					
OK or NG					
NG	Repair or replace it.				

# 15 CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in "Symptom Matrix Chart", EC-155.

OK or NG				
ОК		GO TO 16.		
NG		Repair or replace.		

#### 16 ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-70.

► GO TO 17.

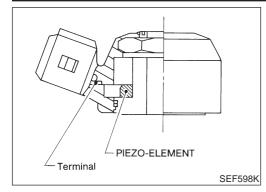
#### 17 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

# DTC P0325 KNOCK SENSOR (KS)

Component Description



#### **Component Description**

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. **Freeze frame data will not be stored in the ECM for the knock sensor. The MI will not light for knock sensor malfunction. The knock sensor has one trip detection logic.** 

# **ECM Terminals and Reference Value**

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.

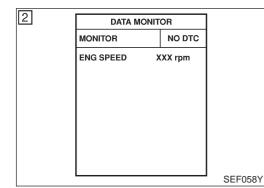
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
81	W	Knock sensor	[Engine is running] • Idle speed	1.0 - 4.0V

# **On Board Diagnosis Logic**

NJEC0208

NJEC0207

DTC No.	Malfunction is detected when	Check Items (Possible Cause)	
P0325 0325	<ul> <li>An excessively low or high voltage from the knock sensor is sent to ECM.</li> </ul>	<ul> <li>Harness or connectors (The knock sensor circuit is open or shorted.)</li> <li>Knock sensor</li> </ul>	



# **DTC Confirmation Procedure**

NJEC0209

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### **With CONSULT-II**

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-326.

#### With GST

NOTE:

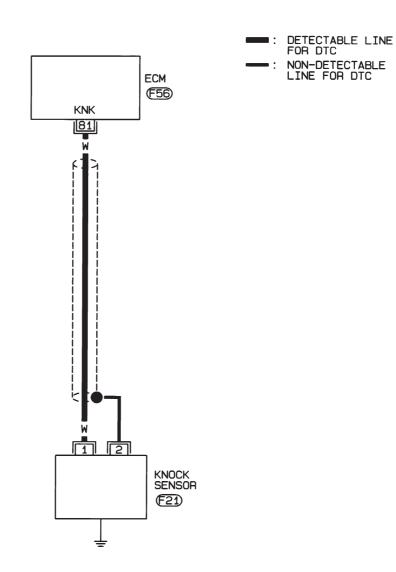
Follow the procedure "With CONSULT-II" above.

## DTC P0325 KNOCK SENSOR (KS)

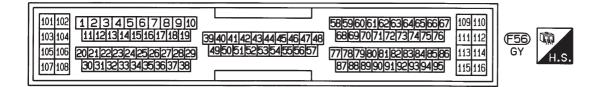
QG Wiring Diagram







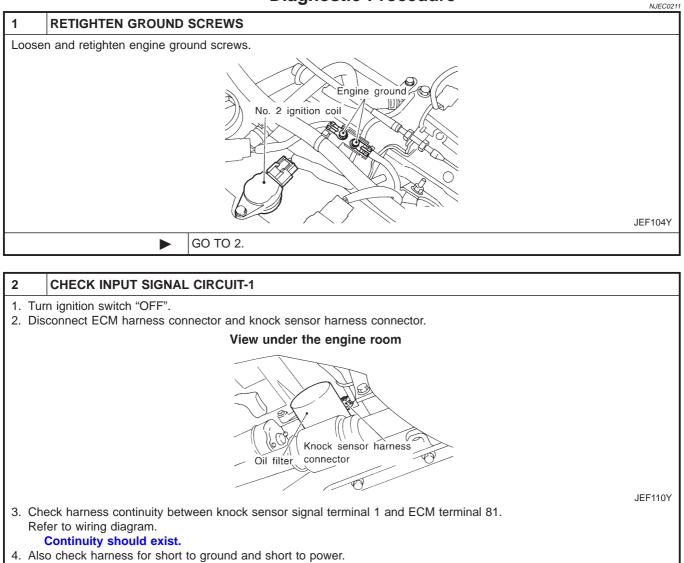




HEC791

## DTC P0325 KNOCK SENSOR (KS)

#### **Diagnostic Procedure**



ОК	GO TO 4.
NG	GO TO 3.

3	DETECT MALFUNCTIONING PART		
Check the harness for open or short between knock sensor and ECM.			
	Repair open circuit or short to ground or short to power in harness or connectors.		

4	CHECK KNOCK SENSOR				
Refer to "Component Inspection", EC-327.					
OK or NG					
OK	OK 🕨 GO TO 5.				
NG	NG   Replace knock sensor.				

QG

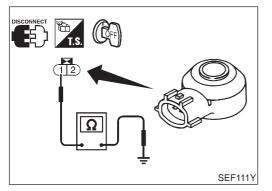
## DTC P0325 KNOCK SENSOR (KS)

Diagnostic Procedure (Cont'd)

#### 5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END



# Component Inspection KNOCK SENSOR

NJEC0212

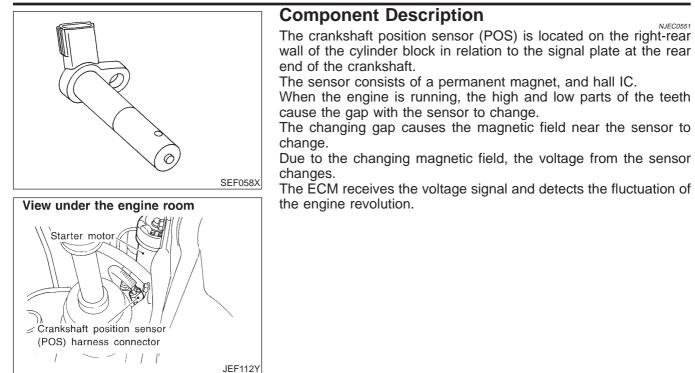
- Use an ohmmeter which can measure more than 10 M $\Omega$ .
- 1. Disconnect knock sensor harness connector.
- Check resistance between terminal 1 and ground. Resistance: 500 - 620 kΩ [at 25°C (77°F)]

#### **CAUTION:**

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.

## DTC P0335 CRANKSHAFT POSITION SENSOR (POS)

Component Description



## ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
		Crockshoft position	[Engine is running] • Warm-up condition • Idle speed	3 - 4V
85	R	Crankshaft position sensor (POS)	[Engine is running] • Engine speed is 2,000 rpm	3 - 4V

QG

On Board Diagnosis Logic

## **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	<ul> <li>The 10° signal is not entered to ECM for the first few seconds during engine cranking.</li> <li>The 10° signal is not entered to ECM during engine running.</li> <li>The 10° signal is not in the normal pattern at each engine revolution.</li> </ul>	<ul> <li>Harness or connectors (The crankshaft position sensor (POS) circuit is open or shorted.)</li> <li>Crankshaft position sensor (POS)</li> <li>Starter motor (Refer to EL section.)</li> <li>Starting system circuit (Refer to EL section.)</li> <li>Dead (Weak) battery</li> </ul>

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

## **DTC Confirmation Procedure**

NJEC0554

QG

NJEC0553

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (P) With CONSULT-II

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-332.

#### With GST

NOTE:

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

BATTERY

B

₩/L |[]

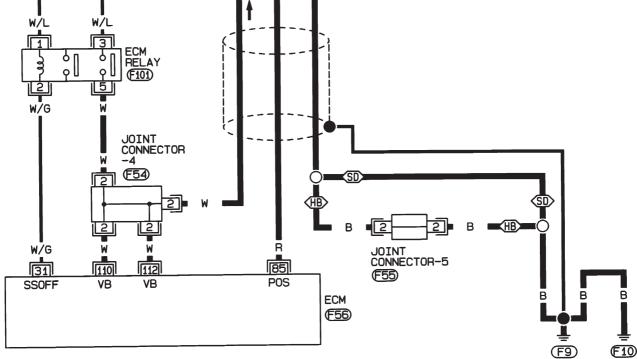
W/L

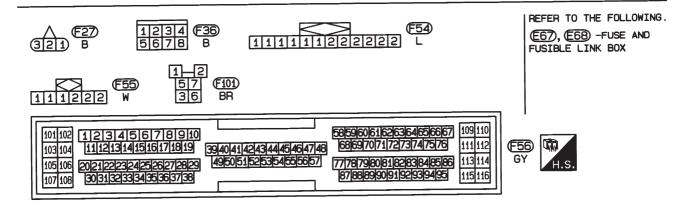
10A

36

E75 F36

#### Wiring Diagram NJEC0555 SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT NJEC0555S01 EC-POS-01 FUSIBLE REFER TO EL-POWER. LINK AND FUSE BOX (SD): SEDAN MODELS E67 E68 (HB): HATCHBACK MODELS DETECTABLE LINE FOR DTC CRANKSHAFT POSITION SENSOR (POS) NON-DETECTABLE LINE FOR DTC (F27) 2 3 W R В





HEC792

QG

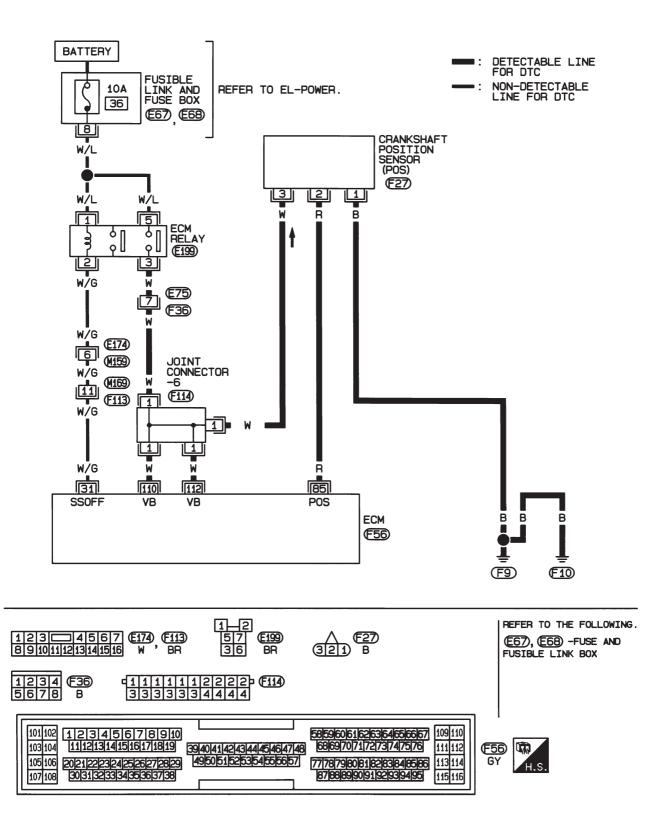
Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN

NJEC0555S02

QG

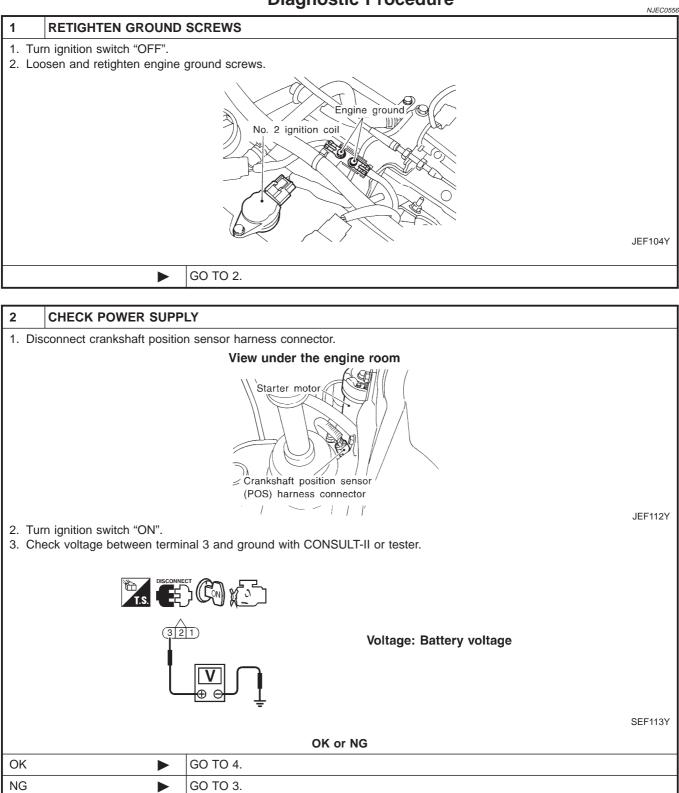
EC-POS-02



HEC974

## **DTC P0335 CRANKSHAFT POSITION SENSOR (POS)**

#### **Diagnostic Procedure**



QG

(POS) QG Diagnostic Procedure (Cont'd)

#### 3 DETECT MALFUNCTIONING PART

#### Check the following.

- Joint connector-4 (If so equipped)
- Joint connector-6 (If so equipped)
- Harness connectors E75, F36 (If so equipped)
- Harness for open or short between joint connector and ECM relay
- Harness for open or short between crankshaft position sensor and joint connector
- Harness for open or short between joint connector and ECM
- ECM relay

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

4	CHECK INPUT SIGNA	L CIRCUIT			
1. Di	1. Disconnect crankshaft position sensor and ECM harness connectors.				
	View under the engine room				
		Starter motor Crankshaft position sensor (POS) harness connector			
	JEF112Y				
Re	<ol> <li>Check continuity between ECM terminal 85 and crankshaft position sensor harness connector terminal 2. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
	OK or NG				
ОК	OK 🕨 GO TO 5.				
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.				
5	CHECK GROUND CIR	CUIT			
1. Re	1. Reconnect ECM harness connector.				

 Check harness continuity between terminal 1 and engine ground. Refer to wiring diagram.
 Continuity should exist.

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

#### OK or NG

OK 🕨	GO TO 6.
NG	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK CRANKSHAFT POSITION SENSOR			
Refer to "Component Inspection", EC-334.				
OK or NG				
OK	►	GO TO 7.		
NG   Replace crankshaft position sensor.				

7	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
		INSPECTION END	

## DTC P0335 CRANKSHAFT POSITION SENSOR (POS)

Component Inspection

# SEF121X



- Disconnect crankshaft position sensor (POS) harness connector.
- 2. Loosen the fixing bolt of the sensor.
- 3. Remove the sensor.

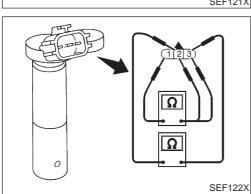
\_

4. Visually check the sensor for chipping.

## 5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]	
3 (+) - 1 (-)		
2 (+) - 1 (-)	Except 0 or ∞	
3 (+) - 2 (-)		

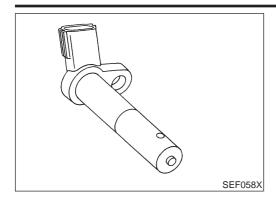
If NG, replace crankshaft position sensor.



QG

Component Description

QG



#### **Component Description**

The camshaft position sensor (PHASE) senses the protrusion provided with exhaust valve cam sprocket to identify a particular cylinder. The crankshaft position sensor senses the piston position. 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 cylinder number signal.

## ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66	R	Camshaft position sen-	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	3 - 4V
75	R	sor (PHASE)	<b>[Engine is running]</b> • Engine speed is 2,000 rpm	3 - 4V

On Board Diagnosis Logic

### **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0340 0340	<ul> <li>The cylinder No. signal is not entered to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not entered to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul> <li>Harness or connectors (The camshaft position sensor (PHASE) circuit is open or shorted.)</li> <li>Camshaft position sensor (PHASE)</li> <li>Starter motor (Refer to EL section.)</li> <li>Starting system circuit (Refer to EL section.)</li> </ul>

## **DTC Confirmation Procedure**

NOTE:

NJEC0223

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

2	DATA MC		
	MONITOR	NO DTC	
	COOLAN TEMP/S	XXX °C	
	L		SEF013Y

#### (I) With CONSULT-II

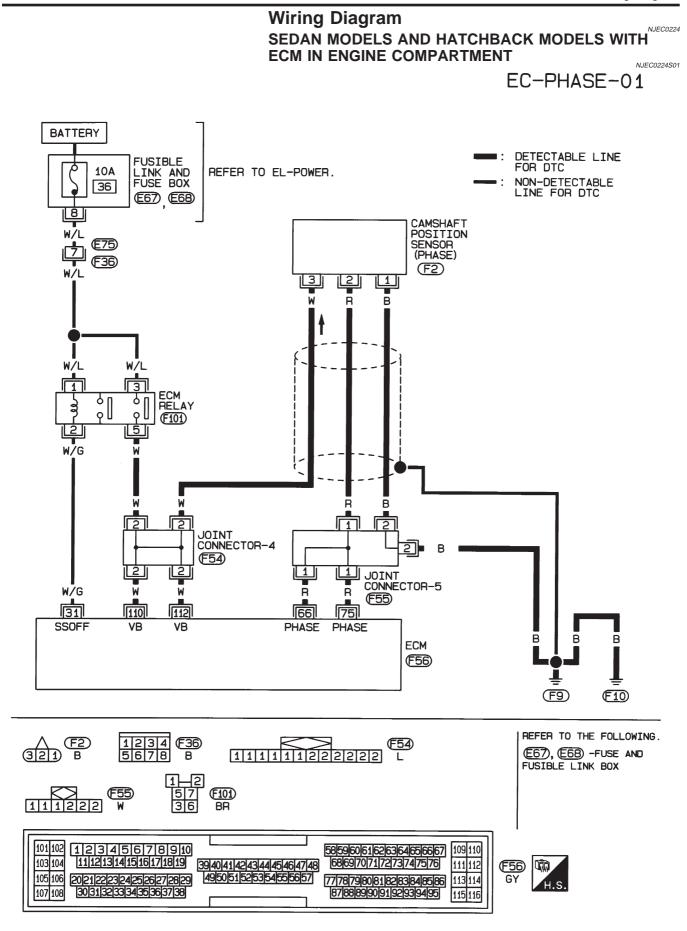
- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-339.

#### With GST

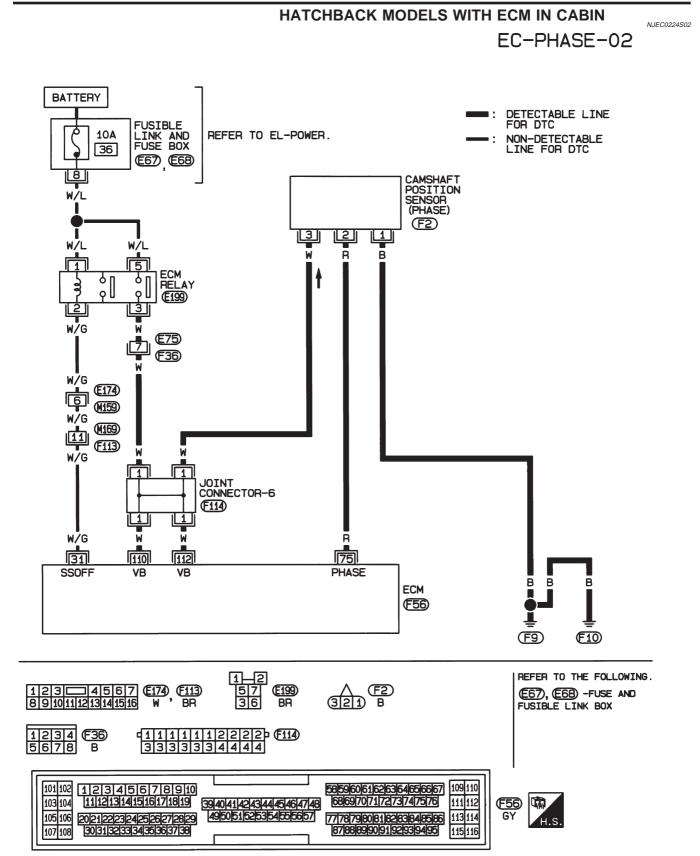
Follow the procedure "With CONSULT-II" above.

QG

Wiring Diagram



Wiring Diagram (Cont'd)



QG

Diagnostic Procedure

QG

#### **Diagnostic Procedure** NJEC0225 1 **CHECK STARTING SYSTEM** Does the engine turn over? (Does the starter motor operate?) Yes or No Yes GO TO 2. No Check starting system. (Refer to EL section.) 2 **RETIGHTEN GROUND SCREWS** 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. Èngine ground R 1111 No. 2 ignition coil Ľ

GO TO 3.

JEF104Y

EC-339

QG

Diagnostic Procedure (Cont'd)

3 CHECK POWER SUPP	LY			
1. Disconnect camshaft position sensor harness connector.				
	Engine front cover Camshaft position sensor (PHASE) harness connector			
2. Turn ignition switch "ON".	JEF114Y			
	nal 3 and ground with CONSULT-II or tester.			
(32	Voltage: Battery voltage			
	SEF113Y			
	OK or NG			
OK ►	GO TO 5.			
NG	GO TO 4.			
4 DETECT MALFUNCTIC	DNING PART			
Harness for open or short bet	ped)			
•	Repair open circuit or short to ground or short to power in harness or connectors.			
<ol> <li>CHECK INPUT SIGNAL</li> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM harness cor</li> <li>Check harness continuity betw Refer to wiring diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short</li> </ol>	nnector. ween sensor terminal 2 and ECM terminal 75.			

OK or NG		
OK 🕨	GO TO 7.	
NG	GO TO 6.	

EC-340

Diagnostic Procedure (Cont'd)

QG

#### 6 DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-5 (If so equipped)
- Harness for open or short between ECM and joint connector
- Harness for open or short between joint connector and camshaft position sensor

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

#### 7 CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".

 Check harness continuity between sensor terminal 1 or 3 and engine ground. Refer to wiring diagram.
 Continuity should exist.

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

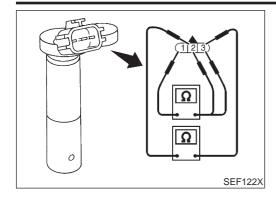
#### OK or NG

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

8	CHECK CAMSHAFT PC	DSITION SENSOR		
Refer to "Component Inspection", EC-342.				
OK or NG				
OK	►	GO TO 9.		
NG  Replace camshaft position sensor.				

9	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

Component Inspection



#### **Component Inspection CAMSHAFT POSITION SENSOR**

1. Disconnect camshaft position sensor (PHASE) harness connector.

QG

=NJEC0226

- 2. Loosen the fixing bolt of the sensor.
- 3. Remove the sensor.

- 4. Visually check the sensor for chipping.
- 5. Check resistance as shown in the figure.

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

If NG, replace camshaft position sensor.

#### Description SYSTEM DESCRIPTION

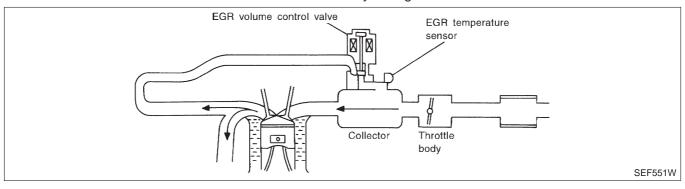
NJEC0227

**QG** Description

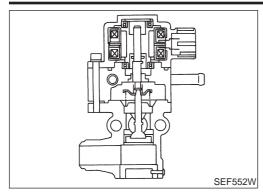
STSTEW DESCRIPTION				
Sensor	Input Signal to ECM	ECM func- tion	Actuator	
Crankshaft position sensor (POS)	Engine speed			
Camshaft position sensor (PHASE)	Engine speed and cylinder number	-		
Mass air flow sensor	Amount of intake air	-		
Engine coolant temperature sensor	Engine coolant temperature	-		
Ignition switch	Start signal	EGR vol- ume control	EGR volume control valve	
Throttle position sensor	Throttle position			
Vehicle speed sensor	Vehicle speed			
Battery	Battery voltage	-		
Air conditioner switch	Air conditioner operation			
Power steering oil pressure switch	Power steering load signal	-		
Electrical load	Electrical load signal	1		
PNP switch	Park/Neutral position signal	1		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Extremely light load engine operation
- Engine idling
- Excessively high engine coolant temperature
- Wide open throttle
- Mass air flow sensor malfunction
- Low battery voltage



Description (Cont'd)



#### COMPONENT DESCRIPTION EGR Volume Control Valve

NJEC0227S02

N.IEC0503

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The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

## CONSULT-II Reference Value in Data Monitor Mode

#### Specification data are reference values.

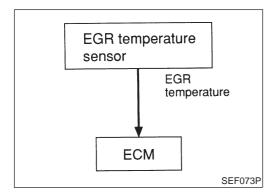
MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	Engine: After warming up		Less than 4.5V
EGR VOL CON/V BGR VOL CON/V CON/V BGR VOL CON/V BGR VOL CON/V		Idle	0 step
	Revving engine up to 3,000 rpm quickly	10 - 55 step	

## **ECM Terminals and Reference Value**

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	0 - 14V
58	В	Sensor's ground	[Engine is running] • Warm-up condition • Idle speed	0V
70	D/D		[Engine is running] • Warm-up condition • Idle speed	Less than 4.5V
72	P/B		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>EGR system is operating.</li> </ul>	0 - 1V

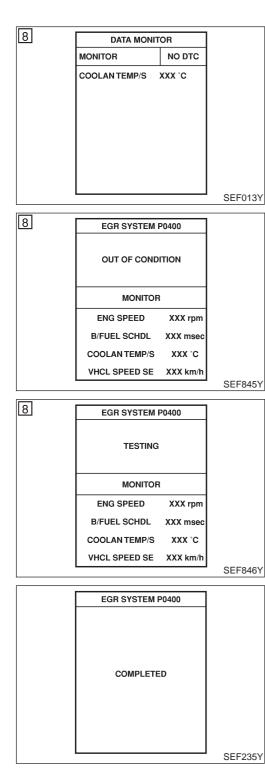


## On Board Diagnosis Logic

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

On Board Diagnosis Logic (Cont'd)

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0400 0400	<ul> <li>No EGR flow is detected under conditions that call for EGR.</li> </ul>	<ul> <li>Harness or connectors (EGR volume control valve circuit is open or shorted.)</li> <li>EGR volume control valve stuck closed</li> <li>Dead (Weak) battery</li> <li>EGR passage clogged</li> <li>EGR temperature sensor and circuit</li> <li>Exhaust gas leaks</li> </ul>



## **DTC Confirmation Procedure**

NJEC0229

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## Always drive vehicle at a safe speed.

#### NOTE:

**CAUTION:** 

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT-II even though DTC work support test result is "NG".

#### TESTING CONDITION:

- Before performing the following procedure, confirm battery voltage is more than 10V at idle, then stop engine immediately.
- For best result, perform the test at a temperature of 0°C (32°F) or higher.

#### With CONSULT-II

- 1) Turn ignition switch "OFF" and wait at least 9 seconds.
- 2) Turn ignition switch "ON".
- 3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II and confirm it is within the range listed below.

## COOLAN TEMP/S: Less than 40°C (104°F)

If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- Start engine and let it idle monitoring "COOLAN TEMP/S" value. When the "COOLAN TEMP/S" value reaches 70°C (158°F), immediately go to the next step.
- 5) Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.

If "COMPLETED" appears on CONSULT-II screen, go to step 9.

If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.

8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 45 seconds or more.)

DTC Confirmation Procedure (Cont'd)

ENG SPEED	Above 2,400 rpm
Vehicle speed	Above 90 km/h (56 MPH)
B/FUEL SCHDL	4.0 - 8.0 msec
Selector lever	4th or 5th

QG

# If "TESTING" is not displayed after 5 minutes, retry from step 2.

 Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-349.

With GST

- 1) Turn ignition switch "ON".
- 2) Check engine coolant temperature in MODE 1 with GST.

Engine coolant temperature: Less than 40°C (104°F)

If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- Start engine and let it idle monitoring the value of "COOLAN TEMP/S". When the engine coolant temperature reaches 70°C (158°F), immediately go to the next step.
- 4) Maintain the following conditions for at least 1 minute.

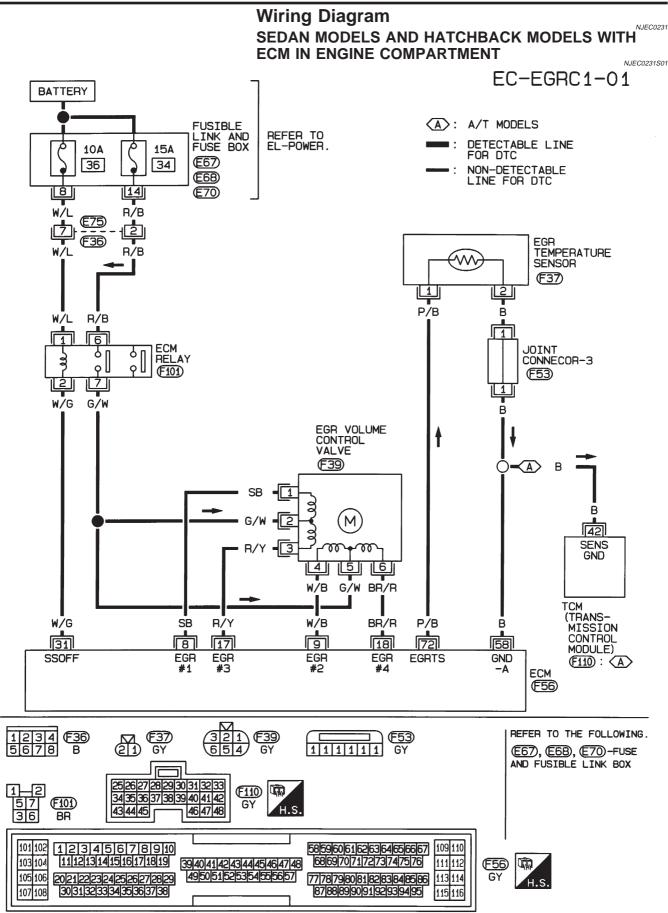
Engine speed	Above 2,400 rpm
Vehicle speed	Above 90 km/h (56 MPH)
Selector lever	4th or 5th

5) Stop vehicle.

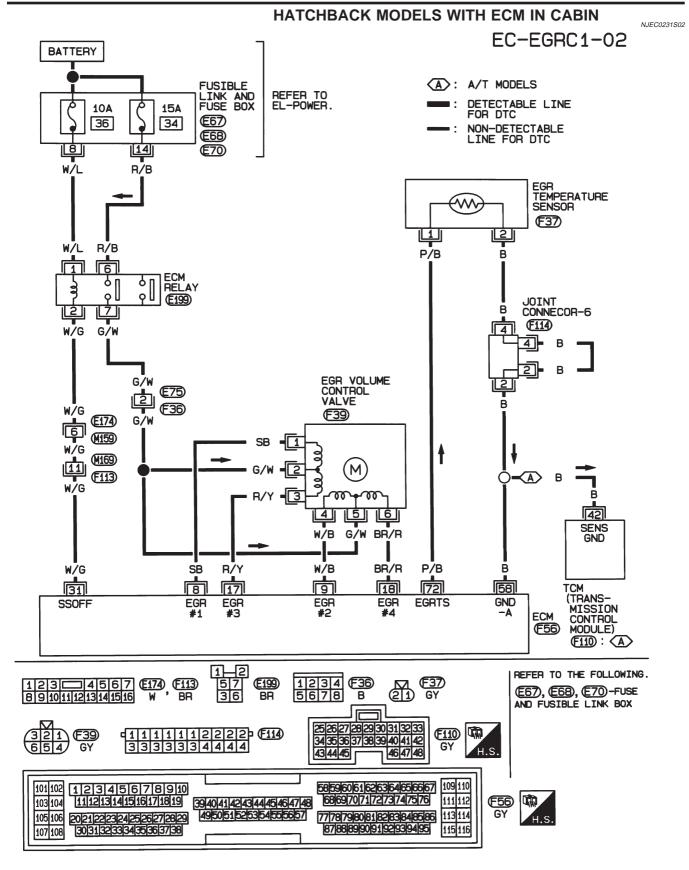
- 6) Turn ignition switch "OFF" and wait at least 9 seconds, then turn "ON".
- 7) Repeat step 2 to 4.
- 8) Select "MODE 3" with GST.
- 9) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-349.
- When using GST, "DTC CONFIRMATION PROCEDURE" should be performed twice as much as when using CON-SULT-II because GST cannot diaplay MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CON-SULT-II is recommended.

Wiring Diagram

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Wiring Diagram (Cont'd)

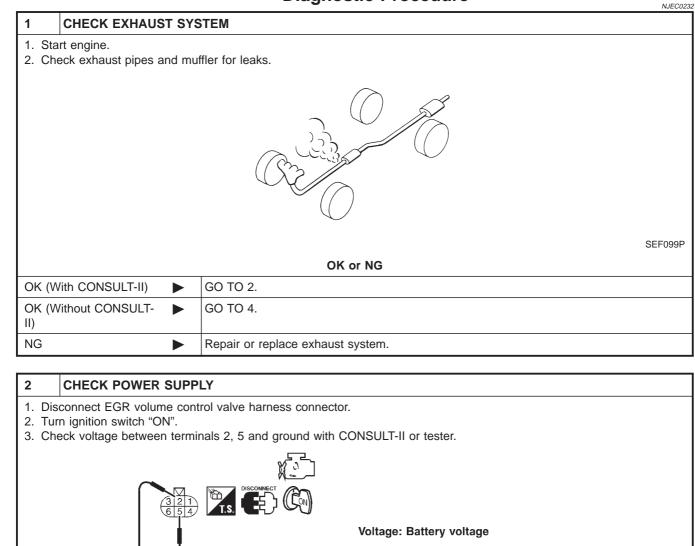


QG

Diagnostic Procedure

QG

#### **Diagnostic Procedure**



	$\Box$		SEF327X
		OK or NG	
ОК		GO TO 4.	
NG		GO TO 3.	

3	DETECT MALFUNCTIONING PART		
	Check the following.		
<ul> <li>Hari</li> </ul>	<ul> <li>Harness connectors E75, F36 (If so equipped)</li> </ul>		
• Hari	<ul> <li>Harness for open or short between EGR volume control valve and ECM relay</li> </ul>		
	Repair harness or connectors.		

Diagnostic Procedure (Cont'd)

4	CHECK OUTPUT SIGN	AL CIRCUIT	
1. Tu	urn ignition switch "OFF".		
2. Di	sconnect ECM harness con	nector.	
3. C	heck harness continuity betw	veen	
E	CM terminal 8 and terminal	1,	
E	CM terminal 9 and terminal	4,	
E	CM terminal 17 and terminal	3,	
E	CM terminal 18 and terminal	6.	
	efer to wiring diagram.		
	ontinuity should exist.		
lf	If OK, check harness for short to ground and short to power.		
	OK or NG		
ОК		GO TO 5.	
NG	NG  Repair open circuit, short to ground or short to power in harness connectors.		

5	CHECK EGR PASSAG	iΕ		
Cheo	ck EGR passage for cloggi	ng and cracks.		
		OK or NG		
OK		GO TO 6.		
NG	•	Repair or replace EGR passage.		
6	6 CHECK EGR TEMPERATURE SENSOR			
Refer to "COMPONENT INSPECTION", EC-424.				

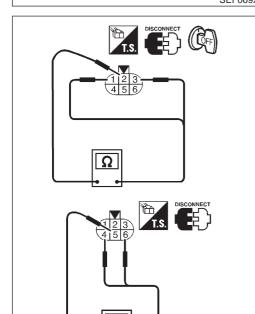
OK or NG		
ОК		GO TO 7.
NG  Replace EGR temperature sensor.		

7 CHECK EGR VOLUME CONTROL VALVE				
Refer to "COMPONENT INSPECTION", EC-351.				
OK or NG				
ОК <b>Б</b> О ТО 8.				
NG Replace EGR volume control valve.				

8	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	► INSPECTION END		

Diagnostic Procedure (Cont'd)

EGR volume control valve



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#### Component Inspection EGR VOLUME CONTROL VALVE With CONSULT-II

- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. terminal 2 and terminals 1, 3 terminal 5 and terminals 4. 6

Temperature °C (°F)	Resistance $\Omega$	
20 (68)	20 - 24	

- 3) Reconnect EGR volume control valve harness connector.
- Remove EGR volume control valve from cylinder head. (The EGR volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON".
- Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

If NG, replace the EGR volume control valve.

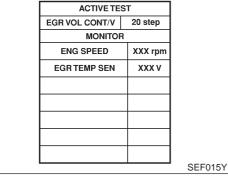
#### **Without CONSULT-II**

- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. terminal 2 and terminals 1, 3 terminal 5 and terminals 4, 6

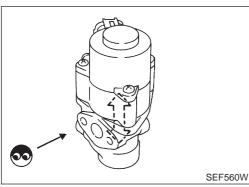
Temperature °C (°F)	Resistance $\Omega$	
20 (68)	20 - 24	

3) Turn ignition switch "ON" and "OFF". Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

If NG, replace the EGR volume control valve.



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NJEC0233

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NJEC0233S01

Description

#### Description SYSTEM DESCRIPTION

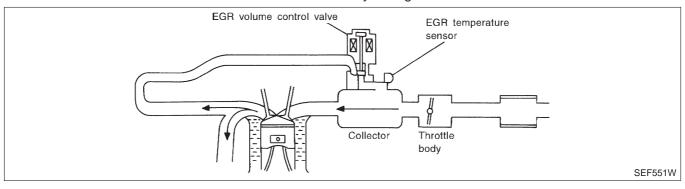
NJEC0504

QG

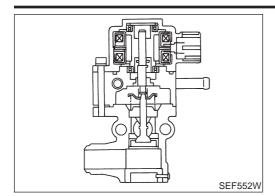
	•	NJEC0504S01	
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		EGR volume control valve
Ignition switch	Start signal		
Throttle position sensor	Throttle position	EGR vol-	
Vehicle speed sensor	Vehicle speed	ume control	
Battery	Battery voltage		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Extremely light load engine operation
- Engine idling
- Excessively high engine coolant temperature
- Wide open throttle
- Mass air flow sensor malfunction
- Low battery voltage



Description (Cont'd)



#### COMPONENT DESCRIPTION EGR Volume Control Valve

NJEC0504S02

NJEC0507

QG

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

## CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	Engine: After warming up	Idle	0 step
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	Revving engine up to 3,000 rpm quickly	1 - 10 step

## **ECM Terminals and Reference Value**

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	[Engine is running] • Warm-up condition • Idle speed	0 - 14V

## **On Board Diagnosis Logic**

DTC No. Malfunction is detected when		Check Items (Possible Cause)	
P0403 0403	<ul> <li>An improper voltage signal is sent to ECM through the valve.</li> </ul>	<ul> <li>Harness or connectors (The EGR volume control valve circuit is open or shorted.)</li> <li>EGR volume control valve</li> </ul>	

DATA M	ONIT	OR
MONITOR		NO DTC
ENG SPEED	X	XX rpm

## **DTC Confirmation Procedure**

NJEC0509

N.IEC0508

**NOTE:** If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (P) With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Rev engine from idle to 2,000 rpm 20 times.

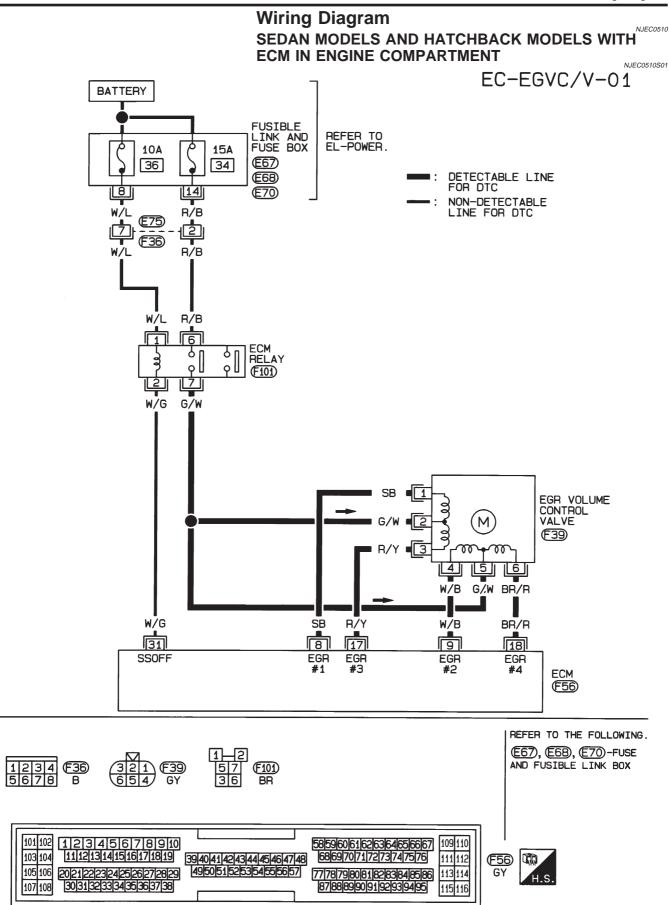
DTC Confirmation Procedure (Cont'd)

If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-357.

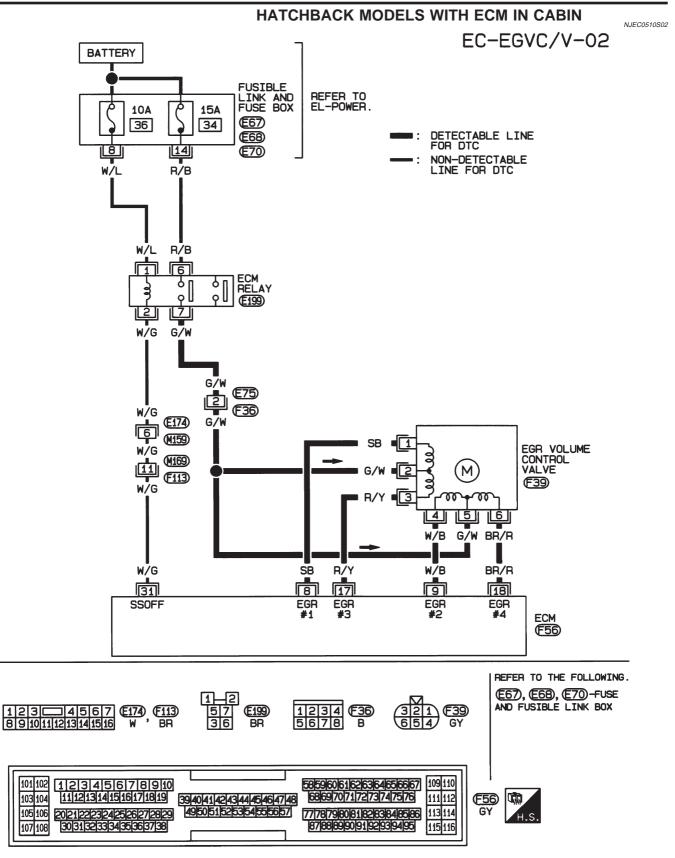
(a) With GST

Follow the procedure "With CONSULT-II" above.

**QG** Wiring Diagram



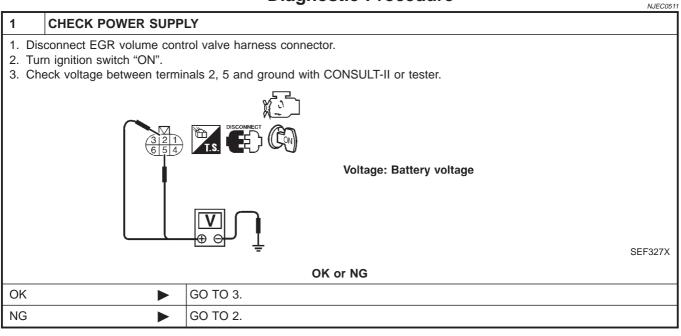
Wiring Diagram (Cont'd)



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QG Diagnostic Procedure

## **Diagnostic Procedure**



#### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36 (If so equipped)
- Harness for open or short between EGR volume control valve and ECM relay

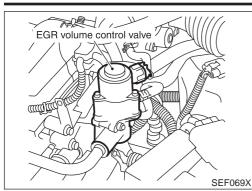
Repair harness or connectors.

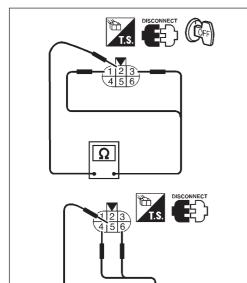
3	CHECK OUTPUT SIGN	VAL CIRCUIT	
1.	Turn ignition switch "OFF".		
2.	2. Disconnect ECM harness connector.		
3. (	Check harness continuity bet	tween	
l	ECM terminal 8 and terminal	1,	
	ECM terminal 9 and terminal	4,	
l	ECM terminal 17 and termina	al 3,	
I	ECM terminal 18 and terminal 2.		
I	Refer to wiring diagram.		
(	Continuity should exist.		
l	If OK, check harness for short to ground and short to power.		
	OK or NG		
OK		GO TO 4.	
NG	•	Repair open circuit, short to ground or short to power in harness connectors.	

4	CHECK EGR VOLUME CONTROL VALVE		
Refer to "COMPONENT INSPECTION", EC-358.			
OK or NG			
OK	OK 🕨 GO TO 5.		
NG  Replace EGR volume control valve.			

5	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	► INSPECTION END		

Diagnostic Procedure (Cont'd)





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## **Component Inspection** EGR VOLUME CONTROL VALVE (P) With CONSULT-II

- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. 2) terminal 2 and terminals 1, 3 terminal 5 and terminals 4.6

Temperature °C (°F)	Resistance $\Omega$
20 (68)	20 - 24

- Reconnect EGR volume control valve harness connector. 3)
- Remove EGR volume control valve from cylinder head. 4) (The EGR volume control valve harness connector should remain connected.)
- Turn ignition switch "ON". 5)
- 6) Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

If NG, replace the EGR volume control valve.

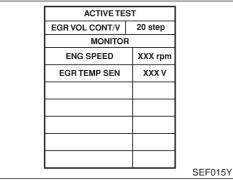
#### **Without CONSULT-II**

- Disconnect EGR volume control valve harness connector. 1)
- Check resistance between the following terminals. 2) terminal 2 and terminals 1, 3 terminal 5 and terminals 1

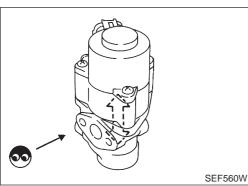
Temperature °C (°F)	Resistance $\Omega$	
20 (68)	20 - 24	

Turn ignition switch "ON" and "OFF". Check that EGR volume 3) control valve shaft moves smoothly forward and backward according to the ignition switch position.

If NG, replace the EGR volume control valve.



SEF605Y



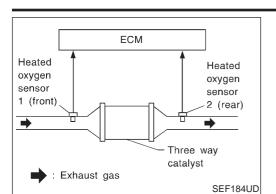
NJEC0512

QG

NJEC0512S01

On Board Diagnosis Logic

QG



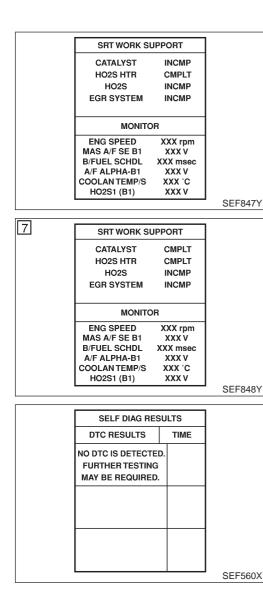
## **On Board Diagnosis Logic**

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).

A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 (front) and 2 (rear) approaches a specified limit value, the three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0420 0420	<ul> <li>Three way catalyst does not operate properly.</li> <li>Three way catalyst does not have enough oxygen storage capacity.</li> </ul>	<ul> <li>Three way catalyst</li> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Injectors</li> <li>Injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul>



## **DTC Confirmation Procedure**

NJEC0241

#### Always drive vehicle at a safe speed.

#### NOTE:

**CAUTION:** 

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

## With CONSULT-II TESTING CONDITION:

- Open engine hood before conducting following procedure.
- Do not hold engine speed more than specified minutes below.
- 1) Turn ignition switch "ON".
- 2) Select "DTC & SRT CONFIRMATION" then "SRT WORK SUP-PORT" mode with CONSULT-II.
- 3) Start engine.
- Rev engine up to 3,000±500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely. If "COMPLETED" appears on the CONSULT-II screen, go to step 7.
- 5) Wait 5 seconds at idle.
- Rev engine up to 2,500±500 rpm and maintain it until "INCMP" of CATALYST changes to "CMPLT" (it will take approximately 5 minutes.)
   If not "CMPLT" stop opging and cool it down to loss than 70°C

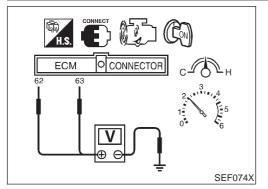
If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

- 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
- Confirm that the 1st trip DTC is not detected. If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-360.

EC-359

## DTC P0420 THREE WAY CATALYST FUNCTION

**Overall Function Check** 



#### **Overall Function Check**

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed. **Without CONSULT-II** 

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 62 (HO2S1 signal), 63 (HO2S2 signal) and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminal 63 and engine ground is much less than that of ECM terminal 62 and engine ground.

#### Switching frequency ratio = A/B

A: Heated oxygen sensor 2 (rear) voltage switching frequency

B: Heated oxygen sensor 1 (front) voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means three way catalyst does not operate properly.

#### NOTE:

If the voltage at terminal 62 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-236.)

### **Diagnostic Procedure**

1	CHECK EXHAUST SYSTEM				
Visually check exhaust tubes and muffler for dent.					
OK or NG					
ОК	ОК 🕨 GO TO 2.				
NG	•	Repair or replace.			

QG

# **DTC P0420 THREE WAY CATALYST FUNCTION**

Diagnostic Procedure (Cont'd)

QG

		Diagnostic Procedure (Contra)
2	CHECK EXHAUST AIR	LEAK
	art engine and run it at idle sten for an exhaust air leak	before the three way catalyst.
		SEF099P
		OK or NG
OK		GO TO 3.
NG	•	Repair or replace.
3		EAK
Lister	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 TIMI	NG
	k for ignition timing. to "BASIC INSPECTION",	EC-100.
		OK or NG
OK		GO TO 5.
NG		Check camshaft position sensor (PHASE) (EC-335) and crankshaft position sensor

(POS) (EC-328).

# **DTC P0420 THREE WAY CATALYST FUNCTION**

Diagnostic Procedure (Cont'd)

5	CHECK INJECTORS			
2. St	<ol> <li>Refer to Wiring Diagram for Injectors, EC-542.</li> <li>Stop engine and then turn ignition switch "ON".</li> <li>Check voltage between ECM terminals 101, 103, 105 and 107 and ground with CONSULT-II or tester.</li> </ol>			
	ECM CONNECTOR			
Ba	SEF075X Battery voltage should exist.			
	OK or NG			
OK	► GO TO 6.			
NG	NG Perform "Diagnostic Procedure" INJECTOR, EC-544.			
6	CHECK IGNITION SPARK			
2. Co	<ol> <li>Disconnect ignition coil assembly from rocker cover.</li> <li>Connect a known good spark plug to the ignition coil assembly.</li> </ol>			

- Place end of spark plug against a suitable ground and crank engine.
   Check for spark.

	Ignition coil	
		SEF575Q
	OK or NG	
ОК	GO TO 7.	
NG	Check ignition coil, power transistor and their circuits. Refer to EC-547.	

7	CHECK INJECTO	DR		
1. Tur	1. Turn ignition switch "OFF".			
2. Rer	move injector assen	nbly. R	efer to EC-41.	
Kee	ep fuel hose and all	injecto	ors connected to injector gallery.	
3. Dis	3. Disconnect camshaft position sensor harness connector.			
4. Tur	4. Turn ignition switch "ON".			
Ma	Make sure fuel does not drip from injector.			
	OK or NG			
OK (D	OK (Does not drip)  GO TO 8.			
NG (D	rips)		Replace the injector(s) from which fuel is dripping.	

QG

# DTC P0420 THREE WAY CATALYST FUNCTION

Diagnostic Procedure (Cont'd)

QG

8	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
Trouble is fixed  INSPECTION END		INSPECTION END	
Trouble is not fixed			Replace three way catalyst.

Description

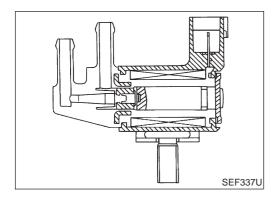
### Description SYSTEM DESCRIPTION

N.IEC0248

		-	NJEC0248S01
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage		
Ignition switch	Start signal	EVAP can- ister purge	EVAP canister purge volume
Closed throttle position switch*	Closed throttle position	control	control solenoid valve
Throttle position sensor	Throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor*	Fuel temperature in fuel tank	1	
Vehicle speed sensor	Vehicle speed	]	

\*: If so equipped

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



### **COMPONENT DESCRIPTION**

NJEC0248S02 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 N.IEC0249

MONITOR ITEM	COND	SPECIFICATION	
PURG VOL C/V	<ul> <li>Engine: After warming up</li> </ul>	Idle	0%
	No-load	Revving engine	_

ECM Terminals and Reference Value

# ECM Terminals and Reference Value

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
14	GY/L	EVAP canister purge vol- ume control solenoid valve	[Engine is running] • Warm-up condition • 2,000 rpm	5 - 12V

# **On Board Diagnosis Logic**

### NJEC0251

=NJEC0250

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 0443	<ul> <li>An improper voltage signal is sent to ECM through the valve.</li> </ul>	<ul> <li>Harness or connectors (The valve circuit is open or shorted.)</li> <li>EVAP canister purge volume control solenoid valve</li> </ul>

# **DTC Confirmation Procedure**

NJEC0252

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

### **TESTING CONDITION:**

NOTE:

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

3	DATA M	ONITOR	
	MONITOR	NO DTC	
	ENG SPEED	XXX rpm	
	L		SEF

### With CONSULT-II

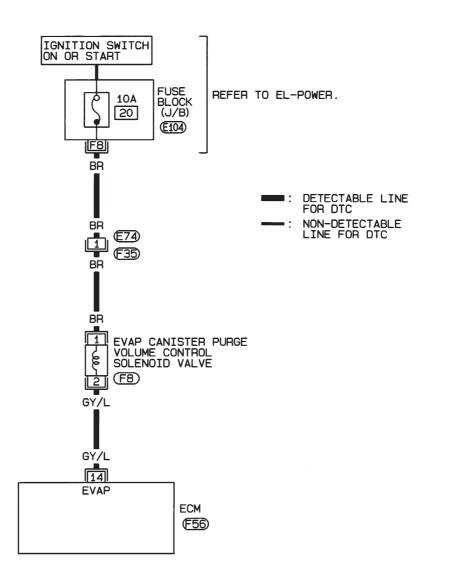
- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-368.

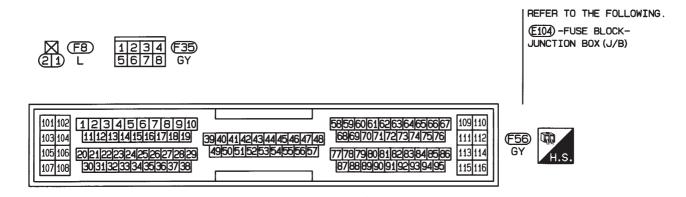
### With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram





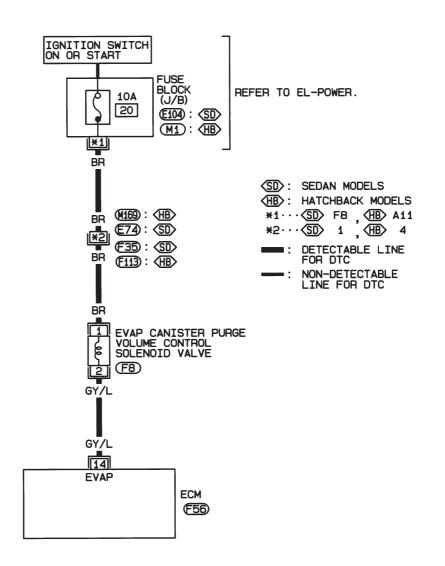


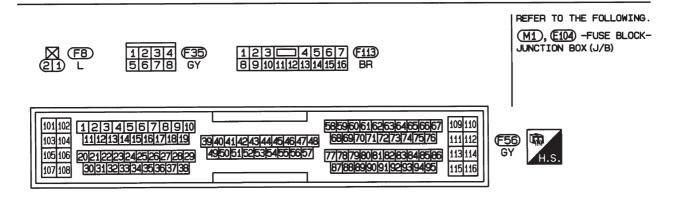
Wiring Diagram (Cont'd)

HATCHBACK MODELS WITH ECM IN CABIN

NJEC0253S02



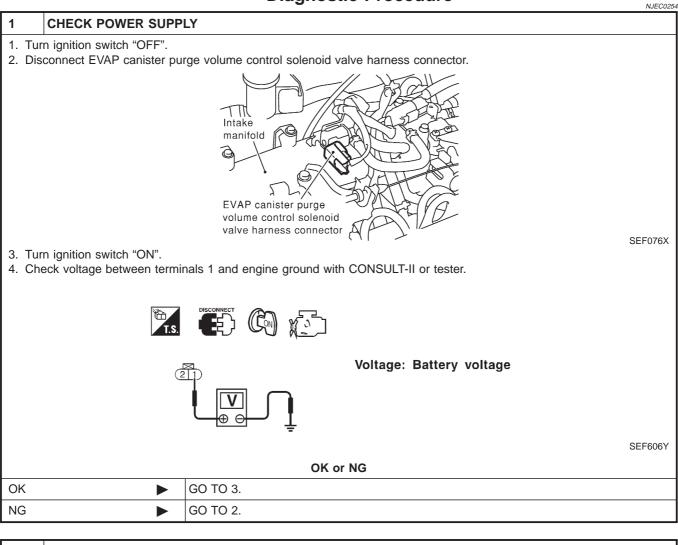




HEC958

Diagnostic Procedure

**Diagnostic Procedure** 



### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E74, F35 (If so equipped)
- Harness connectors M169, F113 (If so equipped)
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse
  - Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT				
	1. Turn ignition switch "OFF".				
-	connect ECM harness co				
3. Che	eck harness continuity bet	ween ECM terminal 14 and terminal 2.			
Ref	er to wiring diagram.				
	Continuity should exist.				
4. Also	o check harness for short	to ground and short to power.			
	OK or NG				
ОК	ОК 🕨 GO TO 4.				
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.				

Diagnostic Procedure (Cont'd)

NJEC0255

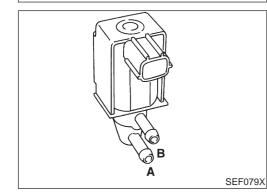
NJEC0255S01

4	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE			
Refer	Refer to "Component Inspection" EC-369.			
	OK or NG			
OK	•	GO TO 5.		
NG		Replace EVAP canister purge volume control solenoid valve.		
5	5 CHECK INTERMITTENT INCIDENT			

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

ACTIVE TES	т	
PURG VOL CONT/V	XXX %	
MONITOR		
ENG SPEED	XXX rpm	
A/F ALPHA-B1	XX %	
A/F ALPHA-B2	XX %	
HO2S1 MNTR (B1)	LEAN	
HO2S1 MNTR (B2)	LEAN	
THRTL POS SEN	X. XX V	
		SEF677Y



# Component Inspection EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

- With CONSULT-II
- 1) Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

If OK, inspection end. If NG, go to following step.

3) Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG or operation takes more than 1 second, replace the EVAP canister purge volume control solenoid valve.

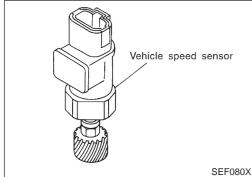
### **Without CONSULT-II**

Check air passage continuity.

Condition	Air passage continuity between A and B	
12V direct current supply between ter- minals	Yes	
No supply	No	

If NG or operation takes more than 1 second, replace the EVAP canister purge volume control solenoid valve.

Component Description



### **Component Description**

N.IEC0272 The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

# **ECM Terminals and Reference Value**

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
86	PU/R	Vehicle speed sensor	<ul> <li>[Engine is running]</li> <li>Lift up the vehicle</li> <li>In 2nd gear position</li> <li>Vehicle speed is 40 km/h (25 MPH)</li> </ul>	2.5 - 3V (V) 15 10 5 0 200 ms SEF976W

# On Board Diagnosis Logic

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0500 0500	<ul> <li>The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.</li> </ul>	<ul> <li>Harness or connector (The vehicle speed sensor circuit is open or shorted.)</li> <li>Vehicle speed sensor</li> </ul>

**DTC Confirmation Procedure** 

NJEC0275

NJEC0274

### **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 9 seconds before conducting the next test.

### **TESTING CONDITION:**

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

NJEC0273

QG

# DTC P0500 VEHICLE SPEED SENSOR (VSS)

DTC Confirmation Procedure (Cont'd)

QG

6	DATA MONIT	DATA MONITOR		
	MONITOR	NO DTC		
	ENG SPEED	XX rpm		
	COOLAN TEMP/S	xxx °c		
	B/FUEL SCHDL X	XX msec		
	PW/ST SIGNAL	OFF		
	VHCL SPEED SE X	XX km/h		
			SEF196Y	

### B With CONSULT-II

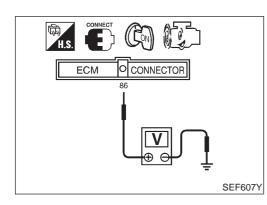
- 1) Start engine
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 3) If NG, go to "Diagnostic Procedure", EC-375. If OK, go to following step.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Warm engine up to normal operating temperature.
- 6) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	2,600 - 4,000 rpm (M/T) 2,600 - 3,000 rpm (A/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.3 - 10.7 msec (M/T) 4.8 - 10.7 msec (A/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-375.

### With GST

Follow the procedure "With CONSULT-II" above.



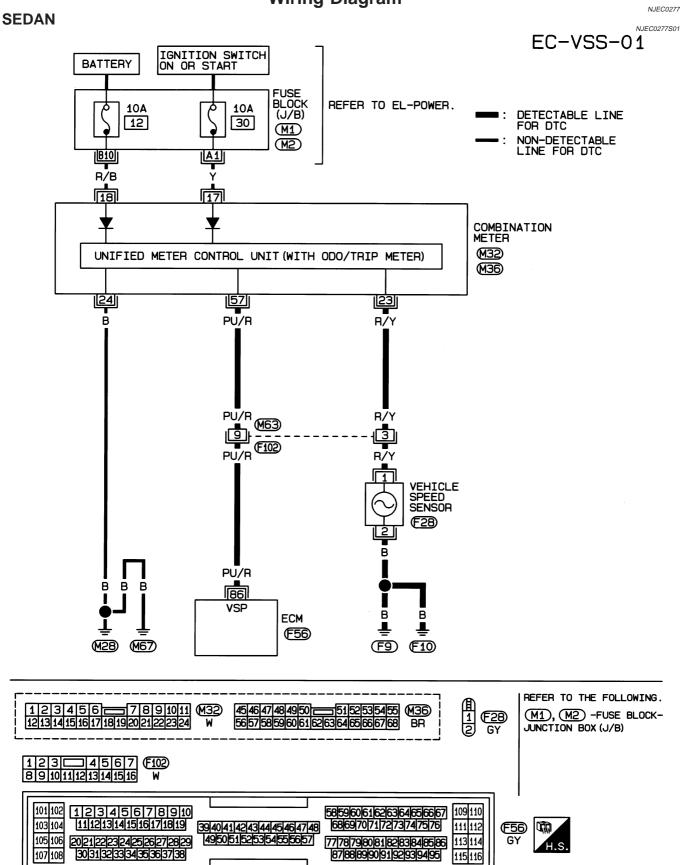
### Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read the voltage signal between ECM terminal 86 (Vehicle speed sensor signal) and ground with oscilloscope.
- 4) Verify that the oscilloscope screen shows the signal wave as shown in the figure.
- 5) If NG, go to "Diagnostic Procedure", EC-375.

# DTC P0500 VEHICLE SPEED SENSOR (VSS)





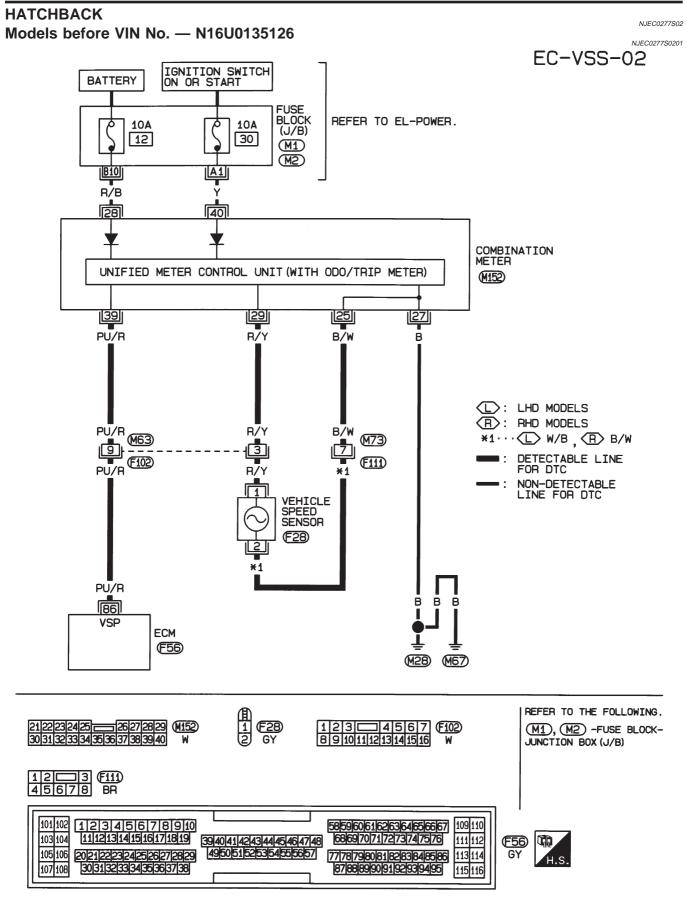


HEC891

# EC-372

QG

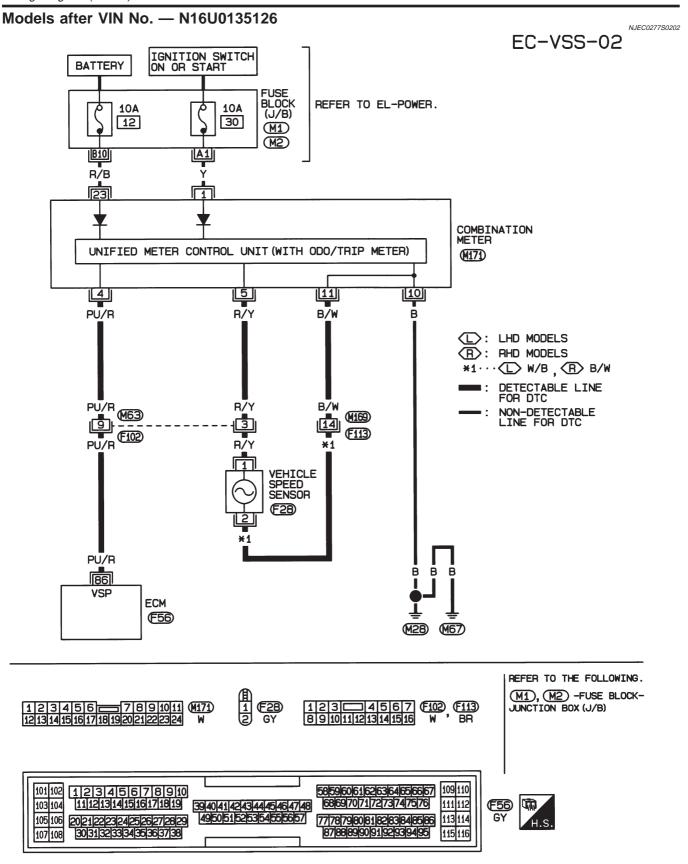
QG Wiring Diagram (Cont'd)



HEC820

# DTC P0500 VEHICLE SPEED SENSOR (VSS)

Wiring Diagram (Cont'd)



HEC959

QG

# DTC P0500 VEHICLE SPEED SENSOR (VSS)

# **Diagnostic Procedure**

		-	NJEC027
1 CHECK	INPUT SIGNAL	CIRCUIT	
<ol> <li>Disconnect E</li> <li>Check harne Refer to wirir</li> <li>Continuit</li> </ol>	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM harness connector and combination meter harness connector.</li> <li>Check harness continuity between ECM terminal 86 and meter terminal 57 (Sedan), 39 or 4 (Hatchback). Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>		
OK or NG			
ОК		GO TO 3.	

### DETECT MALFUNCTIONING PART

Check the following.

NG

2

• Harness connectors M63, F102

• Harness for open or short between ECM and combination meter

GO TO 2.

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

3	CHECK SPEEDOMETE	R FUNCTION				
Make sure that speedometer functions properly.						
	OK or NG					
OK	ОК 🕨 GO TO 5.					
NG	NG 🕨 GO TO 4.					

4	CHECK SPEEDOMETE	R CIRCUIT			
	Check the following.				
	ness connectors M63, F10				
		1 or M169, F113 (Hatchback only)			
		ween combination meter and vehicle speed sensor			
• Har	ness for open or short betw	ween vehicle speed sensor and ground (Sedan only)			
ОК	OK Check combination meter and vehicle speed sensor. Refer to EL-144, "METERS AND GAUGES".				
NG		Repair open circuit or short to ground or short to power in harness or connectors.			

5	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

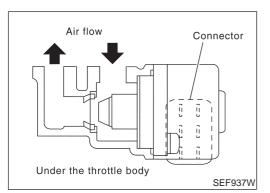
Description

### Description SYSTEM DESCRIPTION

NJEC0279

Sensor	Input Signal to ECM	ECM func- tion	Actuator	
Crankshaft position sensor (POS)	Engine speed		IACV-AAC valve	
Camshaft position sensor (PHASE)	Engine speed and cylinder number			
Engine coolant temperature sensor	Engine coolant temperature	_		
Ignition switch	Start signal	-		
Throttle position sensor	Throttle position	Idle air control		
PNP switch	Park/Neutral position			
Air conditioner switch	Air conditioner operation			
Power steering oil pressure switch	Power steering load signal	-		
Battery	Battery voltage	-		
Vehicle speed sensor	Vehicle speed			
Cooling fan	Cooling fan operation			
Electrical load	Electrical load signal			

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the 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 then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering, cooling fan operation and electrical load).



### COMPONENT DESCRIPTION

IACV-AAC Valve

NJEC0279S02

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

### CONSULT-II Reference Value in Data Monitor Mode

			NJEC0280
MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	<ul><li>Engine: After warming up</li><li>Air conditioner switch: OFF</li></ul>	Idle	5 - 25 steps
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	_

## ECM Terminals and Reference Value

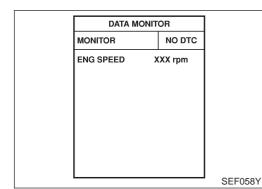
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

# 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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6 7 15 16	BR LG P OR	IACV-AAC valve	[Engine is running] • Warm-up condition • Idle speed	0.1 - 14V

# **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)	
P0505 0505	<ul> <li>An improper voltage signal is sent to ECM through the valve.</li> </ul>	<ul> <li>Harness or connectors (The IACV-AAC valve circuit is open.)</li> <li>IACV-AAC valve</li> </ul>	



# **DTC Confirmation Procedure**

NJEC0283

N.IEC0281

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.
- If the target idle speed is out of the specified value, perform "Idle Air Volume Learning", refer to EC-57, before conducting "DTC Confirmation Procedure". For the target idle speed, refer to "SERVICE DATA AND SPECIFICA-TIONS (SDS)", EC-593.
- With CONSULT-II

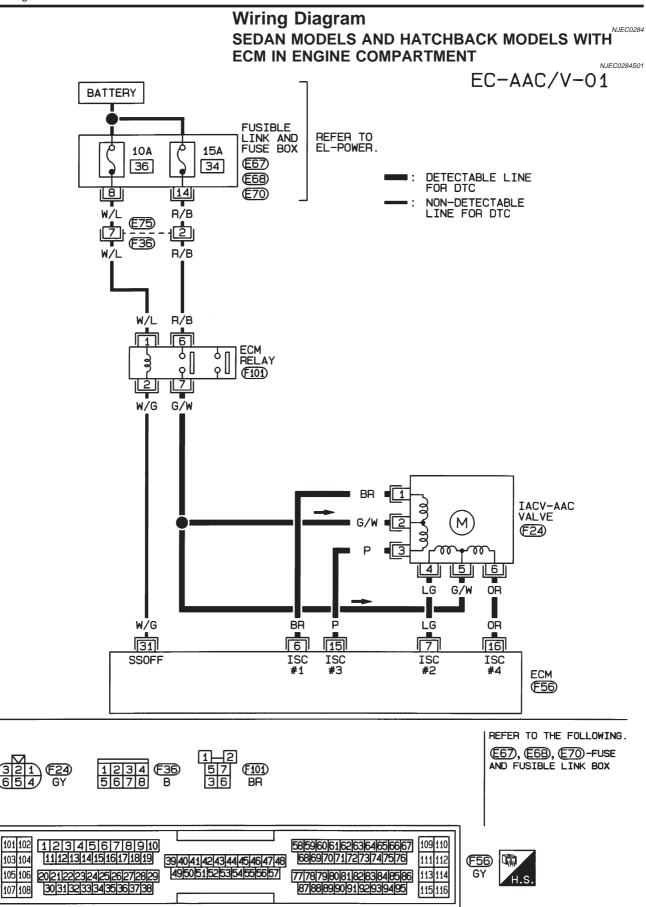
NOTE:

- 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) Rev engine from idle to 2,000 rpm 20 times.
  - If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-357.

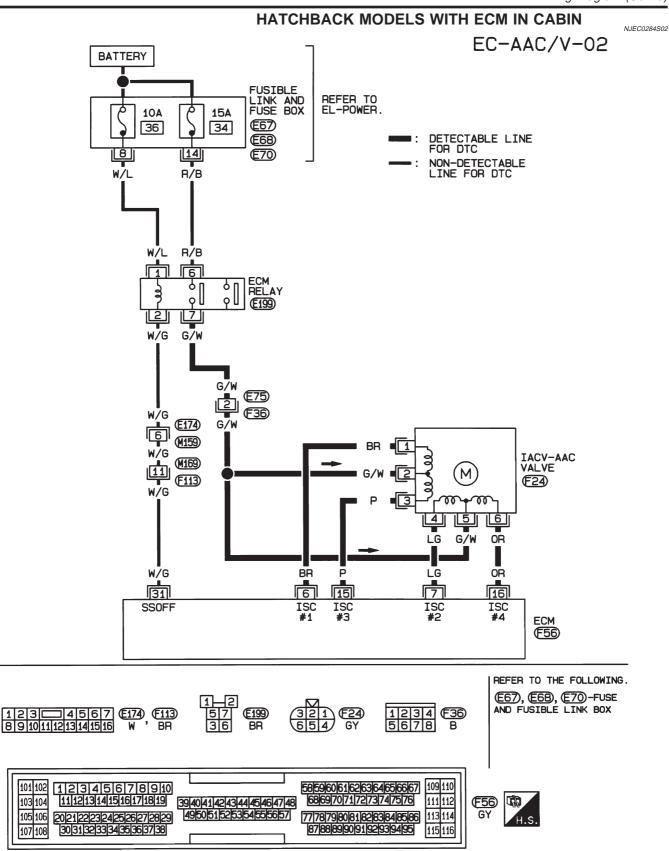
### With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram



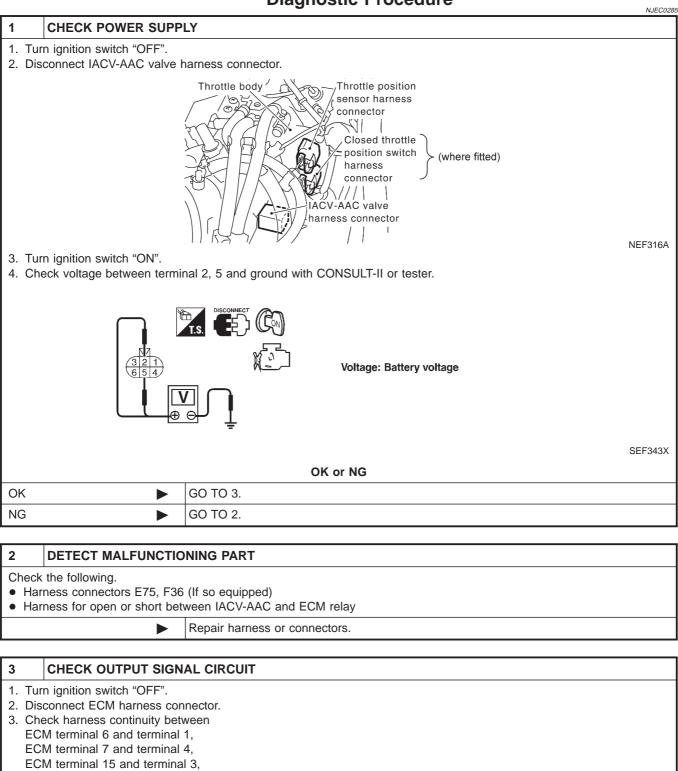
Wiring Diagram (Cont'd)



HEC978

Diagnostic Procedure

# **Diagnostic Procedure**



ECM terminal 16 and terminal 6.

Refer to wiring diagram.

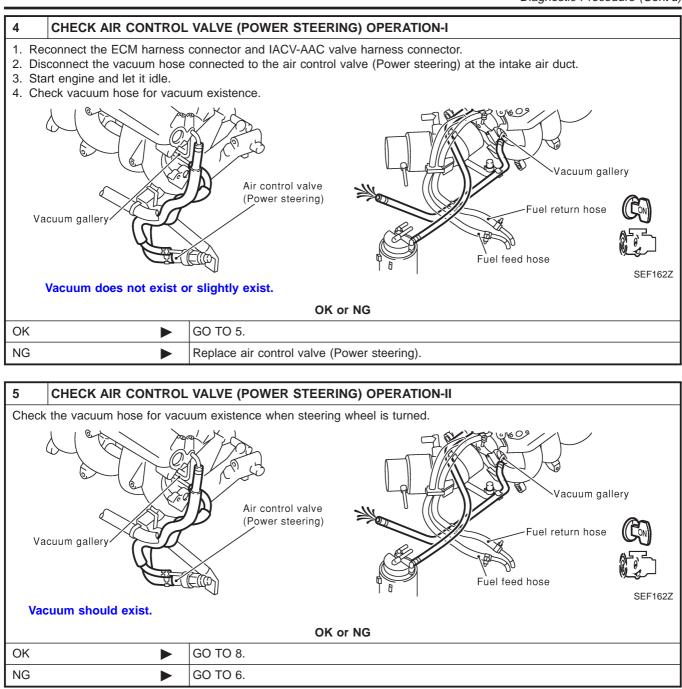
### Continuity should exist.

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

OK or NG

OK 🕨	GO TO 4.
NG	Repair open circuit or short to ground or short to power in harness or connectors.

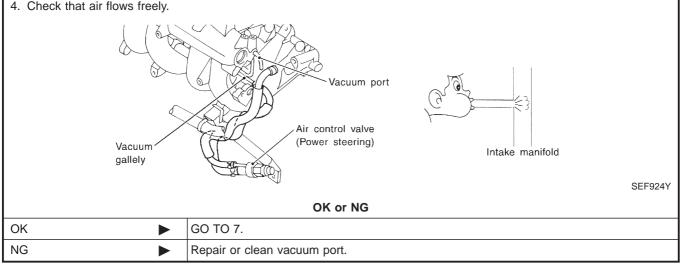
Diagnostic Procedure (Cont'd)



Diagnostic Procedure (Cont'd)

#### 6 CHECK VACUUM PORT

- 1. Stop engine.
- 2. Disconnect the vacuum hose connected to the air control valve (Power steering) at the vacuum port.
- 3. Blow air into vacuum port.
- 4. Check that air flows freely.



#### CHECK VACUUM HOSES AND TUBES 7

- 1. Disconnect vacuum hoses between the air control valve (Power steering) and vacuum port, air control valve (Power steering) and air duct.
- 2. Check hoses and tubes for cracks, clogging, improper connection or disconnection.

	O Split			
Clogging				
	Improper connection SEF109L			
OK or NG				
ОК	GO TO 8.			
NG	Repair hoses or tubes.			

8	CHECK IACV-AAC VALVE					
Refer	Refer to "Component Inspection", EC-384.					
	OK or NG					
ОК	ОК 🕨 GO TO 10.					
NG	NG 🕨 GO TO 9.					

Diagnostic Procedure (Cont'd)

9	REPLACE IACV-AAC V	ALVE			
2. Per	Replace IACV-AAC valve assembly.     Perform "Idle Air Volume Learning", EC-57.     Is the result CMPLT or INCMP?				
		CMPLT or INCMP			
CMPL	Т 🕨	INSPECTION END			
INCM	▷ ►	Follow the construction of "Idle Air Volume Learning".			
10	CHECK TARGET IDLE	SPEED			
<ul> <li>3. Sta</li> <li>4. Als</li> <li>For cate</li> <li>For</li> <li>5. Sto</li> <li>6. Che</li> </ul>	<ol> <li>Reconnect all harness connectors and vacuum hoses.</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Also warm up transmission to normal operating temperature.</li> <li>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.</li> <li>For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.</li> <li>Stop vehicle with engine running.</li> <li>Check target idle speed. M/T: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position)</li> </ol>				
ОК	✓ GO TO 11.				
NG	NG  Perform "Idle Air Volume Learning", EC-57.				
11	11 CHECK INTERMITTENT INCIDENT				

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

Component Inspection

SEF603

# Component Inspection

NJEC0286 NJEC0286S01

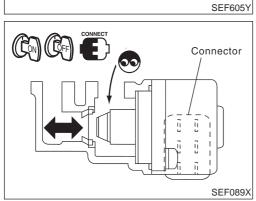
- Disconnect IACV-AAC valve harness connector.
   Check IACV AAC valve registered.
- 2) Check IACV-AAC valve resistance.

Condition	Resistance	
Terminal 2 and terminals 1, 3	- 20 - 24Ω [at 20°C (68°F)]	
Terminal 5 and terminals 4, 6		

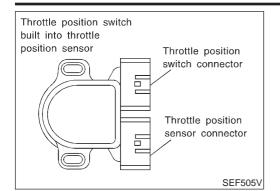
- 3) Reconnect IACV-AAC valve harness connector.
- 4) Remove idle air adjusting unit assembly (IACV-AAC valve is built-in) from engine.

(The IACV-AAC valve harness connector should remain connected.)

5) Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve shaft smoothly moves forward and backward, according to the ignition switch position. If NG, replace the IACV-AAC valve.



Component Description



### **Component Description**

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

# CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	• Engine: Idle	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

### **ECM** Terminals and Reference Value

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40 Y/Pt	V/DU	Throttle position switch	<ul><li>[Engine is running]</li><li>Accelerator pedal released</li></ul>	BATTERY VOLTAGE (11 - 14V)
	T/PU	(Closed position)	<ul><li>[Engine is running]</li><li>Accelerator pedal depressed</li></ul>	Approximately 0V

# **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)	
P0510 0510	<ul> <li>Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.</li> </ul>	<ul> <li>Harness or connectors (The closed throttle position switch circuit is shorted.)</li> <li>Closed throttle position switch</li> <li>Throttle position sensor</li> </ul>	

4	DATA MON		
	MONITOR NO DTC		
	ENG SPEED	XXX rpm	
	COOLAN TEMP/S	XXX °C	
	CLSD THL/P SW	ON	
			055407
1			SEF197

# **DTC Confirmation Procedure**

NJEC0290

N.IEC0289

NJEC0288

### **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 9 seconds before conducting the next test.

### () With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF", wait at least 9 seconds and then start engine.

EC-385

DTC Confirmation Procedure (Cont'd)

- Select "CLSD THL/P SW" in "DATA MONITOR" mode. If "CLSD THL/P SW" is not available, go to step 5.
- 4) Check the signal under the following conditions.

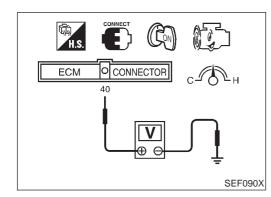
Condition	Signal indication		
Throttle valve: Idle position	ON		
Throttle valve: Slightly open	OFF		

If the result is NG, go to "Diagnostic Procedure", EC-388. If OK, go to following step.

- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.3V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving pattern	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-388.



### **Overall Function Check**

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

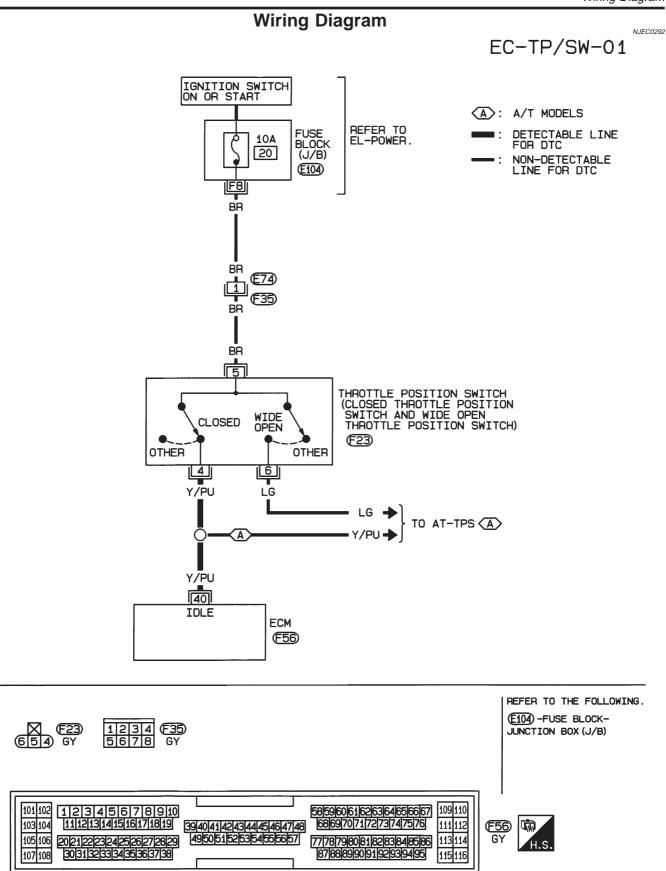
### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- Check the voltage between ECM terminal 40 (Closed throttle position switch signal) and ground under the following conditions.

Condition	Voltage		
At idle	Battery voltage		
At 2,000 rpm	Approximately 0V		

3) If NG, go to "Diagnostic Procedure", EC-388.

DTC P0510 CLOSED THROTTLE POSITION SWITCH (WHERE FITTED) QG Wiring Diagram



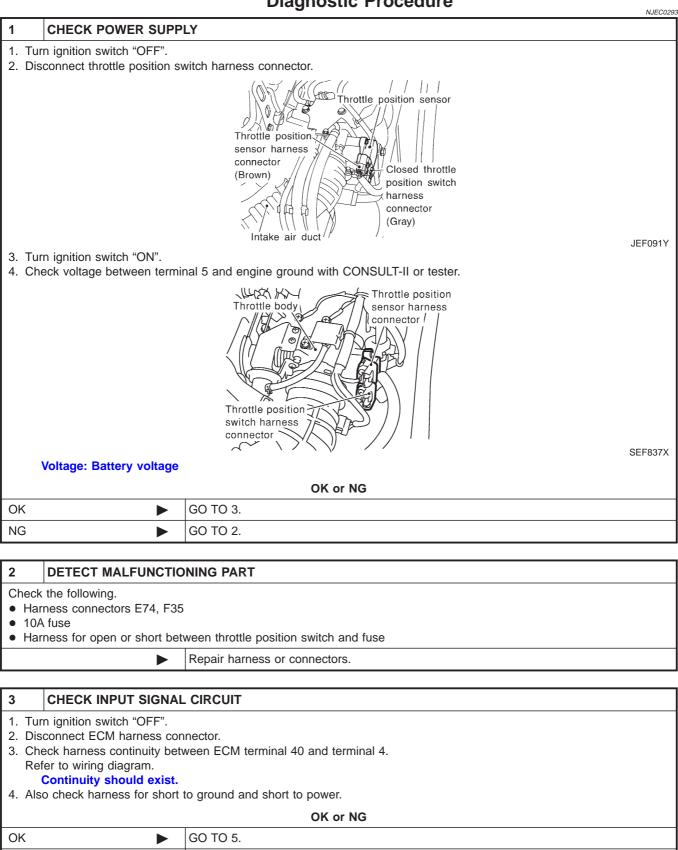
HEC799

### Diagnostic Procedure

NG

GO TO 4.

**Diagnostic Procedure** 



Diagnostic Procedure (Cont'd)

### 4 DETECT MALFUNCTIONING PART

### Check the following.

- Harness for open or short between throttle position switch and ECM
- Harness for open or short between throttle position switch and TCM (Transmission Control Module)

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

### 5 ADJUST THROTTLE POSITION SWITCH IDLE POSITION

Perform Basic Inspection, EC-100.

GO TO 6.

6	CHECK CLOSED THRO	CHECK CLOSED THROTTLE POSITION SWITCH			
Refer to "Component Inspection", EC-389.					
	OK or NG				
ОК	OK 🕨 GO TO 7.				
NG	NG   Replace throttle position switch.				
<u> </u>					

7	CHECK THROTTLE POSITION SENSOR				
Refer to "Component Inspection", EC-214.					
	OK or NG				
OK	OK 🕨 GO TO 8.				
NG	NG   Replace throttle position sensor.				

8	CHECK INTERMITTENT INCIDENT				
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.				
	► INSPECTION END				

	DATA MONITOR		
MONIT	MONITOR N		
ENG SI	PEED	XXX rpm	
COOLA	N TEMP/S	xxx °c	
CLSD T	'HL/P SW	ON	

# Component Inspection CLOSED THROTTLE POSITION SWITCH

NJEC0294

NJEC0294S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and turn ignition switch "ON".
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check indication of "CLSD THL/P SW" under the following conditions.

### NOTE:

Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

5) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

### **Without CONSULT-II**

Component Inspection (Cont'd)

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF".
- 3) Disconnect throttle position switch harness connector.
- 4) Check continuity between terminals 4 and 5 under the following conditions. Refer to wiring diagram.

### NOTE:

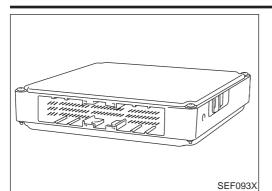
Continuity measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

5) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

# DTC P0605 ECM

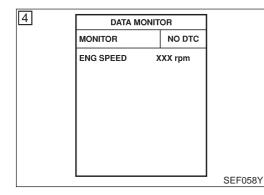


### **Component Description**

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

# On Board Diagnosis Logic

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P0605 0605	<ul> <li>ECM calculation function is malfunctioning.</li> </ul>	• ECM



# **DTC Confirmation Procedure**

NJEC0297

NJEC0296

**NOTE:** If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

### (P) With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 1 second at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-392.

### With GST

Follow the procedure "With CONSULT-II" above.

INCMP

	=NJEC					
1	INSPECTION START					
1. Turn 2. Sele 3. Touc 4. Perf See	<ul> <li>With CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>2. Select "SELF DIAG RESULTS" mode with CONSULT-II.</li> <li>3. Touch "ERASE".</li> <li>4. Perform "DTC Confirmation Procedure". See EC-391.</li> <li>5. Is the 1st trip DTC P0605 displayed again?</li> </ul>					
<ol> <li>Turn</li> <li>Sele</li> <li>Touc</li> <li>Touc</li> <li>Perf</li> <li>See</li> </ol>	<ul> <li>With GST</li> <li>1. Turn ignition switch "ON".</li> <li>2. Select MODE 4 with GST.</li> <li>3. Touch "ERASE".</li> <li>4. Perform "DTC Confirmation Procedure". See EC-391.</li> <li>5. Is the 1st trip DTC P0605 displayed again?</li> </ul>					
		Yes or No				
Yes		GO TO 2.				
No	•	INSPECTION END				
2	2 REPLACE ECM					
<ol> <li>Replace ECM.</li> <li>Perform initialization of NATS (NISSAN ANTI-THEFT SYSTEM) system and registration of all NATS ignition key IDs. Refer to "NATS (NISSAN ANTI-THEFT SYSTEM)", EC-74.</li> <li>Perform "Idle Air Volume Learning", EC-57, Is the result CMPLT or INCMP?</li> </ol>						
	CMPLT or INCMP					
CMPLT		INSPECTION END				

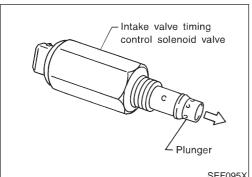
Follow the construction of "Idle Air Volume Learning".

QG

Component Description

NJEC0516

NJEC0517



### **Component Description**

NJEC0513 The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.

The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.

When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.

SEF095X

# Operation

		•				NJEC0514
Engine operating condition			Intake valve tim-	Intake valve		
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch	ing control sole- noid valve	opening and closing time	Valve overlap
20°C (68°F) - 70°C (158°F)	1,150 - 4,600 rpm	Above 3 msec	OFF	ON	Advance	Increased
Above 70°C (158°F)		Above 7 msec	OFF	ON	Advance	Increased
Conditions other than those above			OFF	Normal	Normal	

### **CONSULT-II Reference Value in Data Monitor** Mode

			NJEC0515
MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL-B1	<ul> <li>Engine: After warming up</li> <li>Lift up drive wheels and suitable goar position</li> </ul>	Idle	OFF
		Revving engine from 2,000 to 3,000 rpm	ON

# **ECM Terminals and Reference Value**

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	1     Y/R     Intake valve timing control solenoid valve     [Engine is running]       • Idle speed			BATTERY VOLTAGE (11 - 14V)

# **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1111 1111	<ul> <li>An improper voltage signal is entered to ECM through intake valve timing control solenoid valve.</li> </ul>	<ul> <li>Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.)</li> <li>Intake valve timing control solenoid valve</li> </ul>

# DTC P1111 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

DTC Confirmation Procedure

DATA MON		
MONITOR	NO DTC	
ENG SPEED	XXX rpm	
COOLAN TEMP/S	XXX °C	
THRTL POS SEN	XXX V	
B/FUEL SCHDL	XXX msee	
INT/V SOL-BL	OFF	
		SEF608Y

### **DTC Confirmation Procedure**

NJEC0518

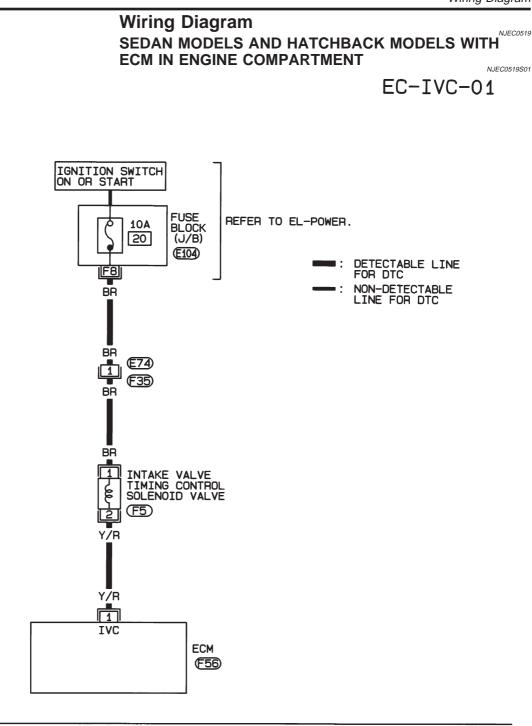
**NOTE:** If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

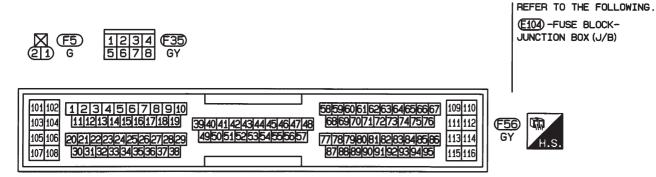
### (I) With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-397.

### **Without CONSULT-II**

- 1) Turn ignition switch "ON", wait at least 5 seconds.
- 2) Perform "Diagnostic Test Mode II" (Self-diagnostic results), EC-74.
- If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-397.





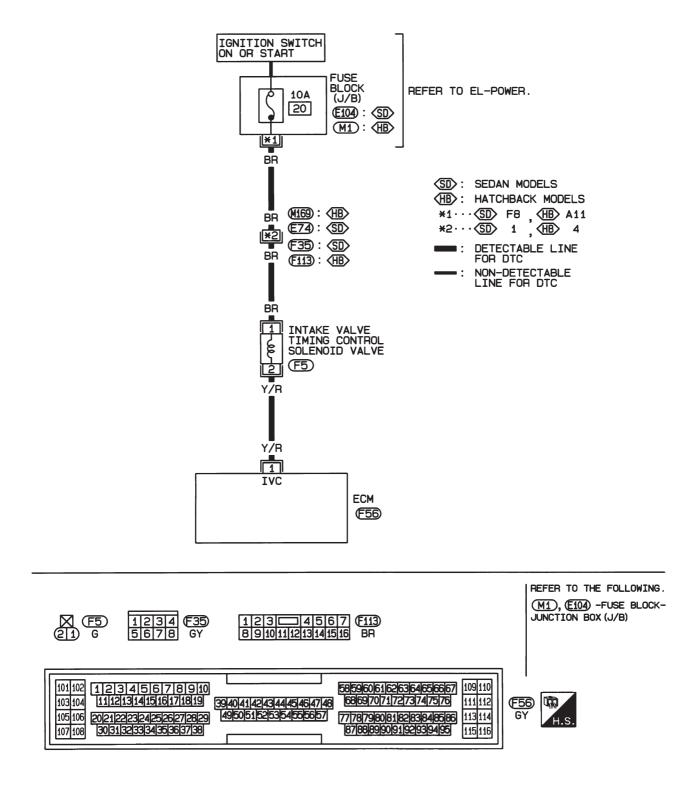
DTC P1111 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Wiring Diagram (Cont'd)

# HATCHBACK MODELS WITH ECM IN CABIN

EC-IVC-01

NJEC0519S02

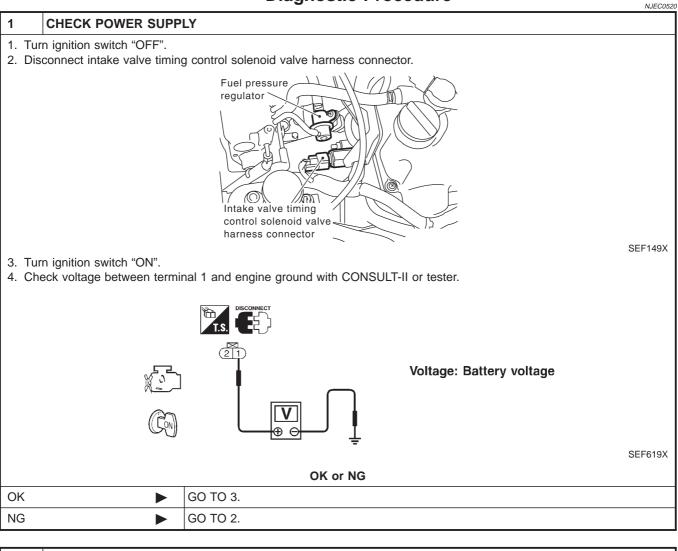


HEC960

Diagnostic Procedure

QG

### **Diagnostic Procedure**



#### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F35, E74 (If so equipped)
- Harness connectors M169, F113 (If so equipped)

- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

Repair harness or connectors.

#### 3 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".

- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve harness connector terminal 2. Refer to wiring diagram.

Continuity should exist.

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

OK or NG		
ОК	GC	O TO 4.
NG	Re	epair open circuit or short to ground to short to power or connectors.

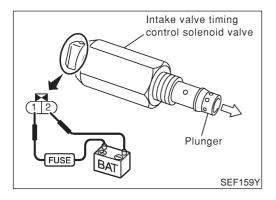
## DTC P1111 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

4	CHECK VALVE TIMING CONTROL SOLENOID VALVE		
Refer	Refer to "Component Inspection", EC-398.		
	OK or NG		
OK		GO TO 5.	
NG		Replace valve timing control solenoid valve.	
5 CHECK INTERMITTENT INCIDENT			

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END



## Component Inspection INTAKE VALVE TIMING CONTROL SOLENOID VALVE

- 1. Check oil passage visually for any metal debris.
- 2. Supply intake valve timing control solenoid valve terminals with battery voltage.
- Make sure that inside plunger protrudes. If NG, replace intake valve timing control solenoid valve.

### Description

N.IEC0522

### Description

#### SYSTEM DESCRIPTION

			NJEC0522S01
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Throttle position sensor	Throttle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed	Swirl con- trol valve noid valve via swirl control valve co	
Camshaft position sensor (PHASE)	Engine speed and cylinder number	system control	valve
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.

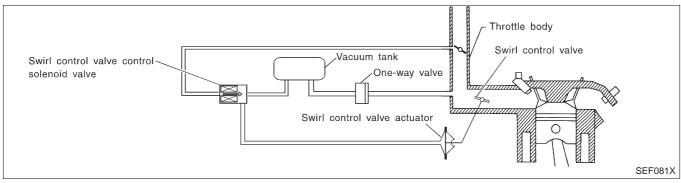
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

### **OPERATION**

				NJEC0522S02
Engine coolant tempera- ture	Throttle position sensor (Idle position)	Engine speed	Swirl control valve con- trol solenoid valve	Swirl control valve
15 - 40°C	ON	—	ON Closed	
15 - 40 C	OFF	Below 2,400 rpm*		Closed
Except above			OFF	Open

\*: The value may vary according to accelerator pedal operation.



## CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	<ul> <li>Engine speed: Idle</li> </ul>	Engine coolant temperature is between 15°C (59°F) to 40°C (104°F).	ON
		Engine coolant temperature is above 40°C (104°F).	OFF

ECM Terminals and Reference Value

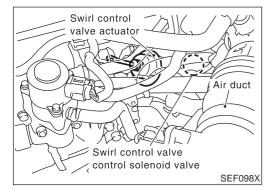
### **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
104		B Swirl control valve control	<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is between 15°C (59°F) to 40°C (104°F).</li> <li>Idle speed</li> </ul>	0 - 1V
104	30		<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is above 40°C (104°F).</li> <li>Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)



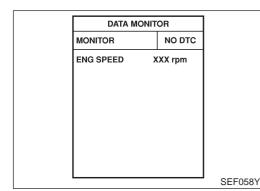
## **Component Description**

### SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

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.

## **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1131 1131	An improper voltage signal is sent to ECM through swirl control valve control solenoid valve.	<ul> <li>Harness or connectors (The swirl control valve control solenoid valve circuit is open or shorted.)</li> <li>Swirl control valve control solenoid valve</li> </ul>



## **DTC Confirmation Procedure**

NJEC0527

N.IEC0526

=N.IEC0524

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### (P) With CONSULT-II

NOTE:

- 1) Turn ignition switch "OFF" and wait at least 9 seconds, then turn ignition switch ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.

EC-400

DTC Confirmation Procedure (Cont'd)

If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-403.

(a) With GST

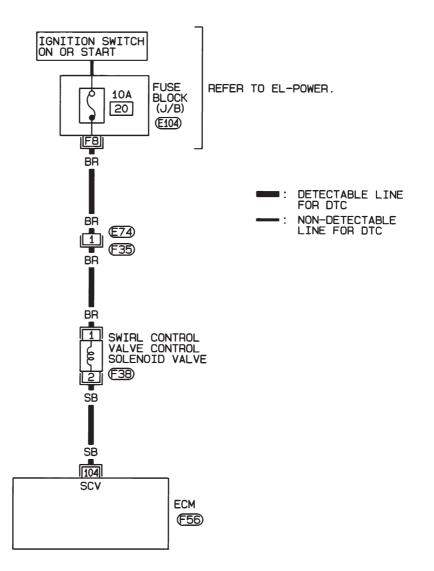
Follow the procedure "With CONSULT-II" above.

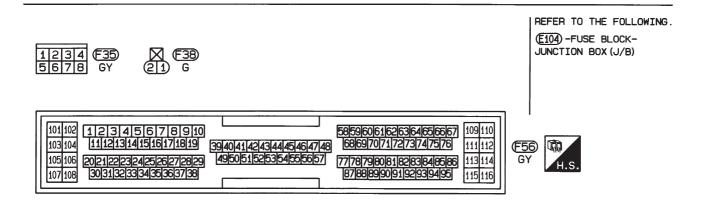
Wiring Diagram

Wiring Diagram

EC-SWL/V-01

N.IEC0528





HEC802

Diagnostic Procedure

### **Diagnostic Procedure**

		Plaghtonio i roodalio	NJEC0529
1	INSPECTION START		
Do you	u have CONSULT-II?		
		Yes or No	
Yes	•	GO TO 2.	
No	•	GO TO 3.	

#### 2 CHECK CIRCUIT

1. Perform "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.

2. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

#### OK or NG

ОК	GO TO 6.	
NG	GO TO 3.	

3	CHECK POWER SUPPI	_Y	
2. Tur	<ol> <li>Disconnect swirl control valve control solenoid valve harness connector.</li> <li>Turn ignition switch "ON".</li> <li>Check voltage between terminal 2 and ground with CONSULT-II or tester.</li> </ol>		
	Voltage: Battery voltage		
		SEF619X	
		OK or NG	
OK		GO TO 5.	
NG		GO TO 4.	

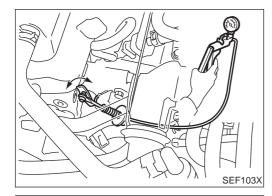
4	DETECT MALFUNCTIONING PART		
Check	Check the following.		
• Har	Harness connectors E74, F35		
	• 10A fuse		
• Har	<ul> <li>Harness for open or short between swirl control valve control solenoid valve and fuse</li> </ul>		
	Repair harness or connectors.		

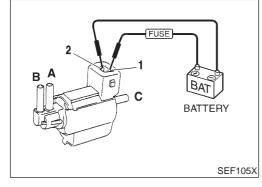
Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGI	NAL CIRCUIT	
2. Dis 3. Ch terr Re	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 104 and swirl control valve control solenoid valve harness connector terminal 2 with CONSULT-II or tester.</li> <li>Refer to wiring diagram.</li> <li>Continuity should exist.</li> <li>If OK, check harness for short to ground and short to power.</li> </ol>		
	OK or NG		
OK		GO TO 6.	
NG		Repair open circuit, short to ground or short to power in harness connectors.	
6	1		

6 CHECK	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE			
Refer to "COMPONENT INSPECTION", EC-404.				
OK or NG				
ОК		GO TO 7.		
NG	NG   Replace swirl control valve control solenoid valve.			

7	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			





## Component Inspection SWIRL CONTROL VALVE AND ACTUATOR

NJEC0530

Supply vacuum to actuator and check swirl control valve operation.

Condition	Swirl control valve
Supply vacuum to actuator	Close
No supply	Open

If NG, replace swirl control valve and actuator.

### SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Check solenoid valve air passage continuity.

#### () With CONSULT-II

Turn ignition switch "ON" and perform "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.

Condition SWIRL CONT SOL/V	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

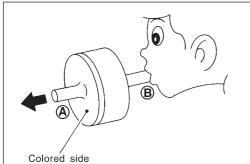
Component Inspection (Cont'd)

# If NG or operation takes more than 1 second, replace solenoid valve.

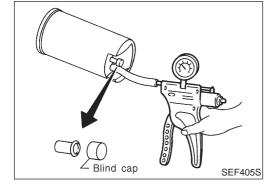
#### **Without CONSULT-II**

Condition	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	

If NG or operation takes more than 1 second, replace solenoid valve.



SEF106X



### **ONE-WAY VALVE**

Check one-way valve air passage continuity.

Condition	Air passage continuity
Blow air from side B to A	Yes
Blow air from side A to B	No

If NG, replace one-way valve.

### VACUUM TANK

Check vacuum tank leakage.

NJEC0530S04

NJEC0530S03

Apply vacuum -80.0 kPa (-800 mbar, -600 mmHg, -23.62 inHg, -11.60 psi). Then keep it for 10 seconds and check there is no leakage.

If NG, replace vacuum tank.

### **System Description**

NJEC0433S01

QG

#### COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM func- tion	Actuator
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner "ON" signal	Cooling fan control	Cooling fan relay(s)
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has ON-OFF control.

#### **OPERATION**

Engine coolant temperatures at which the cooling fan turns "ON" are indicated in the Table below.

		Vehicle speed km/h (MPH)		
Air conditioner switch	High pressure of refrigerant kPa (bar, kg/cm², psi)	Less than 50 (30)	50 - 80 (30 - 50)	More than 80 (50)
011	More than 1,680 (16.8, 17.14, 244)	Always	Always	More than 95°C (203°F)
ON	Less than 1,680 (16.8, 17.14, 244)	Always	More than 95°C (203°F)	More than 95°C (203°F)
OFF		More than 100°C (212°F)	More than 95°C (203°F)	More than 95°C (203°F)

### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NJEC0486

MONITOR ITEM	CONDITION		SPECIFICATION
	Engine: After warming up, idle	Air conditioner switch: OFF	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON
	• After warming up engine, idle	Engine coolant temperature is less than 100°C (212°F)	OFF
COOLING FAN	<ul><li>he engine.</li><li>Air conditioner switch: OFF</li></ul>	Engine coolant temperature is 100°C (212°F) or more	ON

ECM Terminals and Reference Value

QG

=N.JEC0487

### ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10			<ul><li>[Engine is running]</li><li>Cooling fan is not operating</li></ul>	BATTERY VOLTAGE (11 - 14V)
13   LG/R	Cooling fan relay	<ul><li>[Engine is running]</li><li>Cooling fan is operating</li></ul>	0 - 0.6V	
23	23 L/W Air conditioner sw		<ul> <li>[Engine is running]</li> <li>Both air conditioner switch and blower switch are "ON" (Compressor operates)</li> </ul>	Approximately 0V
			<ul><li>[Engine is running]</li><li>Air conditioner switch is "OFF"</li></ul>	BATTERY VOLTAGE (11 - 14V)

## On Board Diagnosis Logic

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature co	ondition, a malfunction is
indicated.	

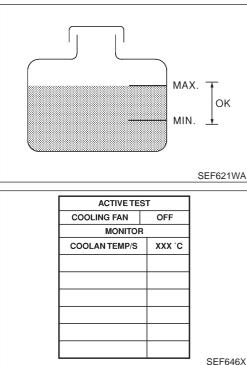
DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1217 1217	• The engine coolant temperature is extraordinary high, even when the load is not heavy.	<ul> <li>Harness or connectors (The cooling fan circuit is open or shorted)</li> <li>Cooling fan</li> <li>Thermostat</li> <li>Improper ignition timing</li> <li>Engine coolant temperature sensor</li> <li>Blocked radiator</li> <li>Blocked front end (Improper fitting of nose mask)</li> <li>Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)</li> <li>Blocked air passage by improper installation of front fog lamp or fog lamps.</li> <li>Improper mixture ratio of coolant</li> <li>Damaged bumper</li> <li>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-416.</li> </ul>

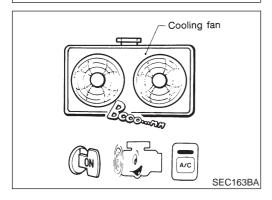
#### CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the LC-18, "Changing Engine Coolant". Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-18, "Anti-freeze Coolant Mixture Ratio", "RECOM-MENDED FLUIDS AND LUBRICANTS".
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

On Board Diagnosis Logic (Cont'd)





### **Overall Function Check**

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

#### WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

(R) With CONSULT-II

1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-410.
- If the coolant mixture ratio is out of the range of 45 to 55%. replace the coolant in the following procedure LC-18, "Changing Engine Coolant".
- Confirm whether customer filled the coolant or not. If customer 2) filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-410.
- Turn ignition switch "ON". 3)
- 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CON-SULT-II.
- 5) If the results are NG, go to "Diagnostic Procedure", EC-410.

#### Without CONSULT-II

- 1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator. Allow engine to cool before checking coolant level and mixture ratio.
- If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-410.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure LC-18, "Changing Engine Coolant".
- Confirm whether customer filled the coolant or not. If customer 2) filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-410.
- 3) Start engine.

#### Be careful not to overheat engine.

- 4) Set temperature control lever to full cold position.
- 5) Turn air conditioner switch "ON".
- Turn blower fan switch "ON". 6)
- 7) Run engine at idle for a few minutes with air conditioner operating.

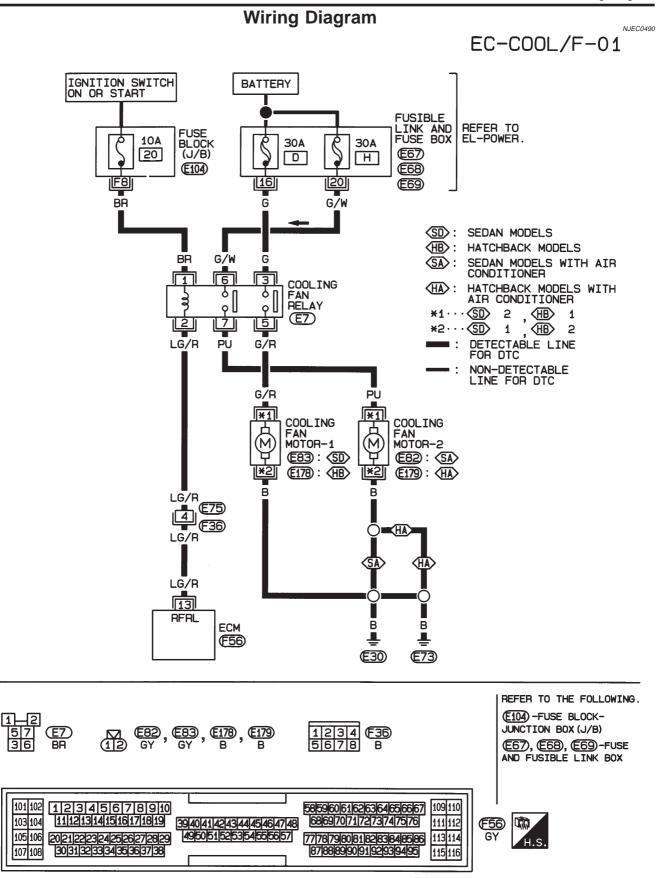
#### Be careful not to overheat engine.

8) Make sure that cooling fan operates. Refer to "OPERATION" table for cooling fan, EC-406.

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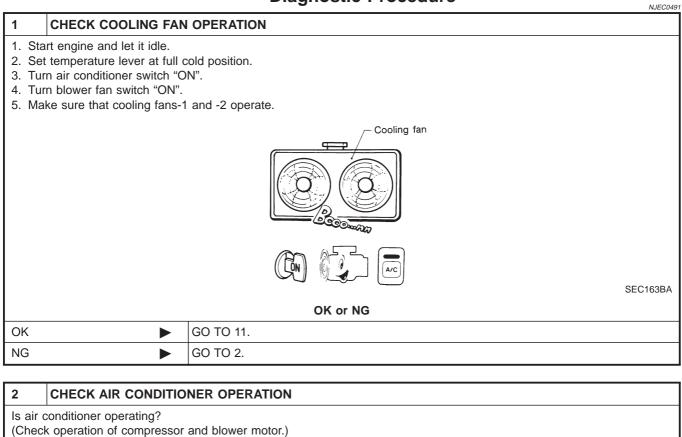
N IEC0489

**QG** Wiring Diagram



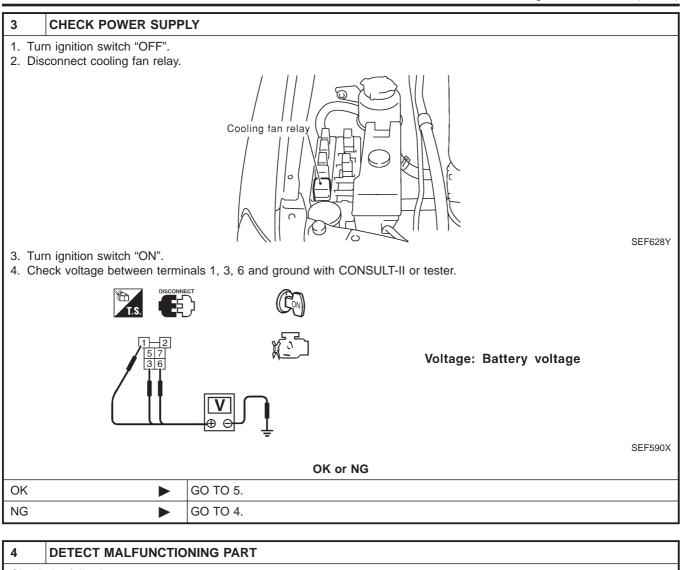
HEC805

### **Diagnostic Procedure**



	OK or NG			
ОК		GO TO 3.		
NG		Check for failure of air conditioner to operate. Refer to HA section.		

VI)
Diagnostic Procedure (Cont'd)



Check the following.

- 10A fuse
- 30A fusible link
- Harness for open or short between cooling fan relay and fuse

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

Diagnostic Procedure (Cont'd)

5	CHECK GROUND CIRCUIT				
1. Tu	rn ignition switch "OFF".				
2. Dis	2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.				
	Cooling fan motor-1 harness connector Cooling fan motor-2 harness connector				
Re 4. Als 5. Ch Re	SEF609Y heck harness continuity between relay terminal 5 and motor-1 terminal 2, motor-1 terminal 1 and body ground. effer to wiring diagram. Continuity should exist. so check harness for short to ground and short to power. heck harness continuity between relay terminal 7 and motor-2 terminal 2, motor-2 terminal 1 and body ground. effer to wiring diagram. Continuity should exist. so check harness for short to ground and short to power. So check harness for short to ground and short to power.				
	OK or NG				
ОК	► GO TO 6.				
NG	Repair open circuit or short to ground or short to power in harness or connectors.				
6	CHECK OUTPUT SIGNAL CIRCUIT				
2. Ch	sconnect ECM harness connector. neck harness continuity between ECM terminal 13 and relay terminal 2. Refer to wiring diagram. Continuity should exist. so check harness for short to ground and short to power.				
	OK or NG				
ок	► GO TO 8.				

	OK	GO 10 8.
	NG	GO TO 7.
1		

7	DETECT MALFUNCTIO	NING PART			
Check	the following.				
• Har	Harness connectors E75, F36				
• Har	<ul> <li>Harness for open or short between cooling fan relay and ECM</li> </ul>				
		Repair open circuit or short to ground or short to power in harness or connectors.			

8	CHECK COOLING FAN	RELAY			
Refer to "Component Inspection", EC-416.					
OK or NG					
OK		GO TO 9.			
NG	NG   Replace cooling fan relay.				

Diagnostic Procedure (Cont'd)

QG

9	CHECK COOLING FAN	I MOTORS-1 AND -2		
Refer to "Component Inspection", EC-416.				
OK or NG				
OK	•	GO TO 10.		
NG   Replace cooling fan motors.				

#### 10 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

11	CHECK COOLING SYS	TEM FOR LEAK
Te: CAUT	sting pressure: 157 kPa( ION:	stem with a tester, and check if the pressure drops. 1.57 bar, 1.6 kg/cm <sup>2</sup> , 23 psi) sure may cause radiator damage.
		Hose adapter EG17650301 (J33984-A) SLC754A
Press	ure should not drop.	5L0754A
		OK or NG
ОК		GO TO 12.
NG		Check the following for leak <ul> <li>Hose</li> <li>Radiator</li> <li>Water pump Refer to LC-14, "Water Pump".</li> </ul>

Diagnostic Procedu		
12 CHECK F	RADIATOR CAP	
Apply pressure to	cap with a tester.	
	EG17650301 (J33984-A)	01 0777
Padiator can	relief pressure:	SLC755A
	a (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi)	
<u></u>	OK or NG	
OK	► GO TO 13.	
NG	Replace radiator cap.	
13 CHECK T	THERMOSTAT	
1 Charlessales		
	eating condition at normal room temperatures.	
It should seat		
	t tightly.	
	t tightly.	
	t tightly. pening temperature and valve lift.	
	t tightly. pening temperature and valve lift.	
2. Check valve o	t tightly. pening temperature and valve lift.	SLC343
2. Check valve o Valve oper	t tightly. pening temperature and valve lift.	SLC343
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2. Check valve o Valve oper 82°C (18 Valve lift: More th 3. Check if valve For details, refer OK NG 14 CHECK E	t tightly. pening temperature and valve lift.	SLC343
2. Check valve o Valve oper 82°C (18 Valve lift: More th 3. Check if valve For details, refer OK NG 14 CHECK E	t tightly. pening temperature and valve lift.	SLC343
2. Check valve o Valve oper 82°C (18 Valve lift: More th 3. Check if valve For details, refer OK NG 14 CHECK E Refer to "COMPC	t tightly. pening temperature and valve lift.	SLC343

Diagnostic Procedure (Cont'd)

QG

15 CHECK MAIN 12 CAUSES
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If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-416.

► INSPECTION END

					=NJEC0492
Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul>	Visual	No blocking	_
	2	Coolant mixture	Coolant tester	50 - 50% coolant mixture	See MA-16, "RECOM- MENDED FLUIDS AND LUBRICANTS".
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See LC-18, "Changing Engine Coolant".
	4	Radiator cap	Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit)	See LC-10, "System Check".
ON*2	5	Coolant leaks	Visual	No leaks	See LC-10, "System Check".
ON*2	6	Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-15, "Thermostat" and LC-16, "Radiator".
ON*1	7	Cooling fan	CONSULT-II	Operating	See "TROUBLE DIAG- NOSIS FOR OVER- HEAT" (EC-406).
OFF	8	Combustion gas leak	Color checker chemi- cal tester 4 Gas ana- lyzer	Negative	_
ON* <sup>3</sup>	9	Coolant temperature     gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driv- ing and idling	See LC-18, "Changing Engine Coolant".
OFF*4	10	Coolant return from reservoir tank to radia- tor	Visual	Should be initial level in reservoir tank	See LC-19, "Refilling Engine Coolant".
OFF	11	Cylinder head	<ul> <li>Straight gauge feeler gauge</li> </ul>	0.1 mm (0.004 in) Maxi- mum distortion (warping)	See EM-37, "Inspection", "CYLINDER HEAD".
	12	<ul> <li>Cylinder block and pistons</li> </ul>	Visual	No scuffing on cylinder walls or piston	See EM-56, "Inspection", "CYLINDER BLOCK".

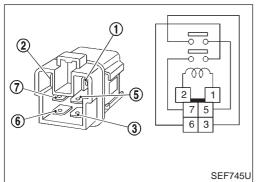
\*1: Turn the ignition switch ON.

\*2: Engine running at 3,000 rpm for 10 minutes.

\*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

\*4: After 60 minutes of cool down time.

For more information, refer to LC-24, "OVERHEATING CAUSE ANALYSIS".



### Component Inspection COOLING FAN RELAY

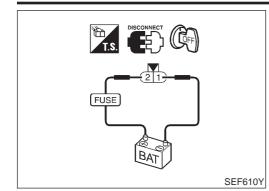
NJEC0493 NJEC0493S01

Check continuity between terminals 3 and 5, 6 and 7.

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

If NG, replace relay.

QG Component Inspection (Cont'd)



### **COOLING FAN MOTORS-1 AND -2**

- 1. Disconnect cooling fan motor harness connectors.
- 2. Supply cooling fan motor terminals with battery voltage and check operation.

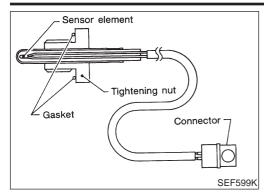
	Term	inals
	(+)	(-)
Cooling fan motor	2	1

#### Cooling fan motor should operate.

If NG, replace cooling fan motor.

NJEC0493S02

Component Description





The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system. It is used only for the on board diagnosis.

#### <Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

\*: These data are reference values and are measured between ECM terminal 72 (EGR temperature sensor) and ground.

When EGR system is operating.

Voltage: 0 - 1.5V

#### **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**

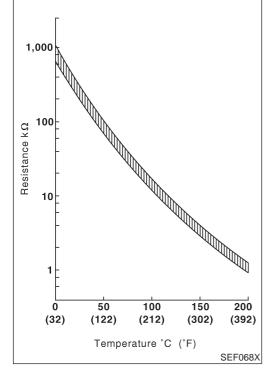
DTC No. Malfunction is detected when ... Check Items (Possible Cause) P1401 A) An excessively low voltage from the EGR tempera- Harness or connectors 1401 ture sensor is sent to ECM even when engine cool-(The EGR temperature sensor circuit is shorted.) EGR temperature sensor ant temperature is low. • Malfunction of EGR function B) An excessively high voltage from the EGR tempera- Harness or connectors ture sensor is sent to ECM even when engine cool-(The EGR temperature sensor circuit is open.) ant temperature is high. EGR temperature sensor Malfunction of EGR function

#### **DTC Confirmation Procedure**

#### Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MAL-FUNCTION B".

#### NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.



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NJEC0343

DTC Confirmation Procedure (Cont'd)

4	DATA MONI		
	MONITOR NO DTC		
	ENG SPEED COOLAN TEMP/S	XXX rpm XXX °C	
	L		SEF174Y

### PROCEDURE FOR MALFUNCTION A

- With CONSULT-II
- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Verify that "COOLAN TEMP/S" is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
- 4) Start engine and let it idle for at least 5 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-423.

#### With GST

Follow the procedure "With CONSULT-II" above.

9	ACTIVE TES		
	EGR VOL CONT/V	50 step	
	MONITOF	1	
	ENG SPEED	XXX rpm	
	EGR TEMP SEN	XXX V	
	L	1	SEF200Y

#### PROCEDURE FOR MALFUNCTION B CAUTION:

Always drive vehicle at a safe speed.

#### **TESTING CONDITION:**

#### Always perform the test at a temperature above $-10^{\circ}$ C (14°F). () With CONSULT-II

- 1) Start engine and warm it up to above 80°C (176°F).
- Select "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- 3) Hold engine speed at 1,500 rpm.
- 4) Touch "Qu" and set the EGR volume control valve opening to 50 step and check EGR TEMP SEN.
  EGR TEMP SEN should decrease to less than 1.0V.
  If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-423.
  If the check result is OK, go to the following step.

DATA MONITOR			
MONITOR		NO DTC	
ENG SPEED COOLAN TEMP/S VHCL SPEED SE THRTL POS SEN B/FUEL SCHDL	x x	XX km/h XXX V	
			SEF201Y

- 5) Turn ignition switch "OFF" and wait at least 9 seconds.
- Start engine and maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Above 2,400 rpm
VHCL SPEED SE	Above 90 km/h (56 MPH) or more
B/FUEL SCHDL	4.0 - 4.8 msec
Selector lever	Suitable position

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-423.

=NJEC0344S01

NJEC0344S02

DTC Confirmation Procedure (Cont'd)

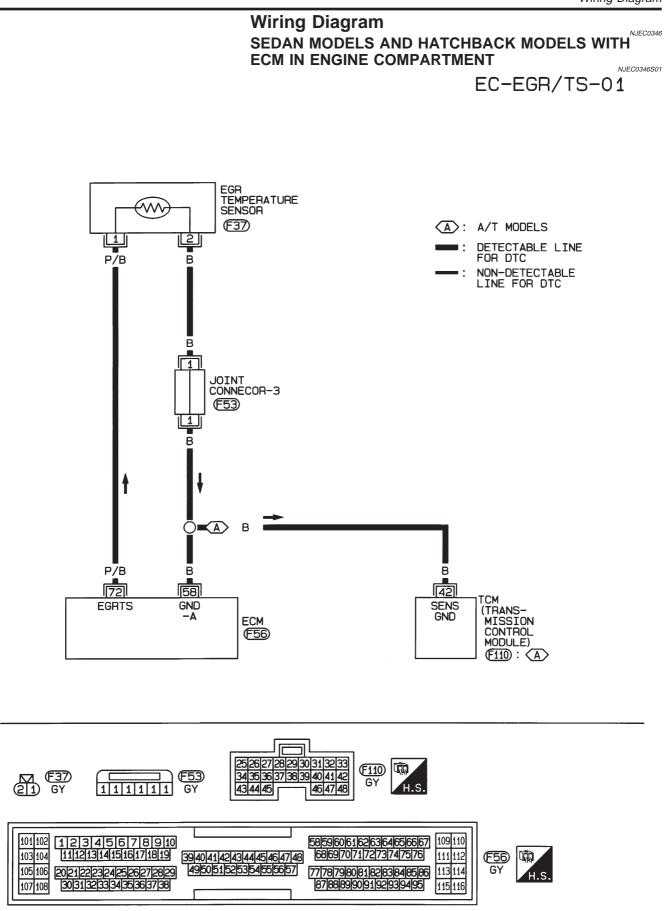
#### With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 9 seconds, then turn "ON".
- 3) Select "MODE 1" with GST and maintain the following conditions for at least 5 consecutive seconds.

Engine speed	Above 2,400 rpm
Vehicle speed	Above 90 km/h (56 MPH)
Selector lever	4th or 5th

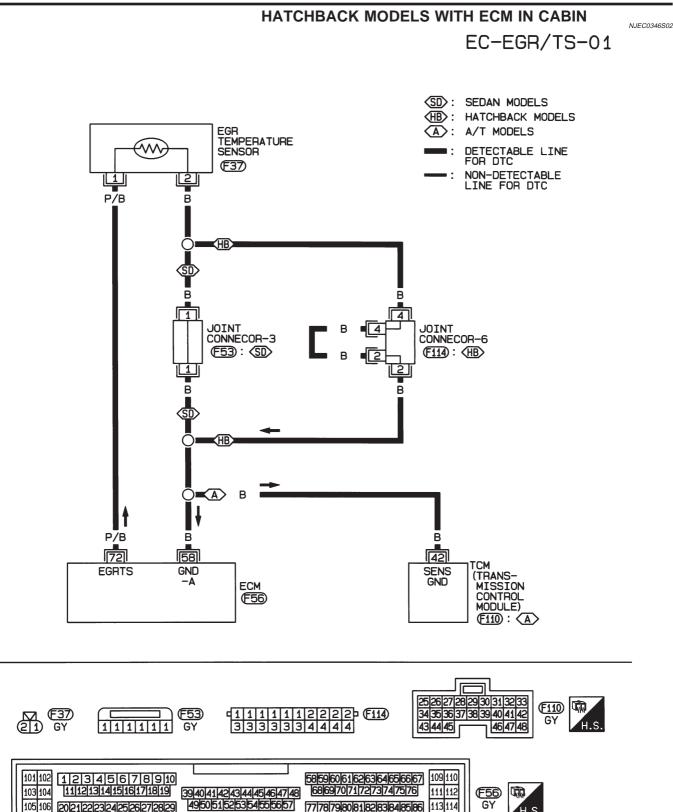
- 4) Select "MODE 7" with GST
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-423.





Wiring Diagram (Cont'd)

105 106 20212223242526272829 107 108 303132333435363738



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77787980818283848586 878889909192939495

GY

H.S.

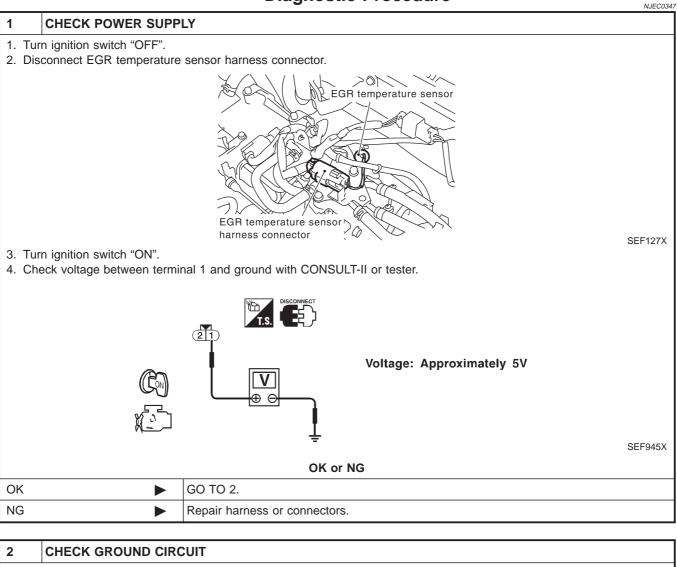
113 114

115 116

Diagnostic Procedure

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### **Diagnostic Procedure**



1. Turn ignition switch "OFF".

2. Check harness continuity between EGR temperature sensor harness terminal 2 and engine ground. Refer to wiring diagram.

Continuity should exist.

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

OK or NG

ОК	GO TO 4.
NG	GO TO 3.

3	DETECT MALFUNCTIONING PART	
---	----------------------------	--

Check the following.

- Harness for open or short between EGR temperature sensor and ECM
- Harness for open or short between TCM (Transmission Control Module) and ECM
- Joint connector-3 (If so equipped)
- Joint connector-6 (If so equipped)

Repair open circuit or short to ground or short to power in harness or connector.

Diagnostic Procedure (Cont'd)

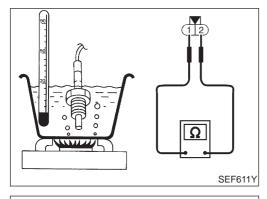
4	CHECK EGR TEMPERATURE SENSOR		
Refer to "Component Inspection", EC-424.			
OK or NG			
ОК		GO TO 5.	
NG   Replace EGR temperature sensor.			

### 5 CHECK EGR VOLUME CONTROL VALVE

Refer to "Component Inspection", EC-432.

OK or NG	
ОК 🕨	GO TO 6.
NG 🕨	Replace EGR volume control valve.

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
► INSPECTION END		



### Component Inspection EGR TEMPERATURE SENSOR

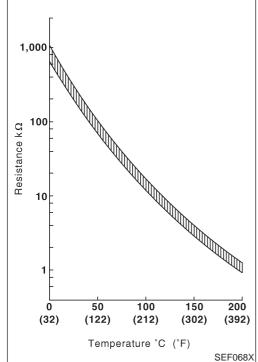
NJEC0348 NJEC0348S01

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Check resistance change and resistance value. <Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

If NG, replace EGR temperature sensor.



EC-424

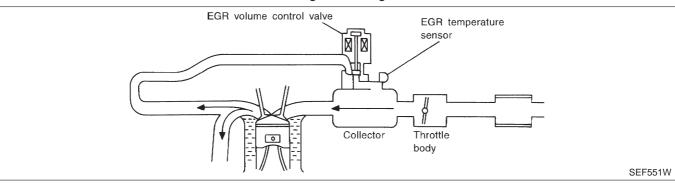
#### Description SYSTEM DESCRIPTION

QG Description

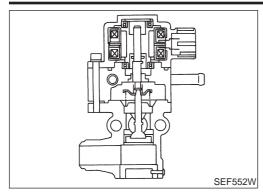
NJEC0349S01 ECM func-Sensor Input Signal to ECM Actuator tion Crankshaft position sensor (POS) Engine speed Camshaft position sensor (PHASE) Engine speed and cylinder number Mass air flow sensor Amount of intake air Engine coolant temperature sensor Engine coolant temperature EGR vol-EGR volume control valve ume control Ignition switch Start signal Throttle position sensor Throttle position Vehicle speed sensor Vehicle speed Battery Battery voltage

> This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

- Extremely light load engine operation
- Mass air flow sensor malfunction
- Engine idling
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High-speed engine operation
- Wide open throttle
- Low battery voltage
- Engine starting



Description (Cont'd)



#### COMPONENT DESCRIPTION EGR Volume Control Valve

NJEC0349S02

N.IEC0540

QG

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

## CONSULT-II Reference Value in Data Monitor Mode

#### Specification data are reference values.

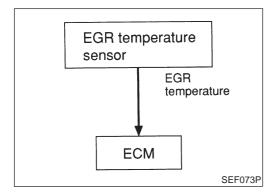
MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	Engine: After warming up		Less than 4.5V
	<ul> <li>Air conditioner switch: "OFF"</li> <li>Shift lever: "N"</li> </ul>	Idle	0 step
EGR VOL CON/V		Revving engine up to 3,000 rpm quickly	10 - 55 step

## **ECM Terminals and Reference Value**

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	[Engine is running.] • Warm-up condition • Idle speed	0 - 14V
58	В	Sensor's ground	<ul> <li>[Engine is running.]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	0V
72	P/B	EGR temperature sensor	<ul><li>[Engine is running.]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Less than 4.5V
			<ul> <li>[Engine is running.]</li> <li>Warm-up condition</li> <li>EGR system is operating.</li> </ul>	0 - 1.0V



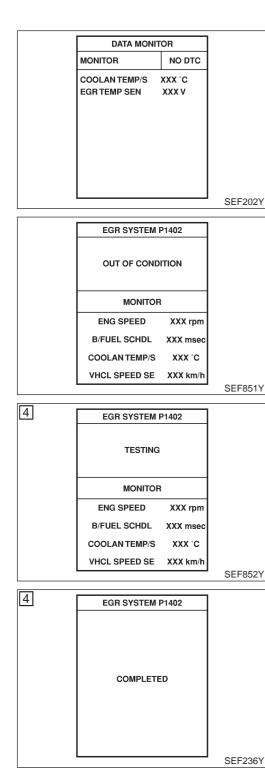
## **On Board Diagnosis Logic**

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed. **NOTE:** 

Diagnosis for this DTC will occur when engine coolant temperature is below 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

On Board Diagnosis Logic (Cont'd)

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1402	<ul> <li>EGR flow is detected under conditions that do not call for</li></ul>	<ul> <li>Harness or connectors</li></ul>
1402	EGR.	(The valve circuit is open or shorted.) <li>EGR volume control valve leaking or stuck open</li> <li>EGR temperature sensor</li>



### **DTC Confirmation Procedure**

NJEC0351

QG

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

#### **TESTING CONDITION:**

NOTE:

- Always perform at a temperature above –10°C (14°F).
- Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.

COOLAN TEMP/S: -10 to 40°C (14 to 104°F)\*

EGR TEMP SEN: Less than 4.8V

If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

\*: Although CONSULT-II screen displays "-10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

#### With CONSULT-II

- 1) Turn ignition switch "OFF" and wait at least 9 seconds, then turn ignition switch "ON".
- 2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START". Follow instruction of CONSULT-II.
- Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 45 seconds or more.)

If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of -10 to  $40^{\circ}$ C (14 to  $104^{\circ}$ F). Retry from step 1.

5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-431.

EC-427

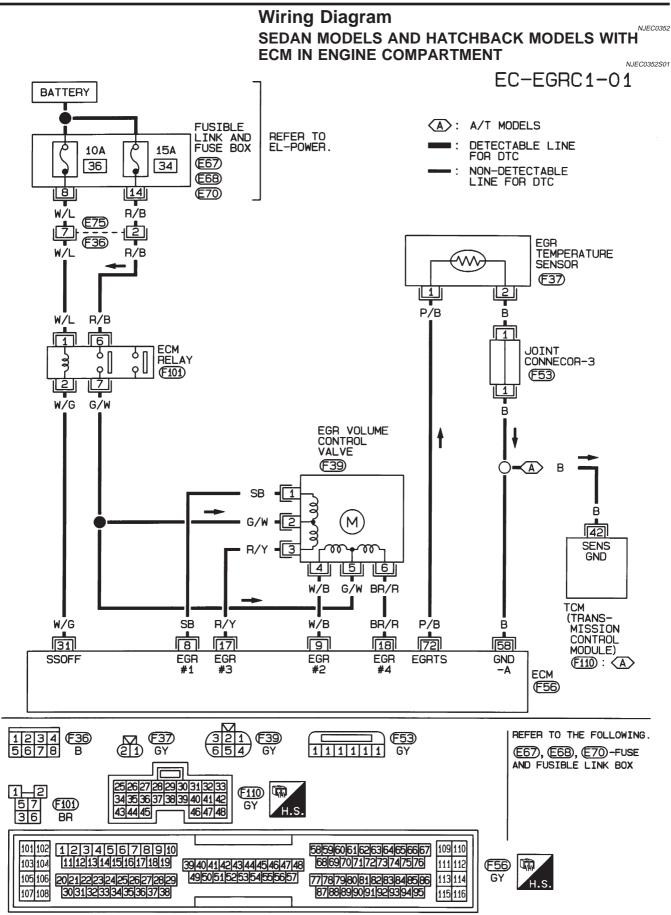
DTC Confirmation Procedure (Cont'd)

# 4 ECM O CONNECTOR 72 C O H CONNECTOR SEF947X

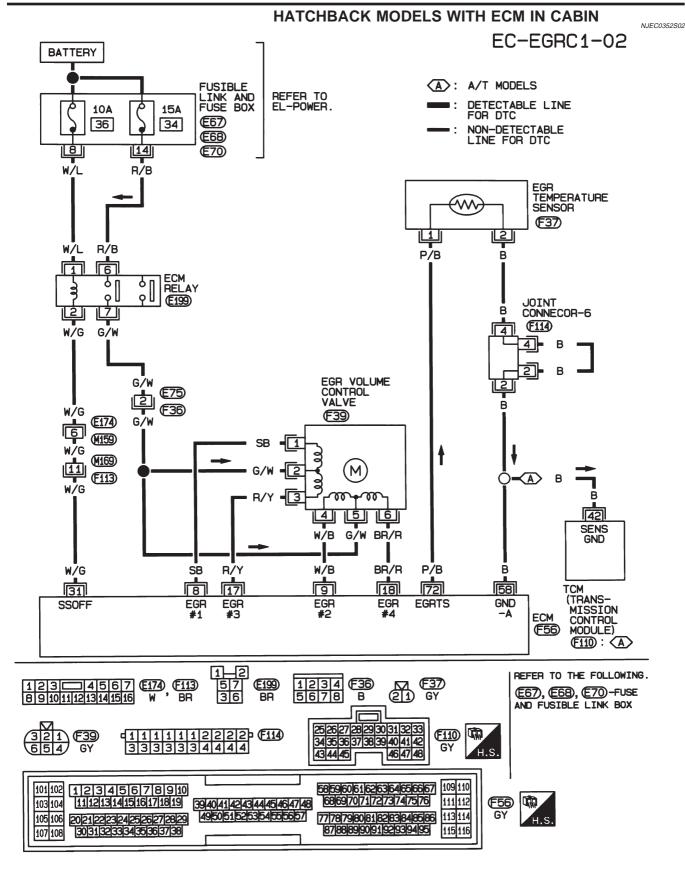
#### With GST

- 1) Turn ignition switch "ON" and select "MODE 1" with GST.
- 2) Check that engine coolant temperature is within the range of -10 to  $40^{\circ}$ C (14 to  $104^{\circ}$ F).
- 3) Check that voltage between ECM terminal 72 (EGR temperature sensor signal) and ground is less than 4.8V.
- 4) Start engine and let it idle for at least 45 seconds.
- 5) Stop engine.
- 6) Perform from step 1 to 4.
- 7) Select "MODE 3" with GST.
- 8) If DTC is detected, go to "Diagnostic Procedure", EC-431.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram



Wiring Diagram (Cont'd)

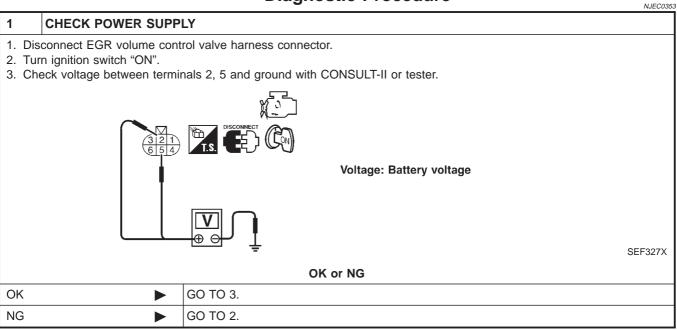


HEC976

Diagnostic Procedure

QG

### **Diagnostic Procedure**



#### 2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36 (If so equipped)
- Harness for open or short between EGR volume control valve and ECM relay

Repair harness or connectors.

3 CHECI	K OUTPUT SIGNA	AL CIRCUIT		
1. Turn ignition switch "OFF".				
2. Disconnect ECM harness connector.				
3. Check harness continuity between				
ECM terminal 8 and terminal 1,				
ECM terminal 9 and terminal 4,				
ECM terminal 17 and terminal 3,				
ECM terminal 18 and terminal 6.				
Refer to wiring diagram.				
Continuity should exist.				
If OK, check harness for short to ground and short to power.				
OK or NG				
ОК		GO TO 4.		
NG		Repair open circuit, short to ground or short to power in harness connectors.		

4	4 CHECK EGR TEMPERATURE SENSOR		
Refer to "COMPONENT INSPECTION", EC-432.			
OK or NG			
OK	•	GO TO 5.	
NG	•	Replace EGR temperature sensor.	

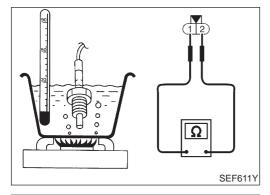
Diagnostic Procedure (Cont'd)

5	CHECK EGR VOLUME CONTROL VALVE		
Refer to "COMPONENT INSPECTION", EC-432.			
OK or NG			
OK		GO TO 6.	
NG		Replace EGR volume control valve.	
6			

#### 6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END



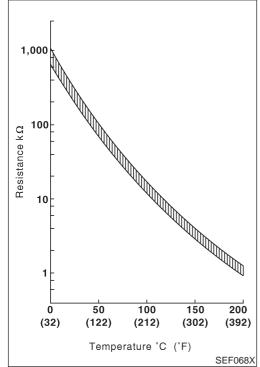
### Component Inspection EGR TEMPERATURE SENSOR

NJEC0354

Check resistance change and resistance value. <Reference data>

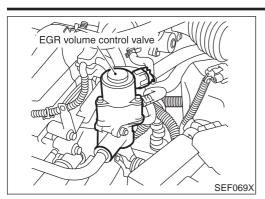
Voltage V	Resistance MΩ
4.56	0.62 - 1.05
2.25	0.065 - 0.094
0.59	0.011 - 0.015
	V 4.56 2.25

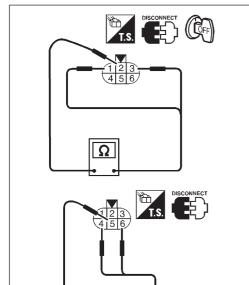
If NG, replace EGR temperature sensor.



## DTC P1402 EGR FUNCTION (OPEN) (WHERE FITTED)

Component Inspection (Cont'd)





Ω

## EGR VOLUME CONTROL VALVE

### (P) With CONSULT-II

- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. terminal 2 and terminals 1, 3 terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance $\Omega$
20 (68)	20 - 24

- 3) Reconnect EGR volume control valve harness connector.
- Remove EGR volume control valve from cylinder head. (The EGR volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON".
- 6) Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening

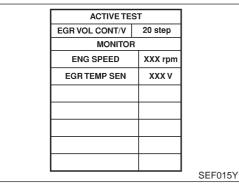
If NG, replace the EGR volume control valve.

- **Without CONSULT-II**
- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. terminal 2 and terminals 1, 3 terminal 5 and terminals 4. 6

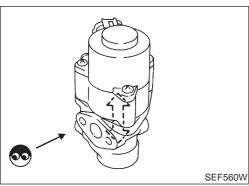
Temperature °C (°F)	Resistance $\Omega$
20 (68)	20 - 24

3) Turn ignition switch "ON" and "OFF". Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

If NG, replace the EGR volume control valve.



SEF605Y



NJEC0354S04

### **System Description**

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from TCM (Transmission Control Module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission Control Module) but also ECM after the A/T related repair.

## **ECM Terminals and Reference Value**

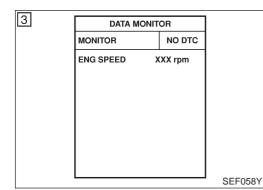
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

## 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	PU	A/T check signal	[Ignition switch "ON"]	0 - Approximately 5V

## **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1605 1605	<ul> <li>An incorrect signal from TCM (Transmission Control Module) is sent to ECM.</li> </ul>	<ul> <li>Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]</li> <li>Dead (Weak) battery</li> <li>TCM (Transmission Control Module)</li> </ul>



## **DTC Confirmation Procedure**

NJEC0576

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 9 seconds before conducting the next test.

### (B) 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 40 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-436.

### With GST

NOTE:

Follow the procedure "With CONSULT-II" above.

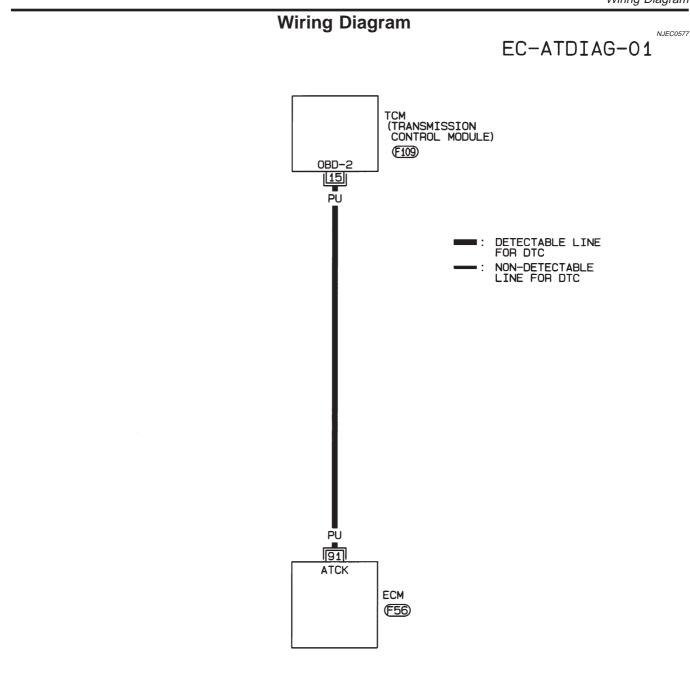
QG

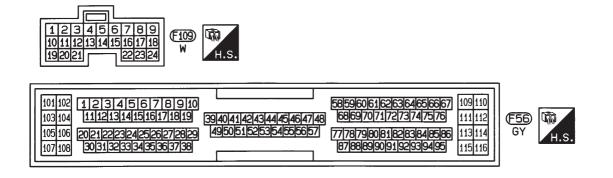
NJEC0574

NJEC0575

## **DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE**

**QG** Wiring Diagram

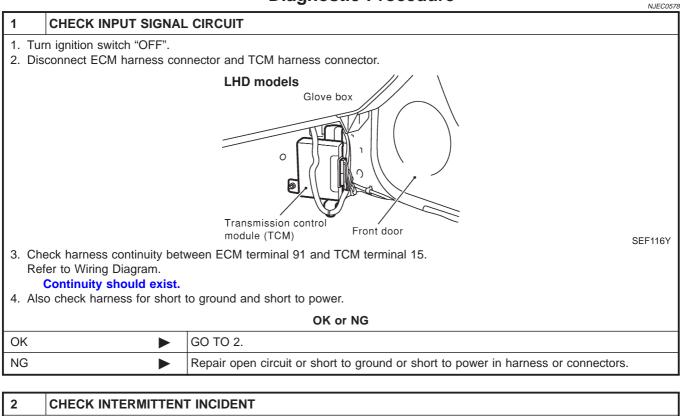




HEC804

## DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

### **Diagnostic Procedure**



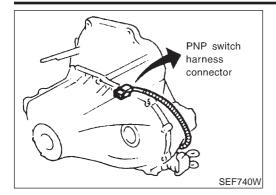
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

Component Description

QG

NJEC0426



### **Component Description**

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".

ECM detects the park/neutral position when continuity with ground exists.

## CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION	
P/N POSI SW	<ul> <li>Ignition switch: ON</li> </ul>	Shift lever: "P" or "N"	ON	
		Except above	OFF	

### **ECM** Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			<ul> <li>[Ignition switch "ON"]</li> <li>Gear position is "Neutral position" (M/T models)</li> <li>Gear position is "N" or "P" (A/T models)</li> </ul>	Approximately 0V
42	42 G/OR PNP switch	<ul><li>[Ignition switch "ON"]</li><li>Except the above gear position</li></ul>	A/T models BATTERY VOLTAGE (11 - 14V) M/T models Approximately 5V	

## **On Board Diagnosis Logic**

DTC No.	Malfunction is detected when	Check Items (Possible Cause)
P1706	<ul> <li>The signal of the PNP switch is not changed in the pro-</li></ul>	<ul> <li>Harness or connectors</li></ul>
1706	cess of engine starting and driving.	(The PNP switch circuit is open or shorted.) <li>PNP switch</li>

## **DTC Confirmation Procedure**

NJEC0428

NJEC0427

### **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 9 seconds before conducting the next test.

### (B) With CONSULT-II

1) Turn ignition switch "ON".

DTC Confirmation Procedure (Cont'd)

4		TOP .	
		1	
	MONITOR	NO DTC	
	ENG SPEED	XXX rpm	
	COOLAN TEMP/S	XXX °C	
	VHCL SPEED SE	XX km/h	
	P/N POSI SW	OFF	
	B/FUEL SCHDL X	XX msec	
			SEF213)

 Select "P/N POSI SW" in "DATA MONITOR" mode with CON-SULT-II. Then check the "P/N POSI SW" signal under the following conditions.

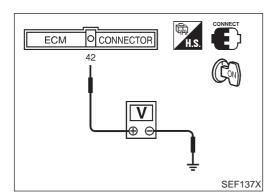
Position (Selector lever)	Known-good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-440. 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 50 consecutive seconds.

ENG SPEED	1,550 - 4,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 msec or more
VHCL SPEED SE	70 - 130 km/h (43 - 81 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-440.



## **Overall Function Check**

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

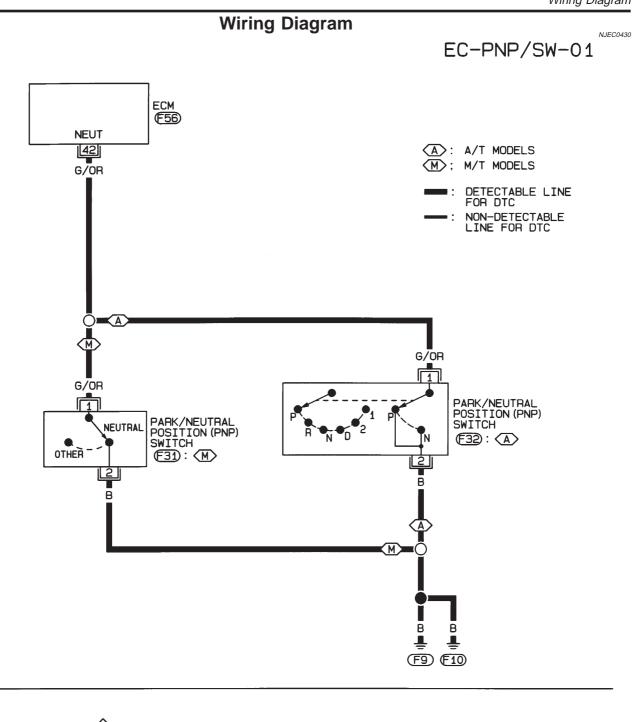
### **Without CONSULT-II**

- 1) Turn ignition switch "ON".
- 2) Check voltage between ECM terminal 42 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	A/T models BATTERY VOLTAGE (11 - 14V) M/T models Approximately 5

3) If NG, go to "Diagnostic Procedure", EC-440.

**QG** Wiring Diagram



101         102         1         2         3         4         5         6         7         8         9         10           103         104         1111213141516171819         3940/4142434445464748         3940/4142434445464748           105         106         20/21/22/23/24/25/26/27/28/29         4950/51/52/53/54/55/56/57         107           107         108         30/31/32/33/4/35/36/37/38         50/37/38         50/37/38	686970717273747576 11 77787980818283848586	109 110 111 112 113 114 115 116	GY H.S.
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HEC808

Diagnostic Procedure

### **Diagnostic Procedure**

		NJEC0431	
1 CHECK GROUND CIR	RCUIT		
<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect PNP switch harness connector.</li> </ol>			
SEF740W 3. Check harness continuity between PNP switch harness connector terminal 2 and body ground. Refer to wiring diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.			
	OK or NG		
OK 🕨	GO TO 3.		
NG	GO TO 2.		
2 DETECT MALFUNCTIONING PART			

Check the harness for open or short between PNP switch and body ground.

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

### 3 CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

2. Check harness continuity between ECM terminal 42 and PNP switch harness connector terminal 1.

Refer to wiring diagram.

Continuity should exist.

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

OK or NG	
ОК	GO TO 5.
NG	GO TO 4.

4	DETECT MALFUNCTIONING PART		
Check	the harness for open or short between ECM and PNP switch.		
	Repair open circuit or short to ground or short to power in harness or connectors.		

5	CHECK PNP SWITCH		
Refer	Refer to MT-21, "POSITION SWITCH CHECK" or AT-183, "PARK/NEUTRAL POSITION (PNP) SWITCH".		
	OK or NG		
OK		GO TO 6.	
NG	•	Replace PNP switch.	

Diagnostic Procedure (Cont'd)

QG

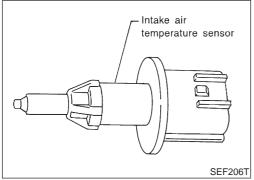
6 CHECK INTERMITTENT INCIDENT

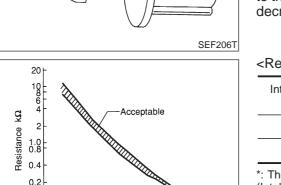
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

Component Description

0.1





) 20 40 60 80 100 2) (68) (104) (140) (176) (212) Temperature °C (°F)

### Component Description MODELS WITH INTAKE AIR TEMPERATURE SENSOR ON INTAKE AIR DUCT

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>

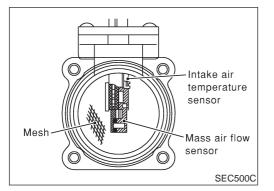
Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

\*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and ground.

#### **CAUTION:**

SEF012P

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.



### MODELS WITH INTAKE AIR TEMPERATURE SENSOR IN MASS AIR FLOW SENSOR

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

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

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance $k\Omega$
25 (77)	3.3	1.9 - 2.1
80 (176)	1.28	0.31 - 0.37

\*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and ground.

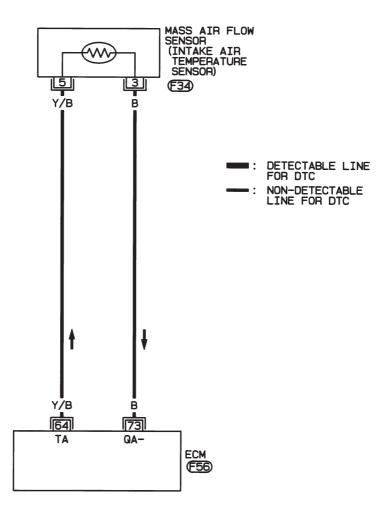
QG Component Description (Cont'd)

### **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.

### Wiring Diagram MODELS WITH INTAKE AIR TEMPERATURE SENSOR IN MASS AIR FLOW SENSOR

EC-IATSEN-01

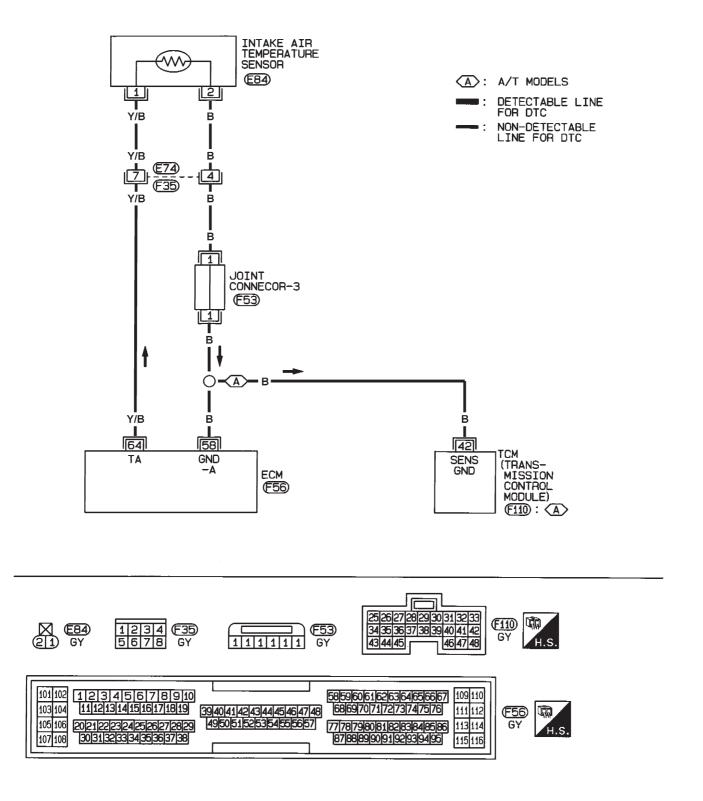


101102         12345678910         58596061626364656667         109110           103104         111213141516171819         39404142434445464748         686970717273747576         1111112           105106         20212223242526272829         495051525364555657         77787980816283846566         113114           107108         303132333435363738         115116         115116	GY H.S.
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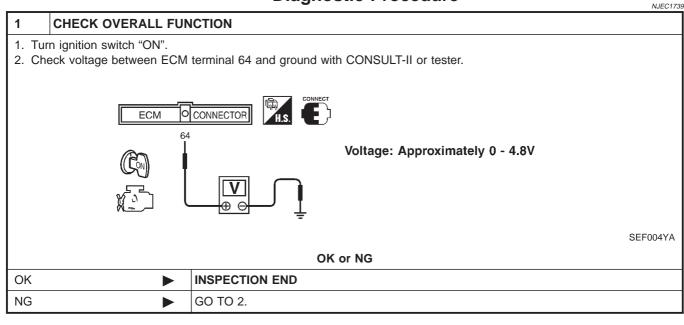
QG Wiring Diagram (Cont'd)

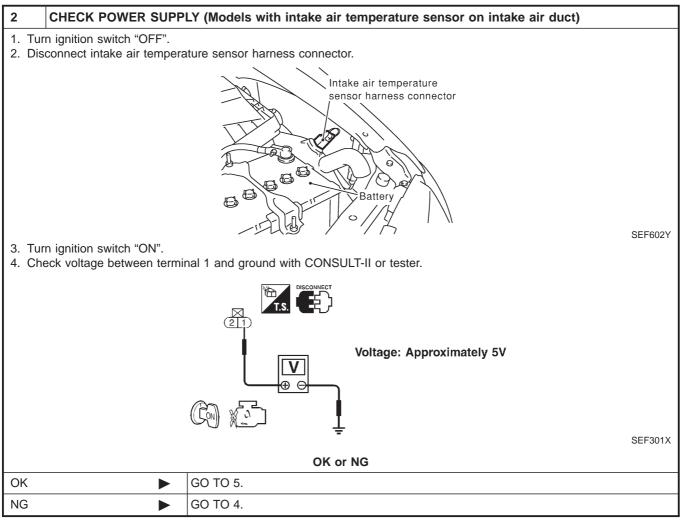
MODELS WITH INTAKE AIR TEMPERATURE SENSOR ON INTAKE AIR DUCT

EC-IATS-01

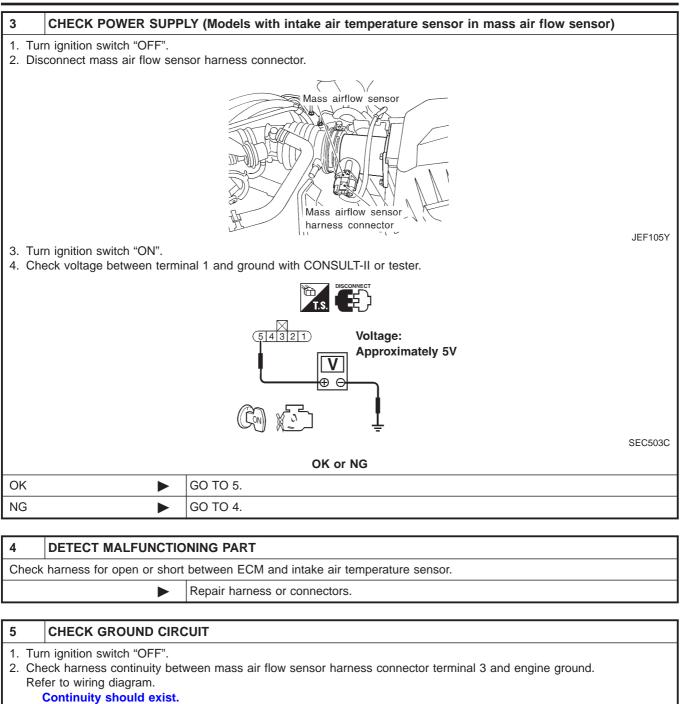


NEF330A





Diagnostic Procedure (Cont'd)



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

OK	
ОК	GO TO 7.
NG	GO TO 6.

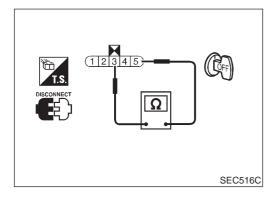
6	DETECT MALFUNCTIONING PART		
Check	neck harness for open or short between ECM and intake air temperature sensor.		
	Repair open circuit or short to ground or short to power in harness or connectors.		

Diagnostic Procedure (Cont'd)

7	CHECK INTAKE AIR T	EMPERATURE SENSOR	
Refe	Refer to "Component Inspection", EC-448.		
OK or NG			
OK		GO TO 8.	
NG		Replace intake air temperature sensor.	
8	CHECK INTERMITTEN	TINCIDENT	

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

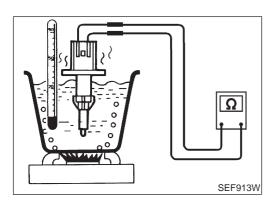
INSPECTION END



Component Inspection INTAKE AIR TEMPERATURE SENSOR Models with Intake Air Temperature Sensor in Mass Air Flow Sensor Check resistance between mass air flow sensor harness connector terminals 3 and 5. <Reference data>

Intake air temperature °C (°F)	Resistance $k\Omega$
25 (77)	1.9 - 2.1

If NG, replace intake air temperature sensor.

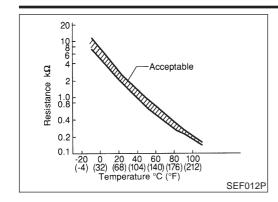


## Models with Intake Air Temperature Sensor on Intake Air Duct

Check resistance as shown in the figure.

NJEC1740S0102

QG Component Inspection (Cont'd)

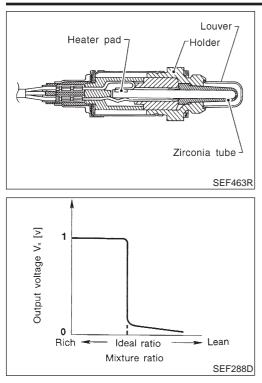


<reference d<="" th=""><th>ata&gt;</th></reference>	ata>
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Intake air temperature °C (°F)	Resistance $k\Omega$
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.

Component Description



### **Component Description**

The heated oxygen sensor 1 (front) 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 (front) 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 (front) 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

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			$0 - 0.3V \leftrightarrow Approx. 0.6 - 1.0V$
HO2S1 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	Maintaining engine speed at 2,000 rpm	LEAN $\leftarrow \rightarrow$ RICH Changes more than 5 times during 10 seconds.

## **ECM Terminals and Reference Value**

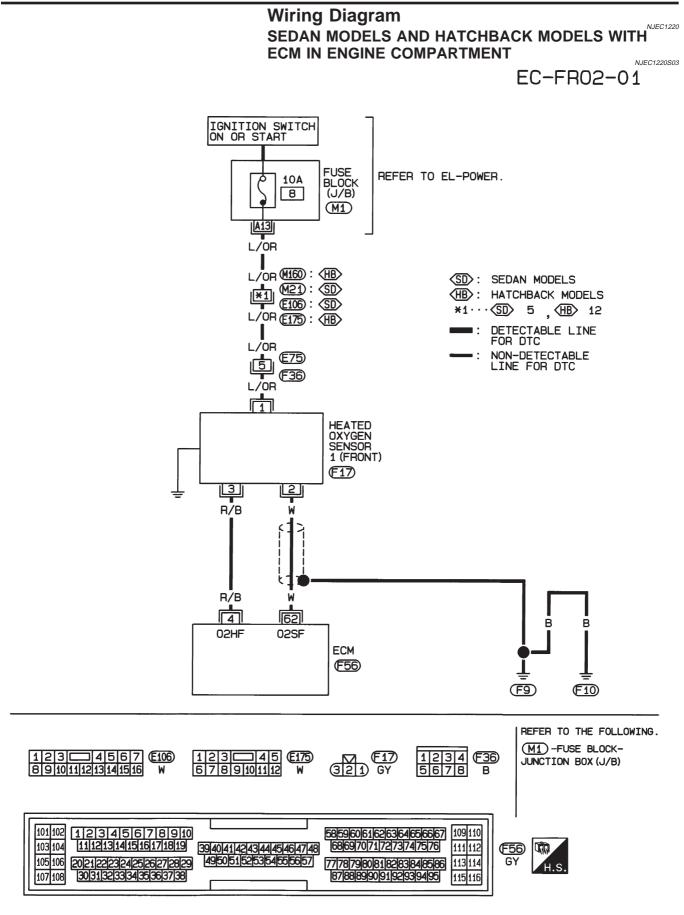
Specification data are reference values and are measured between each terminal and ground.

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

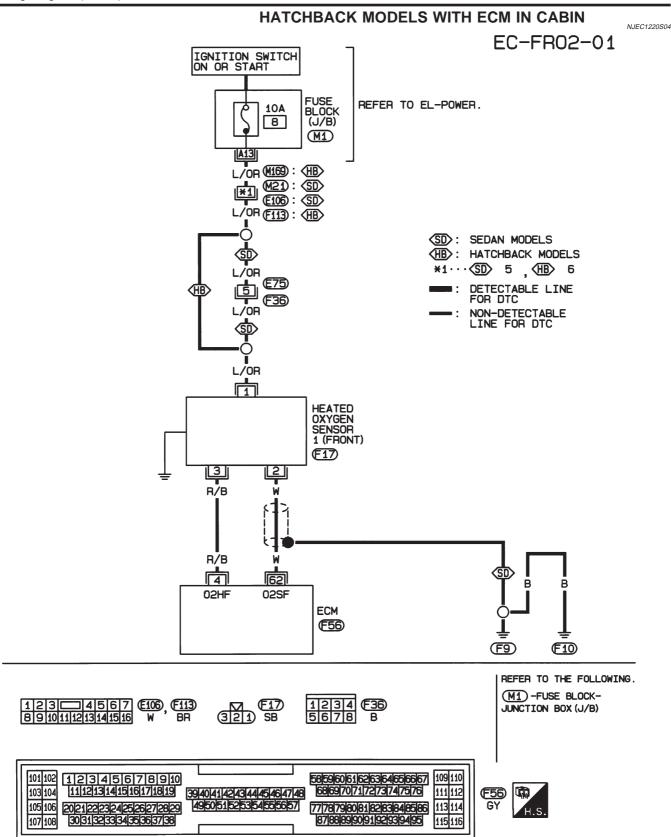
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	w	Heated oxygen sensor 1 (front)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul>	0 - Approximately 1.0V (V) 2 1 0 1 5 SEF008W

NJEC1216

**QG** Wiring Diagram



QG



HEC937

### **Diagnostic Procedure**

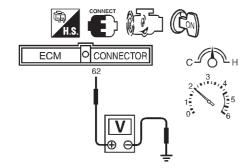
1	INSPECTION START	
Do you	I have CONSULT-II?	
		Yes or No
Yes	•	GO TO 2.
No	•	GO TO 3.

#### 2 **CHECK OVERALL FUNCTION** (P) With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "HO2S1 MNTR (B1)" in "DATA MONITOR" mode with CONSULT-II. 3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuate between LEAN and RICH more than five times in 10 seconds. DATA MONITOR MONITOR NO DTC ENG SPEED XXX rpm MAS A/F SE-B1 XXX V 1 time: RICH $\rightarrow$ LEAN $\rightarrow$ RICH COOLAN TEMP/S XXX °C 2 times: RICH $\rightarrow$ LEAN $\rightarrow$ RICH $\rightarrow$ LEAN $\rightarrow$ RICH HO2S1 (B1) XXX V HO2S1 MNTR (B1) LEAN SEF218Z OK or NG **INSPECTION END** OK NG GO TO 4.

### 3 CHECK OVERALL FUNCTION

### **Without CONSULT-II**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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  $\rightarrow$  0.6 1.0V  $\rightarrow$  0 0.3V

2 times: 0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V  $\rightarrow$  0.6 - 1.0V  $\rightarrow$  0 - 0.3V

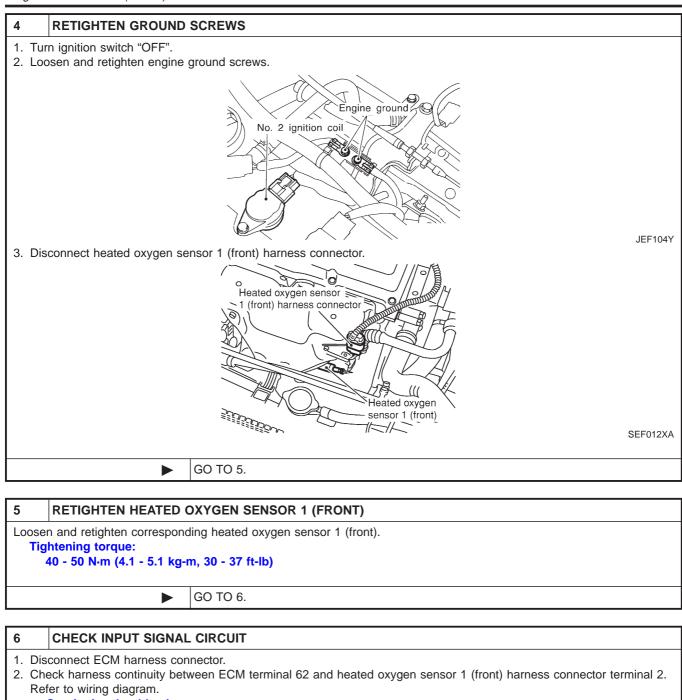
SEC518C

#### **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.

	OK or NG
OK 🕨	INSPECTION END
NG	GO TO 4.

Diagnostic Procedure (Cont'd)



Continuity should exist.

- 3. Check harness continuity between ECM terminal 62 (or terminal 2) and ground.
- Continuity should not exist.
- 4. Also check harness for short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYC	GEN SENSOR 1 (FRONT)
Refer	Refer to "Component Inspection", EC-455.	
		OK or NG
OK	•	GO TO 8.
NG	NG   Replace heated oxygen sensor 1 (front).	
8	CHECK INTERMITTEN	

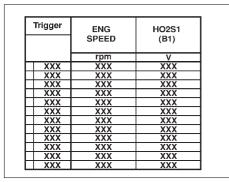
### 8 CHECK INTERMITTENT INCIDENT

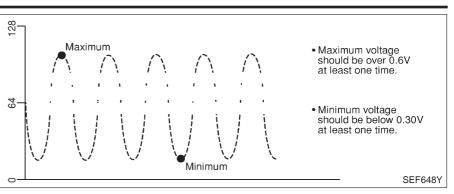
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

# • Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.

Component Inspection (Cont'd)





QG

# 

### **Without CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 62 (HO2S1 signal) and engine 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.
- 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 and approved anti-seize lubricant.

## **HEATED OXYGEN SENSOR 1 HEATER (FRONT)**

**QG** Description

NJEC1225

Description NUEC1223 SYSTEM DESCRIPTION			
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater (front) con- trol	Heated oxygen sensor 1 heater (front)

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater (front) corresponding to the engine operating condition.

### **OPERATION**

	NJEC1223S02
Engine speed	Heated oxygen sensor 1 heater (front)
Above 3,200 rpm	OFF
Below 3,200 rpm	ON

## CONSULT-II Reference Value in Data Monitor Mode

### Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	• Engine speed: Below 3,200 rpm	ON
	• Engine speed: Above 3,200 rpm	OFF

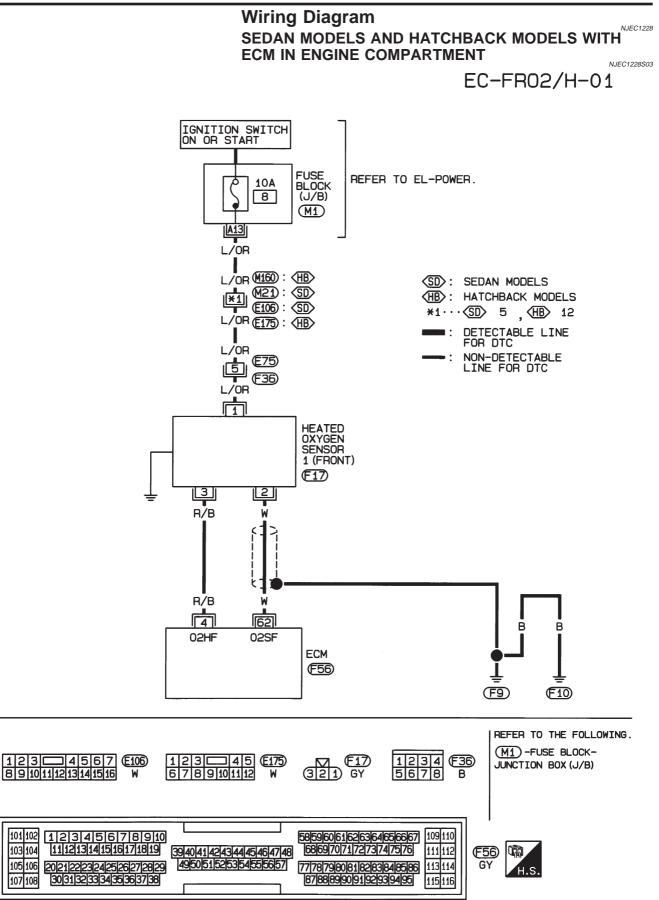
### ECM Terminals and Reference Value

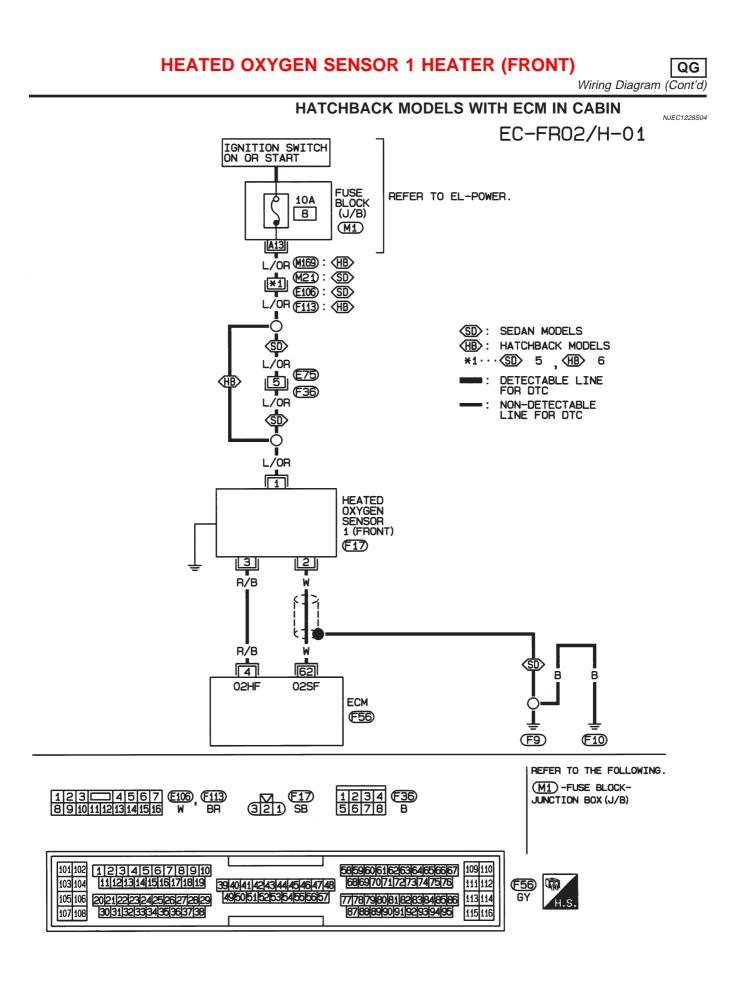
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

## 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
Heated oxygen sensor	Heated oxygen sensor 1	<ul><li>[Engine is running]</li><li>Engine speed is below 3,200 rpm.</li></ul>	Approximately 0V	
4	4 R/B heater (front)	<ul><li>[Engine is running]</li><li>Engine speed is above 3,200 rpm.</li></ul>	BATTERY VOLTAGE (11 - 14V)	

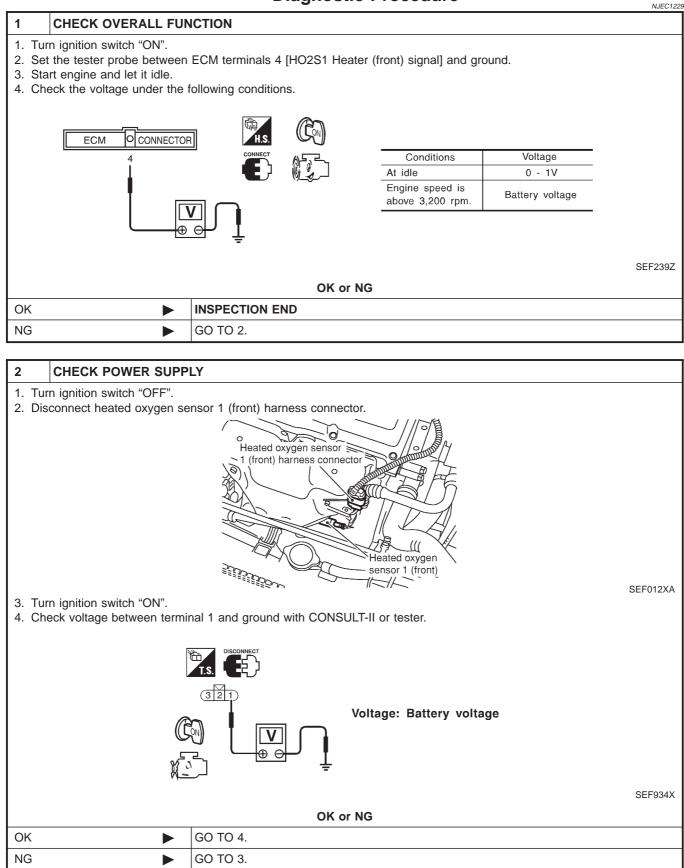
Wiring Diagram





## **HEATED OXYGEN SENSOR 1 HEATER (FRONT)**

## **Diagnostic Procedure**



## **HEATED OXYGEN SENSOR 1 HEATER (FRONT)**

QG

NJEC1230

NJEC1230S01

3	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, E75
- Harness connectors E106, M21 (Sedan), E175, M160 or F113, M169 (Hatchback)
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse

Repair harness or connectors.

### 4 CHECK GROUND CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between heated oxygen sensor 1 (front) harness connector terminal 3 and ECM terminal 4. Refer to wiring diagram.

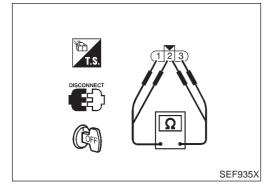
### Continuity should exist.

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

OK or NG		
ОК		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 (FRONT)		
Refer to "Component Inspection", EC-461.			
	OK or NG		
OK	ОК <b>Б</b> О ТО 6.		
NG	NG   Replace heated oxygen sensor 1 (front).		

6	6 CHECK INTERMITTENT INCIDENT			
Perform	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			



## Component Inspection

### HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between terminals 3 and 1.

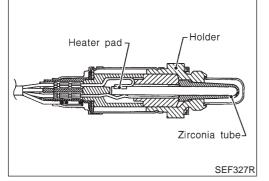
**Resistance: 2.3 - 4.3** Ω at 25°C (77°F)

Check continuity between terminals 2 and 1, 3 and 2. Continuity should not exist.

If NG, replace the heated oxygen sensor 1 (front).

- 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 and approved anti-seize lubricant.

Component Description



### **Component Description**

NJEC1231 The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.

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

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 (rear) is not used for engine control operation.

### **CONSULT-II** Reference Value in Data Monitor Mode

NJEC1232

NJEC1233

Specification data are reference values.

MONITOR ITEM	CONE	DITION	SPECIFICATION
HO2S2 (B1)		Revving engine from idle to 3,000	0 - 0.3V $\leftrightarrow$ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	<ul> <li>Engine: After warming up</li> </ul>	rpm	$LEAN \leftarrow \rightarrow RICH$

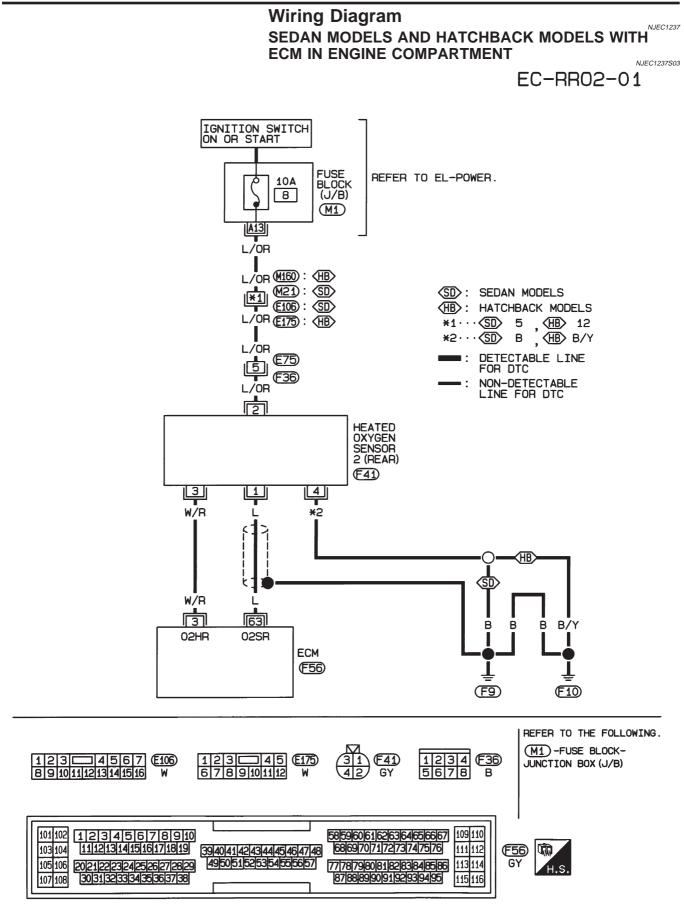
## ECM Terminals and Reference Value

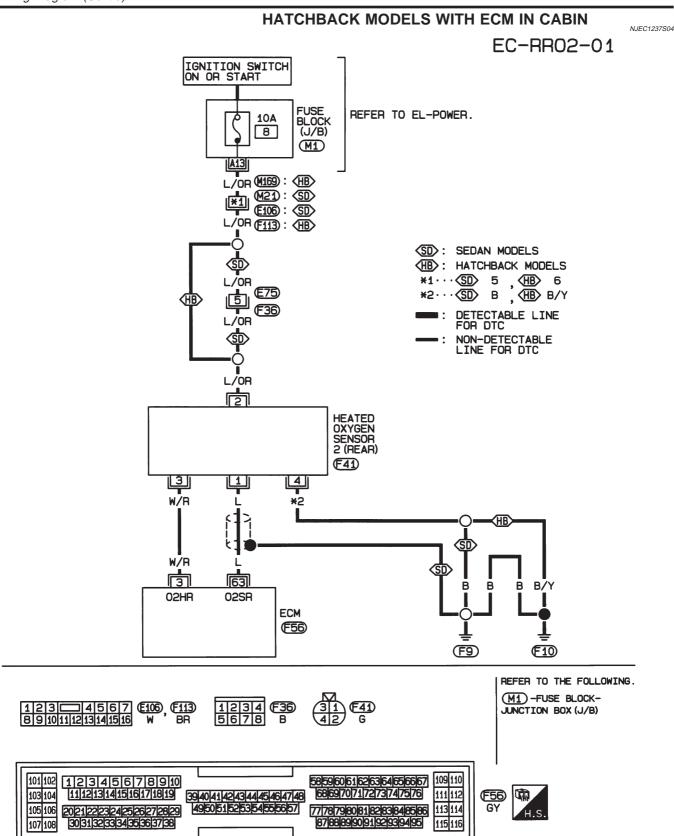
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

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.

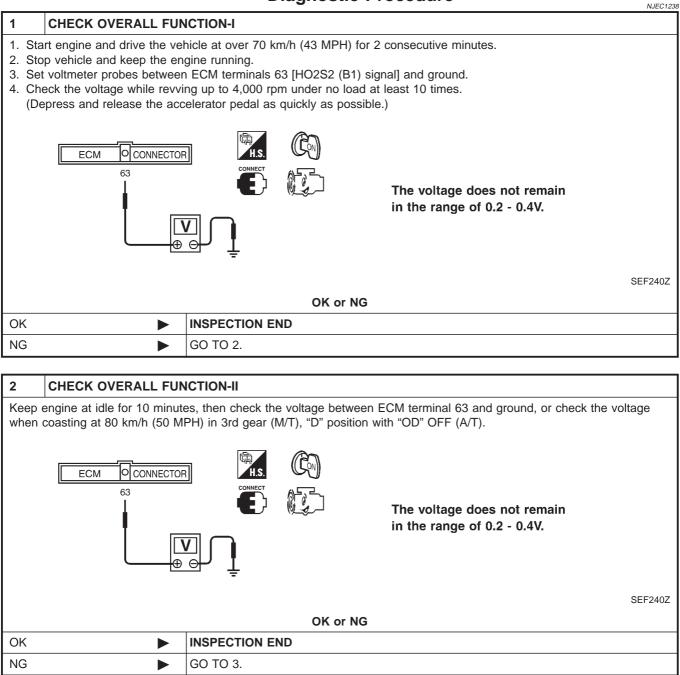
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	L	Heated oxygen sensor 2 (rear)	<ul> <li>[Engine is running]</li> <li>After warming up to normal operating temperature and engine speed is 3,000 rpm</li> </ul>	0 - Approximately 1.0V

**QG** Wiring Diagram





### **Diagnostic Procedure**



QG

Diagnostic Procedure (Cont'd)

3 RETIGHTEN GROUND	SCREWS		
<ol> <li>Turn ignition switch "OFF".</li> <li>Loosen and retighten engine</li> </ol>	<ol> <li>Turn ignition switch "OFF".</li> <li>Loosen and retighten engine ground screws.</li> </ol>		
	JEF104Y		
	GO TO 4.		
4 CHECK INPUT SIGNA	CIRCUIT		
1. Turn ignition switch "OFF".	ensor 2 (rear) harness connector and ECM harness connector.		
For Sedan Heated oxygen sensor 2 (re harness connector	Heated oxygen sensor 2 (rear)		
<ol> <li>Check harness continuity between ECM terminal 63 and heated oxygen sensor 2 (rear) harness connector terminal 1. Refer to wiring diagram. Continuity should exist.</li> <li>Check harness continuity between ECM terminal 63 [or heated oxygen sensor 2 (rear) harness connector terminal 1] and ground. Continuity should not exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
	OK or NG		
ОК	GO TO 6.		
NG	GO TO 5.		

5	DETECT MALFUNCTIONING PART		
Check	Check the harness for open or short between heated oxygen sensor 2 (rear) and ECM.		
	Repair open circuit or short to ground or short to power in harness or connectors.		

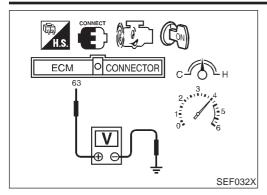
6	CHECK GROUND CIRCUIT			
Ref	<ol> <li>Check harness continuity between heated oxygen sensor 2 (rear) harness connector terminal 4 and body ground. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
	OK or NG			
OK	ØK ► GO TO 7.			
NG	IG  Repair open circuit or short to ground or short to power in harness or connectors.			
7				

	ECK HEATED OXTGEN SENSOR 2 (REAR)		
Refer to "Component Inspection", EC-467.			
OK or NG			
OK 🕨 GO TO 8.			
NG	NG Replace heated oxygen sensor 2 (rear).		

8	CHECK INTERMI	TTENT			
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.					
			INSPECTION EI	ND	
	ACTIVE TEST FUEL INJECTION MONITOR ENG SPEED HO2S1 (B1) HO2S2 (B1) HO2S1 MNTR (B1)		C H [] 1) 2)	Component Inspection       NJECT22         EATED OXYGEN SENSOR 2 (REAR)       NJECT23950         With CONSULT-II       NJECT23950         Start engine and drive vehicle at a speed of more than 70 km/l (43 MPH) for 2 consecutive minutes.       Stop vehicle with engine running.	
	HO2S2 MNTR (B1)	RICH	3) 3	select "HO2S2 (B1)" as the monitor item with CONSULT-II.	
			C •	AUTION: 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 sys tem threads using Oxygen Sensor Thread Cleaner too	

and approved anti-seize lubricant. (Reference data) (Reference data) The voltage should be above 0.68V at least one time. The voltage should be below 0.56V at least one time. SEF244YA

Component Inspection (Cont'd)



### **Without CONSULT-II**

- Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 63 (HO2S2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
  (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once.
  If the voltage is above 0.68V at step 4, step 5 is not necessary.
- 5) Check the voltage when revving up to 6,000 rpm under no load. Or 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 0.56V at least once.

### **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 and approved anti-seize lubricant.

Description

QG

NJEC1242

Description NJEC1240 SYSTEM DESCRIPTION				
Sensor	Input Signal to ECM	ECM func- tion	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater (rear) con- trol	Heated oxygen sensor 2 heater (rear)	

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater (rear) corresponding to the engine speed.

#### **OPERATION**

NJE			
Engine condition		Heated oxygen sensor 2 heater (rear)	
Engine stopped		OFF	
Engine is running.	After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	ON	
	Engine speed above 3,600 rpm	OFF	

# CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
	<ul> <li>Engine speed</li> </ul>	Below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
HO2S2 HTR (B1)		Above 3,600 rpm	OFF
	Ignition switch ON (E	ngine stopped)	OFF

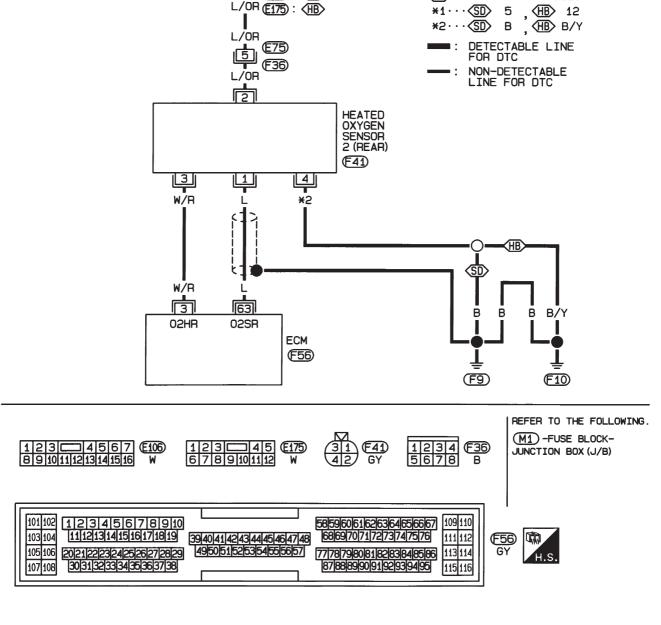
# ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
	Heated oxygen sensor 2		<ul> <li>[Engine is running]</li> <li>Engine speed is below 3,600 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]</li> </ul>	0 - 1V
3	3 W/R heater (rear)	<ul><li>[Engine is running]</li><li>Engine speed is above 3,600 rpm</li></ul>	BATTERY VOLTAGE	
			[Ignition switch "ON"] • Engine stopped	(11 - 14V)

#### **EC-470**



IGNITION SWITCH ON OR START

Q

A13 L/OR 10A

8

L/OR (160) : (HB) ₩1 (M21): SD €106 : SD

Wiring Diagram

FUSE

BLOCK

(M1)

ECM IN ENGINE COMPARTMENT

Wiring Diagram

SEDAN MODELS AND HATCHBACK MODELS WITH

REFER TO EL-POWER.

(SD): SEDAN MODELS (HB): HATCHBACK MODELS

HFC854

QG

NJEC1245

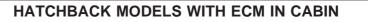
NJEC1245S03

EC-RR02/H-01

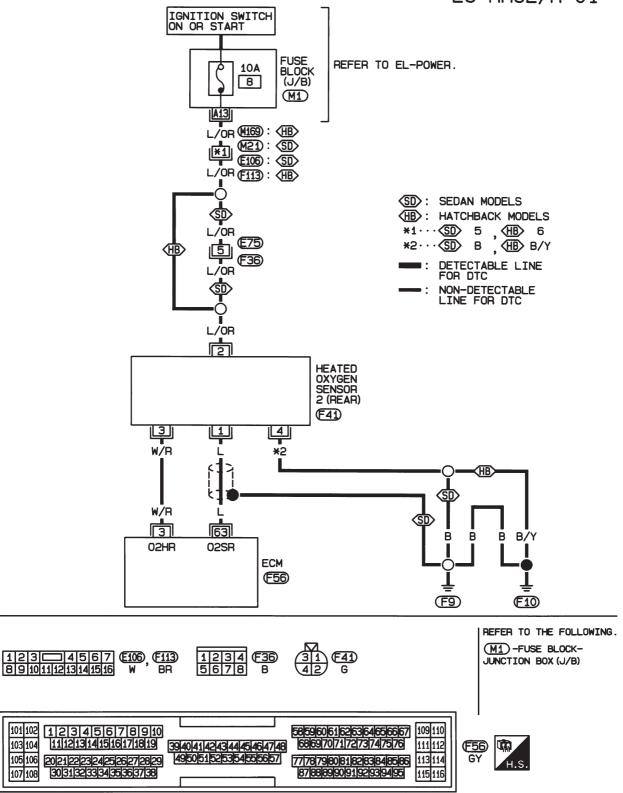
Wiring Diagram (Cont'd)

QG

NJEC1245S04

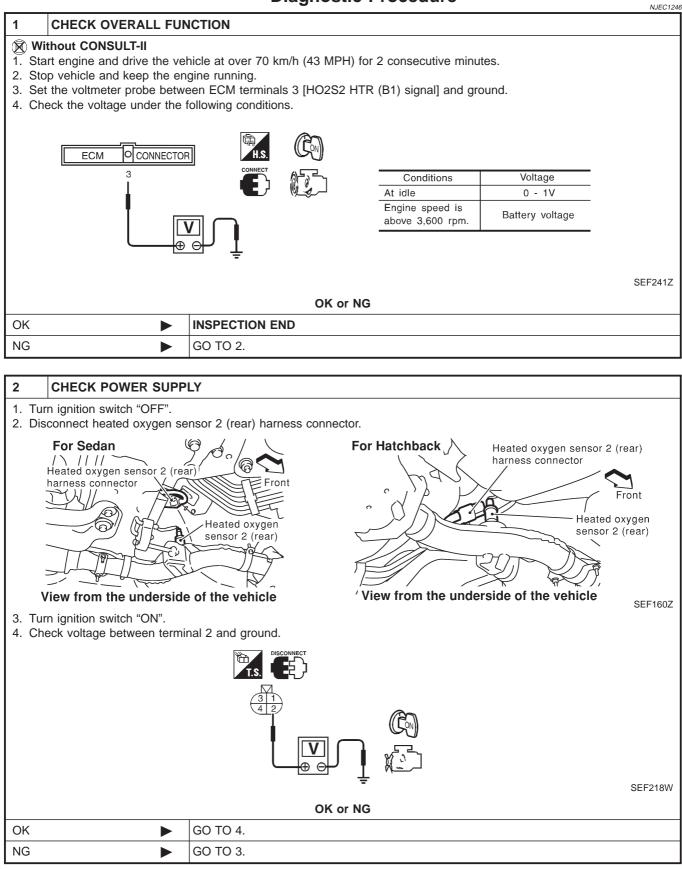


EC-RR02/H-01



HEC943

# **Diagnostic Procedure**



QG

#### 3 DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E75, F36
- Harness connectors M21, E106 (Sedan), M160, E175 (Hatchback)
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse
- 10A fuse

Repair harness or connectors.

#### 4 CHECK GROUND CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between heated oxygen sensor 2 (rear) harness connector terminal 3 and ECM terminal 3. Refer to wiring diagram.

#### Continuity should exist.

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

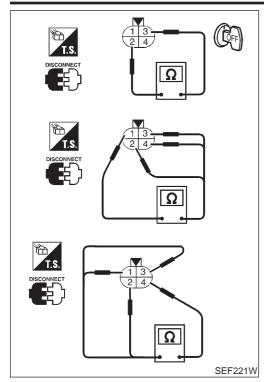
OK or NG			
OK 🕨	GO TO 6.		
NG	GO TO 5.		

5	5 DETECT MALFUNCTIONING PART				
Checl	Check the harness for open or short between heated oxygen sensor 2 heater (rear) and ECM.				
	Repair open circuit or short to ground or short to power in harness or connectors.				

6 CHECK	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)				
Refer to "Component Inspection", EC-474.					
OK or NG					
ОК	ОК 🕨 GO TO 7.				
NG   Replace heated oxygen sensor 2 (rear).					

7	CHECK INTERMITTENT INCIDENT			
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	•	INSPECTION END		

Component Inspection



# Component Inspection

# HEATED OXYGEN SENSOR 2 HEATER (REAR)

NJEC1247 NJEC1247S01

QG

- Check the following.
  1. Check resistance between terminals 1 and 4.
  Resistance: 2.3 4.3Ω at 25°C (77°F)
  - Resistance: 2.3 4.312 at 25°C (77
- 2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	NO

If NG, replace the heated oxygen sensor 2 (rear).

#### **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 and approved anti-seize lubricant.

Description

**QG** Description

NJEC1248

N.IEC1248S01

# SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM func- tion	Actuator
Throttle position sensor	Throttle position		
Ignition switch	Start signal		Swirl control valve control sole- noid valve via swirl control
Crankshaft position sensor (POS)	Engine speed	Swirl con- trol valve	
Camshaft position sensor (PHASE)	Engine speed and cylinder number	system control	valve
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.

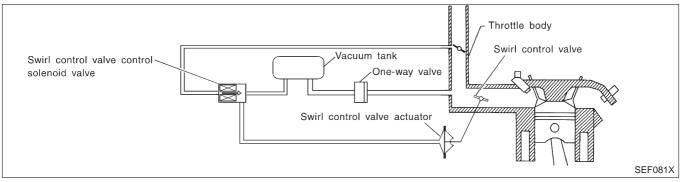
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

#### **OPERATION**

				NJEC1248S02	
Engine coolant tempera- ture	Throttle position sensor (Idle position)	Engine speed	Swirl control valve con- trol solenoid valve	Swirl control valve	
15 - 40°C	ON	—	ON	Closed	
(59 - 104°F)	OFF	Below 2,400 rpm*		Ciosed	
	Except above		OFF	Open	

\*: The value may vary according to accelerator pedal operation.



# CONSULT-II Reference Value in Data Monitor Mode

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 40°C (104°F).	ON
_		Engine coolant temperature is above 40°C (104°F).	OFF

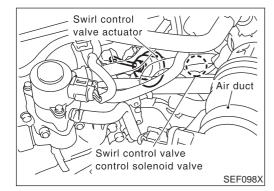
ECM Terminals and Reference Value

# ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
104	S P	Swirl control valve control solenoid valve	<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is between 15°C (59°F) to 40°C (104°F).</li> <li>Idle speed</li> </ul>	0 - 1V
104	SB		<ul> <li>[Engine is running]</li> <li>Engine coolant temperature is above 40°C (104°F).</li> <li>Idle speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)



# **Component Description**

#### SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

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.

#### SWIRL CONTROL VALVE AND ACTUATOR

By controlling the solenoid valve, the actuator pulls on the lever of the swirl control valve and closes it when vacuum accumulated in the vacuum tank is supplied.

#### VACUUM TANK

The vacuum tank is for accumulating vacuum to move the actuator. The vacuum pressure is supplied through the one-way valve from the intake manifold.

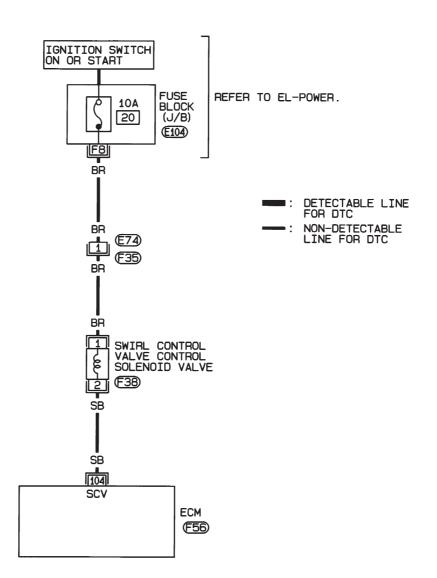
#### ONE-WAY VALVE

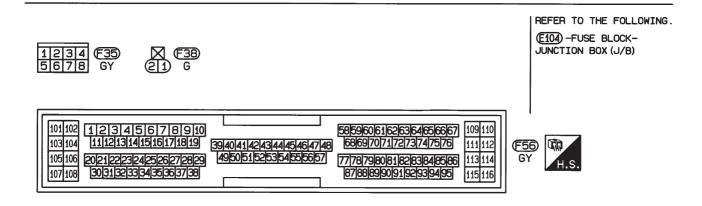
The one-way valve, located between the intake manifold and the vacuum tank, prevents back-flow of the vacuum tank. When installing, the colored side should face the vacuum source.

Wiring Diagram

#### Wiring Diagram

EC-SWL/C-01





HEC855

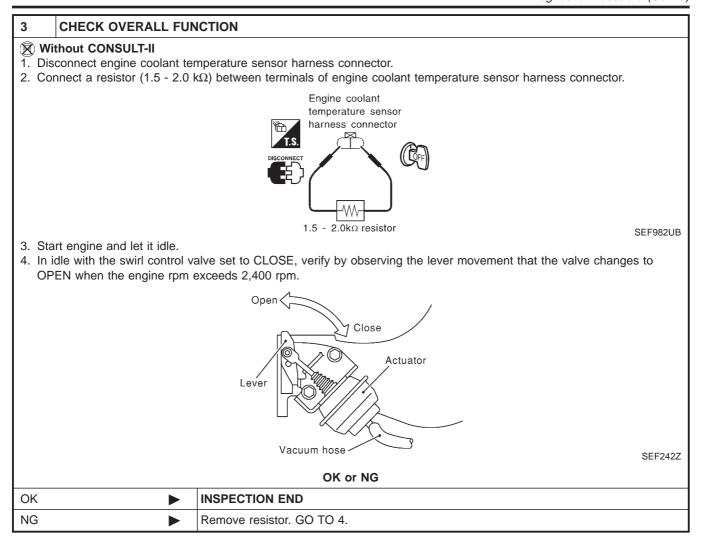
Diagnostic Procedure

**Diagnostic Procedure** 

NJEC1255					
		ON START	INSPECTIO	1	
	Do you have CONSULT-II?				
	Yes or No				
	GO TO 2.		;	Yes	
	GO TO 3.			No	

2	CHECK OVERALL FUNCTI	ION		
1. Sta 2. Se 3. To	<ul> <li>With CONSULT-II</li> <li>Start engine and let it idle.</li> <li>Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.</li> <li>Touch "ON" and "OFF" on CONSULT-II screen.</li> <li>Make sure that the swirl control valve opens and closes by observing the lever movement.</li> </ul>			
	Open Close Lever			
	Vacuum hose SEF242Z OK or NG			
OK		SPECTION END		
NG	► GO	) TO 4.		

Diagnostic Procedure (Cont'd)



Diagnostic Procedure (Cont'd)

#### 4 CHECK VACUUM EXISTENCE (P) 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. ₣**`)((Ç**m Condition Vacuum Actuator ON Should exist. Vacuum hose Should not Í FUSE OFF exist. SEF243Z **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 Actuator 12V direct current Should exist. supply Vacuum hose Should not FUSE No supply exist. SEF244Z OK or NG OK GO TO 9. NG GO TO 5.

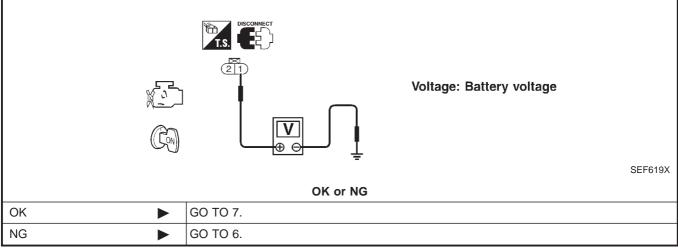
EC-480

Diagnostic Procedure (Cont'd)

QG

5 CHECK POWER SUPPLY
1. Disconnect swirl control valve control solenoid valve harness connector.
2. Ture inside witch "ON"

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



#### DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E74, F35
- 10A fuse

6

- Harness for open or short between swirl control valve control solenoid valve and fuse
  - Repair harness or connectors.

#### 7 CHECK OUTPUT SIGNAL CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 104 and swirl control valve control solenoid valve harness connector terminal 2 with CONSULT-II or tester.

#### Refer to wiring diagram. Continuity should exist.

If OK, check harness for short to ground and short to power.

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

8	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE			
Refer to "Component Inspection", EC-482.				
OK or NG				
OK	OK 🕨 GO TO 10.			
NG	NG   Replace swirl control valve control solenoid valve.			

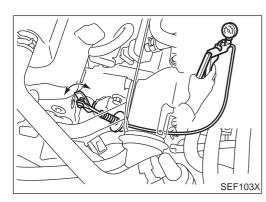
9	CHECK ACTUATOR		
Refer	Refer to "Component Inspection", EC-482.		
	OK or NG		
ОК	OK INSPECTION END		
NG	NG   Replace swirl control valve and actuator.		

Diagnostic Procedure (Cont'd)

10	CHECK HOSES				
	Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.				
	Clogging				
	Improper connection				
	SEF109L				
OK or NG					
OK		GO TO 11.			
NG	•	Repair hoses or tubes.			
11					

11	CHECK VACUUM TANK	(	
Refer to "Component Inspection", EC-482.			
	OK or NG		
ОК	OK 🕨 GO TO 12.		
NG	NG  Replace vacuum tank.		

12	2 CHECK ONE-WAY VALVE		
Refer	Refer to "Component Inspection", EC-482.		
	OK or NG		
ОК	OK INSPECTION END		
NG	NG   Replace one-way valve.		



# Component Inspection SWIRL CONTROL VALVE AND ACTUATOR

NJEC1256

QG

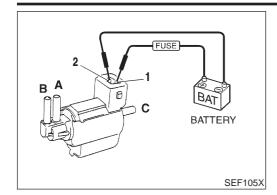
Supply vacuum to actuator and check swirl control valve operation.

Condition	Swirl control valve
Supply vacuum to actuator	Close
No supply	Open

If NG, replace swirl control valve and actuator.

Component Inspection (Cont'd)

QG



#### SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Check solenoid valve air passage continuity.

(I) With CONSULT-II

Turn ignition switch "ON" and perform "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.

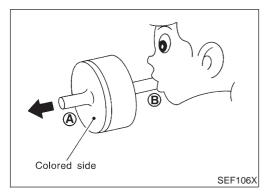
Condition SWIRL CONT SOL/V	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

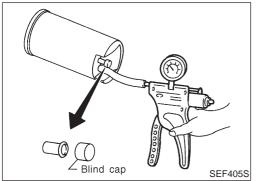
If NG or operation takes more than 1 second, replace solenoid valve.

#### **Without CONSULT-II**

Condition	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

If NG or operation takes more than 1 second, replace solenoid valve.





#### **ONE-WAY VALVE**

Check one-way valve air passage continuity.

NJEC1256S03

Condition	Air passage continuity
Blow air from side B to A	Yes
Blow air from side A to B	No

If NG, replace one-way valve.

#### VACUUM TANK

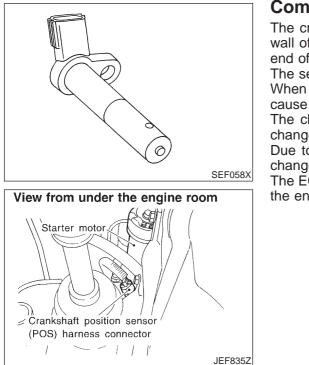
Check vacuum tank leakage.

NJEC1256S04

Apply vacuum -80.0 kPa (-800 mbar, -600 mmHg, -23.62 inHg, -11.60 psi). Then keep it for 10 seconds and check there is no leakage.

If NG, replace vacuum tank.

Component Description



#### **Component Description**

The crankshaft position sensor (POS) is located on the right-rear wall of the cylinder block in relation to the signal plate at the rear end of the crankshaft.

The sensor consists of a permanent magnet, and hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

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

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

# ECM Terminals and Reference Value

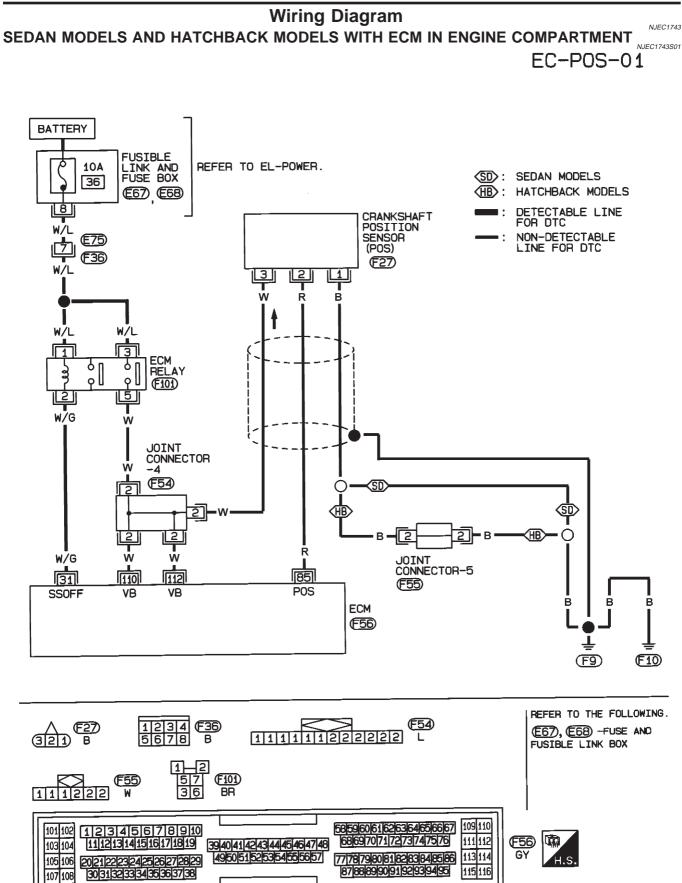
Specification data are reference values and are measured between each terminal and ground.

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
		Crankshoft position	[Engine is running] • Warm-up condition • Idle speed	3 - 4V
85	R Crankshaft positi sensor (POS)		[Engine is running] • Engine speed is 2,000 rpm	3 - 4V

QG

NJEC1742



NEF331A

Wiring Diagram (Cont'd)

 105
 106
 20/21/22/23/24/25/26/27/28/29

 107
 108
 30/31/32/33/34/35/36/37/38

107 108

#### HATCHBACK MODELS WITH ECM IN CABIN



BATTERY DETECTABLE LINE FOR DTC : FUSIBLE NON-DETECTABLE LINK AND FUSE BOX • 1 10A REFER TO EL-POWER. LINE FOR DTC 36 (E67) (E68) 8 CRANKSHAFT POSITION SENSOR (POS) W/L (F27) <u>3</u>j 2 W/L W/L Ē W R B ECM RELAY اه ا δ ತ್ರ 1 Ŷ П **E199** L 3 W/G W E75 Ľ **F36** W/G (E174) (M159) JOINT W/G CONNECTOR (1169) W -6 **F114 F113** 1 W/G 1 1 1 니 R W/G W W 31 110 85 112 POS SSOFF VB VB B В ECM R (F56) 1 (F9) **F10** REFER TO THE FOLLOWING. 123 4567 E174, F113 8910111213141516 W BR (E27) B 7 **E199** 5 (E67), (E68) -FUSE AND 32D 36 BR FUSIBLE LINK BOX 1234 F36 5678 B c11111122222 F114 33333344444 12345678910 111213141516171819 58596061626364656667 686970717273747576 101 102 109 110 39|40|41|42|43|44|45|46|47|48 |49|50|51|52|53|54|55|56|57| 103 104 111 112 F56 

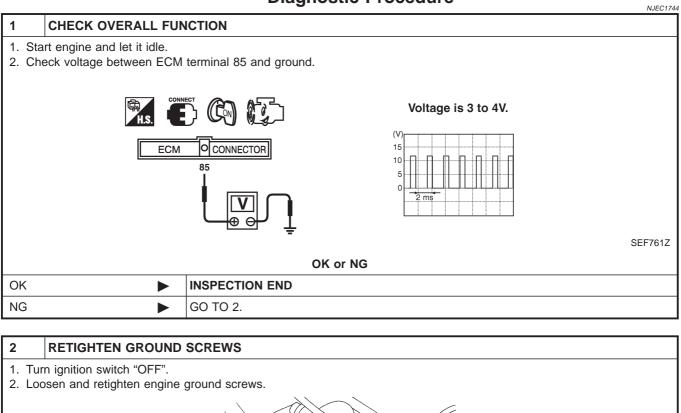
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GY

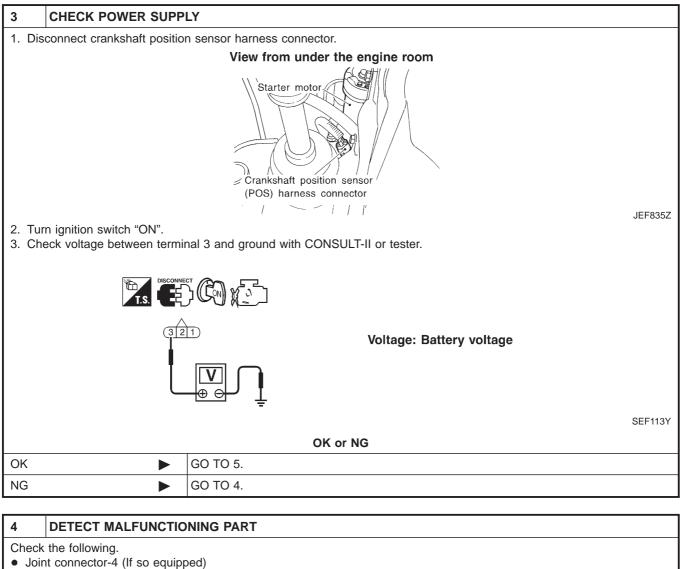
H.S.

### **Diagnostic Procedure**



No. 2 ignition coil	JEF104Y
 GO TO 3.	

Diagnostic Procedure (Cont'd)



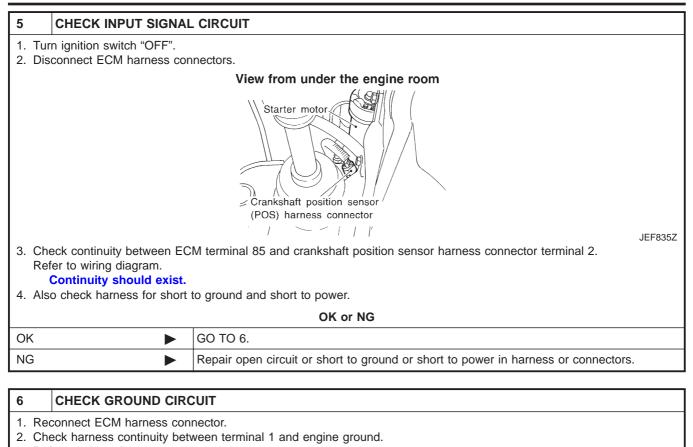
- Joint connector-6 (If so equipped)
- Harness for open or short between joint connector and ECM relay
- Harness for open or short between crankshaft position sensor and joint connector
- Harness for open or short between joint connector and ECM

• ECM relay

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

Diagnostic Procedure (Cont'd)

OG



Refer to wiring diagram. Continuity should exist.

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

OK	or	NG
----	----	----

NG 🕨 GO TO 7.	ОК	GO TO 8.
	NG	GO TO 7.

	7	DETECT MALFUNCTIONING PART
--	---	----------------------------

Check the following.

• Joint connector-5 (Hatchback models)

• Harness for open between crankshaft position sensor harness connector terminal 1 and engine ground.

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

# 8 CHECK CRANKSHAFT POSITION SENSOR Refer to "Component Inspection", EC-490. OK or NG OK GO TO 9. NG Replace crankshaft position sensor.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
	► INSPECTION END	

Component Inspection

# 00) Ø SEF121X

#### **Component Inspection CRANKSHAFT POSITION SENSOR (POS)**

NJEC1745

QG

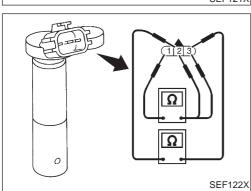
- 1. Disconnect crankshaft position sensor (POS) harness connector.
- Loosen the fixing bolt of the sensor. 2.
- 3. Remove the sensor.

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)]
3 (+) - 1 (-)	
2 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	

If NG, replace crankshaft position sensor.



#### Description SYSTEM DESCRIPTION

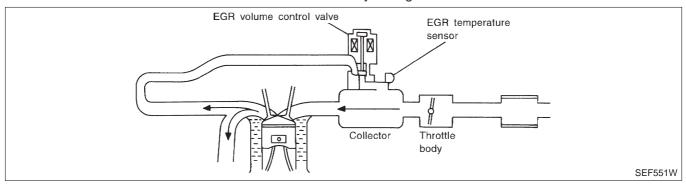
NJEC1746

**QG** Description

	N	NJEC1746S01	
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position	EGR vol-	
Vehicle speed sensor	Vehicle speed	ume control	EGR volume control valve
Battery	Battery voltage		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal	1	

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. The EGR volume control valve remains close under the following conditions.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Extremely light load engine operation
- Engine idling
- Excessively high engine coolant temperature
- Wide open throttle
- Mass air flow sensor malfunction
- Low battery voltage



Description (Cont'd)



#### NJEC1746S02

QG

Sensor element Gasket Connector SEF599K



The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

#### EGR Temperature Sensor

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR volume control valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.

#### <Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

\*: These data are reference values and are measured between ECM terminal 72 (EGR temperature sensor) and ground.

When EGR system is operating.

Voltage: 0 - 1.5V

#### **CAUTION:**

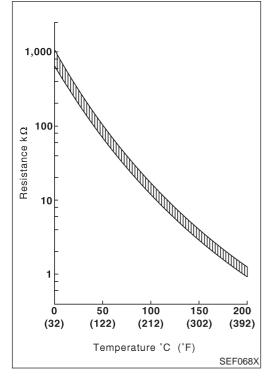
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

# CONSULT-II Reference Value in Data Monitor Mode

NJEC1747

#### Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	Engine: After warming up		Less than 4.5V
EGR VOL CON/V	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: "OFF"</li> </ul>	Idle	0 step
	<ul> <li>All conditioner switch. OFF</li> <li>Shift lever: "N"</li> <li>No-load</li> </ul>	Revving engine up to 3,000 rpm quickly	10 - 55 step



ECM Terminals and Reference Value

QG

NJEC1748

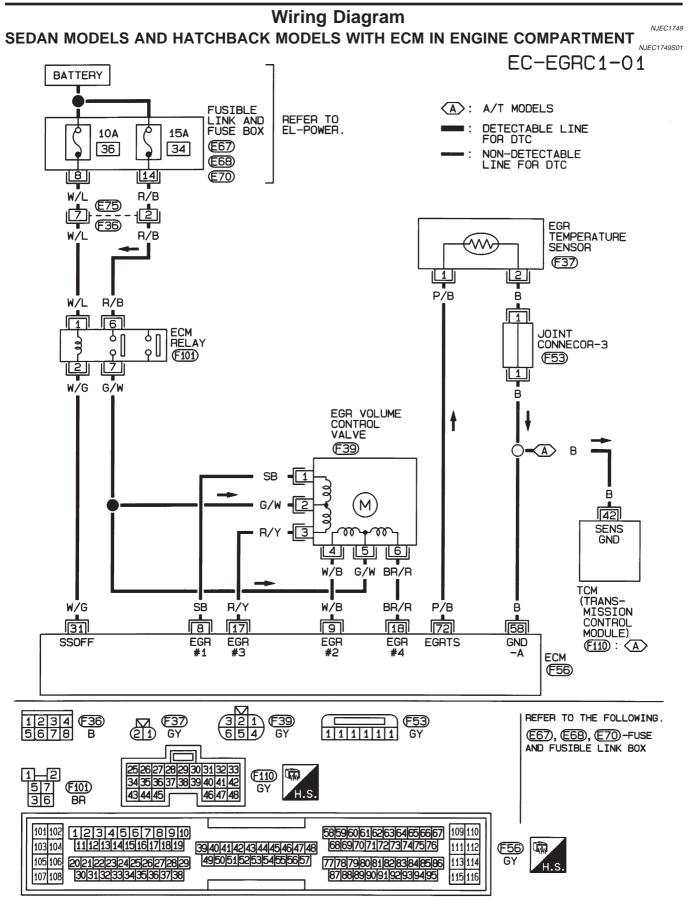
# ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
8 9 17 18	SB W/B R/Y BR/R	EGR volume control valve	<ul><li>[Engine is running]</li><li>Idle speed</li></ul>	0 - 14V
58	В	Sensor's ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	ov
72 P/B	D/D		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Less than 4.5V
	P/B EGR temperature sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>EGR system is operating.</li> </ul>	0 - 1V	

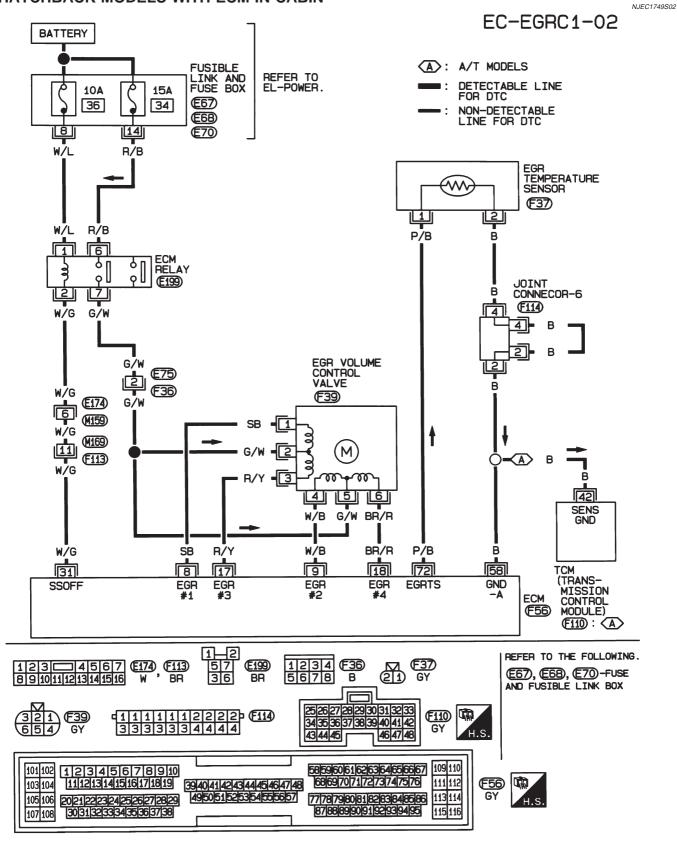
Wiring Diagram



HEC794

D) QG Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN

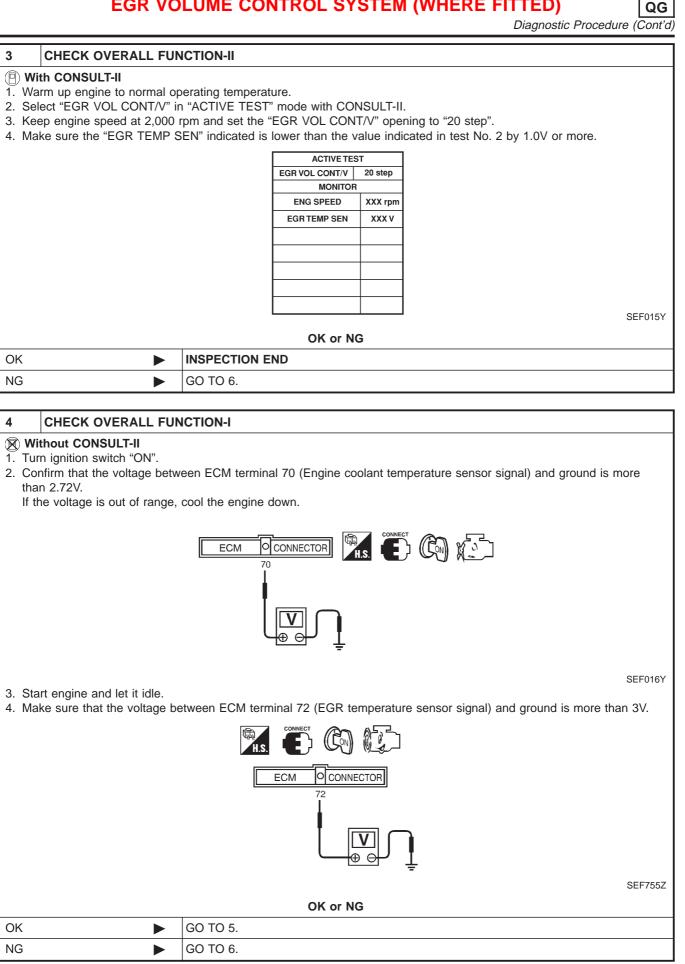


HEC976

Diagnostic Procedure

**Diagnostic Procedure** 

			-		NJEC1750		
1	INSPECTION START						
Do yo	Do you have CONSULT-II?						
			Yes or	No			
Yes		GO TO 2.					
No		GO TO 4.					
		00101					
2	CHECK OVERALL FUN						
	th CONSULT-II						
	in ignition switch "ON".						
2. Se	lect "DATA MONITOR" mod						
	nfirm that "COOLAN TEMF			04°F).			
lf ti	ne indication is out of rang	e, cool the engin	e down.				
			DATA MON	ITOR			
			MONITOR	NO DTC			
			COOLAN TEMP/S	XXX °C			
					00000		
4. Sta	rt engine and let it idle.				SEF013Y		
		SEN" in "DATA M	ONITOR" mod	e indicates	s more than 3V. Print out the screen or note the		
ind	ication.						
			DATA MON	ITOR	]		
			MONITOR	NO DTC			
			EGR TEMP SEN	xxx v			
	SEF014Y						
	OK or NG						
ОК		GO TO 3.					
NG		GO TO 6.					



Diagnostic Procedure (Cont'd)

5 CHECK OVERA	LL FUI	NCTION-II				
<ul> <li>Without CONSULT-II</li> <li>Warm up engine to normal operating temperature.</li> <li>Rev engine from idle up to about 3,000 rpm two to three times.</li> <li>Make sure the voltage between ECM terminal 72 and ground is lower than the voltage measured in test No. 4 by 1.0V or more.</li> </ul>						
			EF755Z			
		OK or NG	LI 7552			
ОК		INSPECTION END				
NG		GO TO 6.				
6 CHECK EGR TE	MPER	ATURE SENSOR POWER SUPPLY				
1. Turn ignition switch "C						
2. Disconnect EGR temp	erature	e sensor harness connector.				
	EGR temperature sensor					
3. Turn ignition switch "C			EF127X			
4. Check voltage betwee	4. Check voltage between terminal 1 and ground with CONSULT-II or tester.					
Voltage: Approximately 5V						
		s	EF896X			
	OK or NG					
ОК		GO TO 7.				
NG		Repair harness or connectors.				

Diagnostic Procedure (Cont'd)

QG

7	CHECK EGR TEMPER	ATURE SENSOR GROUND CIRCUIT					
2. Ch Rei	<ol> <li>Turn ignition switch "OFF".</li> <li>Check harness continuity between EGR temperature sensor harness terminal 2 and engine ground. Refer to wiring diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>						
		OK or NG					
ОК		GO TO 9.					
NG	NG 🕨 GO TO 8.						
8	8 DETECT MALFUNCTIONING PART						

Check the following.

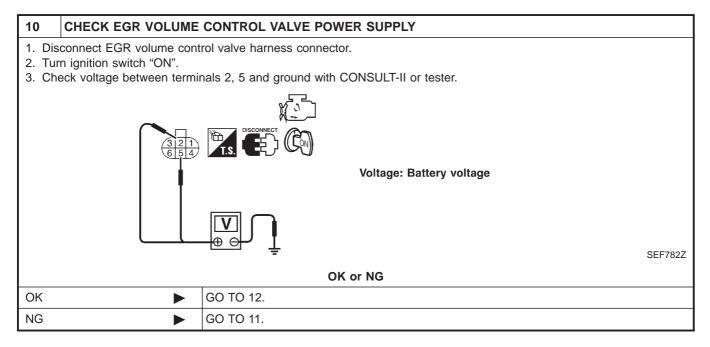
- Harness for open or short between EGR temperature sensor and ECM
- Harness for open or short between TCM (Transmission Control Module) and ECM
- Joint connector-3 (If so equipped)
- Joint connector-6 (If so equipped)

#### 9 CHECK EGR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-502.

OK or NG

ОК	GO TO 10.
NG	Replace EGR temperature sensor.



#### 11 DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness connectors E75, F36
- Harness for open or short between fuse and ECM relay

- ECM relay
- Harness for open or short between EGR volume control valve and ECM relay.

Repair harness or connectors, or replace fuse or ECM relay.

Repair open circuit or short to ground or short to power in harness or connector.

Diagnostic Procedure (Cont'd)

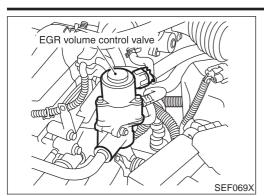
12	CHECK OUTPUT SIGNAL CIRCUIT				
1. Tu	Irn ignition switch "OFF".				
2. Di	sconnect ECM harness con	nector.			
3. Ch	neck harness continuity betw	veen			
EC	CM terminal 8 and EGR volu	ume control valve terminal 1,			
EC	CM terminal 9 and EGR volu	ume control valve terminal 4,			
EC	CM terminal 17 and EGR vo	lume control valve terminal 3,			
EC	ECM terminal 18 and EGR volume control valve terminal 6.				
Re	Refer to wiring diagram.				
Co	Continuity should exist.				
4. Als	4. Also check harness for short to ground and short to power.				
	OK or NG				
ОК		GO TO 13.			
NG	NG  Repair open circuit, short to ground or short to power in harness connectors.				

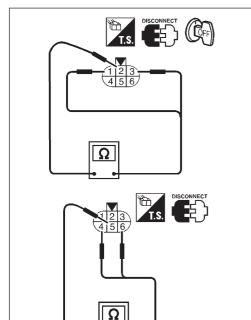
13	CHECK EGR PASSAG	E				
Chec	Check EGR passage for clogging and cracks.					
	OK or NG					
OK	ОК 🕨 GO TO 14.					
NG		Repair or replace EGR passage.				
		•				
14	CHECK EGR VOLUME CONTROL VALVE					
Refer	Refer to "COMPONENT INSPECTION", EC-501.					
	OK or NG					

OK 🕨	GO TO 15.			
NG	Replace EGR volume control valve.			

15	CHECK INTERMITTENT INCIDENT				
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.				
	► INSPECTION END				

Diagnostic Procedure (Cont'd)





#### Component Inspection EGR VOLUME CONTROL VALVE With CONSULT-II

- 1) Disconnect EGR volume control valve harness connector.
- Check resistance between the following terminals. terminal 2 and terminals 1, 3 terminal 5 and terminals 4. 6

Temperature °C (°F)	Resistance $\Omega$		
20 (68)	20 - 24		

- 3) Reconnect EGR volume control valve harness connector.
- Remove EGR volume control valve from cylinder head. (The EGR volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON".
- Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

If NG, replace the EGR volume control valve.

#### **Without CONSULT-II**

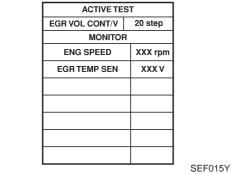
- 1) Disconnect EGR volume control valve harness connector.
- 2) Check resistance between the following terminals. terminal 2 and terminals 1, 3

terminal	5	and	terminals	4,	6

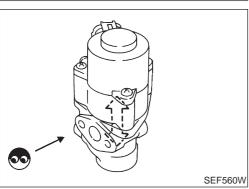
Temperature °C (°F)	Resistance $\Omega$
20 (68)	20 - 24

3) Turn ignition switch "ON" and "OFF". Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

If NG, replace the EGR volume control valve.



SEF605Y



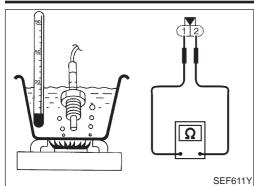
NJEC1751

QG

NJEC1751S01

\_

Component Inspection (Cont'd)

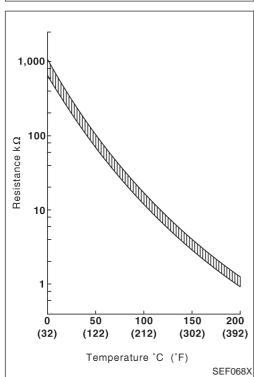


#### EGR TEMPERATURE SENSOR

Check resistance change and resistance value. <Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

If NG, replace EGR temperature sensor.



NJEC1751S02

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

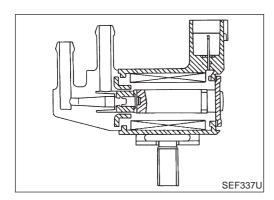
#### Description SYSTEM DESCRIPTION

NJEC1752

**QG** Description

			NJEC1752S0
Sensor	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine speed		EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and cylinder number	-	
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage		
Ignition switch	Start signal	EVAP can- ister purge	
Closed throttle position switch (If so equipped)	Closed throttle position	control	
Throttle position sensor	Throttle position	-	
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



#### **COMPONENT DESCRIPTION**

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

# CONSULT-II Reference Value in Data Monitor Mode

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	<ul><li>Engine: After warming up</li><li>No-load</li></ul>	Idle	0%
		Revving engine	_

# EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

ECM Terminals and Reference Value

# ECM Terminals and Reference Value

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
14	GY/L	EVAP canister purge vol- ume control solenoid valve	[Engine is running] • Warm-up condition • 2,000 rpm	5 - 12V

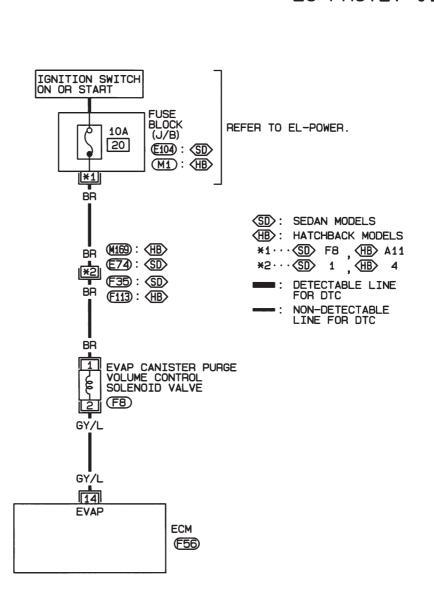
=NJEC1754

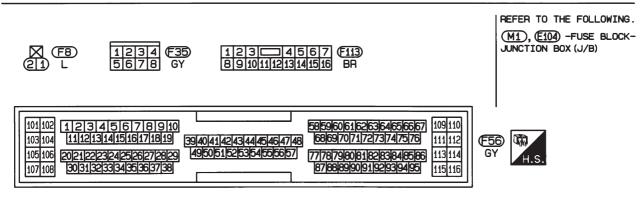
Wiring Diagram

### Wiring Diagram HATCHBACK MODELS WITH ECM IN CABIN EC-PRGVLV-01

NJEC1755

NJEC1755S01

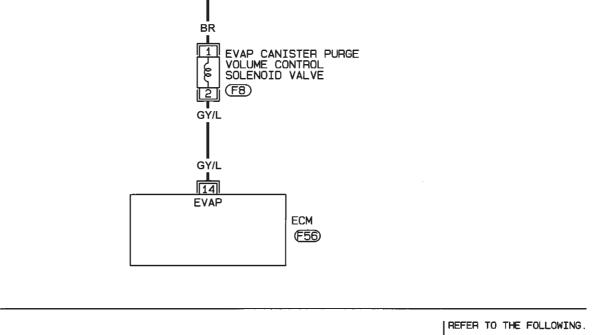




HEC969

### EC-506

101102 12345678910 103104 111213141516171819	39[40]41]42[43]44]45[46]47]48	58596061626364656667 686970717273747576	109110 111112 (F5	6
105 106 20212223242526272829 107 108 303132333435363738	495051525354555657	77787980818283848586	113114 GY	



# SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT EC-PGC/V-01

REFER TO EL-POWER.

.

:

DETECTABLE LINE FOR DTC

NON-DETECTABLE LINE FOR DTC

**EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE** 

FUSE BLOCK (J/B)

(E104)

IGNITION SWITCH ON OR START

> > ΒR

BR

10A 20

(E74) (E35)

Wiring Diagram (Cont'd)

 X
 FB
 1234
 F35

 (21)
 L
 5678
 GY

NEF332A

(E104) -FUSE BLOCK-

JUNCTION BOX (J/B)

Diagnostic Procedure

QG

### **Diagnostic Procedure**

		-	NJEC1756
1	INSPECTION START		
Do you	have CONSULT-II?		
		Yes or No	
Yes		GO TO 2.	
No		GO TO 3.	

# 2 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE CONTROL FUNCTION With CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect the EVAP purge hose connected to the EVAP canister purge volume control solenoid valve at the EVAP canister. 3. Turn ignition switch "ON" and select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.

- 4. Start engine and let it idle.
- 5. Change the valve opening percentage touching "Qu" and "Qd" and check for vacuum existence under the following conditions.

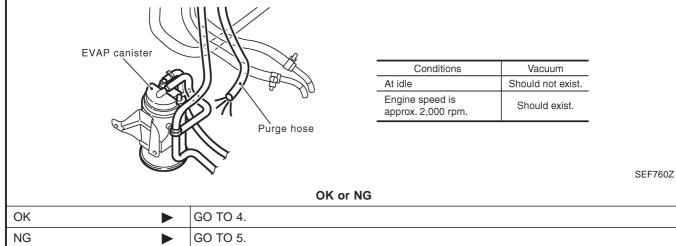
	ACTIVE TE	ST			
	PURG VOL CONT/V	XXX %			
	MONITO	R			
	ENG SPEED	XXX rpm	Conditions	Vacuum	-
	A/F ALPHA-B1	XXX %	At idle	Should not exist.	-
	HO2S1 MNTR (B1	) LEAN			-
	THRTL POS SEN		Engine speed is about 2,000 rpm		_
					-
	L				SEC582C
			OK or NG		
ОК		GO TO 4.			
NG		GO TO 5.			

Diagnostic Procedure (Cont'd)

### 3 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE CONTROL FUNCTION

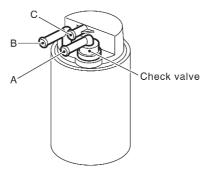
### **Without CONSULT-II**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch "OFF".
- 3. Disconnect the EVAP purge hose connected to the EVAP canister purge volume control solenoid valve at the EVAP canister.
- 4. Start engine and let it idle for at least 90 seconds.
- 5. Check for vacuum existence at the EVAP purge hose under the following conditions.



### 4 CHECK EVAP CANISTER

- 1. Turn ignition switch "OFF".
- 2. Remove EVAP canister.
- 3. Block port B of EVAP canister.
- 4. Blow air through port A orally, and confirm that air flows freely through port C with check valve resistance.
- 5. Block port A of EVAP canister.
- 6. Blow air through port B orally, and confirm that air flows freely through port C.



SEF917W

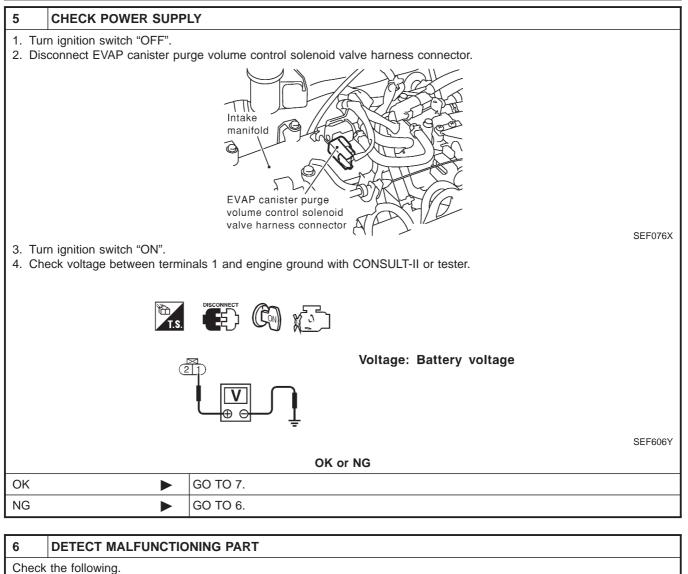
QG

OK or NG		
OK INSPECTION END		
NG	Replace EVAP canister.	

EC-508

Diagnostic Procedure (Cont'd)

QG



- Harness connectors E74, F35 (If so equipped)
- Harness connectors M169, F113 (If so equipped)
- 10A fuse

• Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

Repair harness or connectors.

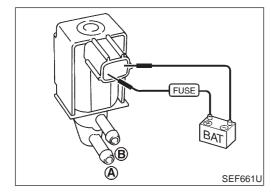
7	CHECK OUTPUT SIGN	AL CIRCUIT		
1. Tur	n ignition switch "OFF".			
2. Dis	connect ECM harness con	nector.		
3. Che	eck harness continuity betw	ween ECM terminal 14 and terminal 2.		
Ref	er to wiring diagram.			
	Continuity should exist.			
4. Als	o check harness for short	to ground and short to power.		
	OK or NG			
ОК	ОК <b>Б</b> О ТО 8.			
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.			

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CANIST	ER PURGE VOLUME CONTROL SOLENOID VALVE		
Refer	Refer to "Component Inspection", EC-510.			
	OK or NG			
OK		GO TO 9.		
NG	NG   Replace EVAP canister purge volume control solenoid valve.			
٥	9 CHECK INTERMITTENT INCIDENT			

9	CHECK INTERMITTENT INCIDENT		
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.		
		INSPECTION END	

		-
ACTIVE TES		
PURG VOL CONT/V	XXX %	
MONITOR		
ENG SPEED	XXX rpm	
A/F ALPHA-B1	XXX %	
HO2S1 MNTR (B1)	LEAN	
THRTL POS SEN	XXX V	
L	1	SEF801



# **Component Inspection EVAP CANISTER PURGE VOLUME CONTROL** SOLENOID VALVE

NJEC1757 NJEC1757S01

QG

### (I) 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.

If OK, inspection end. If NG, go to following step.

Check air passage continuity. 3)

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

### **Without CONSULT-II**

Check air passage continuity.

Condition	Air passage continuity between A and B	
12V direct current supply between ter- minals	Yes	
No supply	No	

If NG, replace the EVAP canister purge volume control solenoid valve.

### Description SYSTEM DESCRIPTION

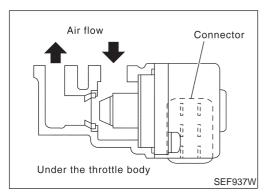
NJEC1758

QG Description

NJEC1758S01

Sensor	Input Signal to ECM	ECM func- tion	Actuator
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Engine speed and cylinder number		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal	1	
Throttle position sensor	Throttle position	1	
PNP switch	Park/Neutral position	Idle air	
Air conditioner switch	Air conditioner operation	control	IACV-AAC valve
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed	7	
Cooling fan	Cooling fan operation	1	
Electrical load	Electrical load signal	1	

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the 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 then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering, cooling fan operation and electrical load).



### COMPONENT DESCRIPTION

### IACV-AAC Valve

NJEC1758S02

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

# CONSULT-II Reference Value in Data Monitor Mode

			NJEC1759
MONITOR ITEM	CONE	DITION	SPECIFICATION
IACV-AAC/V	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> </ul>	Idle	5 - 25 steps
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	_

### ECM Terminals and Reference Value

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6 7 15 16	BR LG P OR	IACV-AAC valve	[Engine is running] • Warm-up condition • Idle speed	0.1 - 14V

QG

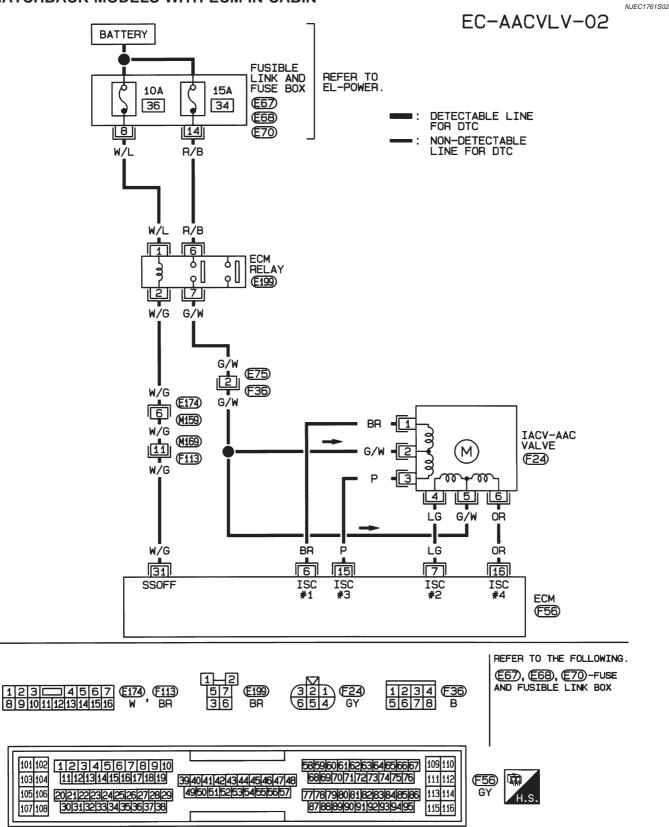
NJEC1760

Wiring Diagram Wiring Diagram NJEC1761 SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT FC-AACVLV-01 BATTERY FUSIBLE REFER TO EL-POWER. LINK AND FUSE BOX 15A 10A **E**67) 34 36 **E68** : DETECTABLE LINE FOR DTC 14 8 Ē70 NON-DETECTABLE LINE FOR DTC W/L R∕B E75 **F**36 W/L R/B W/L R/B **E** ſ 1 9 ತ್ರ γUΙ γl (F101) ĽŻ ц<u>т</u> W/G G/W BR IACV-AAC VALVE 00 G/W **M** (F24) 00 00 ത 5 4 6 Т Т LG G/W OR Ρ OR W/G BR LG 1 31 16 6 15 SSOFF ISC ISC ISC ISC #1 #3 #2 #⊿ ECM (F56) REFER TO THE FOLLOWING. (E67), (E68), (E70)-FUSE AND FUSIBLE LINK BOX 1234 <del>(F36)</del> 5678 B **F101 F24** 517 1 36 4 GY BR 109 110 101 102 12345678910 58596061626364656667 103 104 11 12 13 14 15 16 17 18 19 686970717273747576 111 112 **S** 39404142434445464748 F56 20212223242526272829 303132333435363738 113 114 105 106 495051525354555657 77 78 79 80 81 82 83 84 85 86 GY ́н.s 115116 878889909192939495 107 108

HEC910

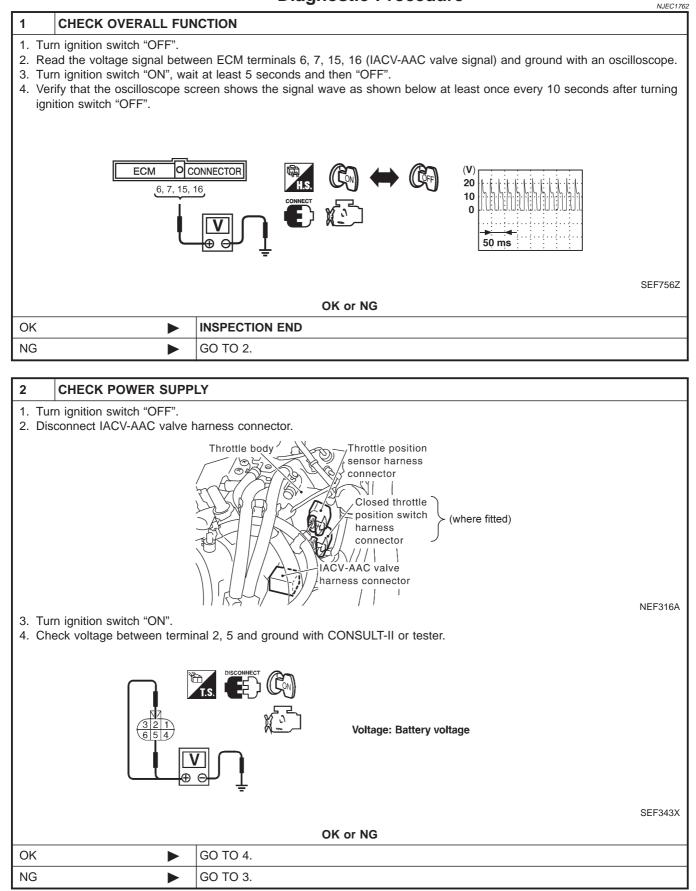
Wiring Diagram (Cont'd)

### HATCHBACK MODELS WITH ECM IN CABIN



QG Diagnostic Procedure

# **Diagnostic Procedure**



Diagnostic Procedure (Cont'd)

### 3 DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness connectors E75, F36 (If so equipped)
- · Harness for open or short between fuse and ECM relay
- ECM relay
- · Harness for open or short between IACV-AAC and ECM relay.

Repair harness or connectors, or replace fuse or ECM relay. 

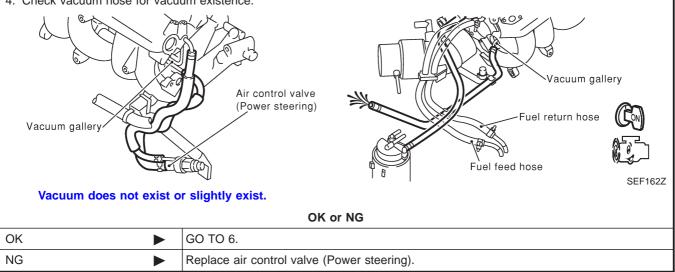
### 4 **CHECK OUTPUT SIGNAL CIRCUIT**

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 6 and IACV-AAC valve terminal 1, ECM terminal 7 and IACV-AAC valve terminal 4, ECM terminal 15 and IACV-AAC valve terminal 3, ECM terminal 16 and IACV-AAC valve terminal 6. Refer to wiring diagram. Continuity should exist.
- 4. Also check harness for short to ground and short to power.

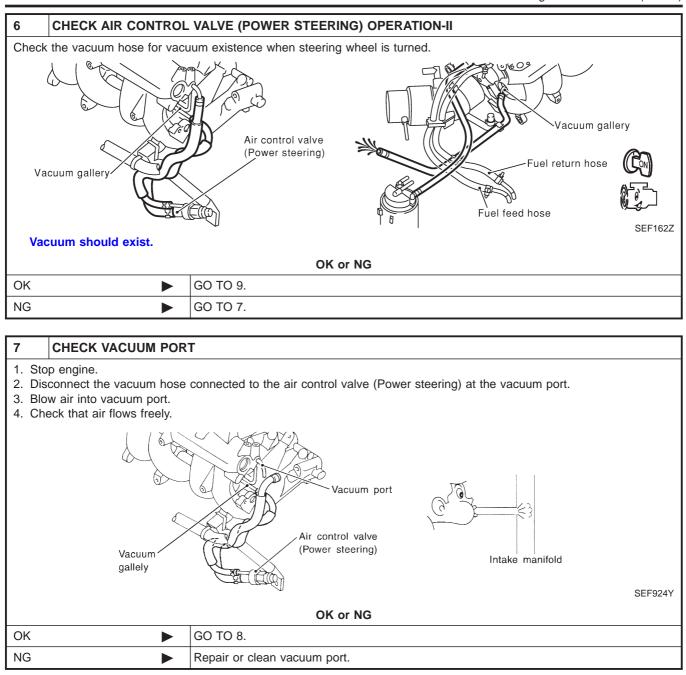
OK or NG	
OK 🕨	GO TO 5.
NG	Repair open circuit or short to ground or short to power in harness or connectors.

### 5 CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-I

- 1. Reconnect the ECM harness connector and IACV-AAC valve harness connector.
- 2. Disconnect the vacuum hose connected to the air control valve (Power steering) at the intake air duct.
- 3. Start engine and let it idle.
- 4. Check vacuum hose for vacuum existence.



Diagnostic Procedure (Cont'd)



Diagnostic Procedure (Cont'd)

8	CHECK VACUUM HOSES AND TUBES			
ste	<ol> <li>Disconnect vacuum hoses between the air control valve (Power steering) and vacuum port, air control valve (Power steering) and air duct.</li> <li>Check hoses and tubes for cracks, clogging, improper connection or disconnection.</li> </ol>			
	Clogging Clogging			
	SEF109L			
	OK or NG			
ОК	► GO TO 9.			
NG	Repair hoses or tubes.			
9	CHECK IACV-AAC VALVE			
Refer	to "Component Inspection", EC-519.			
	OK or NG			
ОК	► GO TO 11.			

10	REPLACE IACV-AAC VALVE			
<ol> <li>Replace IACV-AAC valve assembly.</li> <li>Perform "Idle Air Volume Learning", EC-57.</li> <li>Is the result CMPLT or INCMP?</li> </ol>				
CMPLT or INCMP				
CMPL	CMPLT   INSPECTION END			
INCM	INCMP Follow the construction of "Idle Air Volume Learning".			
11	11 CHECK TARGET IDLE SPEED			

1. Turn ignition switch "OFF".

NG

2. Reconnect all harness connectors and vacuum hose.

GO TO 10.

- 3. Start engine and warm it up to normal operating temperature.
- 4. Also warm up transmission to normal operating temperature.
- 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.
- 5. Stop vehicle with engine running.
- 6. Check target idle speed.
  - M/T: 700±50 rpm A/T: 800±50 rpm (in "P" or "N" position)

OK or NG

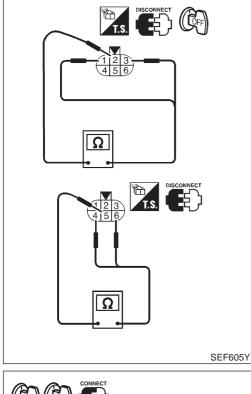
ОК	GO TO 12.
NG	Perform "Idle Air Volume Learning", EC-57.

Diagnostic Procedure (Cont'd)

### 12 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END



# Component Inspection

NJEC1763

QG

NJEC1763S01

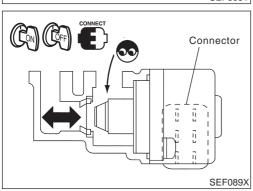
Disconnect IACV-AAC valve harness connector.
 Check IACV-AAC valve resistance.

Condition	Resistance	
Terminal 2 and terminals 1, 3	- 20 - 24Ω [at 20°C (68°F)]	
Terminal 5 and terminals 4, 6		

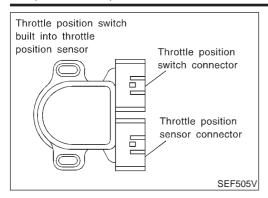
- 3) Reconnect IACV-AAC valve harness connector.
- 4) Remove idle air adjusting unit assembly (IACV-AAC valve is built-in) from engine.

(The IACV-AAC valve harness connector should remain connected.)

5) Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve shaft smoothly moves forward and backward, according to the ignition switch position. If NG, replace the IACV-AAC valve.



Component Description



### **Component Description**

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

QG

NJEC1765

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

### **ECM Terminals and Reference Value**

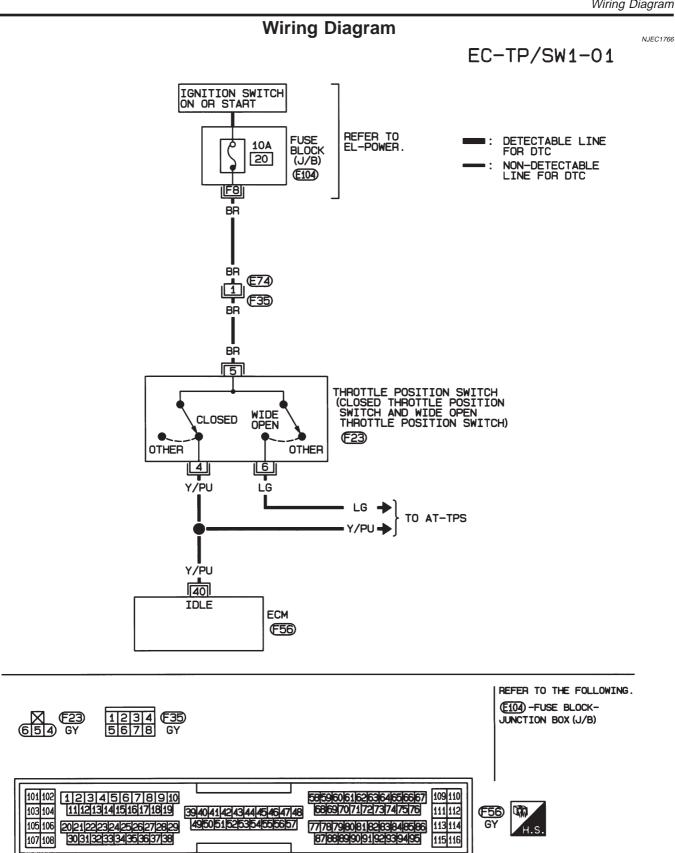
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

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

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	Y/PU	Throttle position switch	<ul><li>[Ignition switch "ON"]</li><li>Accelerator pedal fully released</li></ul>	BATTERY VOLTAGE (11 - 14V)
			<ul><li>[Ignition switch "ON"]</li><li>Accelerator pedal depressed</li></ul>	Approximately 0V

Wiring Diagram

QG



HEC950

Diagnostic Procedure

**Diagnostic Procedure** 

### 1 INSPECTION START

Do you have CONSULT-II?				
		Yes or No		
Yes		GO TO 2.		
No		GO TO 3.		

### 2 CHECK OVERALL FUNCTION

### () With CONSULT-II

1. Turn ignition switch "ON".

2. Select "A/T" and then select "DATA MONITOR" mode with CONSULT-II.

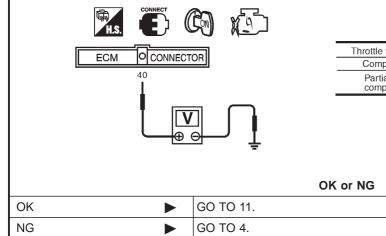
3. Check indication of "CLSD THL/P SW" under the following conditions. Measurement must be made with throttle position switch installed in vehicle.

	Throttle valve conditions	CLSD THL/P SW	
	Completely closed	ON	-
	Partially open or completely open	OFF	
			MTBL0355
	OK or NG	i	
ОК	GO TO 10.		
NG	GO TO 4.		

### 3 CHECK OVERALL FUNCTION

### **Without CONSULT-II**

- 1. Turn ignition switch "ON".
- 2. Check voltage between ECM terminal 40 (closed throttle position switch signal) and ground under the following conditions.



Throttle valve conditions	Voltage
Completely closed	Battery Voltage
Partially open or compleately open	Approximately 0V

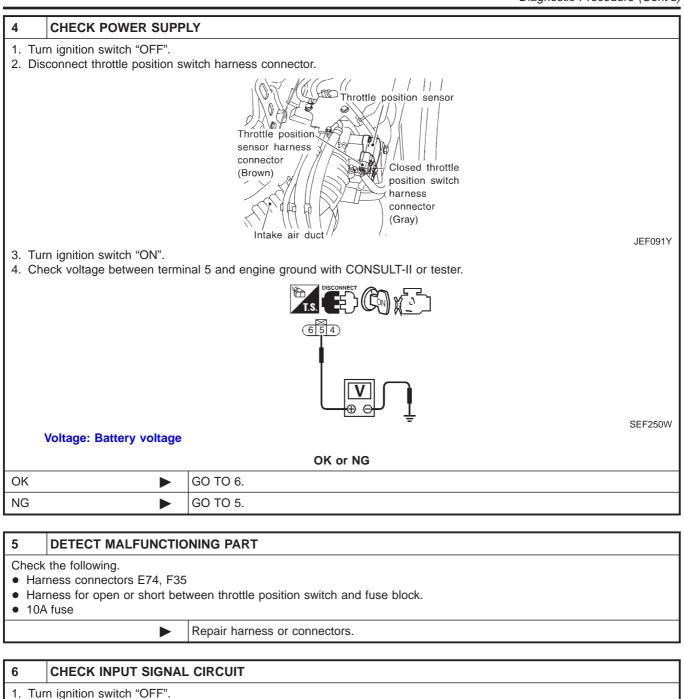
SEC583C

QG

NJEC1767

QG

Diagnostic Procedure (Cont'd)



- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 40 and throttle position switch harness connector terminal 4. Refer to wiring diagram.

### Continuity should exist.

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

OK or NG

ОК	GO TO 8.
NG	GO TO 7.

Diagnostic Procedure (Cont'd)

### 7 DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between throttle position switch and ECM
- Harness for open or short between throttle position switch and TCM (Transmission Control Module)

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

### 8 ADJUST THROTTLE POSITION SWITCH IDLE POSITION

Perform Basic Inspection, EC-100.

GO TO 9.

9	CHECK CLOSED THROTTLE POSITION SWITCH		
Refer	Refer to "Component Inspection", EC-525.		
	OK or NG		
OK (W	/ith CONSULT-II)		GO TO 10.
OK (Without CONSULT- GO TO 11. II) GO TO 11.		GO TO 11.	
NG	NG  Replace throttle position switch.		

### 10 CHECK THROTTLE POSITION SENSOR () With CONSULT-II 1. Select "ENGINE" and then select "DATA MONITOR" mode with CONSULT-II. 2. Check voltage of "THRTL POS SEN" under the following conditins. Voltage measurement must be made with throttle position sensor installed in vehicle. Throttle valve conditions THRTL POS SEN 0.15 - 0.85V Completely closed (a) Partially open Between (a) and (b) Completely open (b) 3.5 - 4.7V MTBL0230 OK or NG OK GO TO 12. NG Replace throttle position sensor. CHECK THROTTLE POSITION SENSOR 11 **Without CONSULT-II** Check voltage between ECM terminal 92 (Throttle position sensor signal) and ground. Voltage measurement must be made with throttle position sensor installed in vehicle. ECM **O** CONNECTOR Throttle valve conditions Voltage 92 Completely closed (a) 0.15 - 0.85V Partially open Between (a) and (b) Completely open (b) 3.5 - 4.7V с YEC049A

OK or NG			
OK 🕨 GO TO 12.			
NG  Replace throttle position sensor.			

Diagnostic Procedure (Cont'd)

### 12 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

DATA MON	ITOR
MONITOR	NO DTC
CLOSED THL/SW	ON

# Component Inspection CLOSED THROTTLE POSITION SWITCH

NJEC1768 NJEC1768S01

QG

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode in A/T SECTION with CON-SULT-II.
- Check indication of "CLOSED THL/SW" under the following conditions.

### NOTE:

Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLOSED THL/SW
Completely closed	ON
Partially open or completely open	OFF

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

4) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

### **Without CONSULT-II**

- 1) Disconnect throttle position switch harness connector.
- 2) Check continuity between terminals 4 and 5 under the following conditions. Refer to wiring diagram.

### NOTE:

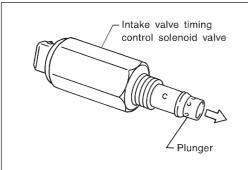
# Continuity measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-100.

3) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

Component Description



### **Component Description**

The valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed and throttle position are used to determine intake valve timing.

The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.

When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.

SEF095X

### Operation

		•				NJEC1770
Engine operating condition			Intake valve tim-	Intake valve		
Engine coolant temperature	Engine speed	B/FUEL SCHDL	Neutral switch	ing control sole- noid valve	opening and closing time	Valve overlap
20°C (68°F) - 70°C (158°F)	1,150 - 4,600 rpm	Above 3 msec	OFF	ON	Advance	Increased
Above 70°C (158°F)		Above 7 msec	OFF	ON	Advance	Increased
	Conditions other than those above			OFF	Normal	Normal

# CONSULT-II Reference Value in Data Monitor Mode

			NJEC1771
MONITOR ITEM	CONE	SPECIFICATION	
	Engine: After warming up	Idle	OFF
INT/V SOL-B1	Lift up vehicle and suitable gear position	Revving engine from 2,000 to 3,000 rpm	ON

# **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)
1	Y/R Intake valve timing control solenoid valve	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Lift up vehicle and suitable gear position</li> <li>Rev engine from 2,000 to 3,000 rpm</li> </ul>	Approximately 0V	

QG

NJEC1772

Wiring Diagram

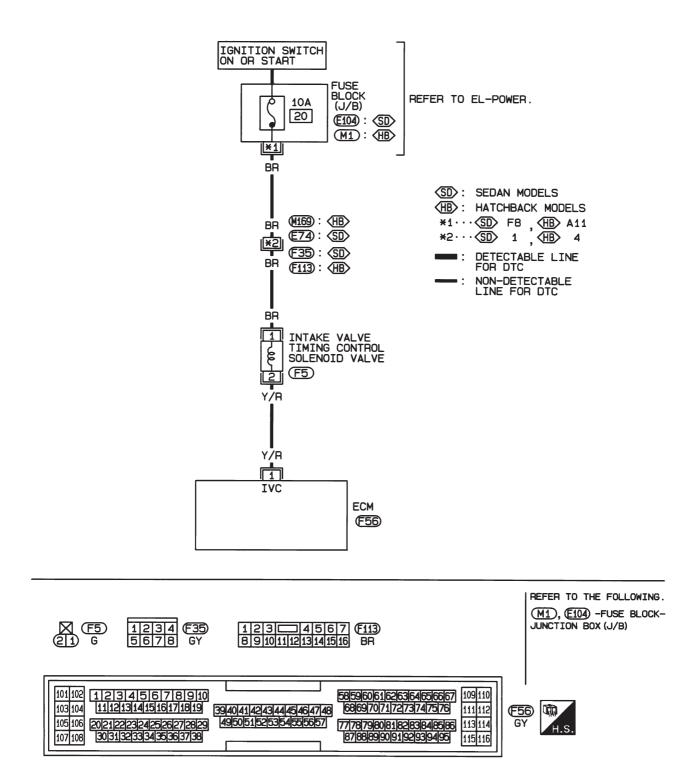
# Wiring Diagram HATCHBACK MODELS WITH ECM IN CABIN

NJEC1773

QG

NJEC1773S01

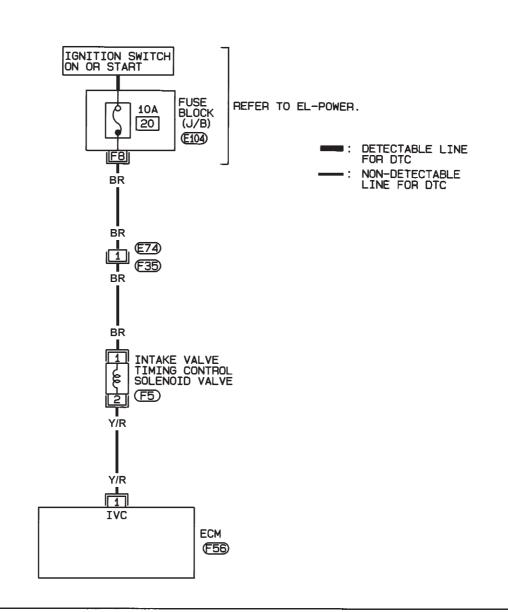
EC-IVC/V-01

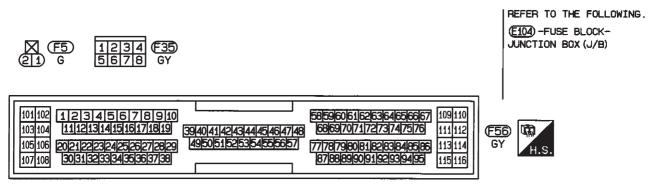


Wiring Diagram (Cont'd)

### SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT

EC-IVC-01

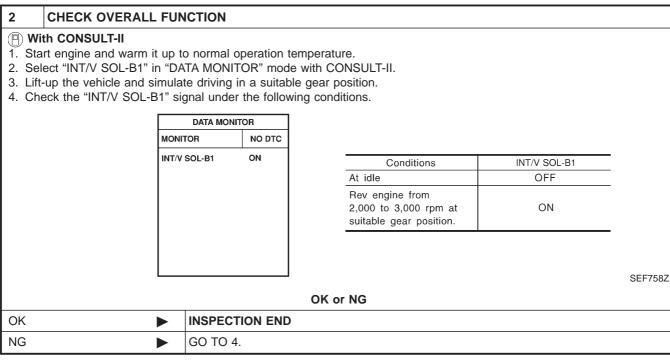




NEF333A

### **Diagnostic Procedure**

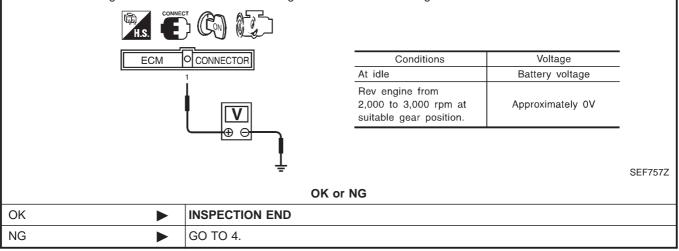
# 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes GO TO 2. No ► GO TO 3.



### 3 CHECK OVERALL FUNCTION

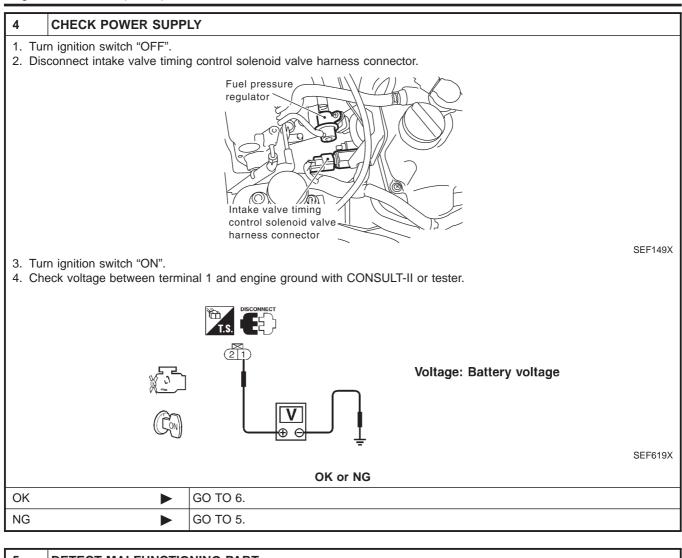
### Without CONSULT-II

- 1. Start engine and warm it up to normal operation temperature.
- 2. Lift up the vehicle and simulate driving in a suitable gear position.
- 3. Check the voltage between ECM terminal 1 and ground under the following conditions.



QG

Diagnostic Procedure (Cont'd)



### 5 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F35, E74 (If so equipped)
- Harness connectors M169, F113 (If so equipped)
- 10A fuse
- Harness for open or short between valve timing control solenoid valve and fuse

Repair harness or connectors.

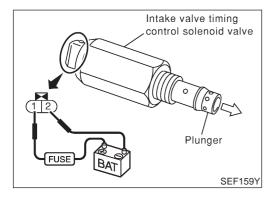
6	CHECK OUTPUT	SIGN	AL CIRCUIT		
2. Dis 3. Che terr	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 1 and intake valve timing control solenoid valve harness connector terminal 2. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
OK or NG					
ОК			GO TO 7.		
NG			Repair open circuit or short to ground to short to power or connectors.		

Diagnostic Procedure (Cont'd)

QG

7	HECK VALVE TIMING CONTROL SOLENOID VALVE				
Refer	to "Component Inspection"	', EC-531.			
	OK or NG				
ОК		GO TO 8.			
NG	NG   Replace valve timing control solenoid valve.				
8	8 CHECK INTERMITTENT INCIDENT				
Perfor	m "TROUBLE DIAGNOSIS	S FOR INTERMITTENT INCIDENT", EC-177.			

INSPECTION END



# Component Inspection INTAKE VALVE TIMING CONTROL SOLENOID VALVE

- 1. Check oil passage visually for any metal debris.
- 2. Supply intake valve timing control solenoid valve terminals with battery voltage.
- 3. Make sure that inside plunger protrudes. If NG, replace intake valve timing control solenoid valve.

### QG

### **System Description**

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.

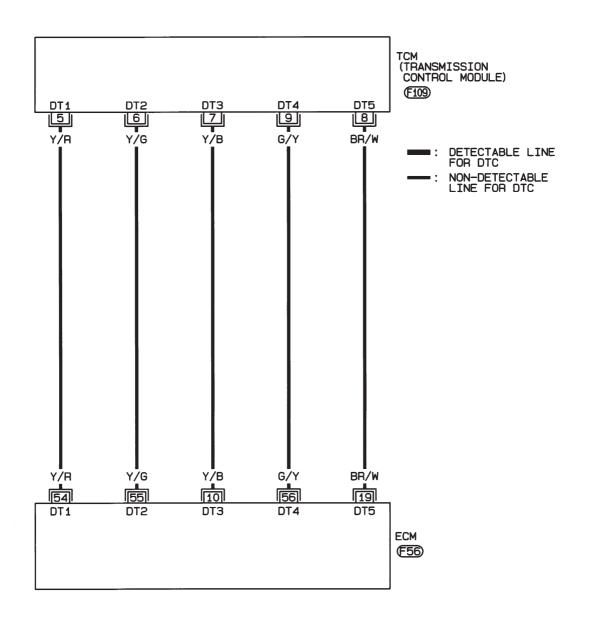
Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

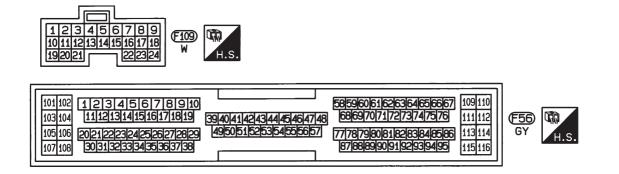
**QG** Wiring Diagram

# Wiring Diagram

NJEC1777

EC-ATCONT-01



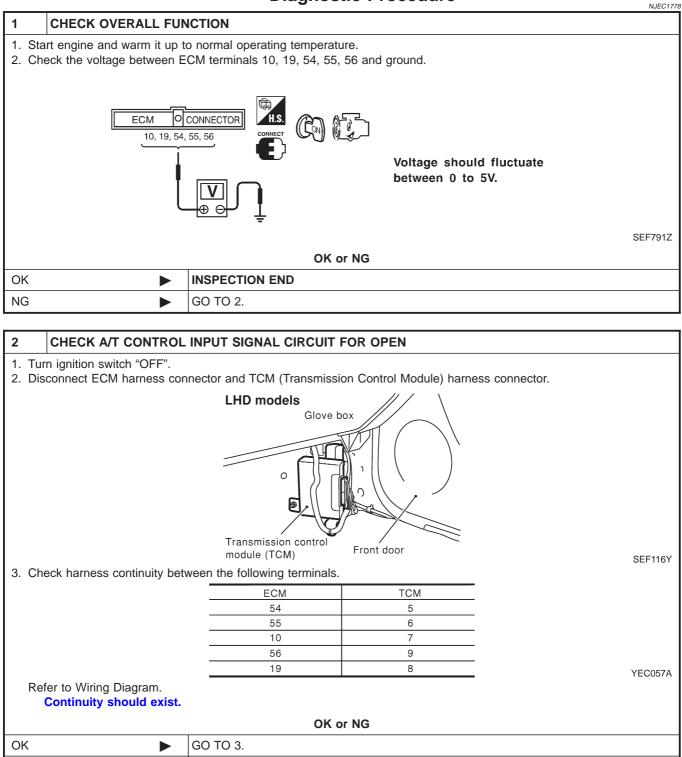


HEC912

NG

QG

### **Diagnostic Procedure**



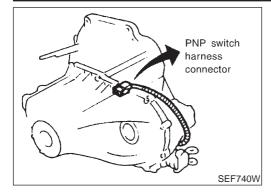
Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT						
Re	<ol> <li>Check harness continuity between ECM terminals 10, 19, 54, 55, 56 and ground. Refer to Wiring Diagram. Continuity should not exist.</li> <li>Also check harness for short to power.</li> </ol>						
	OK or NG						
OK		GO TO 4.					
NG	IG Repair short to ground or short to power in harness or connectos.						
4	4 CHECK INTERMITTENT INCIDENT						

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

Component Description



### **Component Description**

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".

ECM detects the park/neutral position when continuity with ground exists.

# CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
P/N POSI SW		Shift lever: "P" or "N"	ON
	Ignition switch: ON	Except above	OFF

### **ECM Terminals and Reference Value**

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

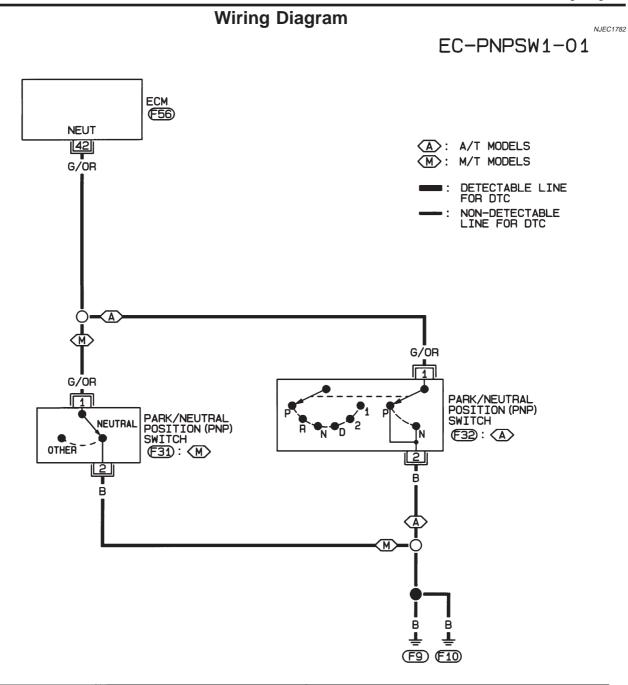
# Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			<ul> <li>[Ignition switch "ON"]</li> <li>Gear position is "Neutral position" (M/T models)</li> <li>Gear position is "N" or "P" (A/T models)</li> </ul>	Approximately 0V
42	G/OR	PNP switch	<ul> <li>[Ignition switch "ON"]</li> <li>Except the above gear position</li> </ul>	A/T models BATTERY VOLTAGE (11 - 14V) M/T models Approximately 5V

QG

NJEC1781

**QG** Wiring Diagram



101         102         123         156         789         109         109         109         109         109         109         109         109         109         109         109         109         101         101         102         123         123         123         123         105         105         101         111         112         103         104         1112         101 <th>GY H.S.</th>	GY H.S.
---	---------

HEC913

# **PARK/NEUTRAL POSITION (PNP) SWITCH**

Diagnostic Procedure

**Diagnostic Procedure** 

	NJEC1783			
1	INSPECTION START			
Do yo	Do you have CONSULT-II?			
Yes or No				
Yes	►	0 TO 2.		
No		O TO 3.		

### 2 CHECK OVERALL FUNCTION (P) With CONSULT-II 1. Turn ignition switch "ON". 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 3. Check the "P/N POSI SW" signal under the following conditions. DATA MONITOR MONITOR NO DTC P/N POSI SW ON P/N POSI SW Selector lever position Neutral position (M/T models) ON "P" or "N" position (A/T models) OFF Except the above position SEF836Z OK or NG **INSPECTION END** OK NG GO TO 4.

3	CHECK OVERALL FUN	CTION			
1. Tu	<ul> <li>Without CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>2. Check voltage between ECM terminal 42 and ground under the following conditions.</li> </ul>				
		42 <b>]</b>	Selector lever position	Voltage	
		•	Neutral position (M/T models) "P" or "N" position (A/T models)	Approx. 0V	
			Except the above position	Battery voltage	
	, L	-			SEF837Z
	OK or NG				
ОК	•	INSPECTION END			
NG	•	GO TO 4.			

EC-538

# PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure (Cont'd)

	Diagnosiic Frocedure (Conica)			
4	CHECK GROUND CIRCUIT			
	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect PNP switch harness connector.</li> </ol>			
	PNP switch harness connector			
Re	<ul> <li>3. Check harness continuity between PNP switch harness connector terminal 2 and body ground. Refer to wiring diagram. Continuity should exist.</li> <li>4. Also check harness for short to ground and short to power.</li> </ul>			
	OK or NG			
ОК	ОК 🕨 GO TO 6.			
NG	NG 🕨 GO TO 5.			
	1			
5	DETECT MALFUNCTIONING PART			
Check	Check the harness for open or short between PNP switch and body ground.			
	Repair open circuit or short to ground or short to power in harness or connectors.			
6	CHECK INPUT SIGNAL CIRCUIT			
<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 42 and PNP switch harness connector terminal 1. Refer to wiring diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				

ОК	GO TO 8.
NG	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and PNP switch.		
	Repair open circuit or short to ground or short to power in harness or connectors.	

8	CHECK PNP SWITCH	
Refer to MT-21, "POSITION SWITCH CHECK" or AT-183, "PARK/NEUTRAL POSITION (PNP) SWITCH".		
OK or NG		
ОК		GO TO 9.
NG	•	Replace PNP switch.

# PARK/NEUTRAL POSITION (PNP) SWITCH

QG

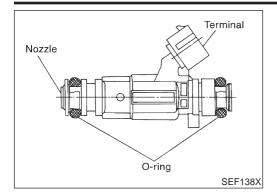
Diagnostic Procedure (Cont'd)

 9
 CHECK INTERMITTENT INCIDENT

 Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

NJEC0437



#### **Component Description**

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 needle 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

			NJEC0430
MONITOR ITEM	CONE	DITION	SPECIFICATION
INJ PULSE-B1	<ul><li>Engine: After warming up</li><li>Air conditioner switch: OFF</li></ul>	Idle	2.0 - 3.5 msec
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	1.5 - 3.5 msec
B/FUEL SCHDL	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> </ul>	Idle	1.5 - 3.0 msec
	<ul><li>Shift lever: "N"</li><li>No-load</li></ul>	2,000 rpm	1.2 - 3.0 msec

# **ECM Terminals and Reference Value**

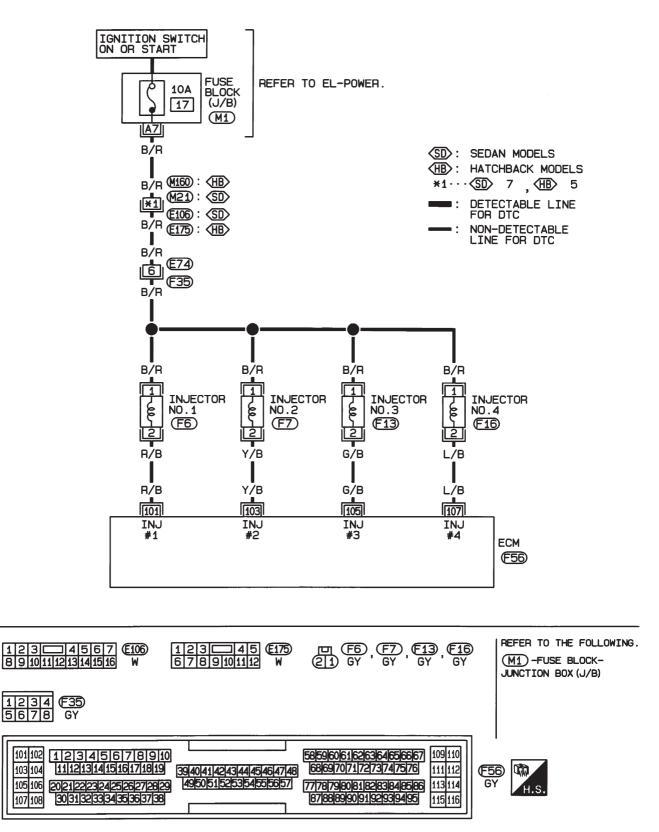
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

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.

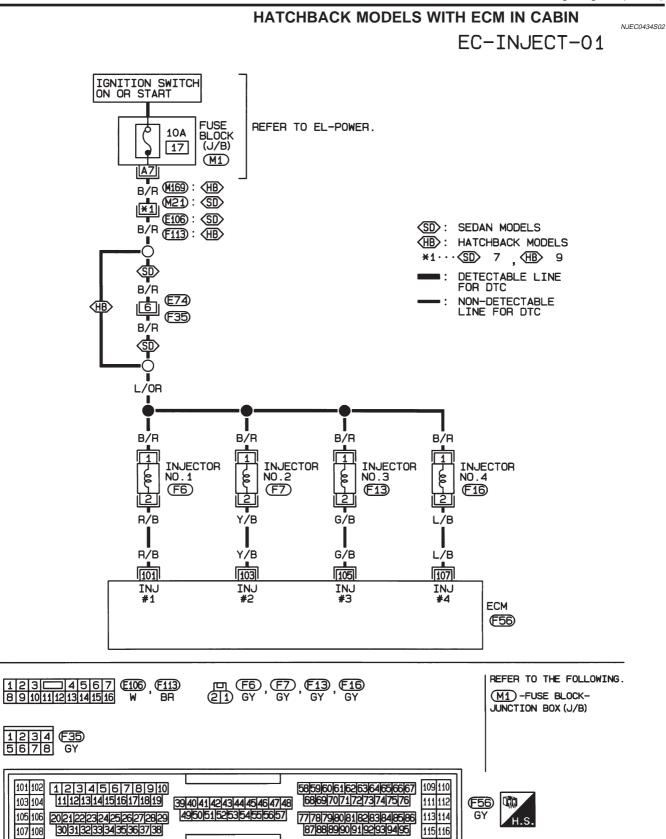
TERMI- NAL NO.	WIRE COLOR	ITEM	ITEM CONDITION	
101 103	R/B Y/B	Injector No. 1 Injector No. 2	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V) (V) 40 20 0 20 0 20 5 20 ms SEF011W
105 105 107	G/B L/B	Injector No. 3 Injector No. 4	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,000 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14V) (V) 40 20 0 0 20 20 20 5 20 ms SEF012W







**QG** Wiring Diagram (Cont'd)



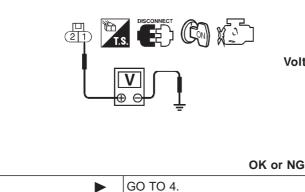
HEC963

# **Diagnostic Procedure**

		Diagnostic Procedure	NJEC0438
1	CHECK OVERALL FUN	CTION	
1. Sta	i <b>th CONSULT-II</b> art engine. rform "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	
		IACV-AAC/V XXX step	
			SEF190Y
3. Ma	ke sure that each circuit pr	oduces a momentary engine speed drop.	GEI 1901
1. Sta	ithout CONSULT-II art engine. ten to each injector operati	ng sound.	
		At idle At idle Click Click Click	
		C <sub>1ick</sub>	MEC703B
	cking noise should be he	ard. OK or NG	
ОК		INSPECTION END	
NG		GO TO 2.	
		00102.	

#### 2 **CHECK POWER SUPPLY**

- 1. Stop engine.
- 2. Disconnect injector harness connector.
- 3. Turn ignition switch "ON".
- 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



GO TO 3.

Voltage: Battery voltage

#### SEF949X

#### 3 DETECT MALFUNCTIONING PART

- Check the following.
- 10A fuse

OK

NG

- Harness connectors M21, E106 (Sedan), M160, E175 or M169, F113 (Hatchback)
- Harness connectors E74, F35 (If so equipped)
- · Harness for open or short between injector and fuse

#### Repair harness or connectors.

#### 4 CHECK OUTPUT SIGNAL CIRCUIT

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 101, 103, 105, 107. Refer to wiring diagram.

#### Continuity should exist.

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

OK or NG			
ОК		GO TO 6.	
NG		GO TO 5.	

#### 5 DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and injector.

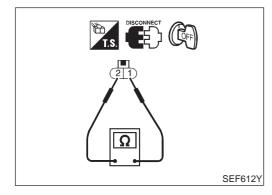
Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INJECTOR			
Refer to "Component Inspection", EC-546.				
OK or NG				
OK		GO TO 7.		
NG	►	Replace injector.		

#### 7 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END 



# **Component Inspection**

# **INJECTOR**

NJEC0439 NJEC0439S01

- 1. Disconnect injector harness connector.
- 2. Check resistance between terminals as shown in the figure. Resistance: 13.5 - 17.5Ω [at 25°C (77°F)]
  - If NG, replace injector.

EC-547

# Component Description

#### IGNITION COIL AND POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

#### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$	$ON\toOFF\toON$

# ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	L/W	Ignition signal (No. 1) Ignition signal (No. 2) Ignition signal (No. 3) Ignition signal (No. 4)	[Engine is running] • Warm-up condition • Idle speed	0 - 0.2V
36 37 38	PU L/R GY/R		[Engine is running] • Engine speed is 2,000 rpm	0.2 - 0.4V

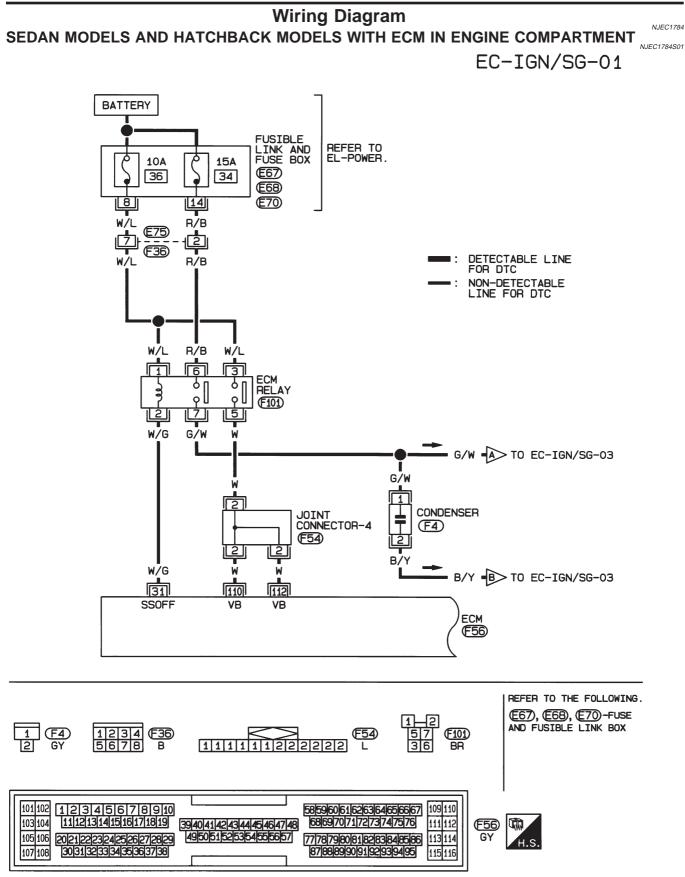
Component Description

NJEC0542

QG

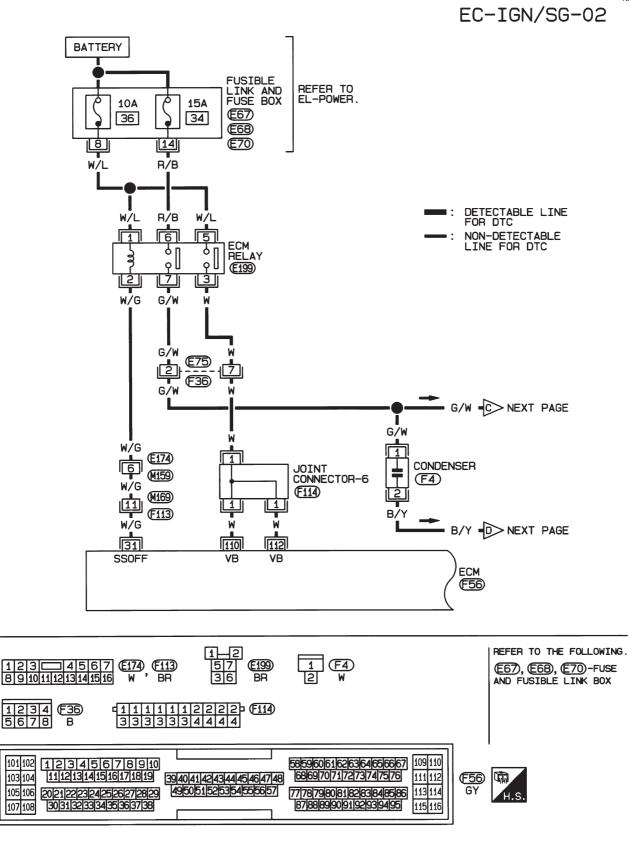
NJEC0543

NJEC0544



#### HATCHBACK MODELS WITH ECM IN CABIN

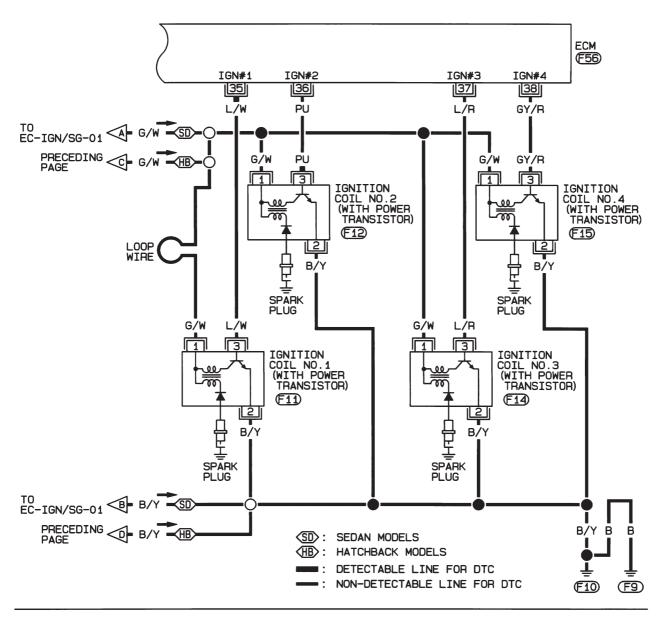
NJEC1784S02



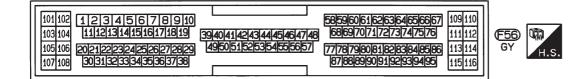
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QG





(123) E11, E12, E14, E15 (123) GY, GY, GY, GY

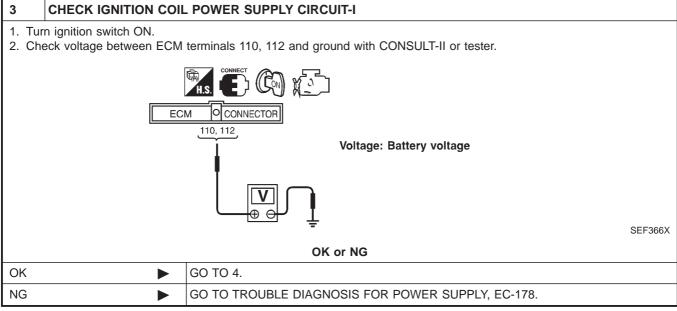


HEC965

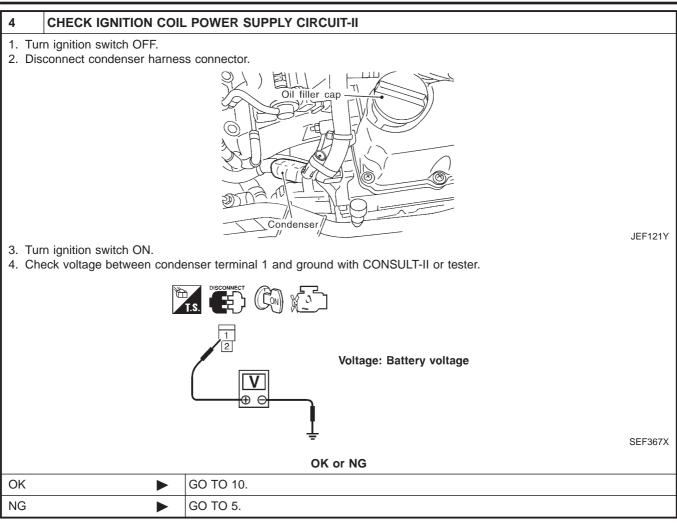
# **Diagnostic Procedure**

			Diagnostic i locedule	NJEC0579			
1	CHECK ENGINE	CHECK ENGINE START					
	Turn ignition switch "OFF", and restart engine. Is engine running?						
	Yes or No						
Yes (V	Vith CONSULT-II)		GO TO 2.				
Yes (V II)	Vithout CONSULT-		GO TO 12.				
No			GO TO 3.				

2	SEARCH FOR MALFUN	ICTIONING CIF	RCUIT			
1. Per	th CONSULT-II form "POWER BALANCE" arch for circuit which does					
			ACTIVE TES	бт	1	
			POWER BALANCE		]	
			MONITOR	1		
			ENG SPEED	XXX rpm		
			MAS A/F SE-B1	xxx v		
			IACV-AAC/V	XXX step		
					-	SEF190Y
		GO TO 12.				



Diagnostic Procedure (Cont'd)



# 5 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III 1. Turn ignition switch OFF. 2. Disconnect ECM relay. (For ECM relay location, refer to "Engine Control Component Parts Location".) 3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1. Refer to Wiring Diagram.

3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1. Refer to Continuity should exist.

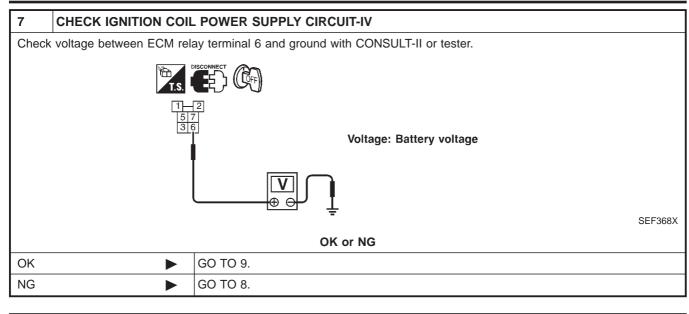
4. Also check harness for short to ground and short to power.

#### OK or NG

ОК	GO TO 7.
NG 🕨	GO TO 6.

6	DETECT MALFUNCTIONING PART				
Check	Check the 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.				

EC-552



#### DETECT MALFUNCTIONING PART

Check the following.

• 15A fuse

8

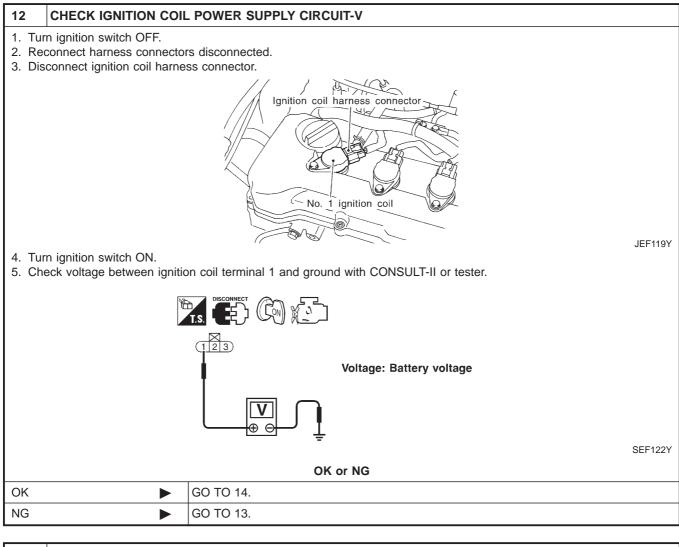
- Harness connectors E75, F36 (If so equipped)
- Harness for open and short between ECM relay and fuse

Repair or replace harness or connectors.

9	CHECK ECM RELAY						
Refer	Refer to "Component Inspection", EC-555.						
	OK or NG						
OK	OK 🕨 GO TO 17.						
NG	NG   Replace ECM relay.						

10	CHECK CONDENSER GROUND CIRCUIT						
1. Tu	1. Turn ignition switch OFF.						
	<ol> <li>Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>						
	OK or NG						
ОК		GO TO 11.					
NG	G Repair open circuit or short to ground or short to power in harness or connectors.						
11	CHECK CONDENSER						

1	CHECK CONDENSER				
Refer	Refer to "Component Inspection", EC-555.				
	OK or NG				
OK	OK 🕨 GO TO 12.				
NG	NG   Replace condenser.				



#### 13 DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E75, F36 (If so equipped)
- Harness for open or short between ignition coil and ECM relay terminal 7

Repair or replace harness or connectors.

14	CHECK IGNITION COIL	GROUND CIRCUIT				
2. Che	<ol> <li>Turn ignition switch OFF.</li> <li>Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram.         Continuity should exist.     </li> <li>Also check harness for short to ground and short to power.</li> </ol>					
	OK or NG					
ОК	OK 🕨 GO TO 15.					
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.					

15	CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT						
2. Ch	<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminals 35, 36, 37, 38 and ignition coil terminal 3. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>						
		OK or NG					
OK		GO TO 16.					
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.						
16	CHECK IGNITION C	DIL WITH POWER TRANSISTOR					

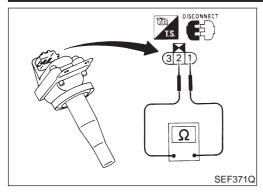
Refer to "Component Inspection", EC-555.

OK or NG					
ОК 🕨 GO TO 17.					
NG	Replace ignition coil with power transistor.				

#### 17 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

#### INSPECTION END



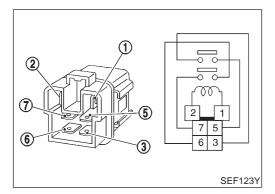
#### Component Inspection IGNITION COIL WITH POWER TRANSISTOR

NJEC0547

- Disconnect ignition coil with power transistor harness connector.
- 2. Check ignition coil with power transistor for resistance as show in the figure.

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

If NG, replace ignition coil with power transistor assembly.



#### ECM RELAY

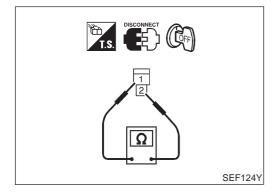
- 1. Apply 12V of direct current between ECM relay terminals 1 and 2.
- Check continuity between ECM relay terminals 3 and 5, and 6 and 7.

Condition	Continuity	
12V direct current supply between ter- minals 1 and 2	Yes	
OFF	No	

QG

NJEC0547S02

If NG, replace ECM relay.



#### CONDENSER

1. Disconnect condenser harness connector.

Check condenser continuity between terminals 1 and 2.
 Resistance: Above 1 MΩ at 25°C (77°F)

If NG, replace condenser.

CONSULT-II Reference Value in Data Monitor Mode

#### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow ON$	$OFF \to ON \to OFF$

#### ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	B/Y	Start signal	[Ignition switch "ON"]	Approximately 0V
			[Ignition switch "START"]	9 - 12V

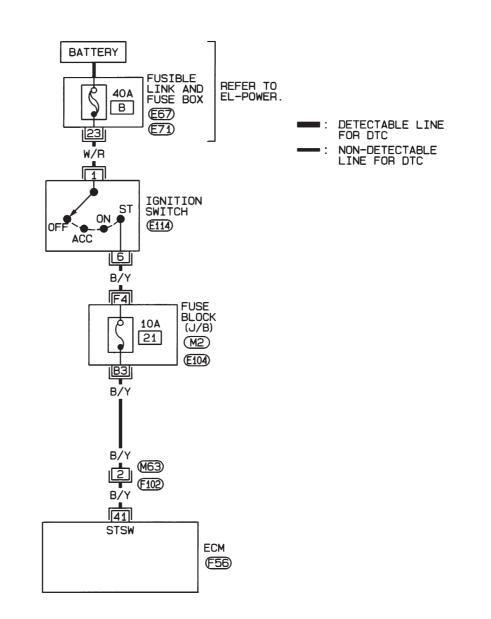
NJEC0442

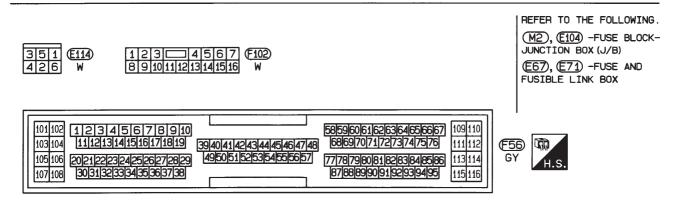
Wiring Diagram

QG









HEC812

# **START SIGNAL**

#### **Diagnostic Procedure**

		Blaghootio Troobadie	=NJEC0443		
1	INSPECTION START				
Do you	Do you have CONSULT-II?				
		Yes or No			
Yes	•	GO TO 2.			
No	•	GO TO 3.			

2	CHECK OVERALL FU	NCTION					
1. Tur	th CONSULT-II n ignition switch "ON". eck "START SIGNAL" in '	DATA MONI MONITOR	TOR NO DTC	with CONS	JLT-II under the following o	conditions.	
		START SIGNAL	OFF		Condition Ignition switch "ON" Ignition switch "START"	"START SIGNAL" OFF ON	
				OK or NG			SEF227Y
ОК		INSPECTION	NEND				
NG		GO TO 4.					

#### 3 CHECK OVERALL FUNCTION **Without CONSULT-II** 1. Turn ignition switch to "START". 2. Check voltage between ECM terminal 41 and ground under the following conditions. Condition Voltage ECM **CONNECTOR** Ignition switch "START" Battery Voltage 41 Except above Approximately 0V Ð e SEF613Y OK or NG **INSPECTION END** OK NG GO TO 4.

4	DETECT MALFUNCTION	ONING PART					
Check the following. <ul> <li>Harness connectors M63, F102</li> <li>10A fuse</li> <li>Harness for open or short between ECM and ignition switch</li> </ul>							
		OK or NG					
OK		GO TO 5.					
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.						
5	CHECK INTERMITTEN	IT INCIDENT					

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

System Description

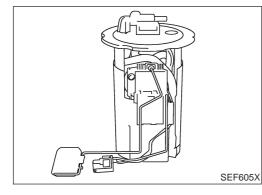
NJEC0501

#### **System Description**

Sensor	Input Signal to ECM	ECM func- tion	Actuator		
Crankshaft position sensor (POS)	Engine speed				
Camshaft position sensor (PHASE)	Engine speed and cylinder number	Fuel pump control	Fuel pump relay		
Ignition switch	Ignition signal and start signal				

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 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° 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 (Signal is not sent from crankshaft position sensor and camshaft position sensor.)	Stops in 1.5 seconds	
Except as shown above	Stops	



# **Component Description**

A turbine type design fuel pump is used in the fuel tank.

# CONSULT-II Reference Value in Data Monitor Mode

		NJEC0445
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul> <li>Ignition switch is turned to ON (Operates for 1 second)</li> <li>Engine running and cranking</li> <li>When engine is stopped (stops in 1.5 seconds)</li> </ul>	ON
	Except as shown above	OFF

#### QG

=NJEC0446

#### **ECM Terminals and Reference Value**

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

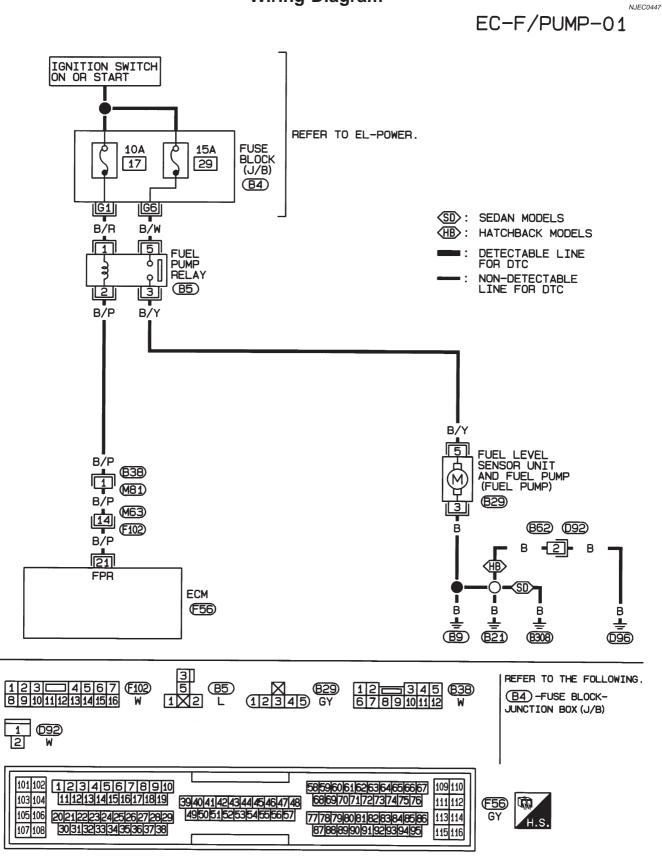
#### CAUTION:

# 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
04	D/D		<ul> <li>[Ignition switch "ON"]</li> <li>For 1 second after turning ignition switch "ON"</li> <li>[Engine is running]</li> </ul>	0 - 1V
21	B/P	Fuel pump relay	<ul> <li>[Ignition switch "ON"]</li> <li>More than 1 second after turning ignition switch "ON"</li> </ul>	BATTERY VOLTAGE (11 - 14V)

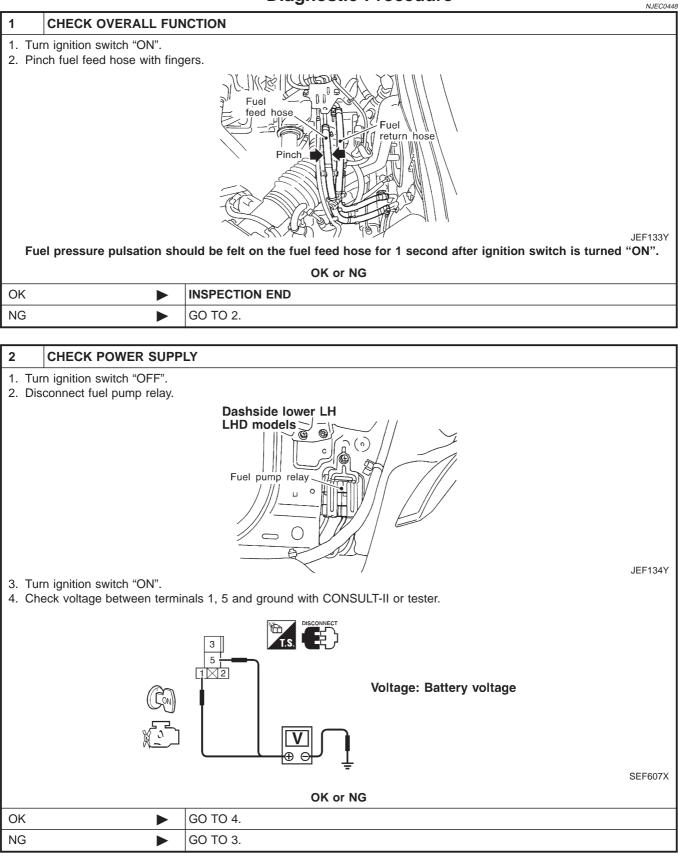
QG Wiring Diagram

Wiring Diagram



HEC813

#### **Diagnostic Procedure**



#### 3 DETECT MALFUNCTIONING PART

Check the following.

• 10A fuse

• 15A fuse

• Harness for open or short between fuse and fuel pump relay

Repair harness or connectors.

#### Δ CHECK POWER GROUND CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit and fuel pump harness connector. Under rear seat cushion Vehicle front $\langle \neg$ Fuel level sensor unit and fuel pump harness connector JEE135Y 3. Check harness continuity between fuel level sensor unit and fuel pump harness connector terminal 3 and body ground, terminal 5 and fuel pump relay connector terminal 3. Refer to wiring diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK GO TO 6. NG GO TO 5.

#### 5 DETECT MALFUNCTIONING PART

Check the following.

• Harness for open or short between fuel pump and body ground

• Harness for open or short between fuel pump and fuel pump relay

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

# 6 CHECK OUTPUT SIGNAL CIRCUIT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 21 and fuel pump relay connector terminal 2. Refer to wiring diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 8. NG ▶ GO TO 7.

#### 7 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B38, M81
- Harness connectors M63, F102
- Harness for open or short between ECM and fuel pump relay

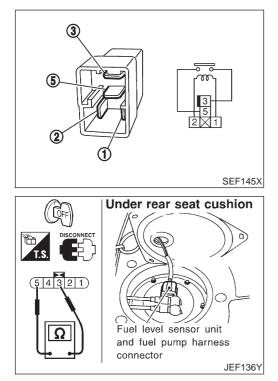
NG

Diagnostic Procedure (Cont'd)

8	CHECK FUEL PUMP RELAY				
Refer to "Component Inspection", EC-566.					
	OK or NG				
OK	ОК 🕨 GO TO 9.				
NG	IG ► Replace fuel pump relay.				

9	CHECK FUEL PUMP				
Refer	Refer to "Component Inspection", EC-566.				
	OK or NG				
OK	OK 🕨 GO TO 10.				
NG	NG   Replace fuel pump.				

10	CHECK INTERMITTENT INCIDENT				
Perfor	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.				
	► INSPECTION END				



#### Component Inspection FUEL PUMP RELAY

NJEC0449 NJEC0449S01

Check	continuity	between	terminals	3	and	5
Oncor	continuity	Detween	Communa	J	and	υ.

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

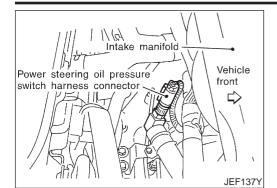
If NG, replace relay.

#### FUEL PUMP

- Disconnect fuel level sensor unit and fuel pump harness connector.
- Check resistance between terminals 3 and 5.
   Resistance: 0.2 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.

Component Description



#### **Component Description**

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0452

NJEC0453

#### Specification data are reference values.

MONITOR ITEM	CONE	DITION	SPECIFICATION	
PW/ST SIGNAL	<ul> <li>Engine: After warming up, idle</li> </ul>	Steering wheel in neutral position (forward direction)	OFF	
	the engine	The steering wheel is fully turned	ON	

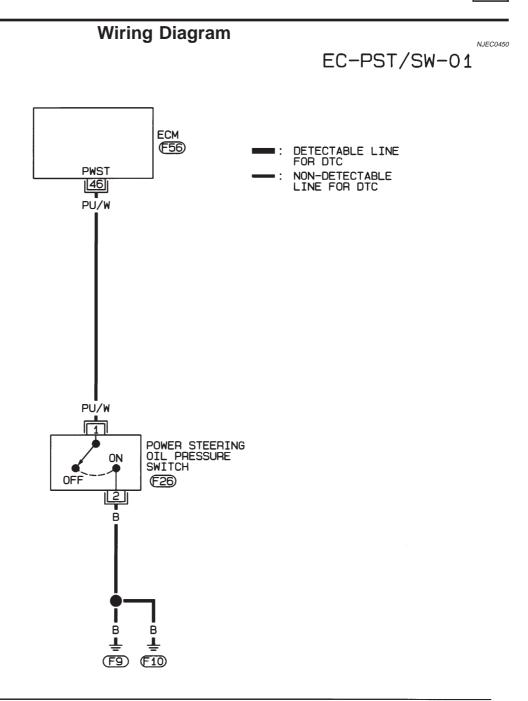
# ECM Terminals and Reference Value

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

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46		Power steering oil pressure	<ul><li>[Engine is running]</li><li>Steering wheel is fully turned</li></ul>	Approximately 0V
46			<ul><li>[Engine is running]</li><li>Steering wheel is not turned</li></ul>	Approximately 5V







101         102         1         2         3         4         5         6         7         8         9         100         110           103         104         111         12         3         14         5         6         7         8         9         100         110           103         104         111         12         13         14         15         16         7         8         9         100         111         112           105         106         20         21         22         23         24         25         26         7         8         9         100         111         112           105         106         20         21         22         32         42         5 </th <th>F56 GY H.S.</th>	F56 GY H.S.
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HEC814

## **Diagnostic Procedure**

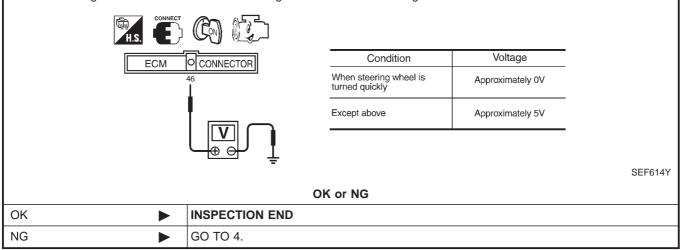
		=NJEC0454		
1	INSPECTION START			
Do you	Do you have CONSULT-II?			
		Yes or No		
Yes	•	GO TO 2.		
No	•	GO TO 3.		

2	CHECK OV	ERALL FUNC	TION		
	ith CONSULT-	11			
	art engine. heck "PW/ST S	IGNAL" in "DA	TA MONITOR" I	mode with CONSULT-II under the following	ng conditions.
		DATA MO	NITOR		
		MONITOR	NO DTC		
		PW/ST SIGNAL	OFF	Conditions	PW/ST SIGNAL
				Steering is in neutral position	OFF
				Steering is turned	ON
					SEF311Y
				OK or NG	
ОК			NSPECTION EN	ND	
NG			GO TO 4.		

# 3 CHECK OVERALL FUNCTION

#### Without CONSULT-II 1. Start engine.

2. Check voltage between ECM terminal 46 and ground under the following conditions.



Diagnostic Procedure (Cont'd)

4  C	HECK GROUND CIR	CUIT			
1. Turn i	gnition switch "OFF".				
2. Disco	nnect power steering o	il pressure switch harness connector.			
3. Checł	harness continuity be	tween power steering oil pressure switch harness terminal 2 and engine ground.			
Refer	to wiring diagram.				
Co	Continuity should exist.				
4. Also d	heck harness for short	to ground and short to power.			
		OK or NG			
OK		GO TO 5.			
OK NG	► ►	GO TO 5.Repair open circuit or short to ground or short to power in harness or connectors.			
	•				

1. Disconnect ECM harness connector.

2. Check harness continuity between ECM terminal 46 and power steering oil pressure switch harness terminal 1. Refer to wiring diagram.

#### Continuity should exist.

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

OK or NG		
ОК		GO TO 7.
NG		GO TO 6.

# 6 DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and power steering oil pressure switch.

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

7 CHECK	POWER STEE	RING OIL PRESSURE SWITCH	
Refer to "Component Inspection", EC-570.			
		OK or NG	
OK		GO TO 8.	
NG		Replace power steering oil pressure switch.	

8	CHECK INTERMITTENT INCIDENT			
Perform	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.			
	► INSPECTION END			

#### Component Inspection POWER STEERING OIL PRESSURE SWITCH

NJEC0455

- Disconnect power steering oil pressure switch harness connector then start engine.
- 2. Check continuity between terminals 1 and 2. Refer to wiring diagram.

Conditions	Continuity
Steering wheel is being fully turned.	Yes
Steering wheel is not being turned.	No

QG

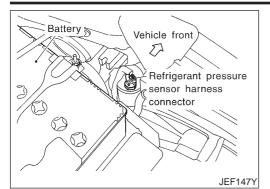
EC-570

CH QG Component Inspection (Cont'd)

If NG, replace power steering oil pressure switch.

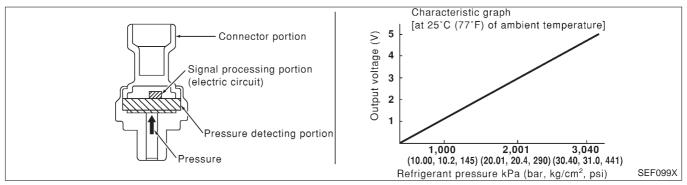
# **REFRIGERANT PRESSURE SENSOR**





#### Description

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



# ECM Terminals and Reference Value

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

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

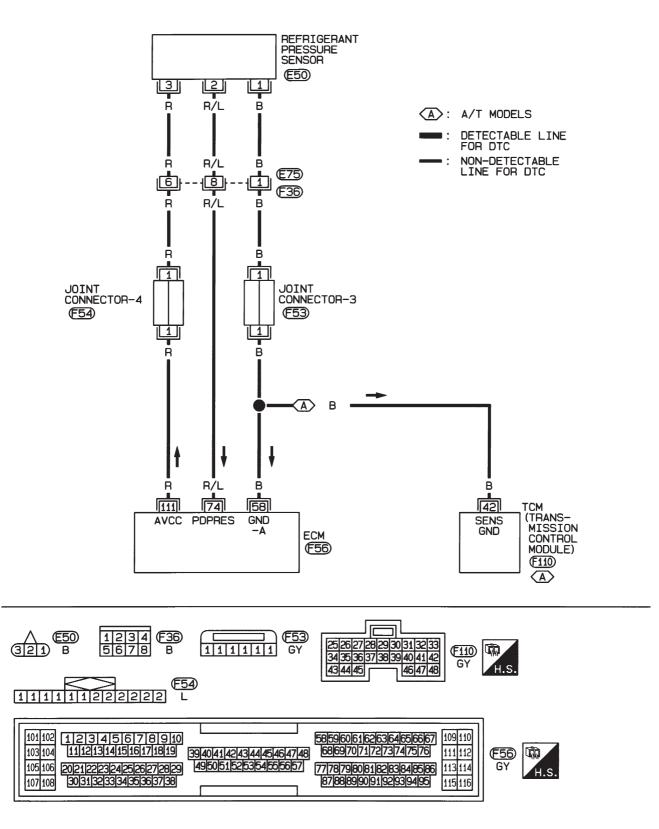
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	В	Sensor's ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0V
74	R/L	Refrigerant pressure sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower switch are "ON" (Compressor operates.)</li> </ul>	1.0 - 4.0V
111	R	Sensor's power supply	[Ignition switch "ON"]	Approximately 5V

QG

NJEC0581

**QG** Wiring Diagram



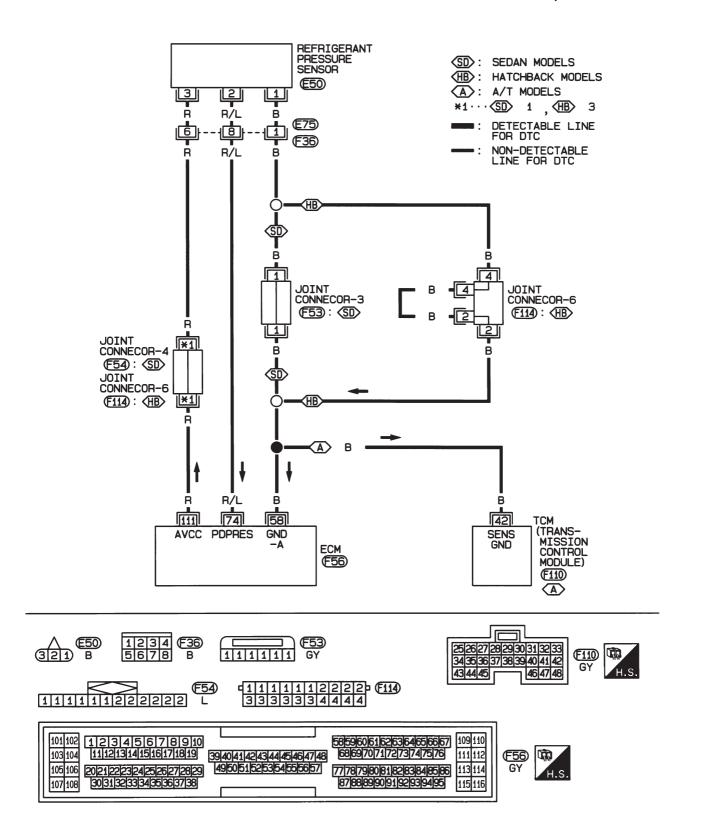


HEC806

Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN

EC-DP/SEN-01



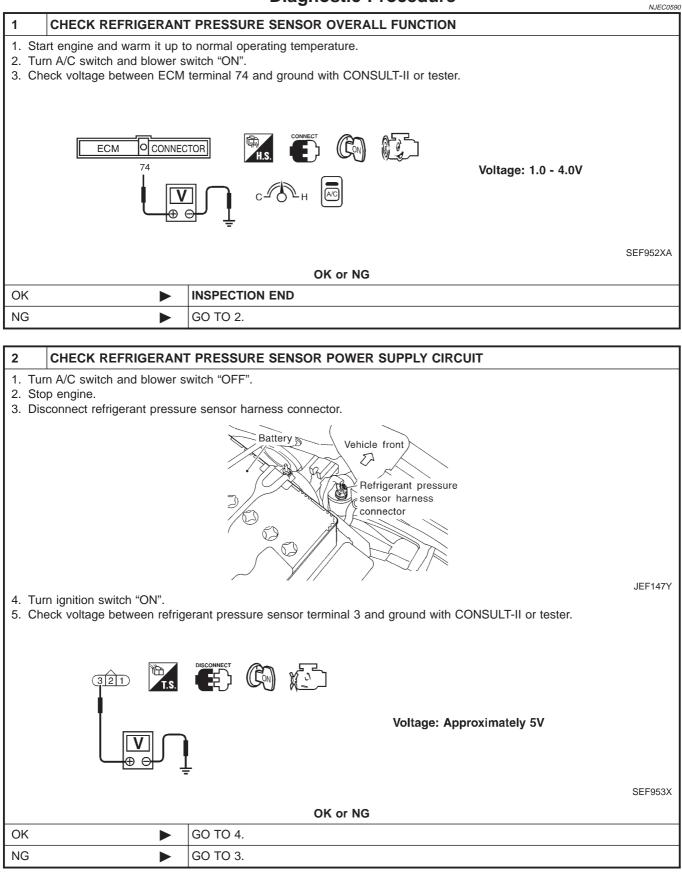
HEC961

QG

NJEC0582S04

# **REFRIGERANT PRESSURE SENSOR**

#### **Diagnostic Procedure**



# **REFRIGERANT PRESSURE SENSOR**

Diagnostic Procedure (Cont'd)

#### 3 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36
- Joint connector-4 (If so equipped)
- Joint connector-6 (If so equipped)
- Harness for open or short between ECM and refrigerant pressure sensor

Repair harness or connectors.

#### 4 CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch "OFF".

- 2. Check harness continuity between refrigerant pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.**
- 3. Also check harness for short to ground and short to power.

OK or NG

OK 🕨	GO TO 6.
NG	GO TO 5.

#### 5 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36
- Joint connector-3 (If so equipped)
- Joint connector-6 (If so equipped)
- Harness for open or short between ECM and refrigerant pressure sensor

• Harness for open or short between TCM (Transmission Control Module) and refrigerant pressure sensor

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

#### 6 CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.

2. Check harness continuity between ECM terminal 74 and refrigerant pressure sensor 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 E75, F36
- 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	Refer to HA-66, "Refrigerant pressure sensor".		
	OK or NG		
OK		GO TO 9.	
NG	•	Replace refrigerant pressure sensor.	

# **REFRIGERANT PRESSURE SENSOR**

QG Diagnostic Procedure (Cont'd)

9 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

► INSPECTION END

#### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NJEC0548

NJEC0549

MONITOR ITEM	CONE	DITION	SPECIFICATION			
LOAD SIGNAL		Rear window defogger is operating and/or lighting switch is on.	ON			
	<ul> <li>Ignition switch: ON</li> </ul>	Rear window defogger is not oper- ating and lighting switch is not on.	OFF			
HEATER FAN SW	<ul> <li>Ignition switch: ON</li> </ul>	Heater fan motor is operating.	ON			
	<ul> <li>Ignition switch: ON</li> </ul>	Heater fan motor is not operating.	OFF			

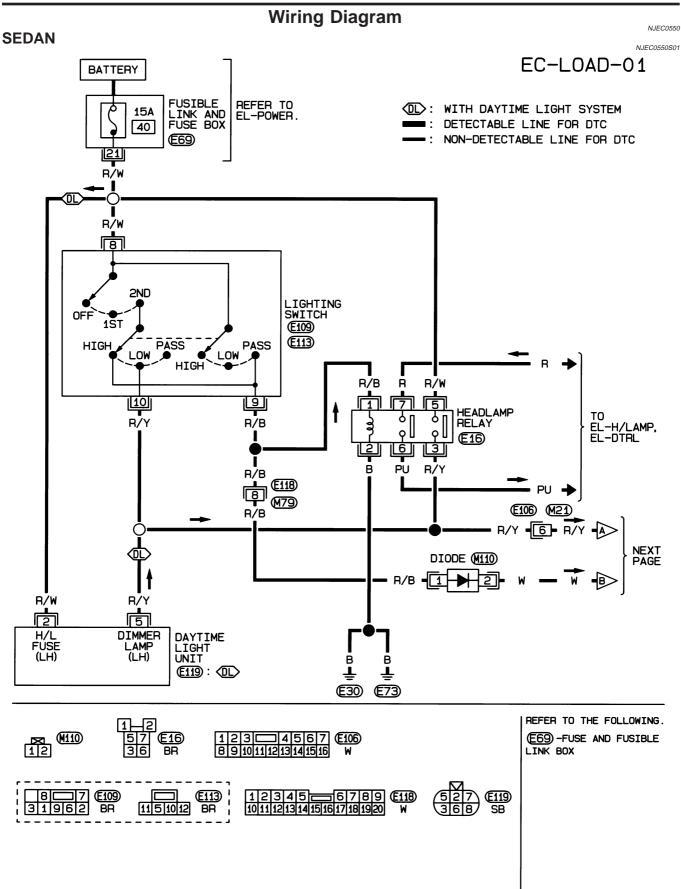
### **ECM Terminals and Reference Value**

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.

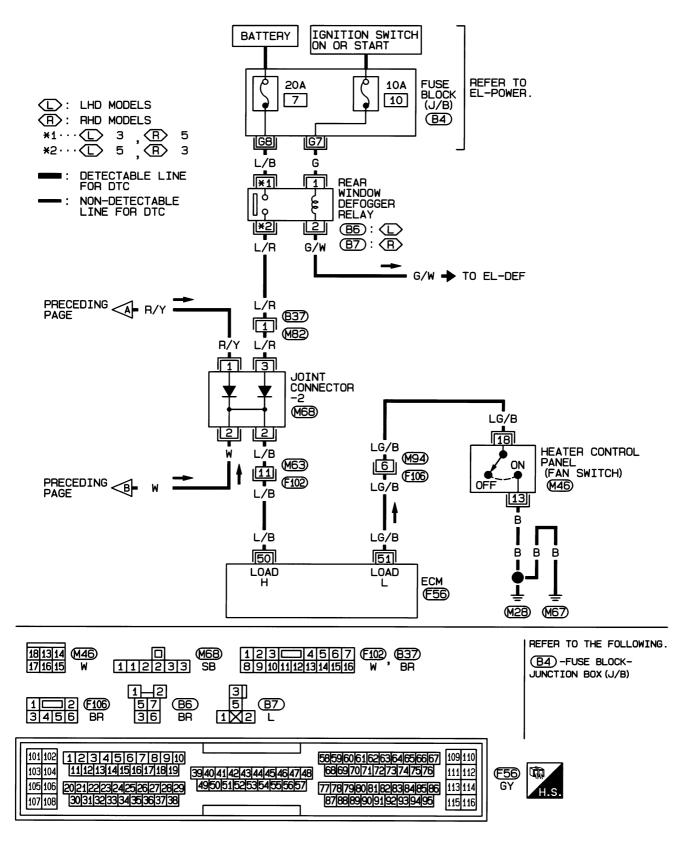
TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	Electric load signa		c load signal [Engine is running] • Rear window defogger is operating and/or lighting switch is on	
50	L/B	(Load switch)	<ul> <li>[Engine is running]</li> <li>Rear window defogger is not operating and lighting switch is not on</li> </ul>	Approximately 0V
51	51 LG/B	Heater fan motor switch	<ul><li>[Engine is running]</li><li>Heater fan motor is operating</li></ul>	Approximately 0V
51	LG/D		<ul><li>[Engine is running]</li><li>Heater fan motor is not operating</li></ul>	Approximately 5V

QG Wiring Diagram



QG

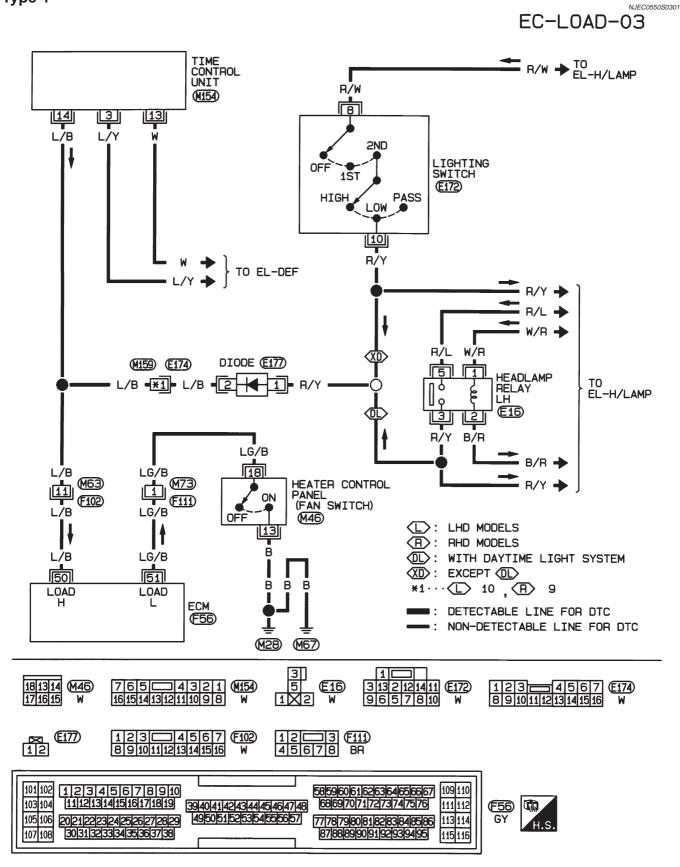
EC-LOAD-02



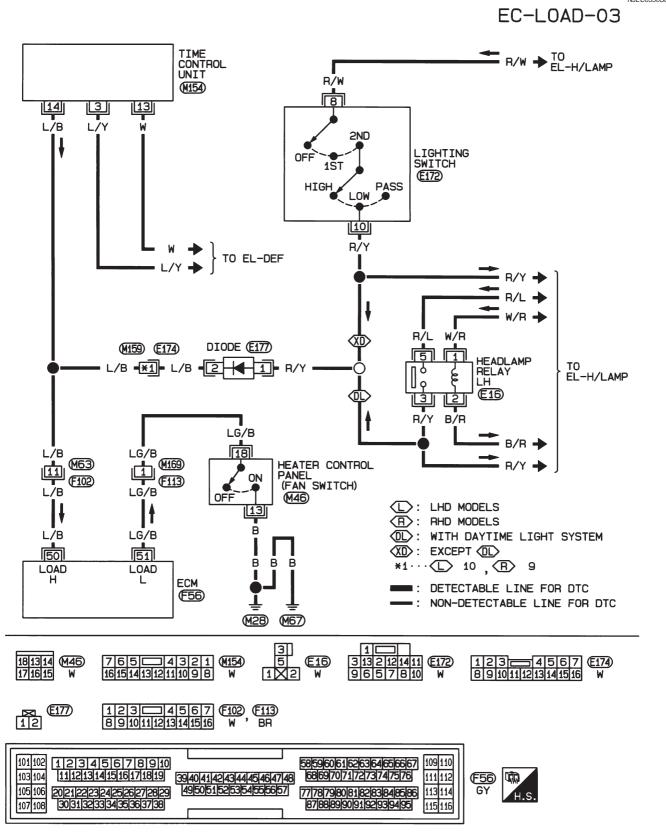
QG Wiring Diagram (Cont'd)

#### HATCHBACK Type-1

NJEC0550S03



#### Type-2



QG

NJEC0550S0302

Diagnostic Procedure — Load Signal –

QG

# Diagnostic Procedure — Load Signal —

		Diagnostic i roccutic	Load Olgilai	NJEC0584
1	INSPECTION START			
Do you	u have CONSULT-II?			
		Yes or No		
Yes		GO TO 2.		
No		GO TO 4.		

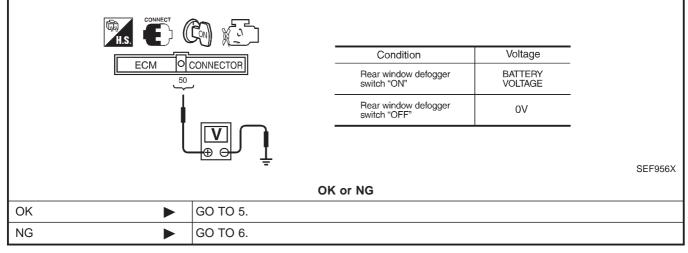
2 CHECK LOAD SI	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I						
<ul> <li>With CONSULT-II</li> <li>1. Turn ignition switch "OI</li> <li>2. Check "LOAD SIGNAL"</li> </ul>	in "DATA MON	IITOR	ode with CONSU	LT-II under the following co	nditions.		
	MONITOR	NO DTC					
	LOAD SIGNAL	ON		Rear window defogger switch "ON"	ON		
				Rear window defogger switch "OFF"	OFF		
			J			SEF954X	
			OK or NG				
ОК	► GO TO	3.					
NG	► GO TO	6.					

3	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II								
	<ul> <li>With CONSULT-II</li> <li>Turn ignition switch "ON".</li> </ul>								
2. Ch	eck "LOAD SIGNAL"	in "DATA N	IONITOR" mo	de with CONSU	ILT-II under the following co	nditions.			
		DATA	MONITOR						
		MONITO	R NO DTC						
		LOAD SIGNAI	L ON						
				_	Lighting switch "ON" at 2nd position	ON			
					Lighting switch "OFF"	OFF			
							SEF955X		
	OK or NG								
ОК				)					
NG		► GO <sup>•</sup>	TO 14.						

Diagnostic Procedure — Load Signal — (Cont'd)

#### 4 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

- **Without CONSULT-II**
- 1. Turn ignition switch "ON".
- 2. Check voltage between ECM terminal 50 and ground under the following conditions.



#### 5 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II **Without CONSULT-II** 1. Turn ignition switch "ON". 2. Check voltage between ECM terminal 50 and ground under the following conditions. Condition Voltage O CONNECTOR ECM BATTERY VOLTAGE Lighting switch "ON" at 2nd position 50 Lighting switch "OFF" 0V SEF957X OK or NG **INSPECTION END** OK NG GO TO 15.

6	CHECK REAR WINDOW DEFOGGER FUNCTION						
2. Turi	<ol> <li>Start engine.</li> <li>Turn "ON" the rear window defogger switch.</li> <li>Check the rear windshield. Is the rear windshield heated up?</li> </ol>						
			Yes or No				
Yes (S	edan)		GO TO 7.				
Yes (H	atchback)		GO TO 12.				
No			Refer to EL-240, "Rear Window Defogger".				

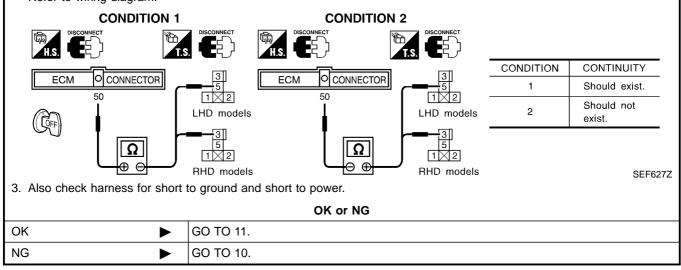
QG

Diagnostic Procedure — Load Signal –

QG

#### (Cont'd) CHECK POWER SUPPLY 7 1. Stop engine. 2. Turn "OFF" the rear window defogger switch. 3. Disconnect rear window defogger relay. 4. Check voltage between terminal 3 (LHD models), 5 (RHD models) and ground with CONSULT-II or tester. Voltage: Battery voltage $1 \times 2$ $1 \times 2$ LHD models RHD models SEF626Z OK or NG OK GO TO 8. ► NG Check the following and repair. 20A fuse Harness for open and short between fuse block and rear window defogger relay 8 CHECK REAR WINDOW DEFOGGER RELAY Refer to "Component Inspection", EC-590. OK or NG OK GO TO 9. NG Replace rear window defogger relay. 9 CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 50 and rear window defogger relay terminals 5 (LHD models), 3 (RHD

models). Refer to wiring diagram.



Diagnostic Procedure — Load Signal — (Cont'd)

#### 10 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B37, M82
- Harness connectors M63, F102
- Diode M68
- Harness for open and short between ECM and rear window defogger relay

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

#### 11 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

#### ► INSPECTION END

#### 12 CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT

- 1. Disconnect ECM harness connector.
- 2. Disconnect time control unit harness connector.
- 3. Check harness continuity between ECM terminal 50 and time control unit harness connector terminal 14. Refer to wiring diagram.
- 4. Also check harness for short to ground and short to power.

OK or NG					
ОК	Refer to EL-414, "TIME CONTROL UNIT".				
NG	GO TO 13.				

#### 13 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M63, F102

• Harness open and short between ECM and time control unit connectors

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

#### 14 CHECK HEADLAMP FUNCTION

1. Start engine.

2. Turn the lighting switch "ON".

3. Check that headlamps are illuminated.

Do the headlamps illuminate in both '	"High" and "	'Low" positions?
---------------------------------------	--------------	------------------

Yes or No				
Yes (Sedan)		GO TO 16.		
Yes (Hatchback)		GO TO 20.		
No Refer to EL-67, "HEADLAMP SYSTEM".				

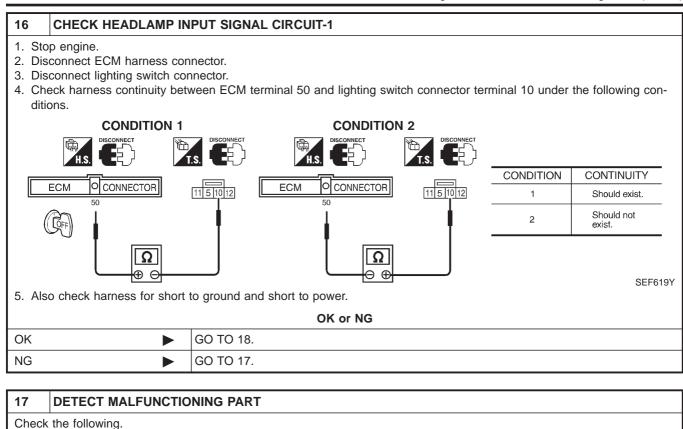
15	CHECK HEADLA	MP Fl	JNCTION				
2. Tur	<ol> <li>Start engine.</li> <li>Turn the lighting switch "ON".</li> <li>Check that headlamps are illuminated.</li> </ol>						
	OK or NG						
OK (Se	adan)		GO TO 16.				
`	,						
OK (Ha	atchback)		GO TO 20.				
NG			Refer to EL-67, "HEADLAMP SYSTEM".				

QG

Diagnostic Procedure — Load Signal —

QG

(Cont'd)



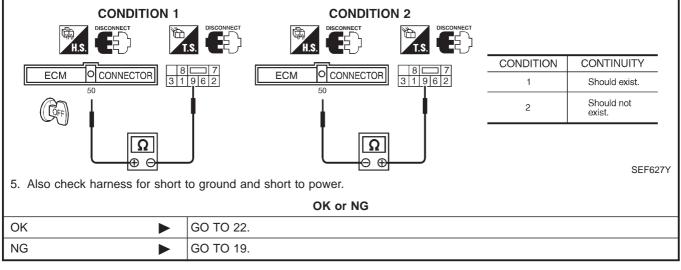
- Harness connectors M63, F102
- Harness connectors M21, E106
- Joint connector-2
- Harness for open and short between ECM and lighting switch connector

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

#### 18 CHECK HEADLAMP INPUT SIGNAL CIRCUIT-2

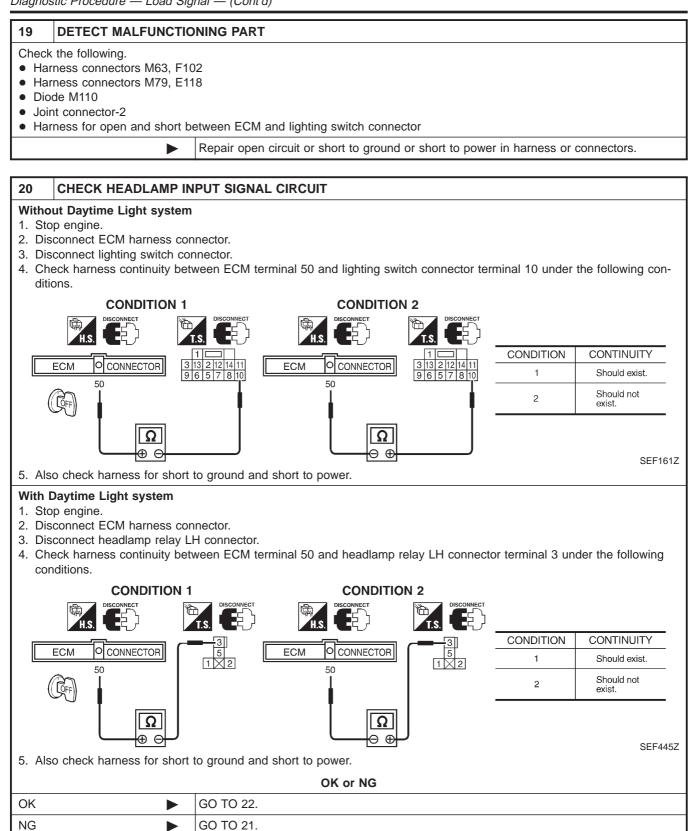
1. Stop engine.

- 2. Disconnect ECM harness connector.
- 3. Disconnect lighting switch connector.
- 4. Check harness continuity between ECM terminal 50 and lighting switch connector terminal 9 under the following conditions.



QG

Diagnostic Procedure — Load Signal — (Cont'd)



Diagnostic Procedure — Load Signal — (Cont'd)

QG

#### 21 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M63, F102
- Harness connectors M159, F174
- Diode E177
- Harness for open and short between ECM and lighting switch connector

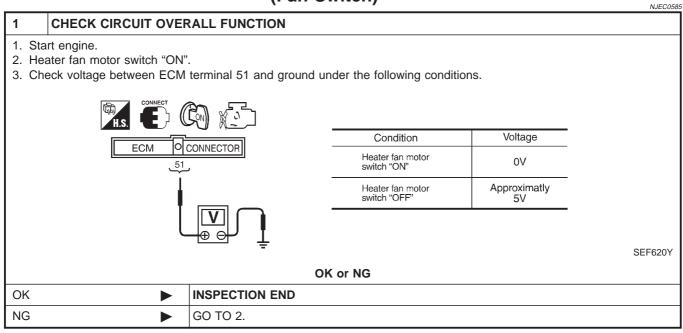
Repair open circuit or short to ground or short to power in harness or connectors.

#### 22 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-177.

INSPECTION END

# Diagnostic Procedure — Heater Control Panel (Fan Switch) —



Diagnostic Procedure — Heater Control Panel (Fan Switch) — (Cont'd)

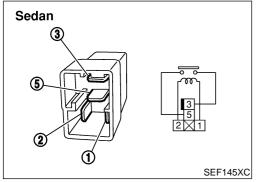
- 5						
2	CHECK INPUT SIGNAL CIRCUIT					
2. Di 3. Di 4. Cl Ri	heck harness continuity bet efer to wiring diagram. Continuity should exist.	nnector. nel fan switch harness connector. ween ECM terminal 51 and heater fan switch harness connector terminal 18. to ground and short to power.				
		OK or NG				
OK		Refer to HA-48, "BLOWER MOTOR".				
NG		GO TO 3.				

#### 3 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M94, F106 (Sedan)
- Harness connectors M73, F111 or M169, F113 (Hatchback)
- Harness for open and short between ECM and heater fan motor switch

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



# Component Inspection REAR WINDOW DEFOGGER RELAY

NJEC0586 NJEC0586S01

Check continuity	between	terminals 3 and 5.
	DCLWCCII	

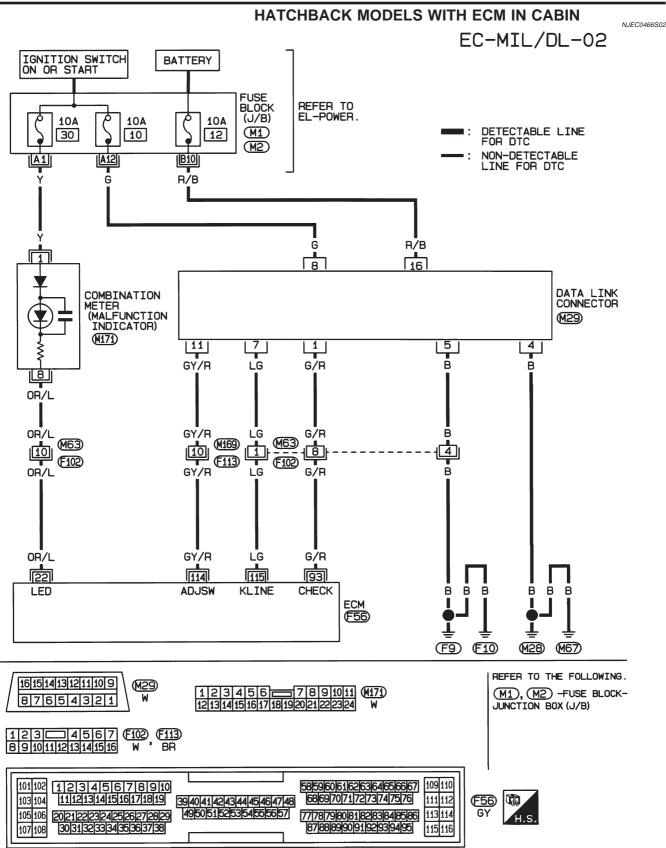
Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

QG

**QG** Wiring Diagram

#### Wiring Diagram NJEC0466 SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT NJEC0466S01 EC-MIL/DL-01 IGNITION SWITCH ON OR START BATTERY (SD): SEDAN MODELS FUSE BLOCK (J/B) REFER TO **(HB): HATCHBACK MODELS** ×1···· ⟨𝔅) 17 , ⟨𝔅⟩ 40 ×2··· ⟨𝔅) 63 , ⟨𝔅⟩ 22 10A 10A 10A 12 (M1) 30 10 (M2) DETECTABLE LINE . B10 A12 FOR DTC R∕B G NON-DETECTABLE LINE FOR DTC Ĝ R/B 16 8 Υ DATA LINK CONNECTOR **×**1 COMBINATION METER (MALFUNCTION (M29) E INDICATOR) 1 5 (M32), (M36) : (SD) |11| 4 Т Т Т Т . (M152): (HB) GY/R G/R B LG в **\***2 **M63** ₫ F102 OR/L G/R LG В Œ SD (SD) $\supset$ OR/L GY/R GY/R 10 M63 F102 P (173) B (HB) (F106) **F111** 2 OR/L JOINT GY/R GY/R CONNECTOR -5 SD (F55) (HB) В (SD $\overline{}$ OR/L GY/R LG G/R 22 115 193 114 LED ADJSW KLINE CHECK B B B B B B ECM I (F56) (F9) **F10** (M28) (M67) REFER TO THE FOLLOWING. 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 123456 7891011 (M32) 12131415161718192021222324 W (M36) M1, M2 -FUSE BLOCK-BR JUNCTION BOX (J/B) 16 15 14 13 12 11 10 9 M29 2122232425 26272829 (M152) 3031323334353637383940 W 123 4567 F102 8910111213141516 W (F55) 111222 W 87654321 M 1 <u>2</u> 3 4 5 6 101 102 12345678910 **F106** 58596061626364656667 109 110 686970717273747576 BR 11 12 13 14 15 16 17 18 19 111 112 103 104 39404142434445464748 (F56) 20|21|22|23|24|25|26|27|28|29 |30|31|32|33|34|35|36|37|38 495051525354555657 777787980818283848586 878889909192939495 GY 105 106 113 114 .s 33 (FIII) 107 108 115 116 45678 BR



# **SERVICE DATA AND SPECIFICATIONS (SDS)**

Fuel Pressure Regulator

QG

NJEC0467

N IEC0468

NJEC0470

NJEC0480

**Fuel Pressure Regulator** 

Fuel pressure at idling kPa (bar, kg/cm², psi)	Vacuum hose is connected	Approximately 235 (2.35, 2.4, 34)	
	Vacuum hose is disconnected	Approximately 294 (2.94, 3.0, 43)	

# Idle Speed and Ignition Timing

Target idle speed* rpm	M/T: 700±50 A/T: 800±50
Air conditioner: ON rpm	825 or more
Ignition timing	M/T: 8±5° BTDC A/T: 10±5° BTDC
Throttle position sensor idle position V	0.15 - 0.85

\*: Under the following conditions:

Air conditioner switch: OFF

Electrical load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

#### Mass Air Flow Sensor

Supply voltage (Heater) V	Battery voltage (11 - 14)
Supply voltage (Sensor) V	Approximately 5
Output voltage V	1.0 - 1.7*
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.0 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

\*: Engine is warmed up to normal operating temperature and idling under no-load.

### Intake Air Temperature Sensor

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

### **Engine Coolant Temperature Sensor**

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

#### **Throttle Position Sensor**

	NJEC0477
Throttle valve conditions	Voltage (V)
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7
	*

# Heated Oxygen Sensor 1 Heater (Front)

	Пеацеи	Oxygen Sensor i Heater (Front)	NJEC0478
Resistance [at 25°C (77°F)] Ω		2.3 - 4.3	
	Heated	Oxygen Sensor 2 Heater (Rear)	NJEC0483
Resistance [at 25°C (77°F)] Ω		2.3 - 4.3	

# SERVICE DATA AND SPECIFICATIONS (SDS)

	Fuel Tank Tem	perature Sensor (Where Fitte	<b>d)</b>	
Temperature °C (°F)		Resistance kΩ		
20 (68)	20 (68) 2.3 - 2.7			
50 (122)		0.79 - 0.90		
	EGR Volume C	Control Valve (Where Fitted)	NJEC056	
Terminal No.		Resistance $\Omega$ [at 20°C (68°F)]	1020000	
1 - 2				
2 - 3		20 24		
4 - 5		20 - 24		
5 - 6				
	EGR Temperat	ure Sensor (Where Fitted)	NJEC047	
EGR temperature °C (°F)	Voltage V	Resistance MΩ		
0 (32)	4.56	0.62 - 1.05		
50 (122)	2.25	0.065 - 0.094		
100 (212)	0.59	0.011 - 0.015		
	EVAP Canister	Purge Volume Control Valve	NJEC048	
Resistance [at 20°C (68°F)] Ω		31 - 35		
	IACV-AAC Valv		NJEC0474	
Terminal No.		Resistance Ω [at 20°C (68°F)]		
1 - 2				
2 - 3		20 24		
4 - 5		20 - 24		
5 - 6				
	Injector		NJEC047	
Resistance [at 25°C (77°F)] Ω		13.5 - 17.5		
	Ignition Coil w	ith Power Transistor	NJEC056	
Terminal No. (Polarity)		Resistance Ω [at 25°C (77°F)]		
3 (+) - 2 (-)		Except 0 or ∞		
1 (+) - 3 (–)				
1 (+) - 2 (-)		Except 0		
	Condenser		NJEC058	
Resistance [at 25°C (77°F)] MΩ		Above 1		
	Fuel Pump		NIFOAT	
Resistance [at 25°C (77°F)] Ω		0.2 - 5.0	NJEC047	
, ,-				

# SERVICE DATA AND SPECIFICATIONS (SDS)

Crankshaft Position Sensor (POS)

Crankshaft Position Sensor (POS) Refer to "Component Inspection", EC-334.

NJEC0558

QG

# **Camshaft Position Sensor (PHASE)**

Refer to "Component Inspection", EC-342.

NJEC0559

# Alphabetical & P No. Index for DTC

NJEC0600

### ALPHABETICAL INDEX FOR DTC

X: Applicable —: Not applicable

Items	DTC		MI illumination	Reference page
(CONSULT-II screen terms)	CONSULT-II	ECM	Wir marinnation	
ACCEL POS SENSOR	P0120	0403	Х	EC-685
BATTERY VOLTAGE	P1660	0502	_	EC-801
BRAKE SW	P0571	0807	Х	EC-706
COOLANT TEMP SEN	P0115	0103	Х	EC-680
CRANK POS SEN (TDC)	P0335	0407	Х	EC-695
ECM RLY	P1620	0902	Х	EC-794
ECM 2	P1607	0301	Х	EC-792
ECM 10	P1107	0802	Х	EC-714
ECM 12	P1603	0901	Х	EC-792
ECM 15	P1621	0903	_	EC-799
FUEL CUT SYSTEM2	P1202	1002	Х	EC-723
MASS AIR FLOW SEN	P0100	0102	Х	EC-673
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	0505	_	_
OVER HEAT	P1217	0208	Х	EC-730
P1-CAM POS SEN	P1341	0701	Х	EC-778
P2-TDC PULSE SIG	P1337	0702	Х	EC-771
P3-PUMP COMM LINE	P1600	0703	Х	EC-785
P4·SPILL/V CIRC	P1251	0704	Х	EC-764
P5-PUMP C/MODULE	P1690	0705	Х	EC-803
P7·F/INJ TIMG FB	P1241	0707	Х	EC-757
P9-FUEL TEMP SEN	P1180	0402	Х	EC-716
VEHICLE SPEED SEN	P0500	0104	Х	EC-701

# **TROUBLE DIAGNOSIS — INDEX**

### P NO. INDEX FOR DTC

X: Applicable —: Not applicable

			A. Ap	Dilcable —: Not applica
CONSULT-II	ЕСМ	MI illumination	Items (CONSULT-II screen terms)	Reference page
P0000	0505	_	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_
P0100	0102	Х	MASS AIR FLOW SEN	EC-673
P0115	0103	Х	COOLANT TEMP SEN	EC-680
P0120	0403	Х	ACCEL POS SENSOR	EC-685
P0335	0407	Х	CRANK POS SEN (TDC)	EC-695
P0500	0104	Х	VEHICLE SPEED SEN	EC-701
P0571	0807	Х	BRAKE SW	EC-706
P1107	0802	Х	ECM 10	EC-714
P1180	0402	Х	P9.FUEL TEMP SEN	EC-716
P1202	1002	Х	FUEL CUT SYSTEM2	EC-723
P1217	0208	Х	OVER HEAT	EC-730
P1241	0707	Х	P7·F/INJ TIMG FB	EC-757
P1251	0704	Х	P4-SPILL/V CIRC	EC-764
P1337	0702	Х	P2-TDC PULSE SIG	EC-771
P1341	0701	Х	P1-CAM POS SEN	EC-778
P1600	0703	Х	P3-PUMP COMM LINE	EC-785
P1603	0901	Х	ECM 12	EC-792
P1607	0301	Х	ECM 2	EC-792
P1620	0902	Х	ECM RLY	EC-794
P1621	0903		ECM 15	EC-799
P1660	0502		BATTERY VOLTAGE	EC-801
P1690	0705	Х	P5-PUMP C/MODULE	EC-803

## PRECAUTIONS

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

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL N16 is as follows (The composition varies according to the destination and optional equipment.):

• 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), front 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 front side air bag module (located in the outer side of front seat), side air bag (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 should 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, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harness can be identified by yellow harness connector.

YD Engine Fuel & Emission Control System

# **Engine Fuel & Emission Control System**

N.IEC0602

- BATTERY · Always use a 12 volt battery as power source.
- · Do not attempt to disconnect battery cable while engine is running.
- value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation. • When ECM is removed for inspection,

· If a battery terminal is disconnected,

the memory will return to the ECM

ECM

· Do not disassemble ECM.

make sure to ground the ECM mainframe. FCM

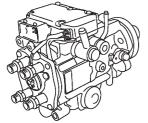
#### WIRELESS EQUIPMENT

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
- 1) Keep the antenna as far as possible away from the ECM.
- 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.

----- G

#### ELECTRONIC CONTROL FUEL INJECTION PUMP

- · Do not disconnect pump harness connector with engine running.
- · Do not disassemble electronic fuel injection pump. If NG, take proper action.



ENGINE CONTROL PARTS HANDLING

If NG, replace injection nozzle.

· Even a slight leak in the air intake

· Do not shock or jar the crankshaft

position sensor (TDC).

system can cause serious problems.

# · Do not disassemble injection nozzle. 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.

#### ECM HARNESS HANDLING

 Securely connect ECM harness connectors.

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

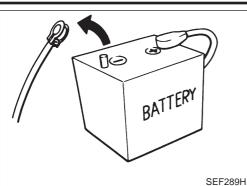
- · Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- · Keep ECM parts and harnesses dry. · Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF433Z

### EC-599

# PRECAUTIONS

#### Precautions



Fasten

Lever

Loosen

ECM

#### Precautions

- N.IEC0603 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.
- When connecting ECM harness connectors, push in both sides of the connector until you hear a click. Maneuver the lever until you hear the three connectors on the inside click. Refer to the figure at left.
- SEF881Y Bend Break SEF291H
- Perform ECM input/output signal) inspection before replacement. LD ONE
  - MEF040D
- SAT652J

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.

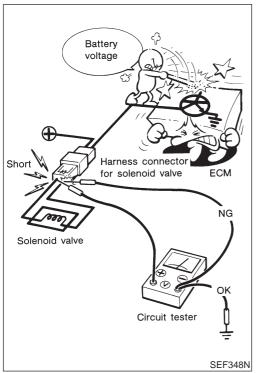
Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-659.

- If MI illuminates or blinks irregularly when engine is running, water may have accumulated in fuel filter. Drain water from fuel filter. If this does not correct the problem, perform specified trouble diagnostic procedures.
- 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.

YD

# PRECAUTIONS



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

# Wiring Diagrams and Trouble Diagnosis

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-10, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-32, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-21, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

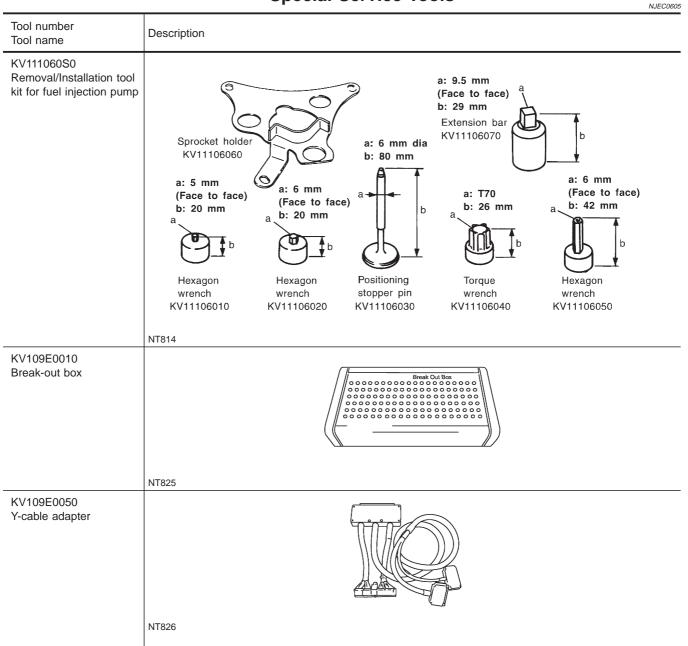
NJEC0604

# PREPARATION

Special Service Tools

**Special Service Tools** 

YD



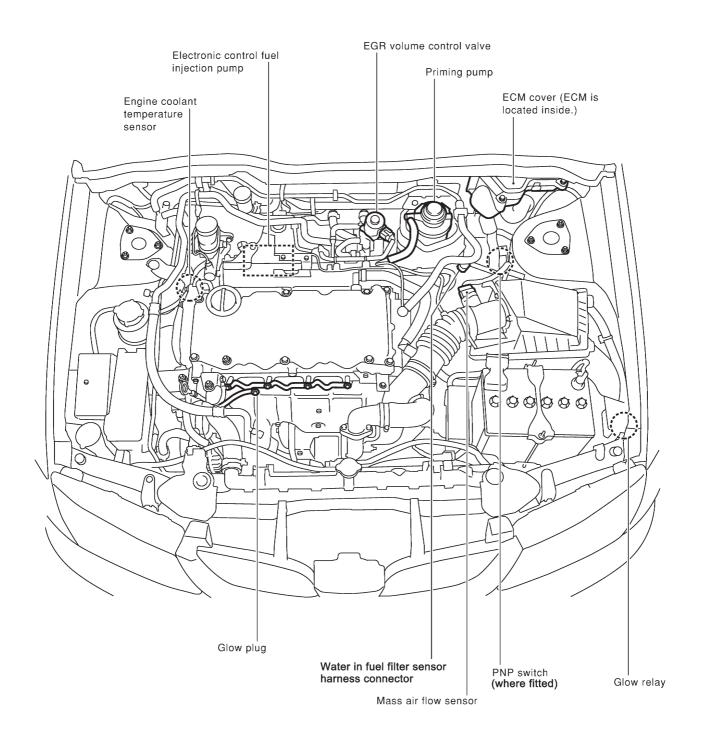
Engine Control Component Parts Location

YD

NJEC0607

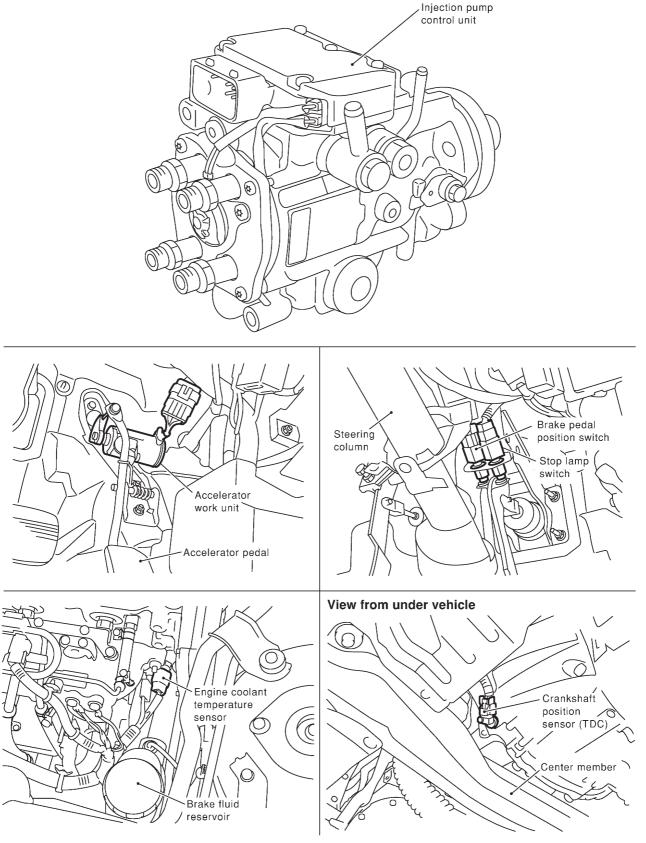
# Engine Control Component Parts Location

For more details of ECM location, refer to "ELECTRICAL UNIT LOCATION" in EL section (EL-517).



Engine Control Component Parts Location (Cont'd)

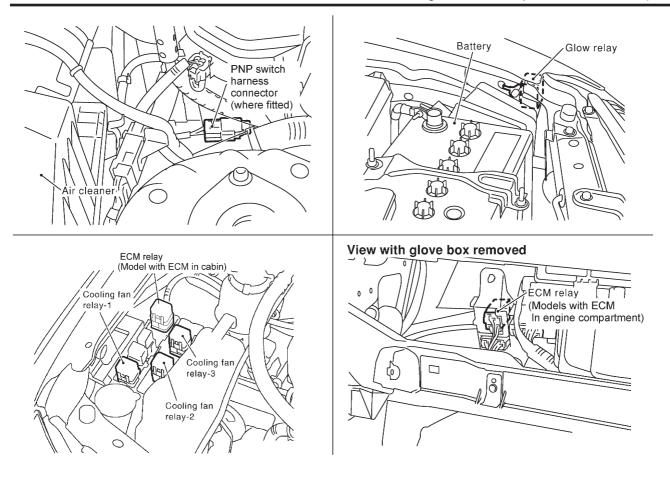
#### Electronic control fuel injection pump



SEF894Y

Engine Control Component Parts Location (Cont'd)

YD



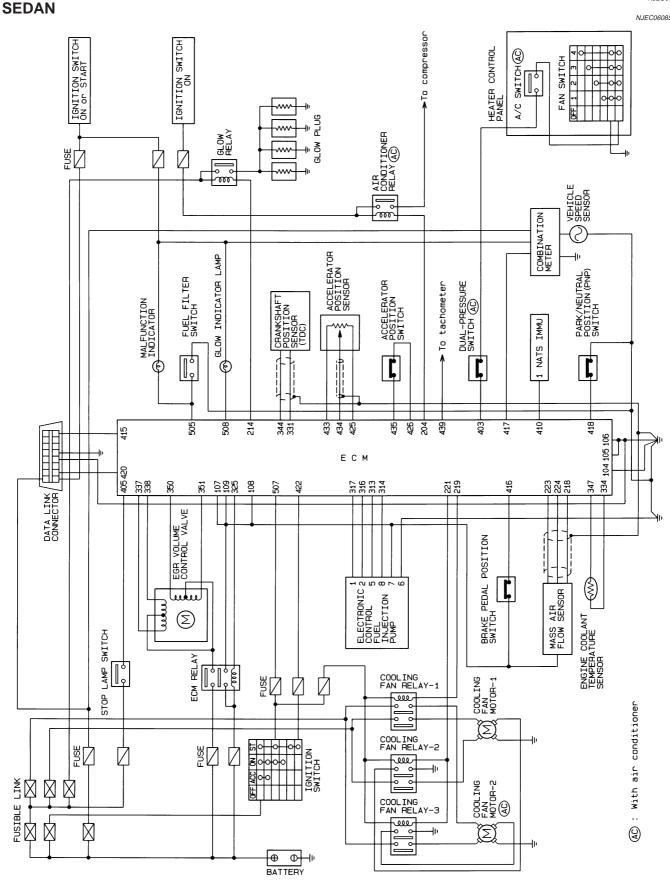
Circuit Diagram

#### **Circuit Diagram**

NJEC0608

YD

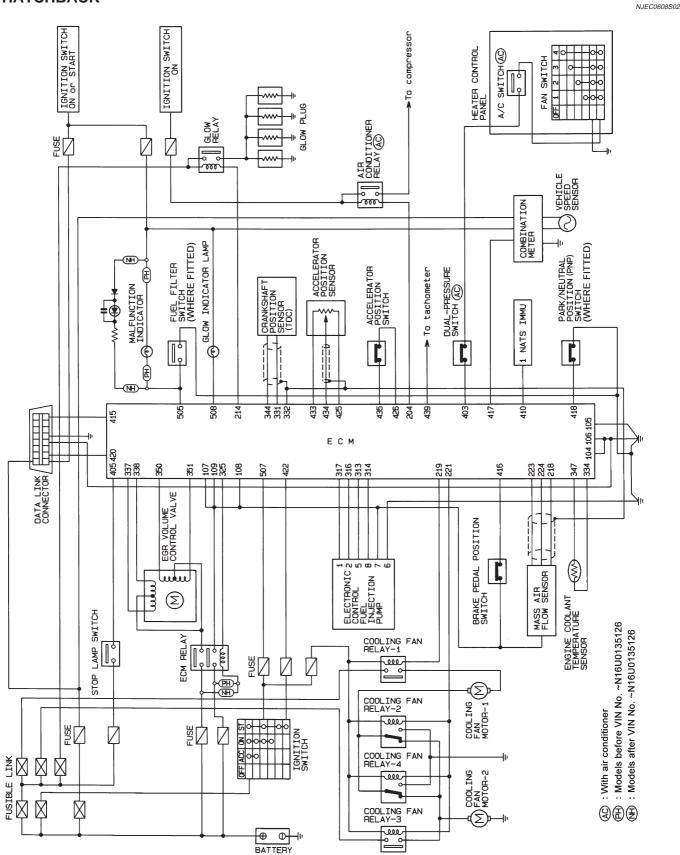
NJEC0608S01



HATCHBACK



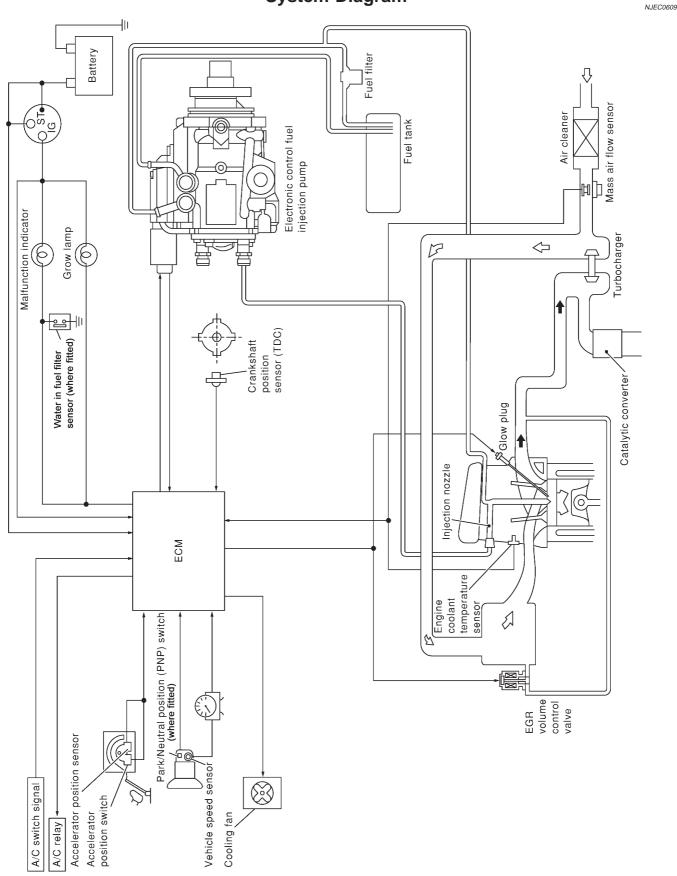
YD



NEF342A

System Diagram

System Diagram



NEF343A

YD

System Chart

#### **System Chart** NJEC0611 **ECM** Function Input (Sensor) Output (Actuator) • Electronic control fuel injection pump Electronic control fuel injection Fuel injection control Crankshaft position sensor (TDC) pump Engine coolant temperature sensor Electronic control fuel injection • Accelerator position sensor Fuel injection timing control pump • Accelerator position switch Park/Neutral position (PNP) switch\* Electronic control fuel injection Fuel cut control • Ignition switch pump • Battery voltage • Vehicle speed sensor Glow control system Glow relay & glow lamp • Air conditioner switch On board diagnostic system MI (On the instrument panel) · Mass air flow sensor • Stop lamp switch EGR volume control EGR volume control valve Cooling fan control Cooling fan relay Air conditioning cut control Air conditioner relay

\*: If so equipped

Fuel Injection Control System

# Fuel Injection Control System

#### DESCRIPTION

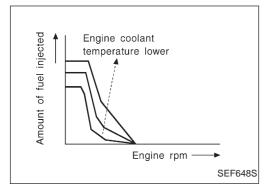
System Description

Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is compensated to improve engine performance.

Pulse signals are exchanged between ECM and electronic control fuel injection pump (control unit is built-in). The fuel injection pump control unit performs duty control on the spill valve (built into the fuel injection pump) according to the input signals to compensate the amount of fuel injected to the preset value.

#### Start Control Input/Output Signal Chart

NJEC NJEC				
Sensor	Input Signal to ECM	ECM Function	Actuator	
Engine coolant temperature sensor	Engine coolant temperature	- Fuel injection		
Crankshaft position sensor (TDC)	Engine speed	control (start	Electronic control fuel	
Ignition switch	Start signal	control)		



When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed and engine coolant temperature.

For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.

#### Idle Control Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (Idle con- trol)	Electronic control fuel injection pump
Crankshaft position sensor (TDC)	Engine speed		
Battery	Battery voltage		
Accelerator position switch	Idle position		
Vehicle speed sensor	Vehicle speed		
Air conditioner switch	Air conditioner signal		

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NJEC0612

NJEC0612S02

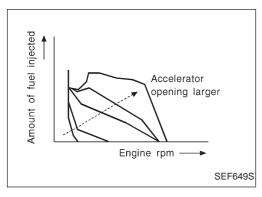
NJEC0612S03

# ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Fuel Injection Control System (Cont'd,

#### Normal Control Input/Output Signal Chart

NJEC0612				
Sensor	Input Signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (TDC)	Engine speed	Fuel injection control (Normal control)	Electronic control fuel injection pump	
Accelerator position sensor	Accelerator position			



The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor (TDC) detects engine speed and the accelerator position sensor detects accelerator position. These sensors send signals to the ECM.

The fuel injection data, predetermined by correlation between various engine speeds and accelerator positions, are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.

#### Maximum Amount Control Input/Output Signal Chart

Input/Output Signal Chart			
Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air		Electronic control fuel injection pump
Engine coolnat temperature sensor	Engine coolant temperature	Fuel injection control (Maxi-	
Crankshaft position sensor (TDC)	Engine speed	mum amount control)	
Accelerator position sensor	Accelerator position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions.

This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

#### Deceleration Control Input/Output Signal Chart

			NJEC0612S0601
Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator position switch	Accelerator position	Fuel injection control (Decel- eration control)	Electronic control fuel injection pump
Crankshaft position sensor (TDC)	Engine speed		

The ECM sends a fuel cut signal to the electronic control fuel injection pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator position switch and crankshaft position sensor (TDC).

#### DESCRIPTION

# Fuel Injection Timing Control System

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM and the injection pump control unit exchange signals and perform feedback control for optimum injection timing in accordance with the map.

#### NJEC0612S04

NJEC0612S05

NJEC0612S06

# ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Air Conditioning Cut Control

# **Air Conditioning Cut Control**

#### DESCRIPTION Input/Output Signal Chart

			NJEC0614S01
Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Accelerator position sensor	Accelerator valve opening angle		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		

#### **System Description**

This system improves acceleration when the air conditioner is used.

NJEC0614S02

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

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

#### DESCRIPTION Input/Output Signal Chart

NJEC0615

NJEC0615			NJEC0615S01
Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Electronic control fuel injection pump
Accelerator position switch	Accelerator position		
Crankshaft position sensor (TDC)	Engine speed		

If the engine speed is above 2,800 rpm with no load (for example, in neutral and engine speed over 2,800 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 operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled. NOTE:

#### This function is different from deceleration control listed under "Fuel Injection Control System", EC-610.

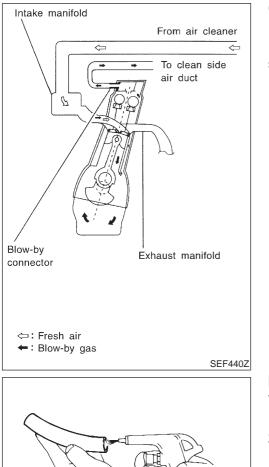
YD

NJEC0614

NIEC0614601

## ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION YD

Crankcase Ventilation System



# Crankcase Ventilation System

In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.

#### INSPECTION Ventilation Hose

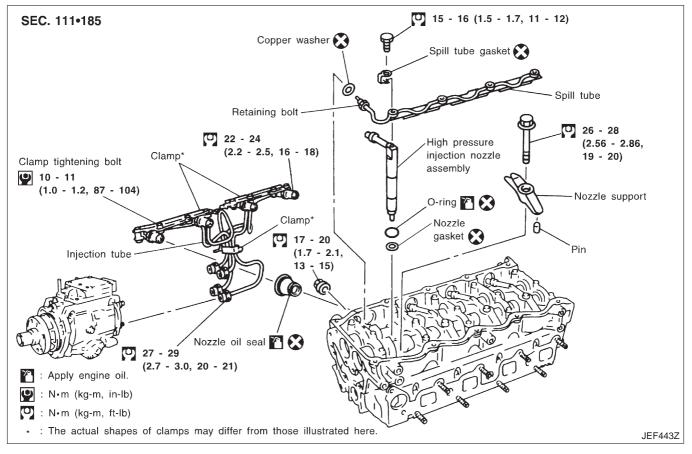
SEC692

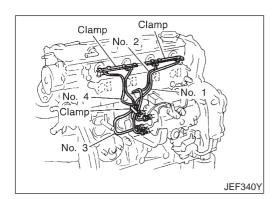
NJEC0617 NJEC0617S01

- 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.

#### **Injection Tube and Injection Nozzle REMOVAL AND INSTALLATION CAUTION:**

- Do not disassemble injection nozzle assembly. If NG, replace injection nozzle assembly.
- Plug flare nut with a cap or rag so that no dust enters the nozzle. Cover nozzle tip for protection of needle.





#### **Injection Tube**

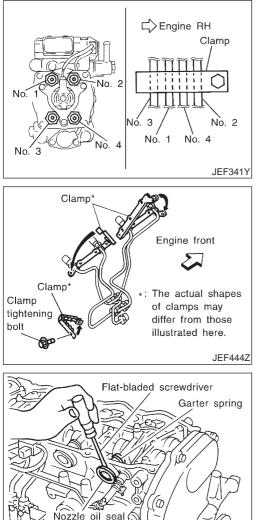
Removal

#### NJEC0618S01

- NJEC0618S0101 Mark the cylinder Nos. to the injection tubes, then disconnect 1. them.
- Marking should be made at proper locations and by the proper method, so that they are not erased by fuel, etc.
- 2. Remove the clamps, then disconnect the tubes one by one.
- The intake manifold is removed for explanation in the figure.

NJEC0618

Injection Tube and Injection Nozzle (Cont'd)



#### Installation

- Referring to the figure and the marking which were made for installation, connect the injection tubes to all the cylinders.
- 2. Connect temporarily the tubes to the cylinder head side only by screwing 2 to 3 turns. Make sure that all tubes can be connected to the pump side also.
- 3. Then, tighten the flare nuts of the cylinder head side and pump side, starting from the opposite side from you.
- 4. Attach the injection tube clamp in the direction shown in the figure.
- 5. Insert tightening bolts of the clamp (4-tube type) from the rear to the front of the engine.

## Injection Nozzle Oil Seal

#### Removal

NJEC0618S02

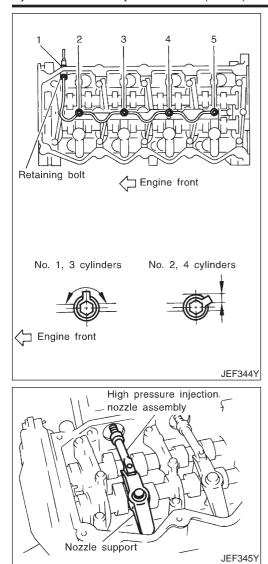
Using a tool such as a flat-bladed screwdriver, pry the flange of the seal, then remove it.

#### Installation

JEF343Y

- 1. After the high-pressure injection nozzle assembly is installed, push the seal from the cylinder head side until it contacts the flange.
- 2. Make sure that the garter spring of the seal on the high-pressure injection nozzle assembly side is not falling.
- Replace the oil seal with new one when the high-pressure injection nozzle assembly is removed. (It is not necessary to replace the oil seal when only injection tubes are removed.)

Injection Tube and Injection Nozzle (Cont'd)



#### Spill Tube

#### . Removal

Loosen and remove the mounting bolts and flare nuts in the reverse order of the numbers in the figure.

• When the flare nuts are loosened, hold the head of hexagonal retaining bolts (head inside) using a wrench.

#### Installation

- 1. Tighten the flare nuts and mounting bolts in the numerical order shown in the figure.
- When the flare nuts are tightened, hold the head of the hexagonal retaining bolts (head inside) using a wrench.
- 2. To prevent interference with the rocker cover, place the spill gasket joint within the range shown by the arrow, then tighten the mounting bolts. (Be especially careful about No. 2 and 4 cylinders.)
- After the spill tube is installed, check the airtightness of the spill tube.
- After the bolts are tightened, the joint of the spill tube gasket might be broken. However, this will not affect function.

## High Pressure Injection Nozzle Assembly

Removal

NJEC0618S04

- Remove the nozzle support, then pull out the high-pressure injection nozzle assembly by turning it clockwise/ counterclockwise.
- 2. Using a tool such as a flat-head screwdriver, remove the copper washer inside the cylinder head.

#### **CAUTION:**

WARNING:

## Do not disassemble the high-pressure injection nozzle.

- 1. Insert the nozzle gasket to the cylinder head hole.
- 2. Attach the O-ring to the mounting groove of the nozzle side, then insert it in the cylinder head.

#### TEST AND ADJUSTMENT

NJEC0619

When using nozzle tester, be careful not to allow diesel fuel sprayed from nozzle to contact your hands or body, and make sure your eyes are properly protected with goggles.

NJEC0618S03

YD

Injection Tube and Injection Nozzle (Cont'd)

# 50 Handy vacuum pump Spill tube Q // JEF346Y Priming pump

#### **Inspection for Spill Tube Airtightness**

Before the rocker cover is installed, perform the inspection as follows.

- 1. Connect the handy vacuum pump to the spill hose.
- Check that the airtightness is maintained after the negative 2. pressure shown below is applied.

Standard:

-53.3 to -66.7 kPa (-533 to -667 mbar, -400 to -500 mmHg, -15.75 to -19.69 inHg)

#### Air Bleeding of Fuel Piping

NJEC0619S02 After the repair, bleed air in the piping by pumping the priming pump up and down until it becomes heavy.

#### Injection Pressure Test

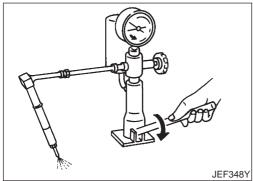
NJEC0619S03 Install injection nozzle assembly to injection nozzle tester and 1. bleed air from flare nut.

- Pump the tester handle slowly (one time per second) and 2. watch the pressure gauge.
  - 3. Read the pressure gauge when the injection pressure just starts dropping.

```
Initial injection pressure:
  New
     21,476 - 22,457 kPa (214.7 - 224.5 bar, 219 - 229
     kg/cm<sup>2</sup>, 3,114 - 3,256 psi)
  Limit
     18,275 kPa (182.7 bar, 186 kg/cm<sup>2</sup>, 2,650 psi)
```

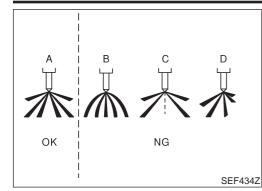
The injection nozzle assembly has a 2-stage pressure injection function. However, the judgement should be made at the first stage of the valve opening pressure.

Always check initial injection pressure using a new nozzle.





Injection Tube and Injection Nozzle (Cont'd)



#### **Spray Pattern Test**

1. Check spray pattern by pumping tester handle one full stroke per second.

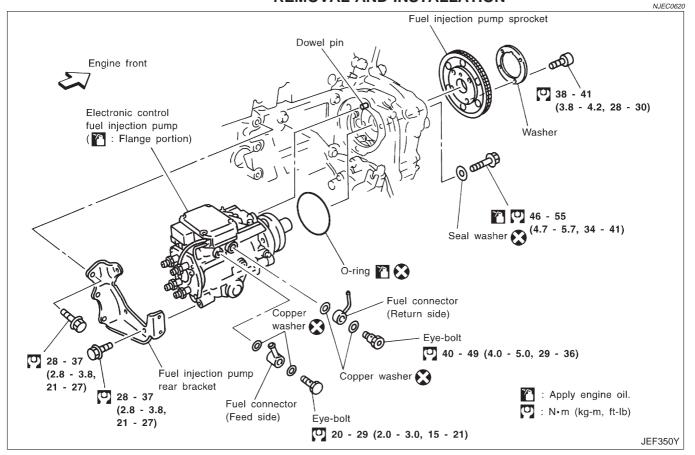
#### NG spray pattern:

Does not inject straight and strong (B in the figure). Fuel drips (C in the figure).

### Does not inject evenly (D in the figure).

2. If the spray pattern is not correct, replace injection nozzle assembly.

### Electronic Control Fuel Injection Pump REMOVAL AND INSTALLATION



#### Removal

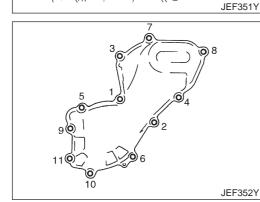
- 1. Remove the parts shown below.
- Engine hood
- Engine coolant (drain)
- Engine cover
- Heater pipe under intake manifold
- Injection tubes
- Right splash cover (with undercover)
- Right front wheel

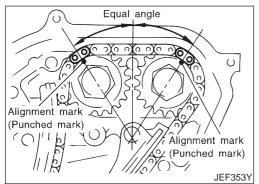
NJEC0620S01

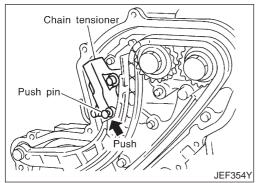
YD

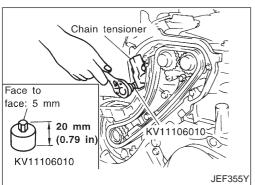
Electronic Control Fuel Injection Pump (Cont'd,

Exit Exit Enter w Connector









- 2. Disconnect the fuel hoses from the fuel injection pump.
  - 3. Disconnect the harness connector from the fuel injection pump.
  - Disconnect the connector by pulling the connector stopper fully.
  - When the stopper is fully pulled, the connector will be disconnected together. For installation, push the connector half way first, then press the stopper until it locks, so that the connector is connected together.
  - 4. Remove the fuel injection pump rear bracket.
  - 5. Remove the front chain case.
  - Move the power steering fluid reservoir tank from the bracket.
  - Loosen and remove the mounting bolts in the reverse order of the numbers shown in the figure.
  - As for bolts 6, 10, and 11, remove with rubber washer because there is not enough space for removing only the bolts.

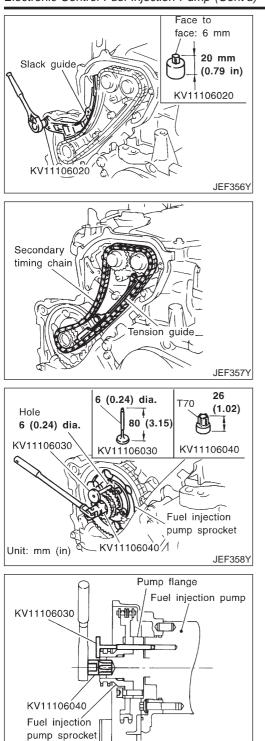
#### **CAUTION:**

To prevent foreign objects from getting in the engine, cover the opening during the removal of the front chain case.

- 6. Adjust the No. 1 cylinder to the top dead center position.
- Turn the crankshaft pulley clockwise, then align the alignment mark (punched mark) of the camshaft sprocket to the position shown in the figure.
- There is no indicator on the crankshaft pulley.
- It is not necessary to mark the secondary timing chain for removal because it can be matched by the link color for installation. However, the alignment mark on the fuel injection pump sprocket is difficult to see; mark it if necessary.
- 7. Remove the chain tensioner.
- a. Push the plunger of the chain tensioner, then fix it with a tool such as a push pin.

- b. Using the hexagon wrench (face to face: 5 mm) (SST), remove the mounting bolts, then remove the chain tensioner.
- A multi-purpose tool may also be used.

#### Electronic Control Fuel Injection Pump (Cont'd)



- 8. Remove the timing chain slack guide.
- Using the hexagon wrench (face to face: 6 mm, short-type) (SST), remove the mounting bolts, then remove the timing chain slack guide.

- 9. Remove the timing chain tension guide.
- 10. Remove the secondary timing chain.
- Only the timing chain can be removed without removing the sprockets.

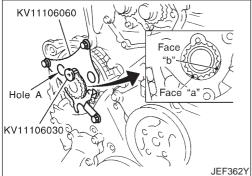
- 11. Fix the fuel injection pump sprocket.
- a. Insert the positioning stopper pin (SST) in the 6 mm (0.24 in) dia. hole of the fuel injection pump sprocket.
- b. Using the torx wrench (SST), turn the pump shaft gradually to adjust the hole position of the fuel injection pump sprocket.
- c. Insert the positioning stopper pin through the fuel injection pump body to fix the sprocket.
- Insert the positioning stopper pin until its flange contacts the fuel injection pump sprocket.
- d. Remove the torx wrench (SST).

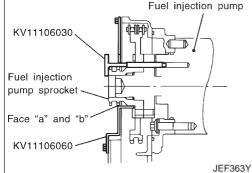
JEF359Y

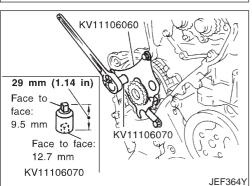
YD

Electronic Control Fuel Injection Pump (Cont'd,

Face to face: 6 mm 42 mm KV11106030 (1.65 in) /11106050 Washer Mounting bolt KV11106050 JEF360Y Fuel injection pump Fuel injection pump sprocket KV11106030 KV11106050 Mounting bolt JEF361Y KV11106060







- Using the hexagon wrench (face to face: 6 mm, long-type) (SST), remove the mounting bolts of the fuel injection pump sprocket.
- It is not necessary to remove the washer of the fuel injection pump sprocket.

- 13. Using the sprocket holder (SST), hold the fuel injection pump sprocket to prevent falling.
- When the sprocket holder is installed, if the positioning stopper pin interferes, pull out the stopper pin approximately 10 mm (0.39 in), then install it.
- After the sprocket holder is installed temporarily, insert the extension bar (SST) and Torx socket in the three holes A. After positioning the holes, tighten the holder mounting bolts. (Refer to the step 14 about the tool.)
- The length of the sprocket holder mounting bolts should be approximately 15 mm (0.59 in) (M6 thread length).
- Make sure that the a- and b-faces of the sprocket holder contact the bottom side of the sprocket 15 mm (0.59 in) (small diameter side).

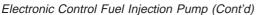
#### **CAUTION:**

Do not remove the sprocket holder until the fuel injection pump is installed.

- After the sprocket holder is installed, pull out the positioning stopper pin (SST) from the fuel injection pump sprocket.
- 14. Using the extension bar [SST: whole length 43 mm (1.69 in)] and the Torx socket (Q6-E12: commercially available), remove the mounting bolts, them remove the fuel injection pump toward the rear of the engine.
- Even after all the mounting bolts are removed, the fuel injection pump is still held by a dowel pin.

#### **CAUTION:**

Do not disassemble or adjust the fuel injection pump.



KV11106070

E12 Torx socket

Dowel pin

Fuel injection pump

Mounting bolt

6 mm (0.24 in) dia.

Pump flange

Mounting bolt

58

Seal washer

Hole

Dowel pin

JEF365Y

JEF366Y

JEF367Y



- 15. Remove the fuel injection pump mounting bolts.
  - The seal washer of the mounting bolts cannot be reused.

#### **CAUTION:**

For removal, be careful not to drop the seal washer into the engine.

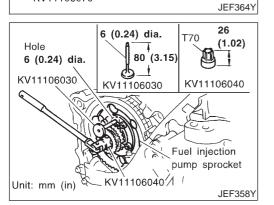
#### Installation

- It is not necessary to adjust the injection timing by changing the installation angle which used to be performed with conventional fuel injection pumps. The installation position can be simply decided by the dowel pin and the mounting bolts.
- 1. Before the fuel injection pump is installed, check that the notch of its flange and the 6 mm (0.24 in) dia. hole on the body are aligned.
- 2. Insert the fuel injection pump to the mounting position from the rear of the engine.
- Adjust the fuel injection pump bracket position to the dowel pin, then install it.

29 mm (1.14 in) Face to face: 9.5 mm Face to face: 12.7 mm KV11106070

O-ring

Fuel injection pump



- 3. Using the extension bar (SST) and the Torx socket, tighten the mounting bolts of the fuel injection pump.
- 4. Remove the sprocket holder (SST).

- 5. Using the torx wrench (SST), turn the pump shaft gradually to adjust the position of the flange. Then, insert the positioning stopper pin (SST) to the 6 mm (0.24 in) dia. hole of the fuel injection pump sprocket through the pump flange and the pump body.
- 6. Remove the torx wrench (SST).

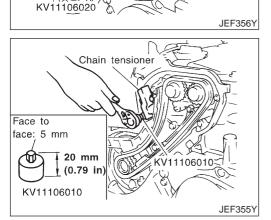
7.

YD

Electronic Control Fuel Injection Pump (Cont'd,

- Face to face: 6 mm 42 mm KV11106030 (1.65 in) 11106050 Washer Mounting bolt KV11106050 JEF360Y Alignment mark Alignment mark (Dark blue link) (Dark blue link) Alignment mark (Punched mark) Secondary timing chain Chain tensioner Slack guide Camshaft sprocket Tension guide Alignment mark (Punched mark) Fuel injection pump sprocket Alignment mark (Yellow link) JEF368Y Face to face: 6 mm 20 mm Slack guide (0.79 in)
- Using the hexagon wrench (face to face: 6 mm, long-type) (SST), tighten the sprocket mounting bolt.
- When the washer of the fuel injection pump sprocket is removed, install it with the marking "F" (front) facing the front of the engine.
- 8. Pull out the positioning stopper pin (SST).
- 9. Install the secondary timing chain.
- Align the alignment marks of the sprockets and those of the chain, then install it.
- The figure shows the installation state and names of the secondary timing chain and other related parts.
- 10. Install timing chain tension guide.
- The upper installation bolt is longer than the lower.

11. Using a hexagon wrench (face to face: 6 mm, short-type) (SST), install the timing chain slack guide.

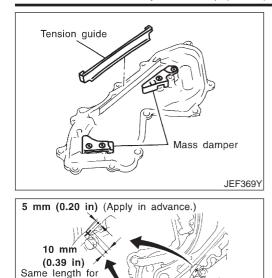


KV11106020

- 12. Install the chain tensioner.
- a. Push the plunger of the chain tensioner, then hold it with a tool such as a push pin, and install it.
- b. Using a hexagon wrench (face to face: 5 mm) (SST), tighten the mounting bolts.
- Installation is possible by a multi-purpose tool also.
- c. Pull out the tool such as a push pin which holds the plunger.
- Make sure that the alignment marks of the sprockets and timing chain are aligned.

Electronic Control Fuel Injection Pump (Cont'd)

YD



Liquid gasket application area

JEF370Y

RH and LH

Rear chain case

Oil pump

- 13. Install the front chain case.
- a. Install the tension guide to the back side of the front chain case.
- If the front chain case is tilted, the tension guide may fall off. Therefore, when installing the front chain case, hold it vertically.
- b. Apply Three Bond 1207C (KP510 00150) to both ends of the arch area of the oil pump (contact surface of rear chain case) as shown in the figure.
- c. Install the front chain case.
- Align the dowel pin of the oil pump case to the pin hole, then install it.
- Install bolts 6, 10, and 11 (shown in the figure) with the rubber washer to the front chain case.
- d. Tighten the mounting bolts in the numerical order shown in the figure.
- e. After all bolts are tightened, tighten the mounting bolts in the numerical order shown in the figure again.
- 14. Install the fuel injection pump rear bracket.
- Tighten all the bolts temporarily, then tighten them securely with the mounting face securely contacting the fuel injection pump and the pump bracket.
- JEF352Y
- 15. Connect the fuel injection pump harness connector.
- Insert the harness connector securely until the stopper locks.
- Push the connector half way first, then press the stopper until it locks, so that the connector is connected together.

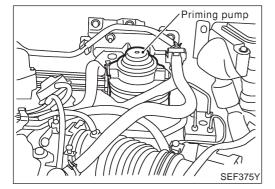
- 16. Connect the fuel hoses.
- When the hoses are disconnected at the fuel gallery side, insert until the hoses contact the valve, then install the clamp securely.
- 17. Install other parts in the reverse order of removal.

Fuel Filter

## **Fuel Filter**

DESCRIPTION

N.IEC0623 A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.



#### AIR BLEEDING

- N IEC0624 After the repair, bleed air from the piping by pumping the prim-1 ing pump up and down until it becomes heavy.
- To start the engine, rotate the starter for a maximum of 30 2. seconds. To start the engine more quickly, crank the engine while pumping the priming pump (requires two workers).
- 3. If the engine does not start after rotating the starter for a maximum of 30 seconds, stop it once, and pump the priming pump again until it becomes heavy.
- Rotate the starter again until the engine starts running. 4.
- After the engine starts, let it idle for at least 1 minute to stabi-5. lize the behavior.
- When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop the operation at that time.
- If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the injection pump. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, then bleed air again.
- Start engine and let it idle for at least one minute after performing air bleeding.

#### WATER DRAINING

- If the MI lights up (not flashes) during the engine operation, drain the water as follows. (If water in fuel filter sensor is equipped.)
- 1. Remove the fuel filter, filter bracket, protector assembly from the dash panel as follows.
- Remove the air cleaner case (upper), air duct assembly, and a. vacuum hose for brake booster (between the vacuum pump and vacuum pipe).

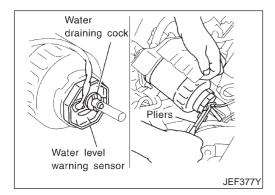
#### CAUTION:

#### After the duct is removed, cover the opening with gum tape, etc. to prevent foreign object from getting into the engine during the operation.

- b. Disconnect the water level warning sensor harness connector.
- Remove the mounting nuts on the dash panel, then remove the C. fuel filter, filter bracket, and protector assembly from the dash panel.
- It is not necessary to disconnect the fuel hose.
- 2. Using a tool such as a pliers, loosen the water draining cock

YD

at the bottom of the water level warning sensor located under the fuel filter.



- 3. Install the fuel filter, filter bracket, and protector assembly temporarily. Then, drain the water by pumping the priming pump with the filter standing straight.
- Extend the drain hose if necessary.
   Water amount when the MI lights up: 65 - 100 mℓ (2.3 - 3.5 Imp fl oz)

#### **CAUTION:**

When the water is drained, the fuel is also drained. Use a pan, etc. to avoid fuel adherence to the rubber parts such as the engine mount insulator.

4. Tighten the water draining cock, then install the fuel filter, filter bracket, protector assembly in the reverse order of removal.

#### **CAUTION:**

Do not over-tighten the water draining cock. This will damage the cock thread, resulting in water or fuel leak.

- 5. Bleed air of the fuel filter. Refer to EC-625.
- Start engine and let it idle for at least one minute after performing air bleeding.
- 6. Start the engine, then check that the MI goes off. (If water in fuel filter sensor is equipped.)

DTC and MI Detection Logic

## DTC and MI Detection Logic

When a malfunction is detected, the malfunction (DTC) is stored in the ECM memory. The MI will light up each time the ECM detects malfunction. For diagnostic items causing the MI to light up, refer to "TROUBLE DIAGNOSIS — INDEX", EC-596.

## **Diagnostic Trouble Code (DTC)**

### HOW TO READ DTC

The DTC can be read by the following methods.

#### **Without CONSULT-II**

ECM displays the DTC by a set of four digit numbers with MI illumination in the diagnostic test mode II (Selfdiagnostic results). Example: 0103, 0807, 1002, etc.

#### With CONSULT-II

CONSULT-II displays the DTC in "SELF-DIAG RESULTS" mode. Examples: P0115, P0571, P1202, etc. These DTCs are prescribed by ISO15031-6.

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

• Output of the trouble code means that the indicated circuit has a malfunction. However, in the Mode II it does not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.

CONSULT-II can identify them. Therefore, using CONSULT-II (if available) is recommended.

#### HOW TO ERASE DTC

#### 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.

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

ACTIVE TEST

ECM PART NUMBER

- 2. Touch "ENGINE".
- 3. Touch "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (The DTC in the ECM will be erased.)

#### How to erase DTC (With CONSULT-II)

SELECT SYSTEM

ENGINE

 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" again.

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

3. Touch "SELF-DIAG RESULTS".

#### How to Erase DTC ( Without CONSULT-II)

2. Turn CONSULT-II "ON" and touch

"ENGINE".

- 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.
- 2. Change the diagnostic test mode from Mode II to Mode I by using the data link connector. (See EC-629.)
- The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode.
  If the battery is disconnected, the emission-related diagnostic information will be lost after approx.
- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.

## ,

NJEC0627S02



SEF2467

SELF DIAG RESULTS

TIME

0

4. Touch "ERASE". (The DTC in the

ECM will be erased.)

DTC RESULTS

COOLANT TEMP SEN

[P0115]

NJEC0627 NJEC0627S01

ΥD

N.IEC0626

Malfunction Indicator (MI)

• Erasing the emission-related diagnostic information using CONSULT-II is easier and quicker than switching the diagnostic test mode using the data link connector.

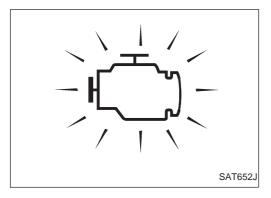
### **Malfunction Indicator (MI)**

DESCRIPTION

NJEC0628

NJEC0628S01

YD



The MI is located on the instrument panel.

- 1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MI does not light up, refer to EL-184, EL-189, "WARNING LAMPS" or see EC-831.
- 2. When the engine is started, the MI should go off.
- If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

If MI illuminates or blinks irregularly after starting engine, water may have accumulated in fuel filter. Drain water from fuel filter. Refer to "WATER DRAINING", EC-625.

#### **On Board Diagnostic System Function**

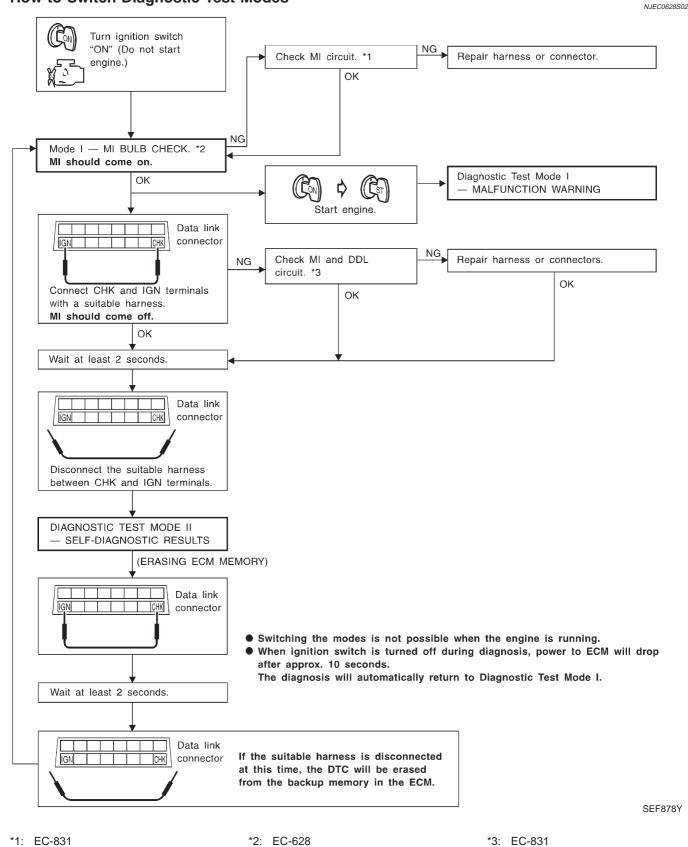
The on board diagnostic system has the following three functions.

KEY and ENG. Function **Diagnostic Test** Explanation of Function Mode Status Ignition switch in **BULB CHECK** Mode I This function checks the MI bulb for damage (blown, ON position open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-831.) Engine stopped MALFUNCTION This is a usual driving condition. When ECM detects a Engine running WARNING malfunction, the MI will light up to inform the driver that a malfunction has been detected. Mode II Ignition switch in SELF-DIAGNOSTIC RESULTS This function allows DTCs to be read. ON position Engine stopped

#### How to Switch Diagnostic Test Modes

Malfunction Indicator (MI) (Cont'd)

ΥD



EC-629

Malfunction Indicator (MI) (Cont'd)

#### Diagnostic Test Mode I — Bulb Check

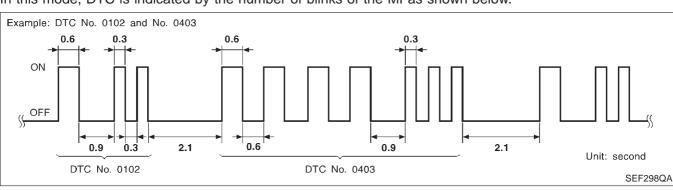
In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-184, EL-189, "WARNING LAMPS" or see EC-831.

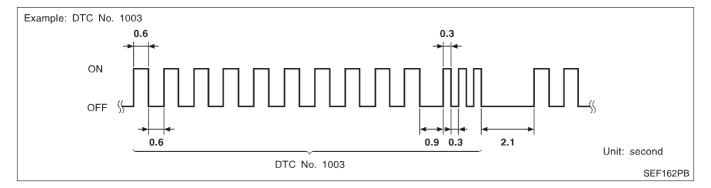
#### Diagnostic Test Mode I — Malfunction Warning

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

#### Diagnostic Test Mode II — Self-diagnostic Results

In this mode, DTC is indicated by the number of blinks of the MI as shown below.





Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the MI blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003".

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-596.)

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

The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "How to Switch Diagnostic Test Modes", EC-629.)

- If the battery terminal 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.

YD

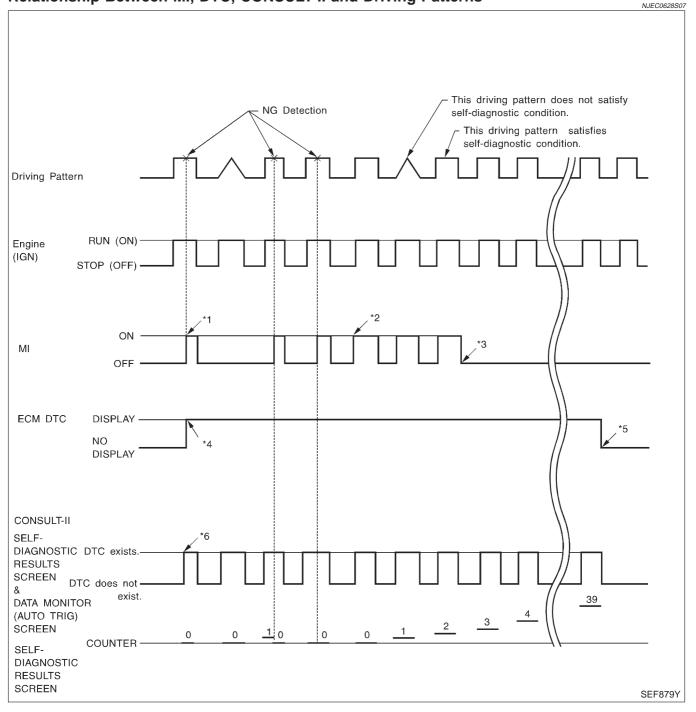
NJEC0628S04

N.IEC0628S05

Malfunction Indicator (MI) (Cont'd,

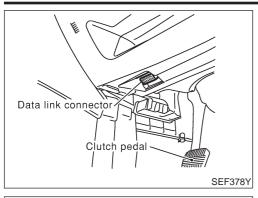
YD

#### Relationship Between MI, DTC, CONSULT-II and Driving Patterns



- \*1: When a malfunction is detected, MI will light up.
- \*2: When the same malfunction is detected in two consecutive driving patterns, MI will stay lit up.
- \*3: MI will go off after vehicle is driven three times without any malfunctions.
- \*4: When a malfunction is detected for the first time, the DTC will be stored in ECM.
- \*5: The DTC will not be displayed any longer after vehicle is driven 40 times without the same malfunction. (The DTC still remain in ECM.)
- \*6: Other screens except SELF-DIAG-NOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction. DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

CONSULT-II



SELECT SYSTEM

ENGINE

## CONSULT-II

#### **CONSULT-II INSPECTION PROCEDURE**

- 1. Turn ignition switch OFF.
- Connect CONSULT-II to data link connector. (Data link connector is located under the driver side dash panel.)
- 3. Turn ignition switch ON.
- 4. Touch "START".
- 5. Touch "ENGINE".
- 6. Perform each diagnostic test mode according to each service procedure.

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

-		
S	EF99	5X

SELECT DIAG MODE	
SELF-DIAG RESULTS	
DATA MONITOR	
ACTIVE TEST	
ECM PART NUMBER	
	SEF320

YD

NJEC0629

NJEC0629S01

CONSULT-II (Cont'd

#### **ENGINE CONTROL COMPONENT PARTS/CONTROL** SYSTEMS APPLICATION

			DIAG	DIAGNOSTIC TEST MODE			
		Item	SELF-DIAG RESULTS	DATA MONI- TOR	ACTIVE TEST		
		Engine coolant temperature sensor	X	Х			
(0		Vehicle speed sensor	X	Х			
ARTS		Accelerator position sensor	X	Х			
IT P/		Accelerator position switch	X	Х			
NEN	INPUT	Crankshaft position sensor (TDC)	X	Х			
MPC		Ignition switch (start signal)		Х			
CONTROL COMPONENT PARTS		Park/Neutral position (PNP) switch (where fitted)		Х			
		Battery voltage	X	Х			
LNO		Mass air flow sensor	X	Х			
		Stop lamp switch	X	Х			
ENGINE		Glow relay		Х	Х		
ш	OUTPUT	EGR volume control valve		Х	Х		
		Cooling fan relay	Х	Х	Х		

X: Applicable

#### SELF-DIAGNOSTIC MODE

NJEC0629S03 Regarding items detected in "SELF-DIAG RESULTS" mode, refer to "TROUBLE DIAGNOSIS - INDEX", EC-596.

#### DATA MONITOR MODE

Monitored item ECM Main [Unit] input Description Remarks signals signals CKPS·RPM (TDC) • The engine speed computed from the [rpm] crankshaft position sensor (TDC) signal  $\bigcirc$  $\bigcirc$ is displayed. CMPS-RPM-PUMP • The engine speed computed from the pulse signal sent from electronic control [rpm]  $\bigcirc$  $\bigcirc$ fuel injection pump is displayed. COOLAN TEMP/S • The engine coolant temperature (deter-• When the engine coolant temperature sensor is open or short-circuited, ECM [°C] or [°F] mined by the signal voltage of the engine coolant temperature sensor) is enters fail-safe mode. The engine cool-0  $\bigcirc$ displayed. ant temperature determined by the ECM is displayed. VHCL SPEED SE • The vehicle speed computed from the vehicle speed sensor signal is dis-[km/h] or [mph]  $\bigcirc$  $\bigcirc$ played. FUEL TEMP SEN • The fuel temperature (sent from elec-[°C] or [°F] Ο Ο tronic control fuel injection pump) is displayed. ACCEL POS SEN • The accelerator position sensor signal  $\bigcirc$  $\bigcirc$ [V] voltage is displayed. OFF ACCEL SW • Indicates [ON/OFF] condition from the  $\bigcirc$ 0 [ON/OFF] accelerator position switch signal.

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NJEC0629S04

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
SPILL/V [°CA]		0	• The control position of spill valve (sent from electronic control fuel injection pump) is displayed.	
BATTERY VOLT [V]	0	0	<ul> <li>The power supply voltage of ECM is displayed.</li> </ul>	
P/N POSI SW*1 [ON/OFF] (where fitted)	0	0	<ul> <li>Indicates [ON/OFF] condition from the park/neutral position switch signal.</li> </ul>	
START SIGNAL [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the starter signal.</li> </ul>	<ul> <li>After starting the engine, [OFF] is dis- played regardless of the starter signal.</li> </ul>
BRAKE SW [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the stop lamp switch signal.</li> </ul>	
BRAKE SW2 [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from the brake pedal position switch signal.</li> </ul>	
IGN SW [ON/OFF]	0	0	<ul> <li>Indicates [ON/OFF] condition from igni- tion switch signal.</li> </ul>	
MAS AIR/FL SE [V]	0	0	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
INT/A VOLUME [mg/]			• The intake air volume computed from the mass air flow sensor signal is displayed.	
F/CUT SIGNAL [ON/OFF]		0	<ul> <li>The [ON/OFF] condition from decelera- tion fuel cut signal (sent from electronic control fuel injection pump) is displayed. OFFFuel is cut off.</li> <li>ONFuel is not cut off.</li> </ul>	
GLOW RLY [ON/OFF]		0	<ul> <li>The glow relay control condition (deter- mined by ECM according to the input signal) is displayed.</li> </ul>	
COOLING FAN [LOW/HI/OFF]		0	<ul> <li>Indicates the control condition of the cooling fans (determined by ECM according to the input signal).</li> <li>LOW Operates at low speed. HI Operates at high speed. OFF Stopped.</li> </ul>	
BARO SEN [kPa]	0	0	• The barometric pressure (determined by the signal voltage from the baromet- ric pressure sensor built into the ECM) is displayed.	
EGR VOL CON/V [step]		0	<ul> <li>Indicates the EGR volume control value computed by the ECM according to the input signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>	

\*1: On models not equipped with park/neutral position (PNP) switch, "OFF" is always displayed regardless of gear shift position. **NOTE:** 

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

YD

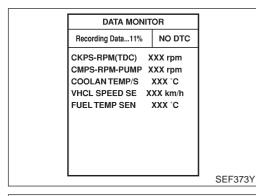
CONSULT-II (Cont'd

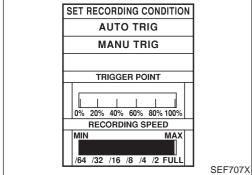
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#### ACTIVE TEST MODE

			NJEC0629505
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
COOLING FAN	<ul> <li>Ignition switch: ON</li> <li>Operate the cooling fan at "LOW", "HI" speed and turn "OFF" using CONSULT-II.</li> </ul>	Cooling fan moves at "LOW", "HI" speed and stops.	<ul> <li>Harness and connector</li> <li>Cooling fan motor</li> <li>Cooling fan relay</li> </ul>
EGR VOL CONT/V	<ul> <li>Ignition switch: ON</li> <li>Change EGR volume control valve opening step using CON-SULT-II.</li> </ul>	EGR volume control valve makes an operating sound.	<ul> <li>Harness and connector</li> <li>EGR volume control valve</li> </ul>
GLOW RLY	<ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the glow relay "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>	Glow relay makes the operating sound.	<ul><li>Harness and connector</li><li>Glow relay</li></ul>





## REAL TIME DIAGNOSIS IN DATA MONITOR MODE

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 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.

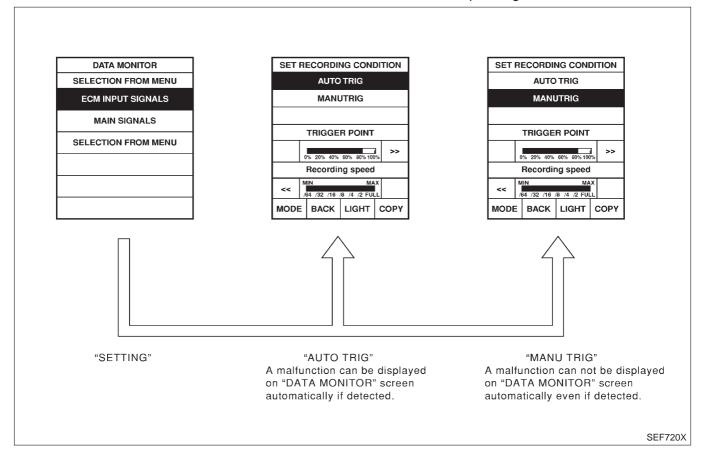
- 2) "MANU TRIG" (Manual trigger):
- DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

- 1) "AUTO TRIG"
- While trying to detect the DTC 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 will be displayed. Refer to GI-22, "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.



Sensors Injection pump ECM ECM SEF858S SEF858S

#### Introduction

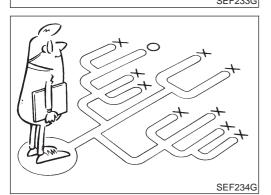
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly drives electronic control fuel injection pump. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems 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 problems. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the "Work Flow", EC-639.

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 problems, 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" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.



#### KEY POINTS

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

SEF907L

#### **DIAGNOSTIC WORKSHEET**

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

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

Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

## **TROUBLE DIAGNOSIS — INTRODUCTION**

Worksheet Sample

NJEC0630S0101

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Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
	☐ Startability	Impossible to start No combus     Partial combustion affected by th     Partial combustion when engine     Possible but hard to start Other	hrottle position e is cool
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [	High idle 🛛 Low idle ]
	Driveability	Stumble Surge Knock Others [	☐ Lack of power ]
	Engine stall	At the time of start While idling While accelerating While dece	elerating
Incident occu	rrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night [	In the daytime
Frequency		All the time Under certain con	ditions
Weather conc	ditions	□ Not affected	
	Weather	Fine     Raining     Snowing	Others [ ]
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌	Cold Humid °F
		Cold During warm-up	After warm-up
Engine conditions		Engine speed 0 2,000	 4,000 6,000 8,000 rpm
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	Jhway 🗌 Off road (up/down)
Driving conditions		Not affected At starting While idling While accelerating While decelerating While turni Vehicle speed	0
		0 10 20	30 40 50 60 MPH
Malfunction indicator		Turned on Not turned on	

MTBL0533

## **TROUBLE DIAGNOSIS** — INTRODUCTION

YD Work Flow

**Work Flow** 

NJEC0631

Cł	HECK IN			
CHECK INCIDENT CONDIT Listen to customer complain		s.)		STEP I
related service bulletins for	rite down) DTC. Pa information.	aste it on repair order sheet. Then clear. Als perform "WATER DRAINING" in "Fuel Filter".		*2 STEP II
Symptoms collected		No symptoms, except MI ligh or DTC exists at STEP II.	its up,	_
	ing in the condition	n the customer described.	]	*3. STEP III
Normal Code (at STEP II)	Malfunction Co	de (at STEP II)		
<b>INCIDENT CONFIRMATION</b> Verify the DTC by performin		irmation Procedure".	•	*3. STEP IV
Choose the appropriate act	ion.		7	*4 STEP V
Malfunction Code (at ST	TEP II or IV)	Normal Code (at both STEP II and IV)		
		BASIC INSPECTION		
		SYMPTOM BASIS (at STEP I or III)		_
	Perform inspecti	ons according to Symptom Matrix Chart.		
Ļ		T		
TROUBLE DIAGNOSIS FOR	R DTC PXXXX.		*5	STEP VI
		Y		
	REPAIR/R	EPLACE		
		T		
	OVERALL FUNCT	by performing BASIC INSPECTION and DTC ION CHECK). Then, erase the unnecessary		STEP VII
	0.1.5.0	OK		
	CHECI	K OUI		SEF880Y
<ol> <li>EC-625</li> <li>If time data of "SELF-DIAG RESULTS" is other than "0", form "TROUBLE DIAGNOSI"</li> </ol>		If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.	FOR *5 If ma	er to "TROUBLE DIAGNOSIS POWER SUPPLY", EC-666. alfunctioning part cannot be icted, perform "TROUBLE

-666. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMIT-`5 TENT INCIDENT", EC-665.

\*4 If the on board diagnostic system

cannot be performed, check main

power supply and ground circuit.

FOR INTERMITTENT INCIDENT",

EC-665.

#### DESCRIPTION FOR WORK FLOW

NJEC0631S01

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STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORKSHEET", EC-637.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the DTC, then erase the DTC. Refer to EC-627. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. Refer to EC-646.) 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" is 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-665. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the DTC by using CONSULT-II. During the 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-665. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The 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 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, EC-641. Then perform inspections according to the Symptom Matrix Chart. Refer to EC-646.
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 CON- SULT-II. Refer to EC-659 or EC-656. 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-24, "Circuit Inspection". Repair or replace the malfunction parts. If the malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.
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 P0000 or 0505) 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) DTC in ECM. (Refer to EC-627.)

#### Precaution:

Basic Inspection

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Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Air conditioner switch is OFF,
- Rear defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

<ol> <li>Check service records for any recent repairs that may indicate a related problem.</li> <li>Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-6, "Peri-</li> </ol>	
odic Maintenance".	
3. Open engine hood and check the following:	
<ul> <li>Harness connectors for improper connections</li> </ul>	
<ul> <li>Vacuum hoses for splits, kinks, or improper connections</li> </ul>	
<ul> <li>Wiring for improper connections, pinches, or cuts</li> </ul>	

4. Start engine and warm it up to the normal operating temperature.

► GO TO 2.

#### 2 PREPARATION FOR CHECKING IDLE SPEED

#### () With CONSULT-II

1

Connect CONSULT-II to the data link connector.

#### **Without CONSULT-II**

Install diesel tacho tester to the vehicle.

**INSPECTION START** 

► GO TO 3.

Basic Inspection (Cont'd)

3	CHECK IDLE SPEED				
1. Sele	<ul> <li>With CONSULT-II</li> <li>Select "CKPS·RPM (TDC)" in "DATA MONITOR" mode with CONSULT-II.</li> <li>Read idle speed.</li> </ul>				
		MONITOR NO DTC CKPS-RPM (TDC) XXX rpm			
		SEF817Y			
	hout CONSULT-II idle speed.				
	± <b>25 rpm</b>				
		OK or NG			
OK		INSPECTION END			
NG		GO TO 4.			
4	CHECK FOR INTAKE	NR LEAK			
Listen f	for an intake air leak after	the mass air flow sensor.			
		OK or NG			
OK		GO TO 5.			
NG	•	Repair or replace.			
5	BLEED AIR FROM FUE	EL SYSTEM			
	<ol> <li>Stop engine.</li> <li>Use priming pump to bleed air from fuel system. Refer to "AIR BLEEDING", EC-625.</li> </ol>				

GO TO 6.

YD

6 CHECK IDLE SPEED	AGAIN
<ul> <li>With CONSULT-II</li> <li>Start engine and let it idle.</li> <li>Select "CKPS·RPM (TDC)" in</li> <li>Read idle speed.</li> </ul>	"DATA MONITOR" mode with CONSULT-II.
5. Read fulle speed.	
	DATA MONITOR MODITO
	CKPS-RPM (TDC) XXX rpm
	SEF817Y
<ul> <li>Without CONSULT-II</li> <li>Start engine and let it idle.</li> <li>Check idle speed. 725±25 rpm</li> </ul>	
	OK or NG
ОК	INSPECTION END
NG	GO TO 7.
7 DRIN WATER FROM F	
	r to "WATER DRAINING", EC-625.
	GO TO 8.
8 CHECK IDLE SPEED	AGAIN
(P) With CONSULT-II	
1. Start engine and let it idle.	"DATA MONITOR" mode with CONSULT-II.
	DATA MONITOR
	MONITOR NO DTC
	CKPS-RPM (TDC) XXX rpm
	SEF817Y
<ul> <li>Without CONSULT-II</li> <li>Start engine and let it idle.</li> <li>Check idle speed.</li> </ul>	
725±25 rpm	
	OK or NG
OK ►	
NG	GO TO 9.

Basic Inspection (Cont'd)

9	CHECK AIR CLEAN	CHECK AIR CLEANER FILTER									
Check air cleaner filter for clogging or braks.											
OK or NG											
OK			GO TO 10.								
NG			Replace air cleaner filter.								

#### 10 CHECK FUEL INJECTION NOZZLE

Check fuel injection nozzle opening pressure. Refer to "Injection Pressure Test", EC-617.

OK or NG									
ОК	GO TO 11.								
NG	Replace fuel injection nozzle assembly.								

11	CHECK IDLE SPEED A	GAIN
1. Sta 2. Sel	th CONSULT-II rt engine and let it idle. ect "CKPS·RPM (TDC)" in ad idle speed.	"DATA MONITOR" mode with CONSULT-II.
		DATA MONITOR
		MONITOR NO DTC
		CKPS-RPM (TDC) XXX rpm SEF817Y
1. Sta 2. Che	thout CONSULT-II rt engine and let it idle. eck idle speed. i±25 rpm	OK or NG
OK		
NG	•	GO TO 12.
12	CHECK COMPRESSIO	N PRESSURE
Oharda		

Check compression pressure. Refer to EM-83, "MEASUREMENT OF COMPRESSION PRESSURE".										
OK or NG										
ОК		GO TO 13.								
NG		Follow the instruction of "MEASUREMENT OF COMPRESSION PRESSURE".								

YD

Basic Inspection (Cont'd)

13	CHECK IDLE SPEED A	GAIN
1. Sta 2. Sel	th CONSULT-II Int engine and let it idle. ect "CKPS·RPM (TDC)" in ad idle speed.	"DATA MONITOR" mode with CONSULT-II.
		DATA MONITOR
		MONITOR NO DTC
		CKPS-RPM (TDC) XXX rpm
		SEF817)
1. Sta 2. Ch	thout CONSULT-II Irt engine and let it idle. eck idle speed. 5±25 rpm	
		OK or NG
ОК	•	INSPECTION END
NG		Replace electronic control fuel injection pump.

## **TROUBLE DIAGNOSIS — GENERAL DESCRIPTION**

Symptom Matrix Chart

## Symptom Matrix Chart

				Зу	mp	tom	wa	trix	Cha	art					NJEC1257				
						SI	(MPTC	MC											
			ENGINE STALL																
SYSTEM — Basic engine control system	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	Reference page	Feature of symptom, Check point				
Warranty symptom code		A	A	1		AB		AB		AB		AC	AD	A	E	A	\F	Refe	Fea
Electronic control fuel injec- tion pump mainframe	4	4	4	4	4	4	4	4	4	5	5	4	4	_	*1				
Injection nozzle	3	3	3	3	3	3	3	3	3	4	4	3	3	EC-614	*2				
Glow system	1	1	1	1					1					EC-806					
Engine body	3	3	3	3	3	3	3		3	4	4		3	EM section	*3				
EGR system										3	3			EC-815					
Air cleaner and ducts										3	3			MA section	*4				

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause.

\*2: Depends on open-valve pressure and spray pattern.

\*3: Caused mainly by insufficient compression pressure.

\*4: Symptom varies depending on off-position of air duct, etc.

## **TROUBLE DIAGNOSIS — GENERAL DESCRIPTION**

Symptom Matrix Chart (Cont'd)

'n

SYSTEM — Basic engine control system	NG		to idle	ENGINE COOLANT TEMPERATURE	CONSUMPTION	CONSUMPTION	ABNORMAL SMOKE COLOR		(UNDER CHARGE)	inates.	CONSULT-II?		ck point
	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL COI	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UN	Malfunction indicator illuminates.	be detected by	Reference page	Feature of symptom, Check point
Warranty symptom code	AG	AH	AJ	AK	AL	AM	A	AP HA		Ma	Can	Re	Ц Ц е́
Electronic control fuel injection pump mainframe	4	4	3		4		5	4		3	3	_	*1
Injection nozzle	3	3			3		4 3					EC-614	*2
Glow system			EC-806										
Engine body	3	3		3	3	3		3				EM section	*3
EGR system							3					EC-815	
Air cleaner and ducts							3				3	MA section	*4

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause.

\*2: Depends on open-valve pressure and spray pattern.

\*3: Caused mainly by insufficient compression pressure.

\*4: Symptom varies depending on off-position of air duct, etc.

## **TROUBLE DIAGNOSIS — GENERAL DESCRIPTION**

Symptom Matrix Chart (Cont'd)

							SY	MPT	ОМ		-						
				HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYST	SYSTEM — ENGINE CONTROL system		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	HESITATION/SURGING/FLAT SPOT KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	TOM IDLE	Reference page	Feature of symptom, Check point
Warranty symptom code			AA				AB		AC	AD	) AE		A	۱ ۲	Refe	Feat	
	Electronic control fuel injection			1		1	1	1	1	1	1	1	1	1	1		
ROL	pump circuit	*c, *d															
ONT	Mass air flow sensor circuit	*a, *c								1		1	1			EC-673	
С С		*b															
ENGINE CONTROL	Engine coolant temperature sensor circuit	*a, *b			1		1		1						1	EC-680	*1
	Vehicle speed sensor circuit	*a, *b											1			EC-701	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short \*c: Ground short

\*d: Noise

\*1: Compensation according to engine coolant temperature does not function.

YD

Symptom Matrix Chart (Cont'd)

ΥD

							SY	MPT	OM						
SYST	SYSTEM — ENGINE CONTROL system		SN		LO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	CONSUMPTION	CONSUMPTION		ABNURWAL SWURE CULUR	DER CHARGE)	nates.	CONSULT-II?		k point
			ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH EN	EXCESSIVE FUEL CO	EXCESSIVE OIL CON	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UNDER	Malfunction indicator illuminates.	Can be detected by CONS	Reference page	Feature of symptom, Check point
Warra	anty symptom code		AG	AH	AJ	AK	AL	AM	A	Ρ	HA	Ma	Ca	Rei	Le.
	Electronic control fuel injection pump	*a, *b	1				1			1		1	1		
ROL	circuit	*c, *d							1						
CONTROL	Mass air flow sensor circuit	*a, *c											1	EC-673	
		*b							1					20-073	
ENGINE	Engine coolant temperature sensor cir- cuit	*a, *b	1	1		1						1	1	EC-680	*1
	Vehicle speed sensor circuit	*a, *b											1	EC-701	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short

\*c: Ground short

\*d: Noise

\*1: Compensation according to engine coolant temperature does not function.

Symptom Matrix Chart (Cont'd)

								SY	MPT	ОМ							
	SYSTEM — ENGINE CONTROL system			HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYS	TEM — ENGINE CONTROL system	Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	Reference page	Feature of symptom, Check point
Warr	Narranty symptom code			A	A			AB		AC	AD	A	E	A	F	Ref	Геа
OL	Fuel cut system line	*a, *c														EC-723	
ENGINE CONTROL		*b		1			1	1	1							20-723	*2
СС	Accelerator position sensor circuit	*a, *b								1		1	1			EC-685	
IGINE	Crankshaft position sensor (TDC)	*a, *b			1	1	1	1	1	1	1	1	1			EC-695	
	circuit	*d														20 000	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

- \*a: Open
- \*b: Short
- \*c: Ground short

\*d: Noise

\*2: Engine runs on after turning ignition switch OFF.

Symptom Matrix Chart (Cont'd)

YD

							SY	MPT	ОМ						
SYST	SYSTEM — ENGINE CONTROL system		NG		to Idle	NGINE COOLANT TEMPERATURE	CONSUMPTION	CONSUMPTION			NDER CHARGE)	linates.	CONSULT-II?		ck point
			ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE	EXCESSIVE FUEL C	EXCESSIVE OIL COI	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UNDER	Malfunction indicator illuminates.	Can be detected by CON	Reference page	Feature of symptom, Check point
Warra	anty symptom code		AG	AH	AJ	AK	AL	AM	A	P	HA	Mal	Car	Ref	Fea
OL	Fuel cut system line	*a, *c										1	1	EC-723	
CONTROL		*b												20-723	*2
	Accelerator position sensor circuit	*a, *b										1	1	EC-685	
ENGINE	Crankshaft position sensor (TDC) circuit	*a, *b	1	1								1	1	EC-695	
ЦN		*d	'	'										20 000	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short

\*c: Ground short

\*d: Noise

\*2: Engine runs on after turning ignition switch OFF.

Symptom Matrix Chart (Cont'd)

								SY	MPT	OM							
				HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYST	TEM — ENGINE CONTROL system	Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	TOM IDLE	Reference page	Feature of symptom, Check point
Warra	anty symptom code			A	A			AB		AC	AD	A	E	A	F	Refe	Feat
	Start signal circuit	*a, *b	1	1	1	1										EC-823	*3
SOL	Accelerator position switch (Idle)	*a, *c			1	1	1		1						1	EC-685	
NTR	circuit	*b								1		1	1				*4
ENGINE CONTROL	Ignition switch circuit	*а		1			1	1	1							EC-666	
IGIN		*b															*5
N U	Power supply for ECM circuit	*а		1			1	1	1							EC-666	
		*b							<u> </u>							20000	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short

\*c: Ground short

\*d: Noise

\*3: Start control does not function.

\*4: Accelerator position sensor NG signal is output.

\*5: Engine does not stop.

Symptom Matrix Chart (Cont'd)

ΥD

							SY	MPT	ОМ						
SYST	SYSTEM — ENGINE CONTROL system		NG		TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	CONSUMPTION	OIL CONSUMPTION		ABINURIMAL SIMURE CULUR	DER CHARGE)	inates.	CONSULT-II?		sk point
			ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL CON	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UNDER	Malfunction indicator illuminates.	be detected by	Reference page	Feature of symptom, Check point
Warra	anty symptom code		AG	AH	AJ	AK	AL	AM	A	P	HA	Ma	Can	Re	Ŭ L
	Start signal circuit	*a, *b												EC-823	*3
Ы		*a, *c													
NTR	Accelerator position switch (Idle) circuit	*b										1	1	EC-685	*4
CO	D D ⊔ Ignition switch circuit													F0.000	
ENGINE CONTROL		*b												EC-666	*5
EN	Power supply for ECM circuit	*a										4	1	FO 000	
		*b										1	1	EC-666	

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short

\*c: Ground short

\*d: Noise

\*3: Start control does not function.

\*4: Accelerator position sensor NG signal is output.

\*5: Engine does not stop.

Symptom Matrix Chart (Cont'd)

								SY	MPT	ОМ		-					
				HARD/NO	EXCP. HA)			ENGINE STALL									
SYS	TEM — ENGINE CONTROL system	Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	Reference page	Feature of symptom, Check point
Warra	anty symptom code			A	A		AB		AC	AD	A	E	A	F	Re	Le	
	EGR volume control valve circuit	*a, *b														EC-815	
		*c								1		1	1			20010	*6
	Glow relay circuit	*а	1	1	1	1										EC-806	*7
Ч		*b														LC-000	*8
ITRO	ECM relay (Self-shutoff) circuit	*а		1			1	1	1							EC-794	
CON		*b														20-794	*9
ENGINE CONTROL	ECM, Connector circuit	*a, *b	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-792, 714	
Ξ	Air conditioner relay circuit	*а														EC-830	*10
		*b											1			EC-030	*11
	Air conditioner switch circuit	*a, *c														EC-830	*11
		*b														EC-830	*12

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

\*a: Open

\*b: Short

- \*c: Ground short
- \*d: Noise
- \*6: Does not stop operating.
- \*7: Glow lamp does not turn on.
- \*8: Glow lamp does not turn off.

\*9: Ground short makes engine unable to stop.

\*10: Air conditioner does not operate.

\*11: Air conditioner does not stop operating.

\*12: Air conditioner does not work.

Symptom Matrix Chart (Cont'd)

ΥD

							SY	MPT	ОМ						
SYST	FEM — ENGINE CONTROL system	Malfunction	DN		to Idle	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	CONSUMPTION	CONSUMPTION		- ABNURIMAL SIMURE CULUR	NDER CHARGE)	inates.	CONSULT-II?		ck point
			ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL CO	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UNDER	Malfunction indicator illuminates.	be detected by	Reference page	Feature of symptom, Check point
Warra	anty symptom code	_	AG	AH	AJ	AK	AL	AM	A	P	HA	Ma	Can	Ret	Цей
	EGR volume control valve circuit	*a, *b												EC-815	
		*c							1					20010	*6
	Glow relay circuit	*а								1				EC-806	*7
Ъ		*b												20 000	*8
ITRO	ECM relay (Self-shutoff) circuit	*a												EC-794	
CO		*b												20704	*9
ENGINE CONTROL	ECM, Connector circuit	*a, *b	2	2	2	2	2	2	2	2	2	2	2	EC-792, 714	
Ш	Air conditioner relay circuit	*а												EC-830	*10
		*b												EC-830	*11
	Air conditioner switch circuit	*a, *c												EC-830	*11
		*b												LC-030	*12

1 - 5: The numbers refer to the order of inspection.

- \*a: Open
- \*b: Short
- \*c: Ground short
- \*d: Noise
- \*6: Does not stop operating.

\*7: Glow lamp does not turn on.

\*8: Glow lamp does not turn off.

\*9: Ground short makes engine unable to stop.

\*10: Air conditioner does not operate.

\*11: Air conditioner does not stop operating.

\*12: Air conditioner does not work.

CONSULT-II Reference Value in Data Monitor Mode

### CONSULT-II Reference Value in Data Monitor Mode

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.

MONITOR ITEM	CON	IDITION	SPECIFICATION				
CKPS·RPM (TDC) CMPS·RPM- PUMP	<ul> <li>Tachometer: Connect</li> <li>Run engine and compare tacho value.</li> </ul>	meter indication with the CONSULT-II	Almost the same speed as the CONSULT-II value.				
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)				
VHCL SPEED SE	Turn drive wheels and compare CONSULT-II value	speedometer indication with the	Almost the same speed as the CONSULT-II value				
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)				
ACCEL POS SEN	Ignition switch: ON	Accelerator pedal: fully released	0.30 - 0.50V				
ACCEL POS SEN	(Engine stopped)	Accelerator pedal: fully depressed	3.0 - 4.3V				
OFF ACCEL SW	Ignition switch: ON	Accelerator pedal: fully released	ON				
OFF ACCEL SW	(Engine stopped)	Accelerator pedal: slightly open	OFF				
SPILL/V	• Engine: After warming up, idle t	ne: After warming up, idle the engine.					
BATTERY VOLT	Ignition switch: ON (Engine stop	nition switch: ON (Engine stopped)					
P/N POSI SW*1	<ul> <li>Ignition switch: ON</li> </ul>	Shift lever: Neutral position	ON				
(where fitted)		Except above	OFF				
START SIGNAL	• Ignition switch: $ON \rightarrow START -$	→ ON	$OFF\toON\toOFF$				
IGN SW	• Ignition switch: $ON \rightarrow OFF$		$ON\toOFF$				
BRAKE SW	<ul> <li>Ignition switch: ON</li> </ul>	Brake pedal: depressed	ON				
BRARE SW		Brake pedal: released	OFF				
PDAKE SM/2	Ignition switch: ON	Brake pedal: depressed	ON				
BRAKE SW2	<ul> <li>Ignition switch: ON</li> </ul>	Brake pedal: released	OFF				
MAS AIR/FL SE	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: OFF</li> <li>Shift lever: Neutral position</li> <li>No-load</li> </ul>	Idle	1.5 - 2.0V				
INT/A VOLUME	• Engine: After warming up, idle t	ngine: After warming up, idle the engine.					
F/CUT SIGNAL	Engine: After warming up	ngine: After warming up Idle					
GLOW RLY	• Refer to EC-806.						
	• When cooling fan is stopped.		OFF				
COOLING FAN	When cooling fans operate at lo	LOW					
	• When cooling fans operate at h	HIGH					

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

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MONITOR ITEM	CONE	DITION	SPECIFICATION
BARO SEN	• Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)
	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: "OFF"</li> </ul>	After one minute at idle	More than 10 steps
EGR VOL CON/V	<ul> <li>Shift lever: Neutral position</li> <li>No-load</li> </ul>	Revving engine from idle to 3,200 rpm	0 steps

\*1: On models not equipped with park/neutral position (PNP) switch, "OFF" is always displayed regardless of gear shift position.

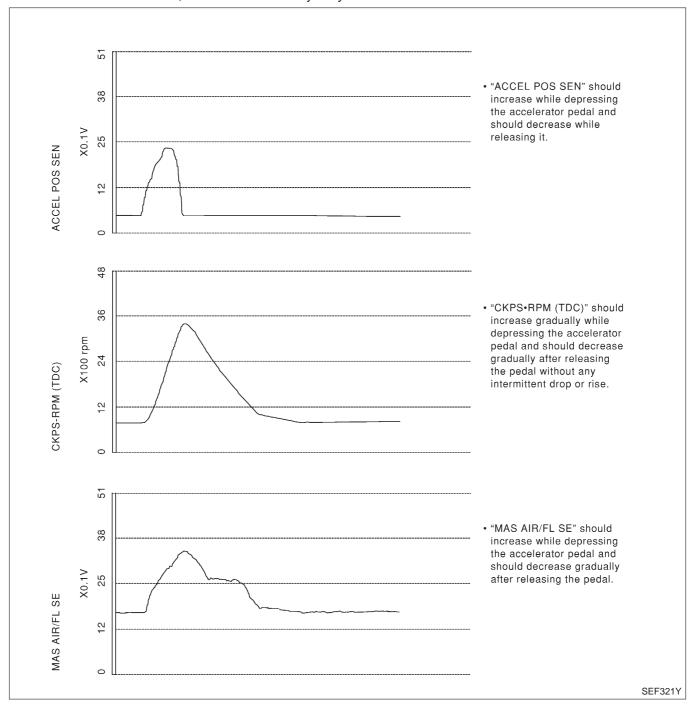
Major Sensor Reference Graph in Data Monitor Mode

### Major Sensor Reference Graph in Data Monitor Mode

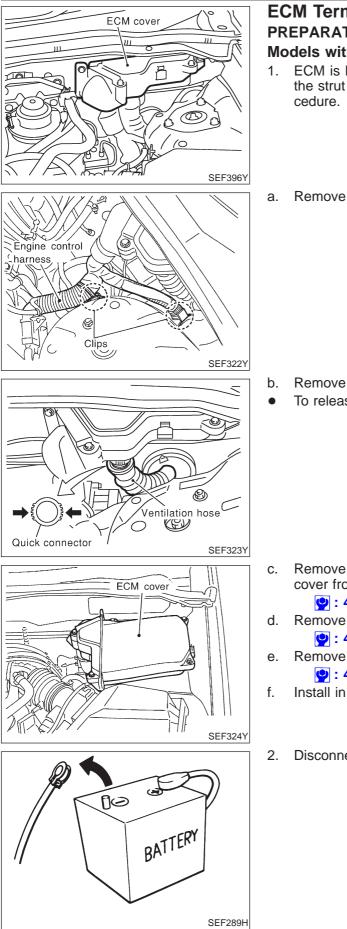
The following are the major sensor reference graphs in "DATA MONITOR" mode.

#### ACCEL POS SEN, "CKPS-RPM (TDC)", "MAS AIR/FL SE"

Below is the data for "ACCEL POS SEN", "CKPS·RPM (TDC)" and "MAS AIR/FL SE" when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature. Each value is for reference, the exact value may vary.



ECM Terminals and Reference Value



ECM Terminals and Reference Value PREPARATION Models with ECM in Engine Compartment

### NJEC0636

YD

NJEC0636S01

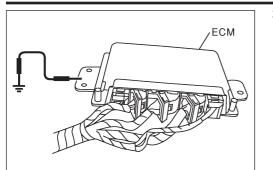
- ECM is located on the left side under the cowl panel (behind the strut tower). For the inspection, perform the following procedure.
- . Remove the engine control harness fixing clips.

- b. Remove the ventilation hose.
- To release the lock, push the quick connector.

- c. Remove the ECM cover mounting bolts, then remove the ECM cover from the vehicle.
  - E : 4.0 7.8 N·m (0.4 0.8 kg-m, 35 69 in-lb)
    Remove the ECM cover belts, then once the ECM cover
- d. Remove the ECM cover bolts, then open the ECM cover.

   2 : 4.0 6.8 N·m (0.4 0.7 kg-m, 35 60 in-lb)
  - Remove the ECM bolts. 2 : 4.2 - 6.7 N·m (0.42 - 0.69 kg-m, 37 - 59 in-lb)
  - Install in the reverse order of removal.
- 2. Disconnect negative battery terminal.

ECM Terminals and Reference Value (Cont'd)



f)0

BATTERY

SEF883Y

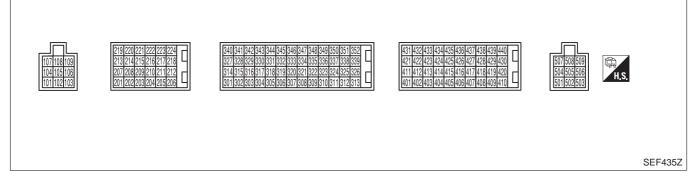
SEF289H

- Connect a break out box (SST) between the ECM and ECM 3. harness connectors.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.
- Be sure ECM unit is properly grounded before checking.

#### Models with ECM in cabin ECM is locating beside of blower unit.

- Remove the ECM bracket fixing.
- 1. 2. Remove ECM harness protector.
- 3. Disconnect negative battery terminal.
- Connect a break out box (SST) between the ECM and ECM 4. harness connectors.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.
- Be sure ECM unit is properly grounded before checking.

## 

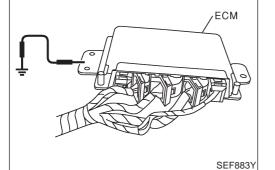


#### ECM INSPECTION TABLE

NJEC0636S03 Remarks: 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.



YD

NJEC0636S0102

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
104 105 106	B B B	ECM ground	[Engine is running] • Idle speed	Approximately 0V
107 108 109	R R R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
			<ul> <li>[Engine is running]</li> <li>Air conditioner switch is "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
204	L	Air conditioner relay	<ul> <li>[Engine is running]</li> <li>Both air conditioner switch and blower fan switch are "ON" (Compressor is operating)</li> </ul>	Approximately 0.1V
214	W/B	Glow relay	Refer to "Glow Control System", EC-806.	
218	в	Sensors' ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
210		Cooling for relay (Low)	<ul><li>[Engine is running]</li><li>Cooling fan is not operating</li></ul>	BATTERY VOLTAGE (11 - 14V)
219	LG/R	Cooling fan relay (Low)	<ul><li>[Engine is running]</li><li>Cooling fan is operating</li></ul>	Approximately 0.1V
221	LG/B	Cooling fan relay (High)	<ul> <li>[Engine is running]</li> <li>Cooling fan is not operating</li> <li>Cooling fan is operating at low speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			<ul><li>[Engine is running]</li><li>Cooling fan is operating at high speed</li></ul>	Approximately 0.1V
223	W	Mass air flow sensor power supply	[Ignition switch "ON"]	Approximately 5V
224	R	Mass air flow sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	1.5 - 2.0V
313	L/W	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Р	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
325	G	ECM relay (Self-shutoff)	<ul> <li>[Ignition switch "ON"]</li> <li>[Ignition switch "OFF"]</li> <li>For a few seconds after turning ignition switch "OFF"</li> </ul>	Approximately 0.25V
			<ul> <li>[Ignition switch "OFF"]</li> <li>A few seconds passed after turning ignition switch "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
331	OR	Crankshaft position sen- sor (TDC) ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
334	B/R	Engine coolant tempera- ture sensor ground	[Ignition switch "ON"]	Approximately 0V
337 338 350 351	W/L PU/W GY OR/B	EGR volume control valve	[Engine is running] • Warm-up condition • Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
		Crankshaft position sen-	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
344	W	sor (TDC)	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,000 rpm</li> </ul>	Approximately 0V
347	L/B	Engine coolant tempera- ture sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
			<ul><li>[Engine is running]</li><li>Air conditioner switch is "OFF"</li></ul>	BATTERY VOLTAGE (11 - 14V)
403	R/L	Air conditioner switch	<ul> <li>[Engine is running]</li> <li>Both air conditioner switch and blower fan switch are "ON" (Compressor is operating)</li> </ul>	Approximately 0.1V
405	D/C	Oton Jamp ou itst	[Ignition switch "ON"] • Brake pedal fully released	Approximately 0V
405	R/G	Stop lamp switch	[Ignition switch "ON"] • Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
416	Y/B	Brake pedal position	[Ignition switch "ON"] • Brake pedal fully released	BATTERY VOLTAGE (11 - 14V)
410		switch [lgr	[Ignition switch "ON"] • Brake pedal depressed	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			<ul> <li>[Engine is running]</li> <li>Lift up the vehicle</li> <li>In 1st gear position</li> <li>Vehicle speed is 10 km/h (6 MPH)</li> </ul>	0 - Approximately 8V
417	PU/R	Vehicle speed sensor	<ul> <li>[Engine is running]</li> <li>Lift up the vehicle</li> <li>In 2nd gear position</li> <li>Vehicle speed is 30 km/h (19 MPH)</li> </ul>	Approximately 6V
44.0	0/00	Park/Neutral position	[Ignition switch "ON"] ● Gear position is "Neutral"	Approximately 0V
418	G/OR	switch (where fitted)	<ul> <li>[Ignition switch "ON"]</li> <li>Except the above gear position</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	Approximately 0V
422	B/Y	Start signal	[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)
425	P/B	Accelerator position sen- sor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
426	BR/R	Accelerator position switch (Idle) ground	[Ignition switch "ON"]	Approximately 0V
433	G/Y	Accelerator position sen- sor power supply	[Ignition switch "ON"]	Approximately 5V
40.4	W Accelerator position sen- sor Sor [Ignition switch "ON"] • Accelerator pedal fully released [Ignition switch "ON"]	<ul> <li>[Ignition switch "ON"]</li> <li>Accelerator pedal fully released</li> </ul>	0.30 - 0.50V	
434			[Ignition switch "ON"] • Accelerator pedal fully depressed	3.0 - 4.3V
405		Accelerator position	<ul> <li>[Ignition switch "ON"]</li> <li>Accelerator pedal fully released</li> </ul>	Approximately 0V
435	W/G	switch (Idle)	[Ignition switch "ON"] • Accelerator pedal depressed	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
		Tachometer	[Engine is running] • Warm-up condition • Idle speed	Approximately 4.8V
439	L/OR		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,000 rpm</li> </ul>	Approximately 4.6V (V) 10 5 0 20 ms SEF326Y
505	OR/L	Malfunction indicator	[Ignition switch "ON"] [Engine is running]	Approximately 1V BATTERY VOLTAGE
			Idle speed	(11 - 14V) 0V
507	W/R	Ignition switch	[Ignition switch "OFF"] [Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
	OR	OR Glow lamp	[Ignition switch "ON"] • Glow lamp is "ON"	Approximately 1V
508			[Ignition switch "ON"] • Glow lamp is "OFF"	BATTERY VOLTAGE (11 - 14V)

NJEC0637S01

#### Description

Intermittent incidents (I/I) may occur. In many cases, the problem 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 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 problem area.

#### COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0".
III	The symptom described by the customer does not recur.
IV	DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the problem area.

### **Diagnostic Procedure**

1 INSPECTION START Frase DTCs. Refer to "HOW TO ERASE DTC". EC-627.			
Frase DTCs. Refer to "HOW TO FRASE DTC" EC-627	INSPECTION START		
	Erase DTCs. Refer to "HOW TO ERASE DTC", EC-627.		
► GO TO 2.			

CHECK GROUND TERMINALS				
Check ground terminals for corroding or loose connection. Refer to GI-22, "GROUND INSPECTION".				
OK or NG				
		GO TO 3.		
NG   Repair or replace.				
3 SEARCH FOR ELECTRICAL INCIDENT				
	ground terminals fo to GI-22, "GROUND	k ground terminals for corro to GI-22, "GROUND INSP ►		

Perform GI-22, "Incident Simulation Tests".			
	OK or NG		
ОК		INSPECTION END	
NG		Repair or replace.	

Main Power Supply and Ground Circuit

### Main Power Supply and Ground Circuit

#### ECM TERMINALS AND REFERENCE VALUE

Remarks: 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
104 105 106	B B B	ECM ground	[Engine is running] • Idle speed	Approximately 0V
107 108 109	R R R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
325	G	ECM relay (Self-shutoff)	<ul> <li>[Ignition switch "ON"]</li> <li>[Ignition switch "OFF"]</li> <li>For a few seconds after turning ignition switch "OFF"</li> </ul>	Approximatley 0.25V
			<ul> <li>[Ignition switch "OFF"]</li> <li>A few seconds passed after turning ignition switch "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
	W/R	Ignition switch	[Ignition switch "OFF"]	0V
507			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

WIRING DIAGRAM

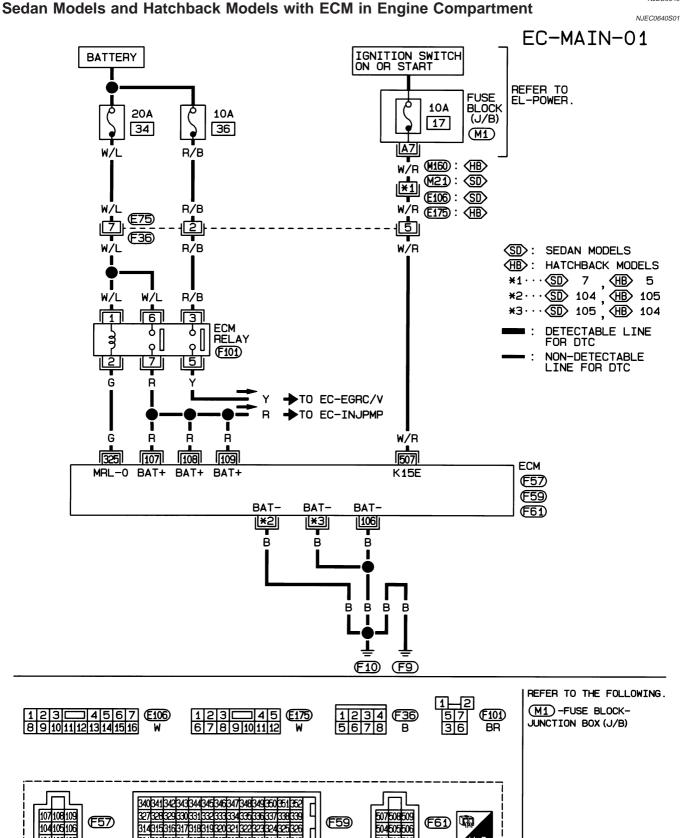
107 108 109

104 105 106

101 102 103

(F57)

Main Power Supply and Ground Circuit (Cont'd)



HEC881

(F59)

Γ

301302303304305306307308309310311312313

507508509

504505506

501502503

**G** 

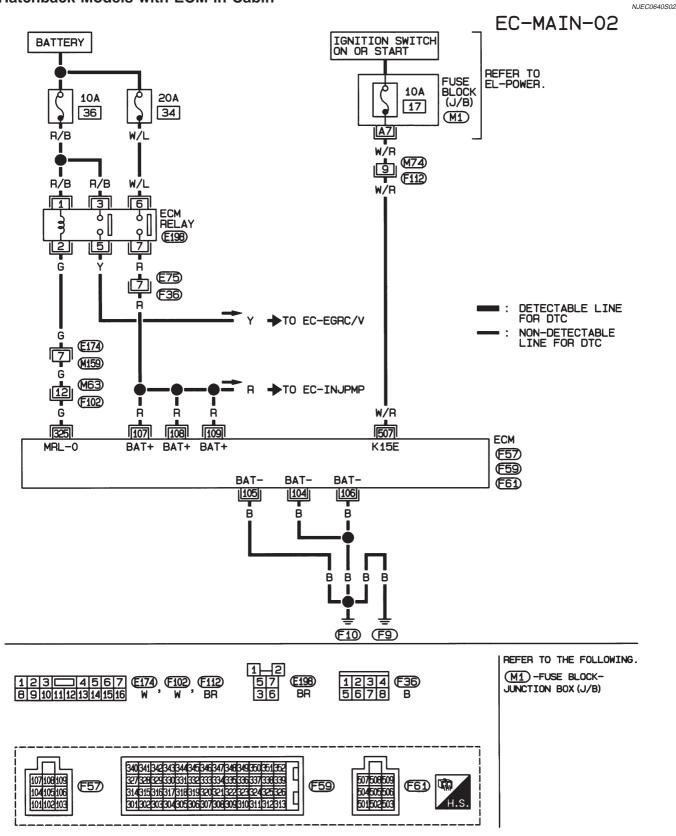
H.S

**F61** 

NJEC0640

Main Power Supply and Ground Circuit (Cont'd)

#### Hatchback Models with ECM in Cabin



HEC987

Main Power Supply and Ground Circuit (Cont'd)

YD

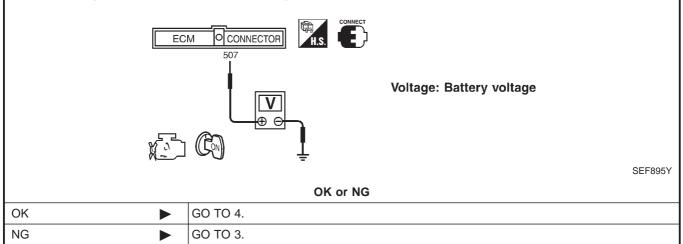
#### DIAGNOSTIC PROCEDURE

			NJEC0641	
1	INSPECTION START	INSPECTION START		
	Start engine. Is engine running? Yes or No			
Yes	•	GO TO 13.		
No	•	GO TO 2.		

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

1. Turn ignition switch "ON".

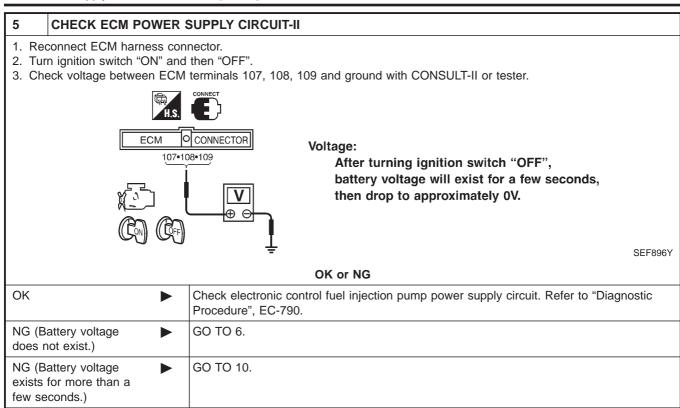
2. Check voltage between ECM terminal 507 and ground with CONSULT-II or tester.



3	DETECT MALFUNCTIO	NING PART
<ul> <li>Harring</li> <li>Harring</li> <li>Harring</li> <li>Harring</li> <li>Fusion</li> <li>10A</li> </ul>	nt) ness connectors E75, F36 ness connectors M74, F11 e block (J/B) connector M <sup>2</sup>	
	•	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT				
2. Dis 3. Che	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminals 104, 105, 106 and engine ground. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
	OK or NG				
ОК		GO TO 5.			
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.			

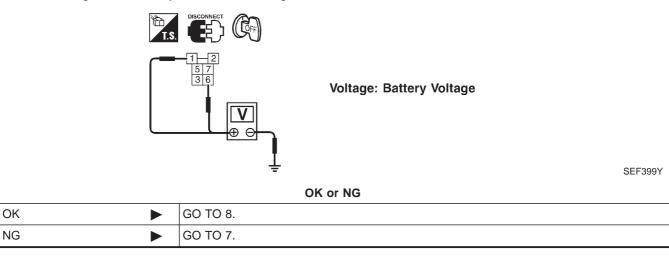
Main Power Supply and Ground Circuit (Cont'd)



#### 6 CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay. (For ECM relay location, refer to "Engine Control Component Parts Location".)

2. Check voltage between relay terminals 1, 6 and ground with CONSULT-II or tester.



#### 7 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E75, F36 (Sedan models and hatchback models with ECM in engine compartment)

20A 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.

Main Power Supply and Ground Circuit (Cont'd)

8	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT			
<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 325 and ECM relay terminal 2. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
		OK or NG		
OK		GO TO 10.		
NG	NG 🕨 GO TO 9.			
		÷		
9	DETECT MALFUNCTIC	NING PART		
● Har ● Har	<ul> <li>Check the following.</li> <li>Harness connectors E174, M159 (Hatchback models with ECM in cabin)</li> <li>Harness connectors M63, F102 (Hatchback models with ECM in cabin)</li> <li>Harness for open or short between ECM and ECM relay</li> </ul>			
	Repair open circuit or short to ground or short to power in harness or connectors.			
10	10 CHECK ECM POWER SUPPLY CIRCUIT-IV			
	1. Check harness continuity between ECM terminals 107, 108, 109 and ECM relay terminal 7. 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 12.	
NG 🕨	GO TO 11.	

#### 11 DETECT MALFUNCTIONING PART

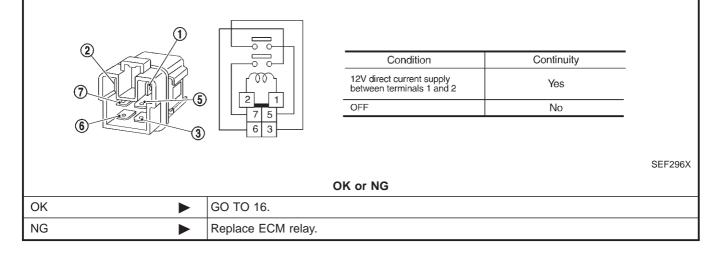
Check the following.

- Harness connectors E75, F36 (Hatchback models with ECM in cabin)
- 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.

#### 12 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, 7 and 6.

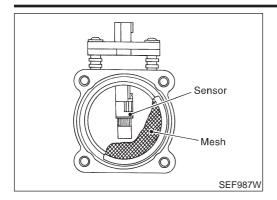


Main Power Supply and Ground Circuit (Cont'd)

13	B CHECK ECM POWER SUPPLY CIRCUIT-V				
2. Di 3. Di 4. Cł	<ol> <li>Turn ignition switch "OFF".</li> <li>Disconnect ECM relay. (For ECM relay location, refer to "Engine Control Component Parts Location".)</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminals 107, 108, 109 and ECM relay terminal 7. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
		OK or NG			
OK		GO TO 15.			
NG		GO TO 14.			
		•			
14	DETECT MALFUNCTIO	DNING PART			
• Ha	<ul> <li>Check the following.</li> <li>Harness connectors E75, F36 (New H/B)</li> <li>Harness for open or short between ECM and ECM relay</li> </ul>				
	Repair open circuit or short to ground or short to power in harness or connectors.				
15	5 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT				
<ol> <li>Check harness continuity between ECM terminals 104, 105, 106 and engine ground. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>					
	OK or NG				
OK	ЭК 🕨 GO TO 16.				
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.			

16	16 CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.			
		INSPECTION END	

### DTC P0100 MASS AIR FLOW SEN



#### **Component Description**

The mass air flow sensor (MAFS) is placed in the stream of intake air. It measures the intake air flow rate by measuring a part of the entire intake air flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.

# CONSULT-II Reference Value in Data Monitor Mode

NJEC0643

NJEC0644

NJEC0645

#### Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: "OFF"</li> <li>Shift lever: Neutral position</li> <li>No-load</li> </ul>	Idle	1.5 - 2.0V

### ECM Terminals and Reference Value

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

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

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
218	В	Sensor's ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V
223	W	Mass air flow sensor power supply	[Ignition switch "ON"]	Approximately 5V
224	R	Mass air flow sensor	[Engine is running] • Warm-up condition • Idle speed	1.5 - 2.0V

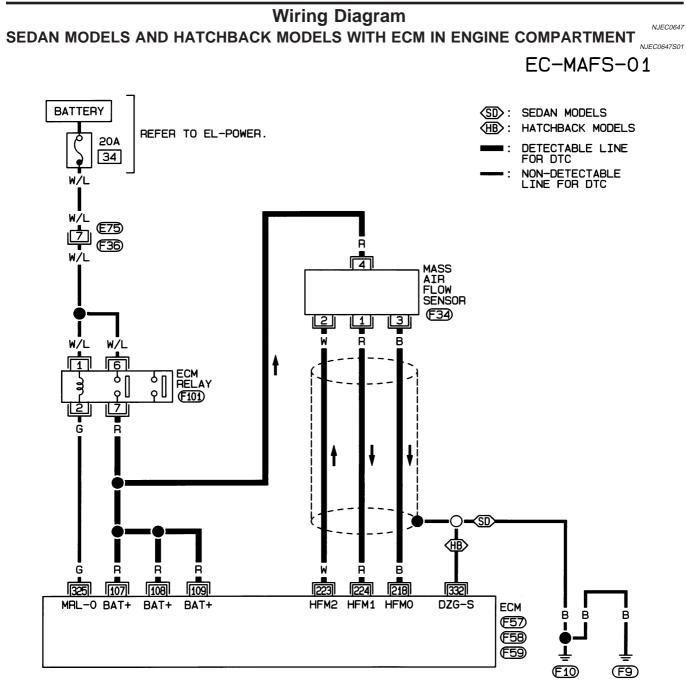
### **On Board Diagnosis Logic**

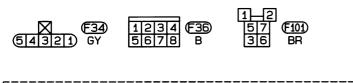
				NJE COUV
DTC Malfu		alfunction is	detected when Check Items (Possible Cause)	
P0100 0102		<ul> <li>An excess sor is sen</li> </ul>	, 0	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> </ul>
3	DATA M	ONITOR		DTC Confirmation Procedure
	MONITOR	NO DTC		WITH CONSULT-II
	2) Select "DATA 3) Start engine a			<ol> <li>Turn ignition switch "ON", and wait at least 6 seconds.</li> <li>Select "DATA MONITOR" mode with CONSULT-II.</li> <li>Start engine and wait at least 3 seconds.</li> <li>If DTC is detected, go to "Diagnostic Procedure", EC-677.</li> </ol>
				WITHOUT CONSULT-II     Turn ignition gwitch "ON" and wait at least 6 accords <sup>NJEC0646502</sup>
			SEF817Y	<ol> <li>Turn ignition switch "ON", and wait at least 6 seconds.</li> <li>Start engine and wait at least 3 seconds.</li> </ol>

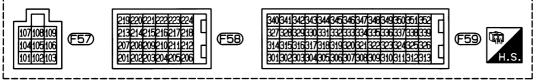
### DTC P0100 MASS AIR FLOW SEN

- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-677.

YD Wiring Diagram







HEC883

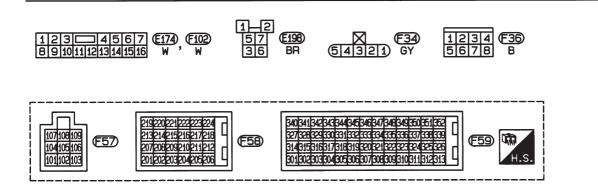
Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN

NJEC0647S02

EC-MAFS-02

BATTERY DETECTABLE LINE FOR DTC REFER TO EL-POWER. 10A 20A NON-DETECTABLE LINE FOR DTC 36 34 R/B W/L R R/B W/L MASS AIR FLOW SENSOR 1 င်္ဂ ဂ ş **E34**) 2 1 3 Ĝ R Ā В E75 t **F36** R **E174** (1159) t **M63 F102** Ĝ ł R B R R G 14 R 108 109 [325] 218 224 107 332 223 HFM2 HFM1 **HFMO** DZG-S MRL-0 BAT+ BAT+ BAT+ ECM **(F57) F58 F**59

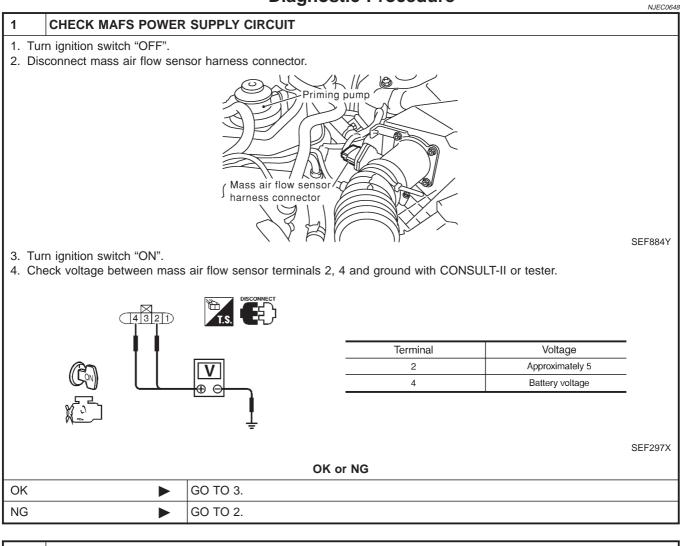


HEC988

### EC-676

### DTC P0100 MASS AIR FLOW SEN

### **Diagnostic Procedure**



#### 2 DETECT MALFUNCTIONING PART

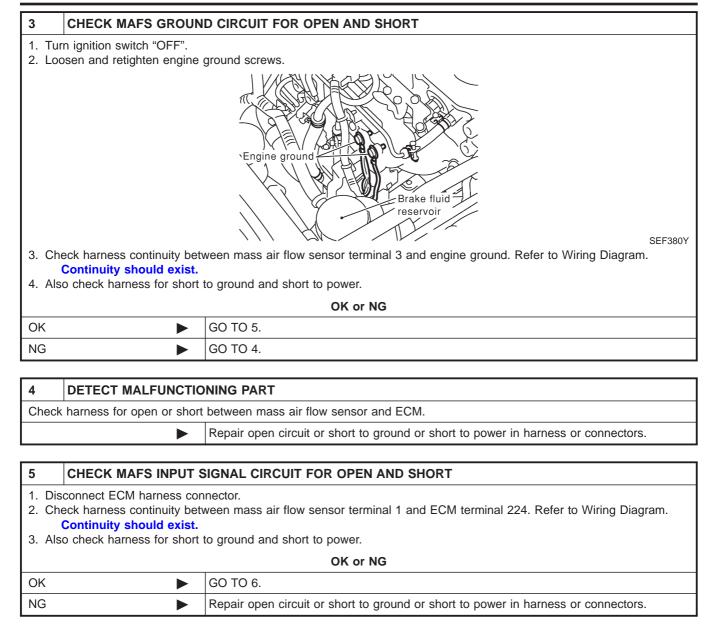
Check the following.

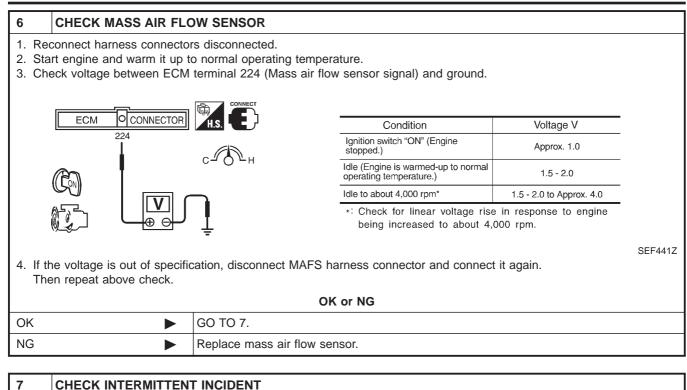
- Harness connectors E75, F36 (Sedan models and hatchback models with ecm in engine compartment)
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

Repair open circuit or short to ground or short to power in harness or connector.

### DTC P0100 MASS AIR FLOW SEN

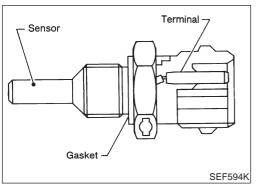
Diagnostic Procedure (Cont'd)





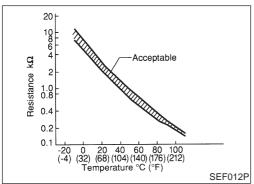
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

INSPECTION END



#### Description

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 tempera- ture °C (°F)	Voltage* (V)	Resistance ( $k\Omega$ )
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.3	0.68 - 1.00
90 (194)	1.0	0.236 - 0.260

\*: These data are reference values and measured between ECM terminal 347 (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**

DTC	Malfunction is detected when	Check Items (Possible Cause)
P0115 0103	<ul> <li>An excessively high or low voltage from the sensor is entered to ECM.</li> </ul>	<ul><li>Harness or connectors (The sensor circuit is open or shorted.)</li><li>Engine coolant temperature sensor</li></ul>

			-
3	DATA MON	NITOR	
	MONITOR	NO DTC	
	CKPS-RPM (TDC)	XXX rpm	
			055047
			SEF817

### **DTC Confirmation Procedure**

#### WITH CONSULT-II

NJEC0651 NJEC0651S01

NJEC0650

- 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-683.

#### **WITHOUT CONSULT-II**

- 1) Turn ignition switch "ON" and wait at least 5 seconds.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

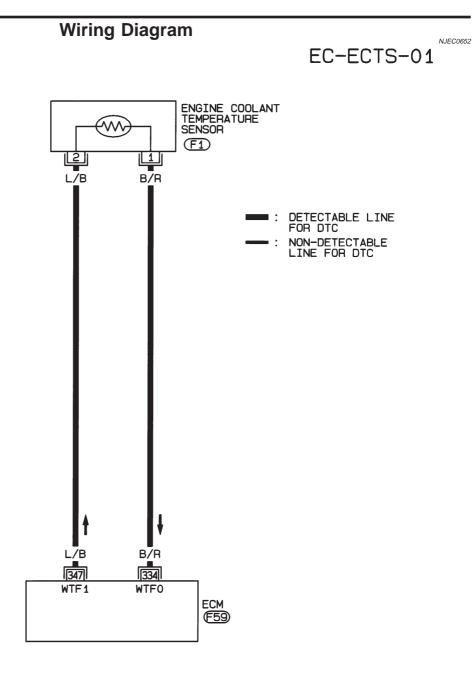
YD

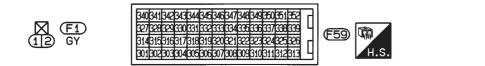
EC-680

N YD DTC Confirmation Procedure (Cont'd)

- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-683.

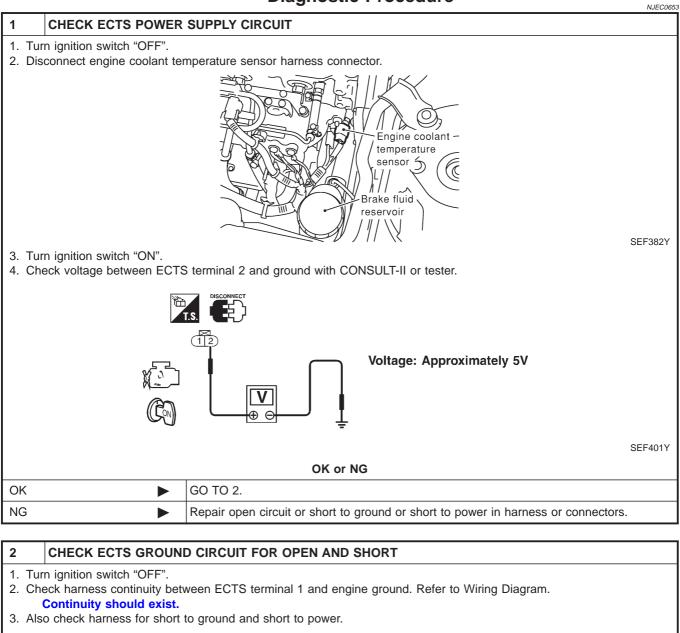
Wiring Diagram





HEC823

### **Diagnostic Procedure**



OK or NG		
ОК	GO TO 4.	
NG	GO TO 3.	

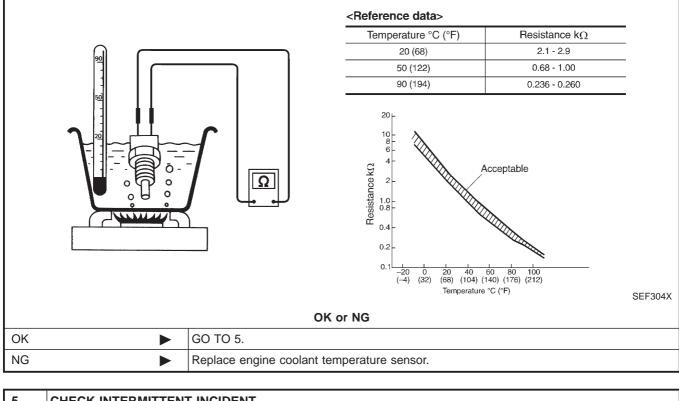
3	DETECT MALFUNCTIONING PART		
Check	Check the following harness for open or short between ECM and engine coolant temperature sensor.		
		Repair open circuit or short to ground or short to power in harness or connectors.	

Diagnostic Procedure (Cont'd)

#### 4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor from the engine.

2. Check resistance between ECTS terminals 1 and 2 as shown in the figure.



5	CHECK INTERMITTENT INCIDENT		
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.		
	► INSPECTION END		

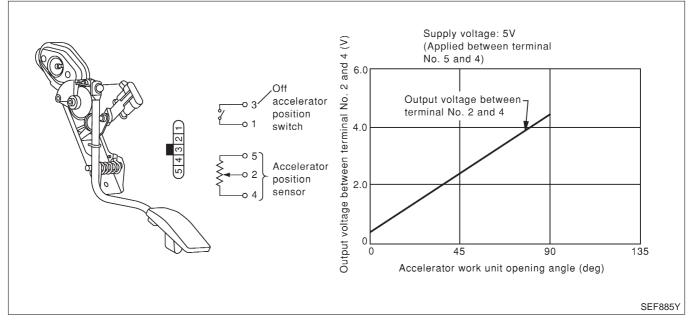
**YD** Description

NJEC0681

#### Description

The accelerator work unit is installed on the upper end of the accelerator pedal assembly. The accelerator position sensor and accelerator position switch are built into the accelerator work unit. The sensor detects the accelerator position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

The accelerator position switch detects Off-accelerator switch signal and send these signals to the ECM. The ECM will then determine engine idle conditions. These signals are also used for diagnosing the accelerator position sensor.



### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN	<ul> <li>Ignition switch: ON</li> </ul>	Ignition switch: ON Accelerator pedal: released 0.30 - 0.50	
	(Engine stopped) Accelerator pedal: depresse	Accelerator pedal: depressed	3.0 - 4.3V
OFF ACCEL SW	(Engine standed)	Accelerator pedal: fully released	ON
		Accelerator pedal: slightly open	OFF

### **ECM Terminals and Reference Value**

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.

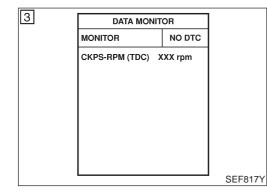
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
425	P/B	Accelerator position sensor ground	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0V
426	BR/R	Accelerator position switch (Idle) ground	[Ignition switch "ON"]	Approximately 0V
433	G/Y	Accelerator position sensor power supply	[Ignition switch "ON"]	Approximately 5V

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
424	W	Accelerator position concor	[Ignition switch "ON"]0.30 - 0.50V• Accelerator pedal fully released	
434 W	vv	Accelerator position sensor	[Ignition switch "ON"] • Accelerator pedal fully depressed	3.0 - 4.3V
435 W/G		[Ignition switch "ON"] • Accelerator pedal fully released	Approximately 0V	
	(Id	(Idle)	[Ignition switch "ON"] • Accelerator pedal depressed	BATTERY VOLTAGE (11 - 14V)

### **On Board Diagnosis Logic**

	0.1 200. d 2.0.g		NJEC0682
DTC	Malfunction is detected when	Check Items (Possible Cause)	
P0120 0403	• The relation between sensor and switch signals is not in the nomal range during the specified accelerator positions.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Accelerator position sensor</li> <li>Accelerator position switch</li> </ul>	



# DTC Confirmation Procedure

NJEC0683 NJEC0683S01

NJEC0683S02

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Depress and release fully accelerator pedal slowly.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-688.

#### **WITHOUT CONSULT-II**

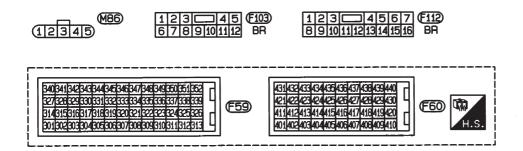
- 1) Turn ignition switch "ON".
- 2) Depress and release fully accelerator pedal slowly.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-688.

YD Wiring Diagram



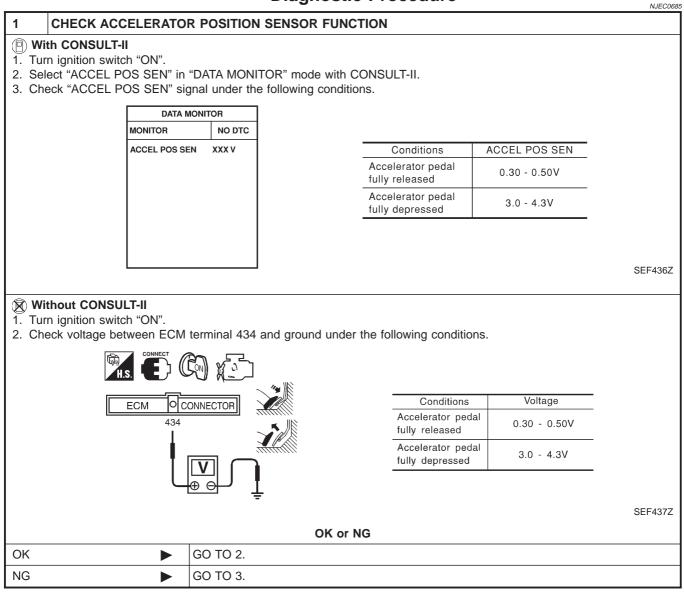
NJEC0684

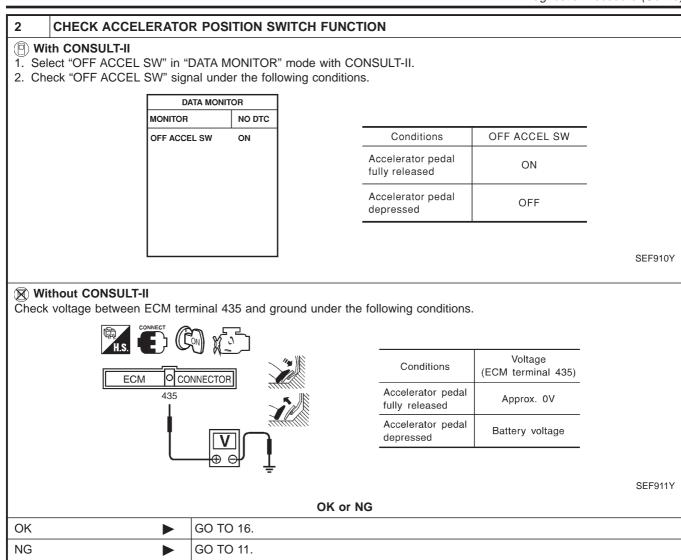
EC-APS-01 ECM **F59 (F60)** PWG21 PWG20 PWG12 PWG11 DZG-S PWG10 435 426 433 [434] 332 425 BR/R G/Y P∕B W/G W (SD): SEDAN MODELS (HB) **(HB)** : HATCHBACK MODELS **(PH)**: HATCHBACK MODELS BEFORE VIN No. ~N16U0135126 (NH) : HATCHBACK MODELS AFTER VIN No. ~N16U0135126 \*1···· (SD) 10 , (HB) 12 \*2···③ 11 (HB 15 \*3···③ 7 (PB 9 (MB 2 ⟨HB⟩: €112 ₩/G BR/R G/Y P/B W DETECTABLE LINE • SD: F103 3 FOR DTC -[¥1] 6 **F \***2 SD: (M64) NON-DETECTABLE LINE FOR DTC : BR/R G/Y P/B W/G h (HB): (M74) 6 (M64) (F103) SD W/G BR/R G/Y P/B W r 5 ា r T ſ 2 ACCELERATOR RELEASED WORK В в В UNIT DEPRESSED **M86** ACCELERATOR POSITION SWITCH ACCELERATOR POSITION SENSOR **(F9) F10** 



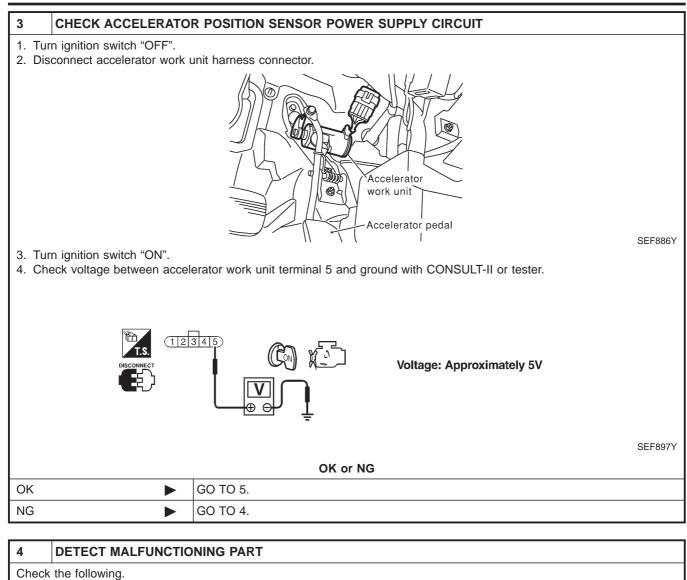
NEF334A

### **Diagnostic Procedure**





Diagnostic Procedure (Cont'd)



- Harness connectors F112, M74 or F103, M64
- Harness for open or short between ECM and accelerator work unit

Repair harness or connectors.

YD

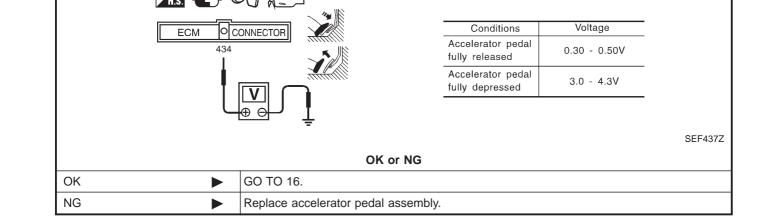
5 CHECK ACCELERATO	OR POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT			
1. Turn ignition switch "OFF".				
2. Loosen and retighten engine ground screw.				
Engine ground Brake fluid ESEF380Y				
<ol> <li>Check harness continuity between accelerator work unit terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
	OK or NG			
OK 🕨	GO TO 7.			
NG	GO TO 6.			
6 DETECT MALFUNCTIO	ONING PART			
<ul><li>Check the following.</li><li>Harness connectors F112, M</li><li>Harness for open or short be</li></ul>	74 or F103, M64 tween ECM and accelerator work unit			
	Repair open circuit or short to ground or short to power in harness or connectors.			
7 CHECK ACCELERATO	OR POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT			
<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 434 and accelerator work unit terminal 2. Refer to Wiring Diagram. Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
	OK or NG			
OK ►	GO TO 9.			
NG	NG DO TO 8.			
8 DETECT MALFUNCTIO				
<ul><li>Check the following.</li><li>Harness connectors F112, M74 or F103, M64</li></ul>				

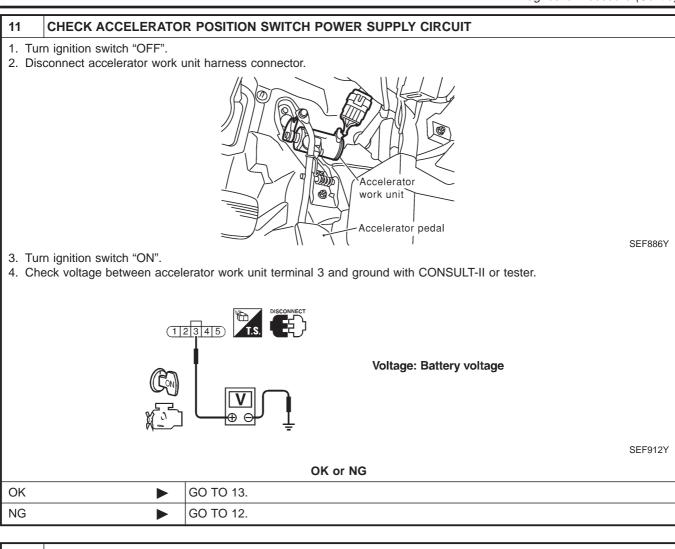
• Harness for open or short between ECM and accelerator work unit

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

Diagnostic Procedure (Cont'd)

#### 9 CHECK ACCELERATOR POSITION SENSOR (P) With CONSULT-II 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Check the indication of "ACCEL POS SEN" under the following conditions. DATA MONITOR MONITOR NO DTC ACCEL POS SEN XXX V Conditions ACCEL POS SEN Accelerator pedal 0.30 - 0.50V fully released Accelerator pedal 3.0 - 4.3V fully depressed SEF436Z OK or NG GO TO 16. OK NG Replace accelerator pedal assembly. CHECK ACCELERATOR POSITION SENSOR 10 **Without CONSULT-II** 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Check voltage between ECM terminal 434 and ground under the following conditions.





#### 12 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M74, F112 or M64, F103
- Harness for open or short between accelerator work unit and ECM

Repair harness or connectors.

#### 13 CHECK ACCELERATOR POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".

2. Disconnect ECM harness connector.

3. Check harness continuity between accelerator work unit terminal 1 and ECM terminal 426. Refer to Wiring Diagram. Continuity should exist.

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

OK or NG

ОК	GO TO 15.
NG	GO TO 14.

#### 14 DETECT MALFUNCTIONING PART

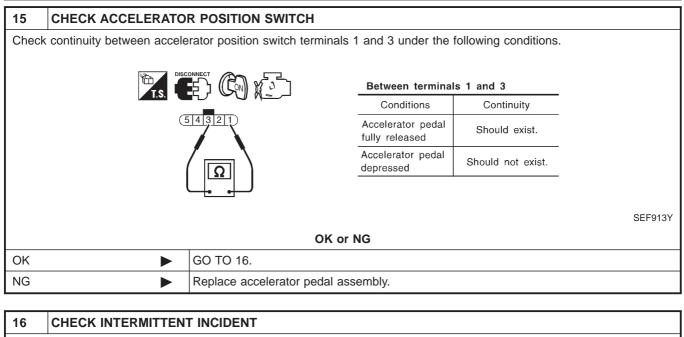
Check the following.

• Harness connectors M74, F112 or M64, F103

Harness for open or short between ECM and accelerator work unit

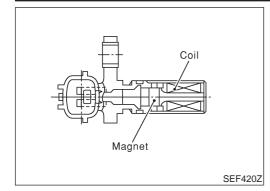
Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)



Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

INSPECTION END



#### Description

The crankshaft position sensor (TDC) monitors engine speed by means of signals from the sensing plate (with three protrusions) installed to the crankshaft pulley. The datum signal output is detected at ATDC 10° and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.

### CONSULT-II Reference Value in Data Monitor Mode

#### Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	Run engine and compare tachometer indication with the CUN-	Almost the same speed as the CONSULT-II value.

### ECM Terminals and Reference Value

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage and Pulse Signal)
331	OR	Crankshaft position sen- sor (TDC) ground [Engine is running] • Warm-up condition • Idle speed		Approximately 0V
	344 W Crankshaft position sen- sor (TDC)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0V	
344		sor (TDC)	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed is 2,000 rpm</li> </ul>	Approximately 0V

### **On Board Diagnosis Logic**

NJEC0689

_	DTC	Malfunction is detected when	Check Items (Possible Cause)
	P0335	<ul> <li>An improper signal from the sensor is sent to</li></ul>	<ul> <li>Harness or connectors</li></ul>
	0407	ECM during engine running and cranking.	(The sensor circuit is open.) <li>Crankshaft position sensor (TDC)</li>

N.IEC.0688

DTC Confirmation Procedure

			1
L	DATA M	ONITOR	
	MONITOR	NO DTC	
	CKPS-RPM (TDC	C) XXX rpm	
			SEF817

#### **DTC Confirmation Procedure**

Before performing the following procedure, confirm that battery voltage is more than 10V.

#### B WITH CONSULT-II

- Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Crank engine for at least 1 second.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-698.

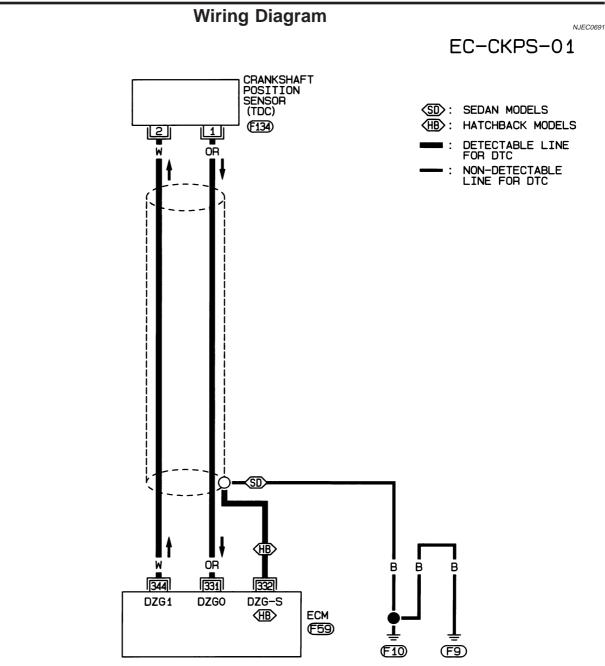
#### 🛞 WITHOUT CONSULT-II

NJEC0690S02

YD

- 1) Crank engine for at least 1 second.
- 2) Start engine and run it for at least 2 seconds at idle speed.
- Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-698.

YD Wiring Diagram

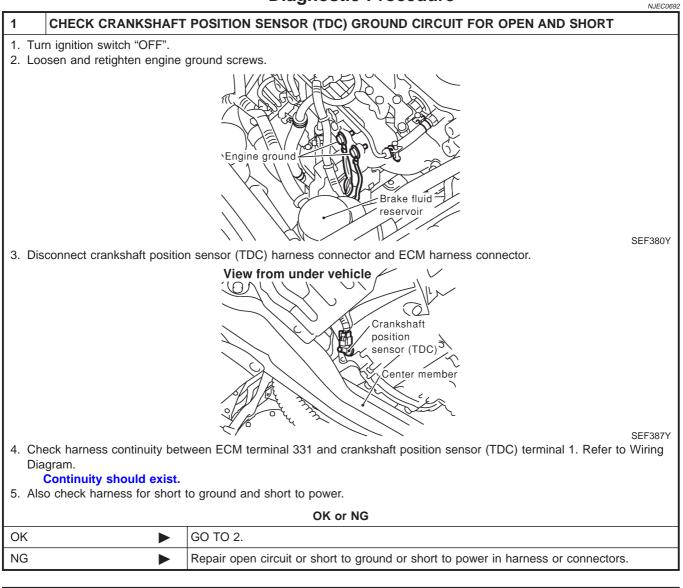


#### (12) F134) (12) GY



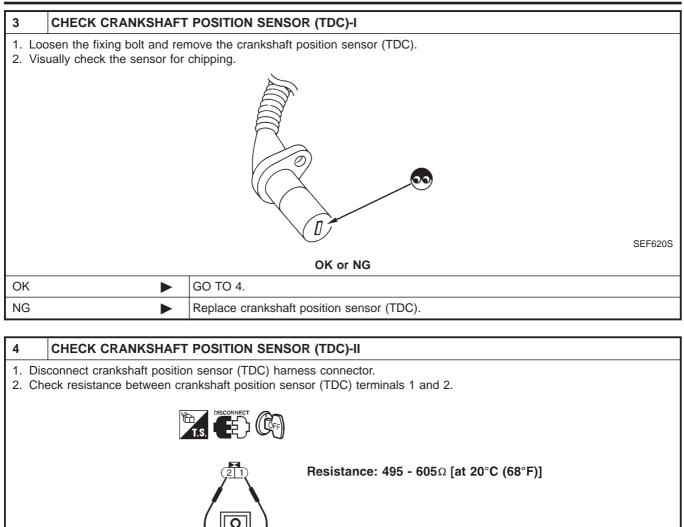
HEC885

#### **Diagnostic Procedure**



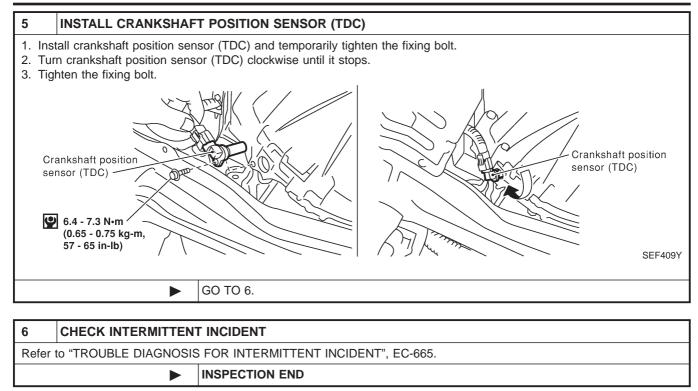
2	CHECK CRANKSHAFT	POSITION SENSOR (TDC) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT		
<ol> <li>Check harness continuity between crankshaft position sensor (TDC) terminal 2 and ECM terminal 344. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>				
OK or NG				
ОК		GO TO 3.		
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.		

Diagnostic Procedure (Cont'd)



			214	
		SEF408	5 Y	
OK or NG				
OK 🕨	•	GO TO 5.		
NG	•	Replace crankshaft position sensor (TDC).		

Diagnostic Procedure (Cont'd)

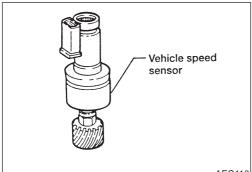


YD

# DTC P0500 VEHICLE SPEED SEN



NJEC0655



#### Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

AEC110

### **ECM Terminals and Reference Value**

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			<ul> <li>[Engine is running]</li> <li>Lift up the vehicle.</li> <li>In 1st gear position</li> <li>Vehicle speed is 10 km/h (6 MPH)</li> </ul>	Approximately 8V
417	PU/R	Vehicle speed sensor	<ul> <li>[Engine is running]</li> <li>Lift up the vehicle.</li> <li>In 2nd gear position</li> <li>Vehicle speed is 30 km/h (19 MPH)</li> </ul>	Approximately 6V

### **On Board Diagnosis Logic**

DTC	Malfunction is detected when	Check Items (Possible Cause)
P0500 0104	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	<ul> <li>Harness or connector (The vehicle speed sensor circuit is open or shorted.)</li> <li>Vehicle speed sensor</li> </ul>

3	DATA MO	DATA MONITOR		
	MONITOR	NO DTC	1	
	CKPS-RPM (TDC)	XXX rpm		
	VHCL SPEED SE	XXX km/h		
	P/N POSI SW	OFF		
			SEF864	

#### **Overall Function Check**

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

#### (B) WITH CONSULT-II

1) Lift up the vehicle.

2)

NJEC0657S01

NJEC0656

- Start engine.
- 3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II.

The vehicle speed on CONSULT-II should be able to

YD

NJEC0657S02

# exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

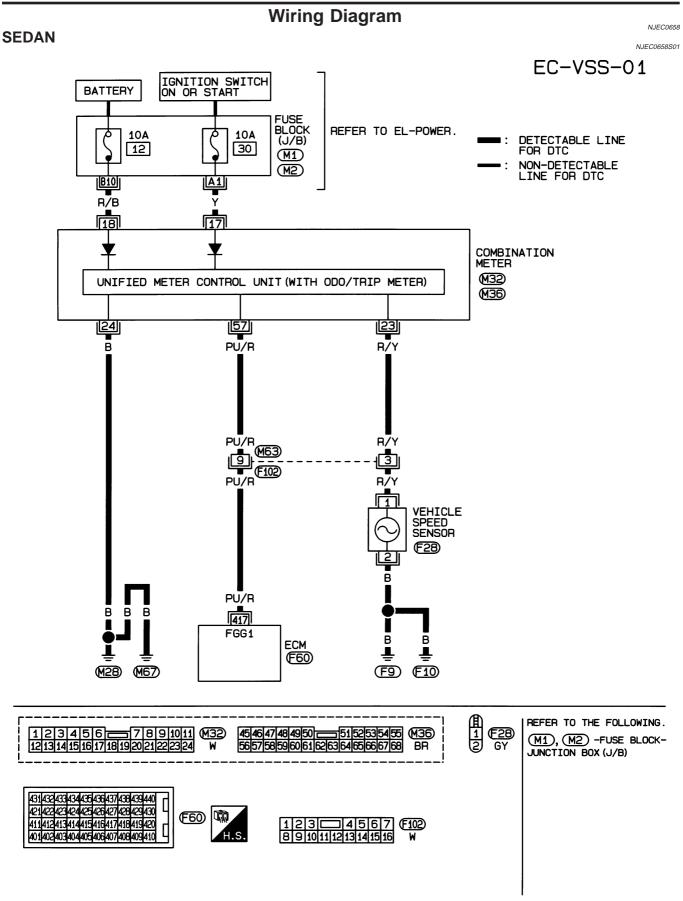
4) If NG, go to "Diagnostic Procedure", EC-705.

#### **WITHOUT CONSULT-II**

- 1) Lift up the vehicle.
- 2) Start engine.
- Read the voltage signal for the vehicle speed sensor with an oscilloscope. Refer to "ECM Terminals and Reference Value", EC-701.
- 4) Verify that the oscilloscope screen shows the signal wave as shown at "ECM Terminals and Reference Value", EC-701.
- 5) If NG, go to "Diagnostic Procedure", EC-705.

### DTC P0500 VEHICLE SPEED SEN

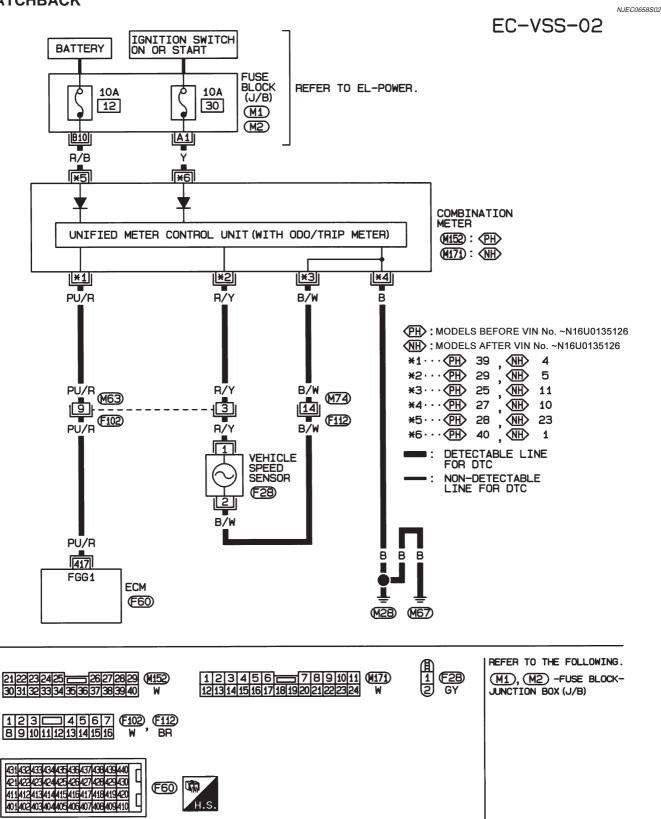
YD Wiring Diagram



### **DTC P0500 VEHICLE SPEED SEN**

Wiring Diagram (Cont'd)

#### HATCHBACK



YD

NJEC0659

### **Diagnostic Procedure**

1	CHECK VEHICLE SPEED \$	SENSOR INPUT SIGNAL	<b>CIRCUIT FOR OPEN AND SHORT</b>

- 1. Turn ignition switch "OFF".
- 2. Disconnect ECM harness connector and combination meter harness connector.
- 3. Check harness continuity between ECM terminal 417 and combination meter terminal 4 or 39 or 57. Refer to Wiring Diagram.

#### Continuity should exist.

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

OK or NG

ОК	GO TO 3.
NG	GO TO 2.

#### DETECT MALFUNCTIONING PART

Check the following.

2

• Harness connectors M63, F102

• Harness for open or short between ECM and combination meter

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

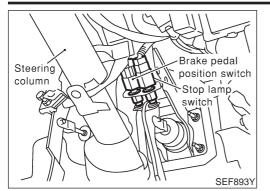
3	CHECK SPEEDOMETE	R FUNCTION		
Make sure that speedometer functions properly.				
	OK or NG			
OK	ОК 🕨 GO TO 5.			
NG	NG 🕨 GO TO 4.			

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT				
● Ha ● Ha	<ul> <li>Check the following.</li> <li>Harness connectors M63, F102</li> <li>Harness for open or short between vehicle speed sensor and engine ground</li> <li>Harness for open or short between combination meter and vehicle speed sensor</li> </ul>				
	OK or NG				
ОК	DK         Check vehicle speed sensor and combination meter. Refer to EL section.				
NG	G Repair open circuit or short to ground or short to power in harness or connectors.				
5	5 CHECK INTERMITTENT INCIDENT				

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

#### ► INSPECTION END

Description



#### Description

The stop lamp switch is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.

### **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
405	R/G	Stop lamp switch	[Ignition switch "ON"] • Brake pedal fully released	Approximately 0V
405	K/G		[Ignition switch "ON"] • Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
416	V/P	Y/B Brake pedal position switch	<ul><li>[Ignition switch "ON"]</li><li>Brake pedal fully released</li></ul>	BATTERY VOLTAGE (11 - 14V)
416 Y.	ĭ/Б		[Ignition switch "ON"] • Brake pedal depressed	Approximately 0V

### **On Board Diagnosis Logic**

DTC Malfunction is detected when		Check Items (Possible Cause)	
P1571	<ul> <li>An irregular voltage signal from the switch is sent</li></ul>	<ul> <li>Harness or connectors</li></ul>	
0807	to ECM.	(The stop lamp switch circuit is open or shorted.) <li>Stop lamp switch</li>	

2	DATA M	ONITOR	]
	MONITOR	NO DTC	]
	CKPS-RPM (TDC	) XXX rpm	
			SEF817Y

# **DTC Confirmation Procedure**

NJEC0741 NJEC0741S01

NJEC0740

1) Turn ignition switch "ON".

(P) WITH CONSULT-II

- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Depress and release brake pedal more than 10 times.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-710.

#### **WITHOUT CONSULT-II**

1) Turn ignition switch "ON".

- NJEC0741S02
- 2) Depress and release brake pedal more than 10 times.

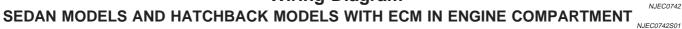
NJEC0739

EC-706

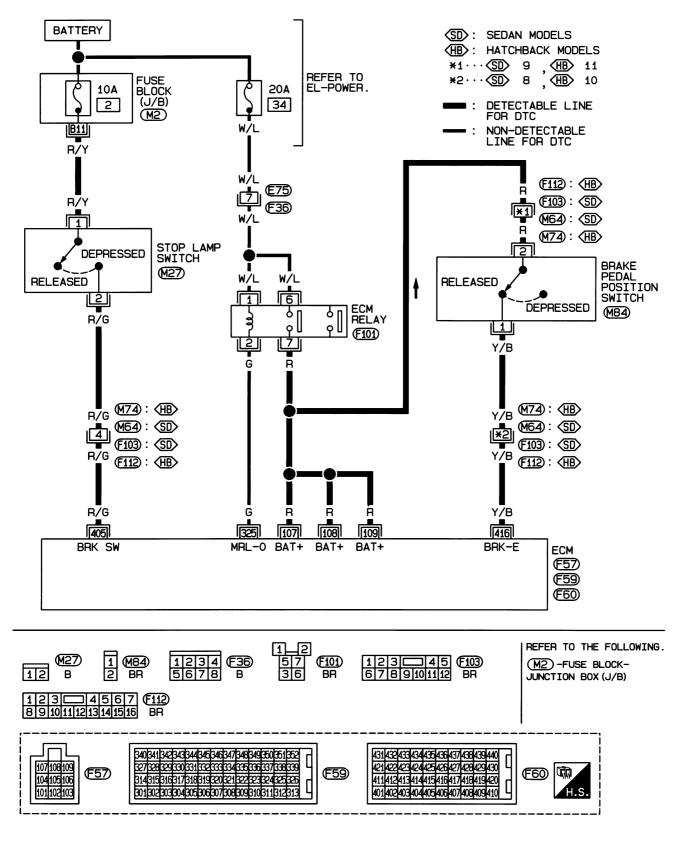
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-710.







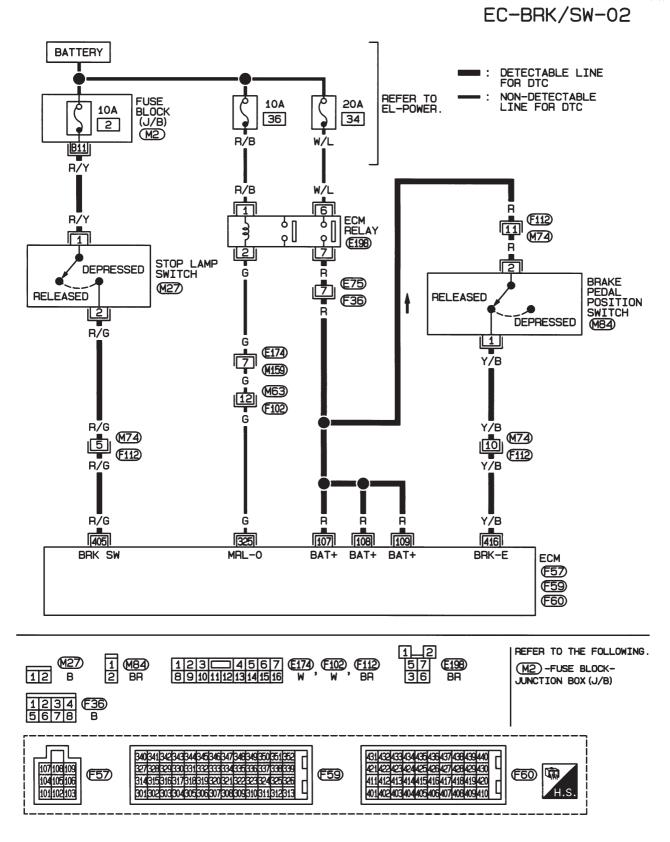
EC-BRK/SW-01



HEC887

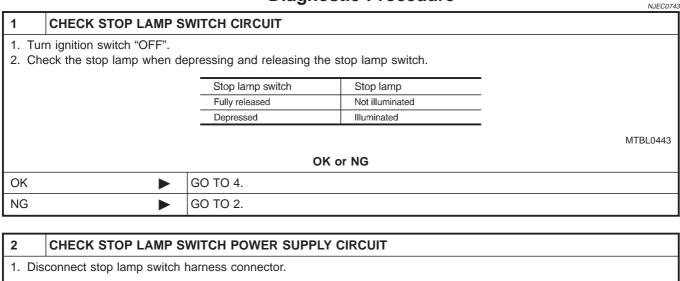
#### HATCHBACK MODELS WITH ECM IN CABIN

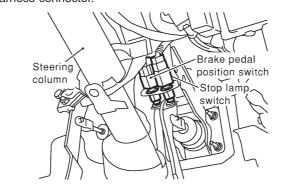
NJEC0742S02



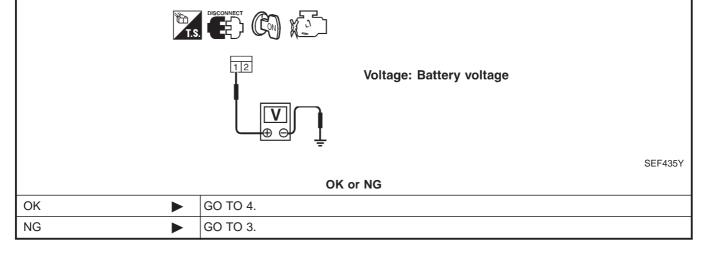
HEC991

#### **Diagnostic Procedure**





2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



### 3 DETECT MALFUNCTIONING PART

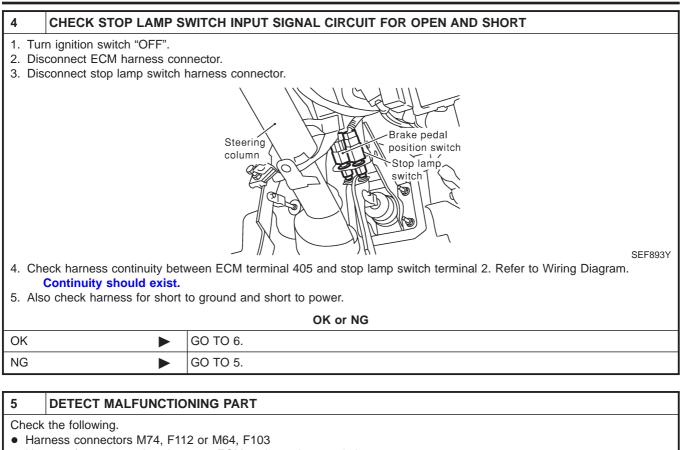
Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open and short between stop lamp switch and fuse

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

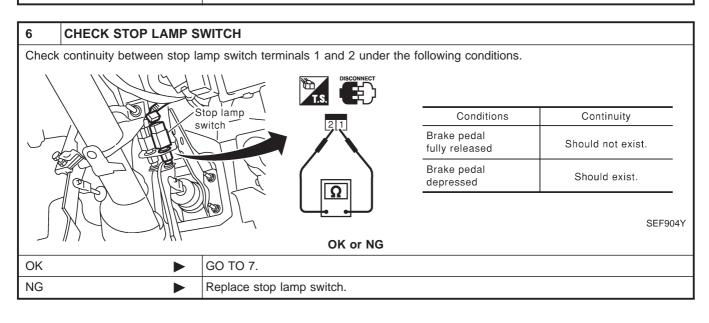
# YD

SEF893Y



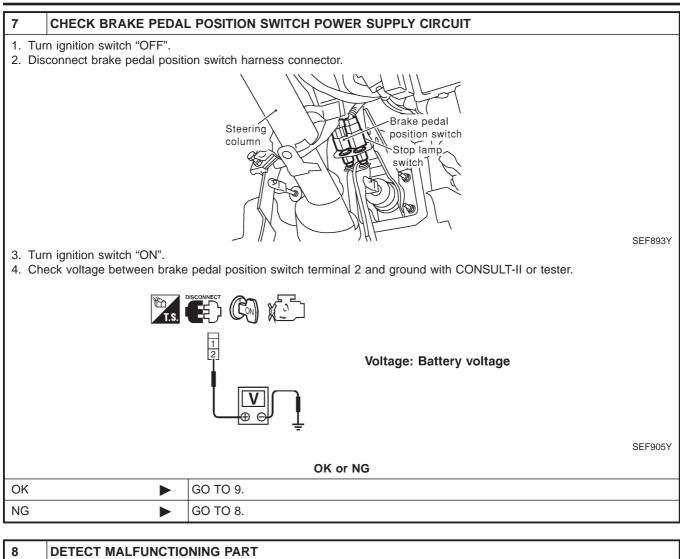
• Harness for open or short between ECM and stop lamp switch

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



ΥD

Diagnostic Procedure (Cont'd)



Check the following.

• Harness connectors M74, F112 or M64, F103

- · Harness for open and short between brake pedal position switch and ECM relay
- · Harness for open and short between brake pedal position switch and ECM

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

#### 9 CHECK BRAKE PEDAL POSITION 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 416 and brake pedal position switch terminal 1. Refer to Wiring Diagram.

#### Continuity should exist.

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

OK or NG

ОК	GO TO 11.
NG	GO TO 10.

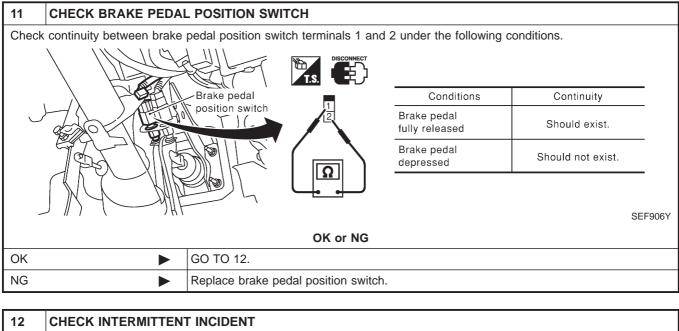
#### 10 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M74, F112 or M64, F103

• Harness for open or short between ECM and brake pedal position switch

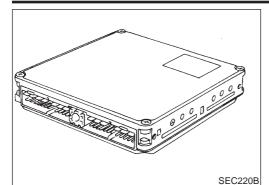
Repair open circuit or short to ground or short to power in harness or connectors.



Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

► INSPECTION END

# DTC P1107 ECM 10

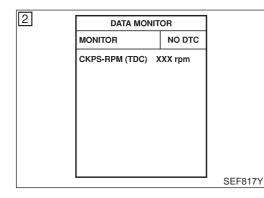


#### Description

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**

DTC	Malfunction is detected when	Check Items (Possible Cause)
P1107 0802	• An excessively high or low voltage from the absolute pressure sensor (built-into ECM) is sent to ECM.	ECM (ECCS-D control module)



# **DTC Confirmation Procedure**

NJEC0736 NJEC0736S01

NJEC0735

1) Turn ignition switch "ON".

(P) WITH CONSULT-II

- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 2 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-715.

#### **WITHOUT CONSULT-II**

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and wait at least 2 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-715.

YD

# DTC P1107 ECM 10

NJEC0737

### **Diagnostic Procedure**

#### 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", EC-714, again.
- 5. Is the DTC P1107 displayed again?

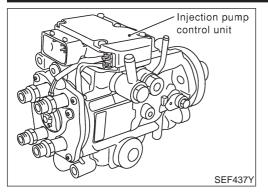
#### Without CONSULT-II

- 1. Turn ignition switch "ON".
- 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
- 3. Perform "DTC Confirmation Procedure", EC-714, again.
- 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)".
- 5. Is the DTC 0802 displayed again?

Yes or No

Yes	Replace ECM.
No	INSPECTION END

### DTC P1180 P9-FUEL TEMP SEN



#### Description SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAMSHAFT POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The camshaft position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the camshaft position sensor.

#### CONSULT-II Reference Value in Data Monitor Mode

NJEC0673

Remarks: Specification data are reference values.

MONITOR ITEM	COND	SPECIFICATION	
FUEL TEMP SEN	• Engine: After warming up	More than 40°C (104°F)	
SPILL/V	• Engine: After warming up, idle the	Approx. 12 - 13°CA	
INT/A VOLUME	• Engine: After warming up, idle the	Approx. 150 - 450 mg/st	
F/CUT SIGNAL	Engine: After warming up	Idle	ON

NJEC0672

### DTC P1180 P9-FUEL TEMP SEN

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

### **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Р	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V

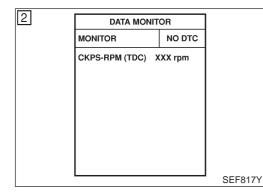
### **On Board Diagnosis Logic**

 DTC
 Malfunction is detected when ....
 Check Items (Possible cause)

 P1180
 • An improper voltage signal from fuel temperature sensor (Built-into electronic control fuel injection pump) is sent to injection pump control unit.
 • Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)

 • Electronic control fuel injection pump

(I) WITH CONSULT-II



### **DTC Confirmation Procedure**

NJEC0676

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-721.

#### **WITHOUT CONSULT-II**

Turn ignition switch "ON" and wait at least 2 seconds.

EC-717

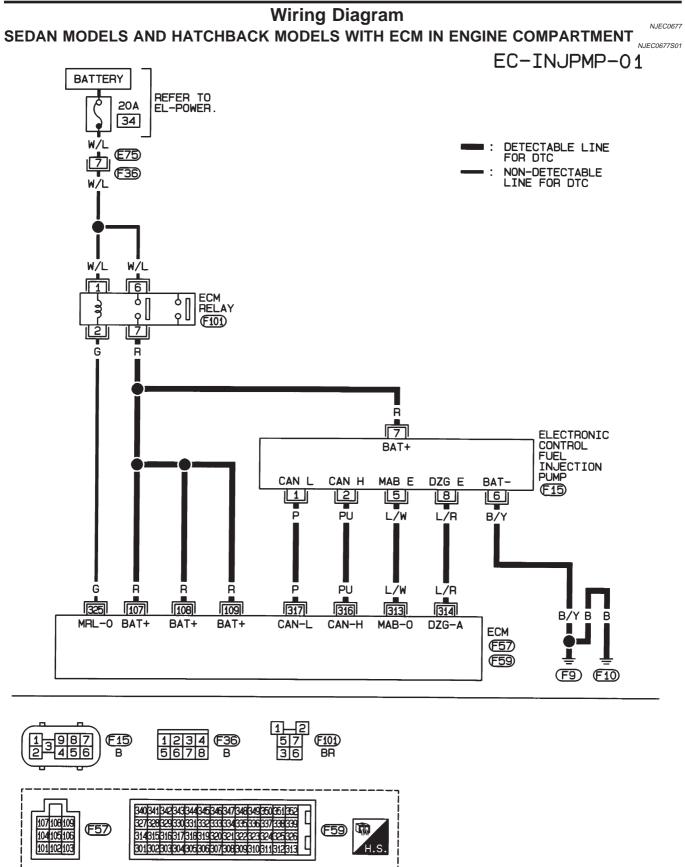
YD

NJEC0674

### DTC P1180 P9-FUEL TEMP SEN

- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-721.

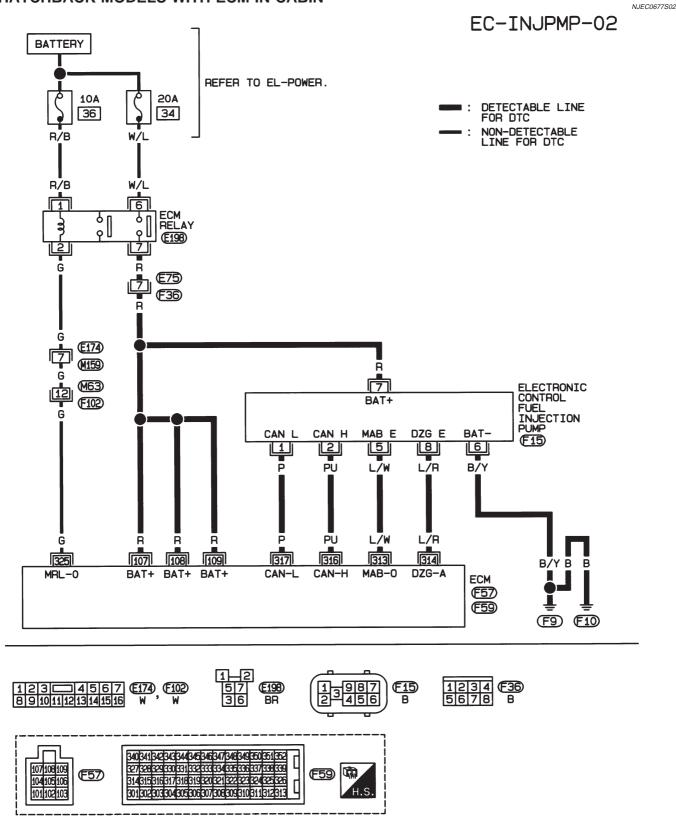
YD Wiring Diagram



HEC825

Wiring Diagram (Cont'd)

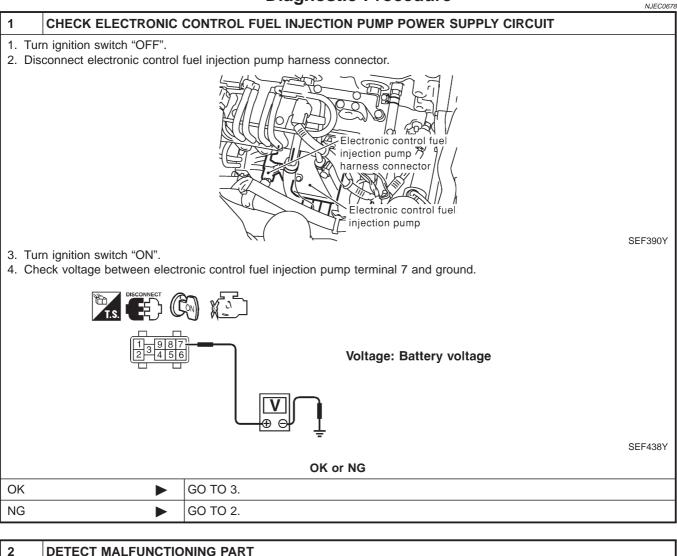
#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

YD

### **Diagnostic Procedure**



Check the following.

• Harness connectors E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- · Harness for open or short between electronic control fuel injection pump and ECM relay

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

# 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

# DTC P1180 P9-FUEL TEMP SEN

Diagnostic Procedure (Cont'd)

4	CHECK COMMUNICATIO	ON LINE FOR OPEN AND SHORT		
1. Cł	neck continuity between the fo	ollowing terminals. Refer to Wiring Diag	am.	
		Electronic control fuel injection pump	ECM	
		1	317	
		2	316	
		5	313	
		8	314	
2. Al	Continuity should exist. so check harness for short to	ground and short to power.		MTBL0462
		OK or NG		

ОК	GO TO 5.
NG 🕨	Repair open circuit or short to ground or short to power in harness or connectors.

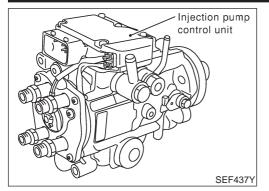
5	CHECK INTERMITTENT INCIDENT				
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.				
	OK or NG				
ОК	OK   Replace electronic control fuel injection pump.				
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.				

EC-722

YD

# DTC P1202 FUEL CUT SYSTEM2

**YD** Description



### Description SYSTEM DESCRIPTION

NJEC0753

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

### CONSULT-II Reference Value in Data Monitor Mode

NJEC0754

Remarks: Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
FUEL TEMP SEN	Engine: After warming up	More than 40°C (104°F)	
SPILL/V	• Engine: After warming up, idle the	Approx. 12 - 13°CA	
INT/A VOLUME	• Engine: After warming up, idle the	Approx. 150 - 450 mg/st	
F/CUT SIGNAL	Engine: After warming up	Idle	ON

# DTC P1202 FUEL CUT SYSTEM2

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

### **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Р	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V

### **On Board Diagnosis Logic**

NJEC0756

DTC	Malfunction is detected when	Check Items (Possible cause)
P1202 1002	• Fuel cut control system does not function properly.	<ul> <li>Harness or connectors (Electronic control fuel circuit is open or shorted.)</li> <li>Electronic control fuel</li> </ul>

(P) WITH CONSULT-II

2				
Ľ	DATA MO	DATA MONITOR		
	MONITOR	MONITOR NO DTC		
	CKPS-RPM (TDC	) XXX rpm		

# **DTC Confirmation Procedure**

NJEC0757

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-728.

YD

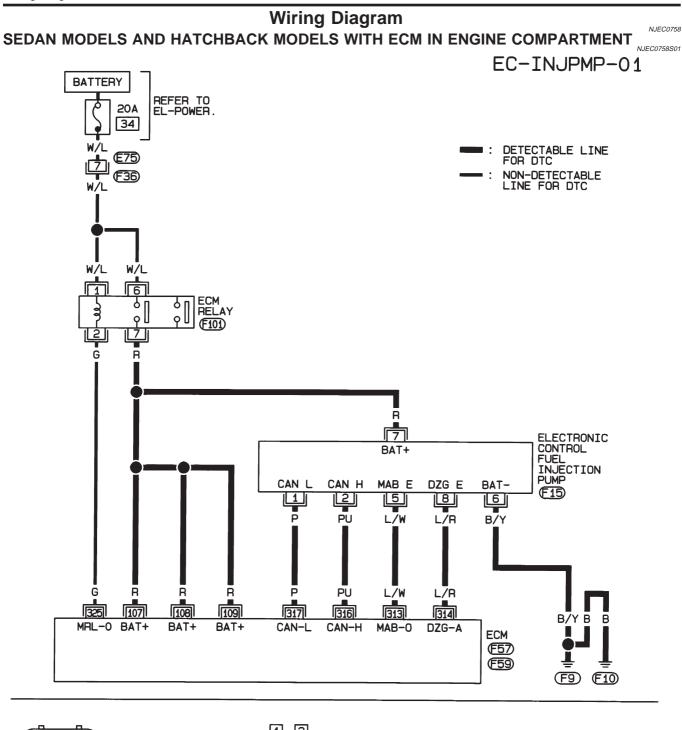
NJEC0755

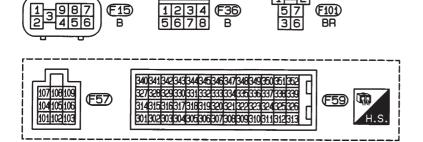
EC-724

DTC Confirmation Procedure (Cont'd)

### **WITHOUT CONSULT-II**

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-728.





**E15** 

HEC825

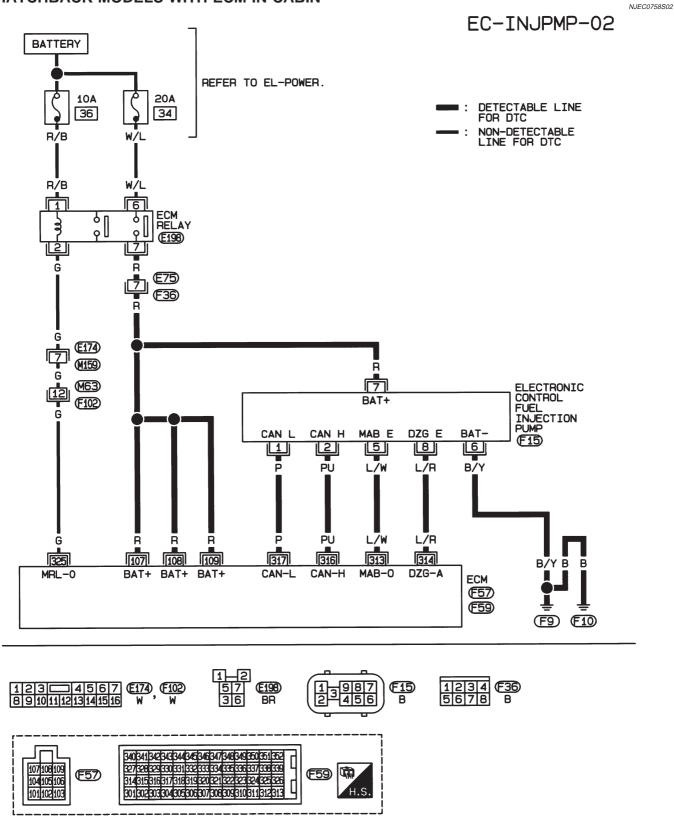
YD

**F101** 

7

**YD** Wiring Diagram (Cont'd)

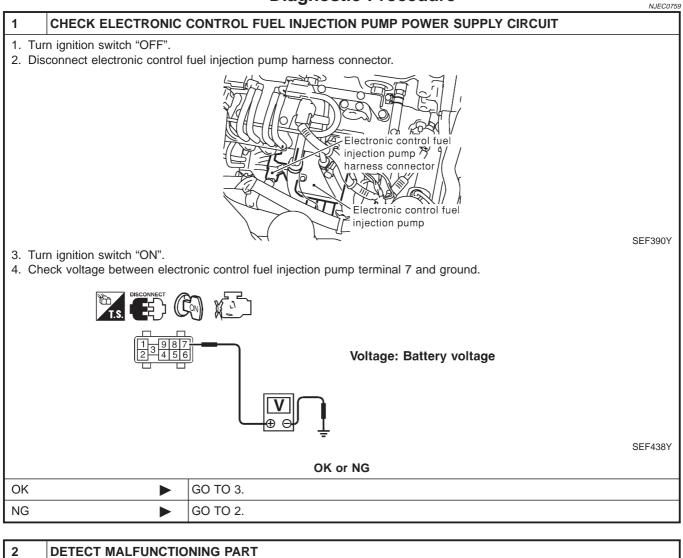
### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

# DTC P1202 FUEL CUT SYSTEM2

### **Diagnostic Procedure**



Check the following.

• Harness connectors E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- · Harness for open or short between electronic control fuel injection pump and ECM relay

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

3	CHECK ELECTRONIC	CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT				
1. Tur	1. Turn ignition switch "OFF".					
2. Che	eck harness continuity betw	veen electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Dia-				
gra	m.					
	Continuity should exist.					
3. Also	o check harness for short	o ground and short to power.				
	OK or NG					
OK	ОК <b>Б</b> О ТО 4.					
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.					

YD

# DTC P1202 FUEL CUT SYSTEM2

4	CHECK COMMUNICATION LINE FOR OPEN AND SHORT						
1. Check continuity between the following terminals. Refer to Wiring Diagram.							
	Electronic control fuel injection pump ECM						
		1	317	-			
		2	316	_			
5 313							
8 314							
				MTBL0462			
	Continuity should exist.						
	-	to ground and short to power.					
	OK or NG						
OK		GO TO 5.					
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.						

5	CHECK INTERMITTENT INCIDENT				
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.				
	OK or NG				
OK	OK   Replace electronic control fuel injection pump.				
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.				

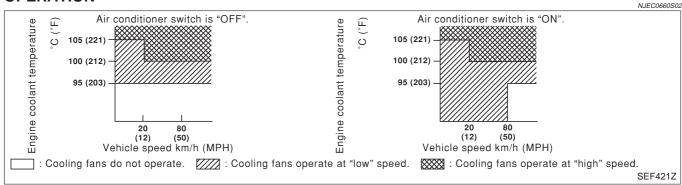
### EC-729

Description

SYSTEM DESCRIPTION						
Sensor	Input signal to ECM	ECM function	Actuator			
Vehicle speed sensor	Vehicle speed					
Engine coolant temperature sensor	Engine coolant temperature	Cooling fan control	Cooling fan relay			
Air conditioner switch	Air conditioner "ON" signal					

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

### **OPERATION**



# CONSULT-II Reference Value in Data Monitor Mode

### Specification data are reference values.

MONITOR ITEM	MONITOR ITEM CONDITION		SPECIFICATION
	Engine: After warming up, idle	Air conditioner switch: OFF	OFF
AIR COND SIG	<ul> <li>Engine: After warming up, idle the engine</li> </ul>	Air conditioner switch: ON (Compressor operates.)	ON
	• When cooling fan is stopped.		OFF
COOLING FAN	When cooling fans operate at lo	w speed.	LOW
	When cooling fans operate at hi	gh speed.	HIGH

### **ECM Terminals and Reference Value**

NJEC0662

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
210	LG/R Cooling fan relay (Low)		<ul><li>[Engine is running]</li><li>Cooling fans are not operating</li></ul>	BATTERY VOLTAGE (11 - 14V)
219		<ul><li>[Engine is running]</li><li>Cooling fans are operating</li></ul>	Approximately 0.1V	

YD

NJEC0660

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
221	LG/B Cooling fan	Cooling fan relay (High)	<ul> <li>[Engine is running]</li> <li>Cooling fans are not operating</li> <li>Cooling fans are operating at low speed</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			<ul><li>[Engine is running]</li><li>Cooling fans are operating at high speed</li></ul>	Approximately 0.1V

# **On Board Diagnosis Logic**

NJEC0663

П

This diagnosis continuously monitors the engine coolant temperature.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC	Malfunction is detected when	Check Items (Possible Cause)
P1217 0208	<ul> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> </ul>	<ul> <li>Harness or connectors (The cooling fan circuit is open or shorted.)</li> <li>Cooling fan</li> <li>Radiator hose</li> <li>Radiator</li> <li>Radiator cap</li> <li>Water pump</li> <li>Thermostat</li> <li>Engine coolant temperature sensor</li> <li>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-756.</li> </ul>

### **CAUTION:**

When a malfunction is indicated, be sure to replace the coolant following the procedure in the LC-44, "Changing Engine Coolant". Also, replace the engine oil.

- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-18, "Engine Coolant Mixture Ratio".
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

On Board Diagnosis Logic (Cont'd)

# **Overall Function Check** Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

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.

### AEC640 WITH CONSULT-II

WARNING:

MAX

MIN.

ок

SEF111X

- NJEC0664S01 1) Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-735.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-735.
- 3) Turn ignition switch "ON".
- Perform "COOLING FAN" in "ACTIVE TEST" mode with CON-4) SULT-II and make sure that cooling fans operate when touching "HIGH" or "LOW".

If NG, go to "Diagnostic Procedure", EC-735.

### **WITHOUT CONSULT-II**

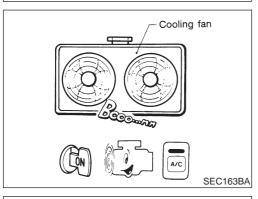
- NJEC0664S02 Check the coolant level in the reservoir tank and radiator. 1) Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-735.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-735.
- 3) Start engine.

### Be careful not to overheat engine.

- 4) Set temperature control lever to full cold position.
- 5) Turn air conditioner switch "ON".
- 6) Turn blower fan switch "ON".
- Run engine at idle for a few minutes with air conditioner oper-7) ating.

### Be careful not to overheat engine.

- Make sure that cooling fans operate at low speed. 8)
- 9) Turn ignition switch "OFF".
- 10) Turn air conditioner switch and blower fan switch "OFF".
- 11) Disconnect engine coolant temperature sensor harness connector.
- 12) Connect 150 $\Omega$  resistor to engine coolant temperature sensor harness connector.
- 13) Start engine and make sure that cooling fans operate at higher speed than low speed. Be careful not to overheat engine.
- 14) If NG, go to "Diagnostic Procedure", EC-735.



ACTIVE TEST

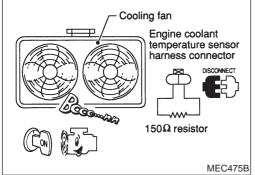
MONITOR

OFF

XXX °C

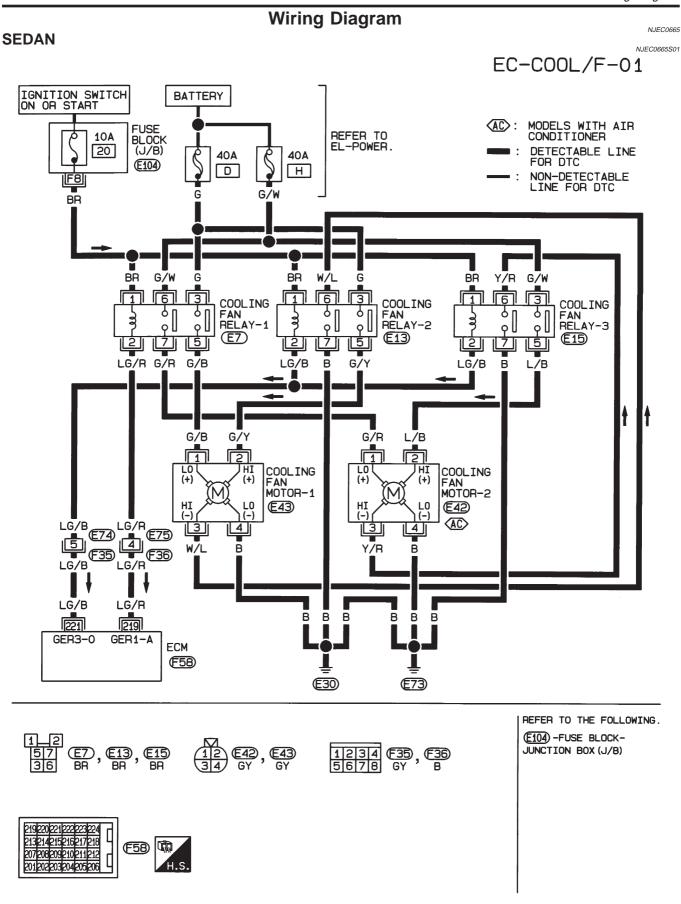
COOLING FAN

COOLAN TEMP/S



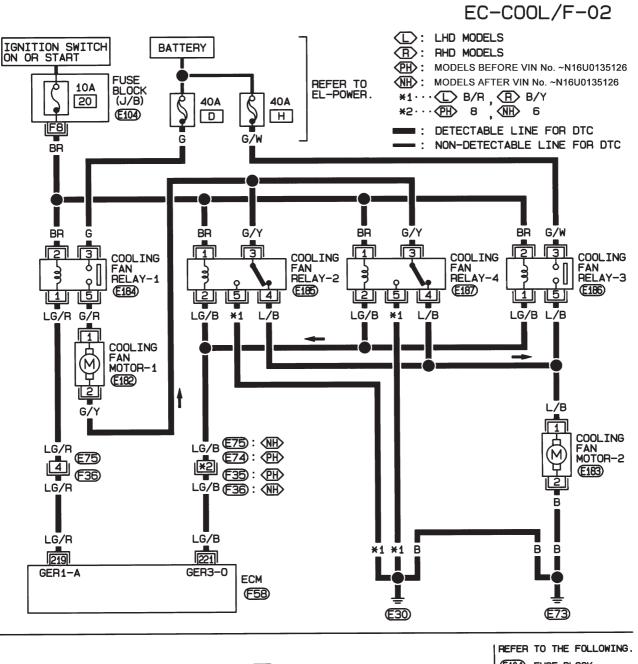
N.IEC0664

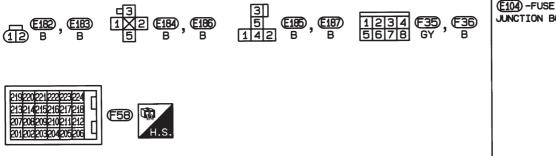
YD Wiring Diagram



Wiring Diagram (Cont'd)

### HATCHBACK





(E104) -FUSE BLOCK-JUNCTION BOX (J/B)

NJEC0665S02

YD

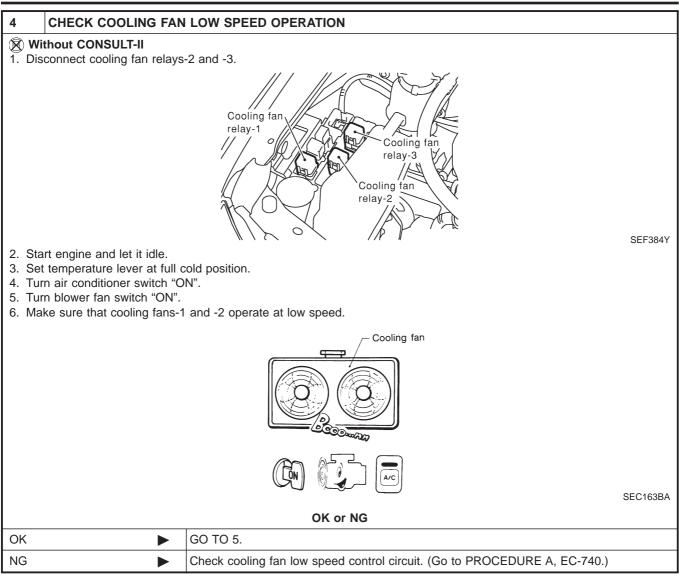
NEF336A

**YD** Diagnostic Procedure

### **Diagnostic Procedure** NJEC0666 **SEDAN** NJEC0666S03 **INSPECTION START** 1 Do you have CONSULT-II? Yes or No GO TO 2. Yes No GO TO 4. 2 CHECK COOLING FAN LOW SPEED OPERATION B With CONSULT-II 1. Disconnect cooling fan relays-2 and -3. Cooling fan relay-1 Cooling fan relay-3 Ŀ 1 Cooling fan relay-2 C SEF384Y 2. Turn ignition switch "ON". 3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II. ACTIVE TEST COOLING FAN OFF MONITOR COOLAN TEMP/S XXX °C SEF646X 4. Make sure that cooling fans-1 and -2 operate at low speed. OK or NG OK GO TO 3. NG Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-740.)

Diagnostic Procedure (Cont'd)

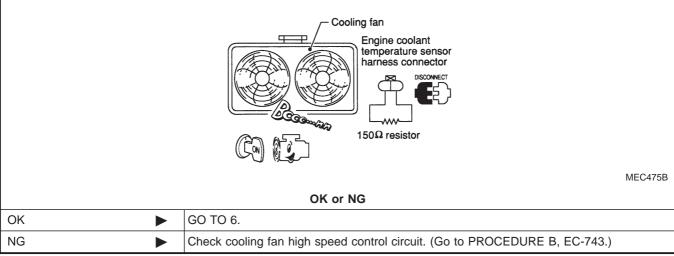
3 CHECK COOLING FAN	HIGH SPEED OPERAT	ΓΙΟΝ			
<ol> <li>With CONSULT-II</li> <li>Turn ignition switch "OFF".</li> <li>Reconnect cooling fan relays-</li> <li>Turn ignition switch "ON".</li> <li>Perform "COOLING FAN" in "</li> </ol>		h CONSL	JLT-II.		
	A	CTIVE TEST			
	COOLIN	IG FAN	OFF		
		MONITOR			
	COOLAN	N TEMP/S	XXX °C		
					SEF111X
5. Make sure that cooling fans-1	and -2 operate at high s	peed.			SEFIIIA
	0	K or NG			
OK 🕨	GO TO 6.				
NG	Check cooling fan high s	speed cor	ntrol cir	cuit. (Go to PROCEDURE B, EC-743.)	

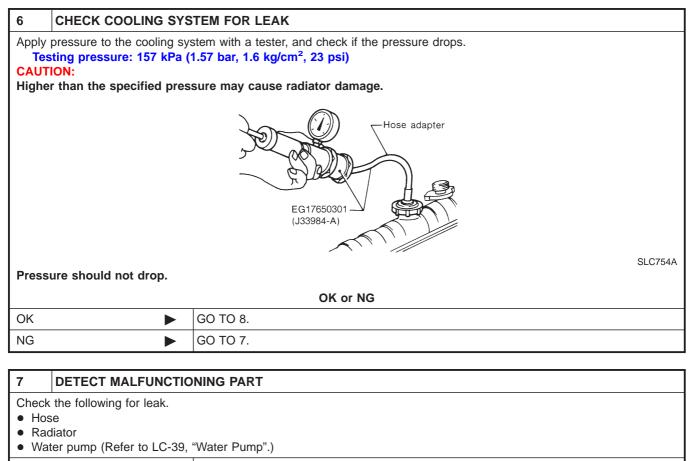


### 5 CHECK COOLING FAN HIGH SPEED OPERATION

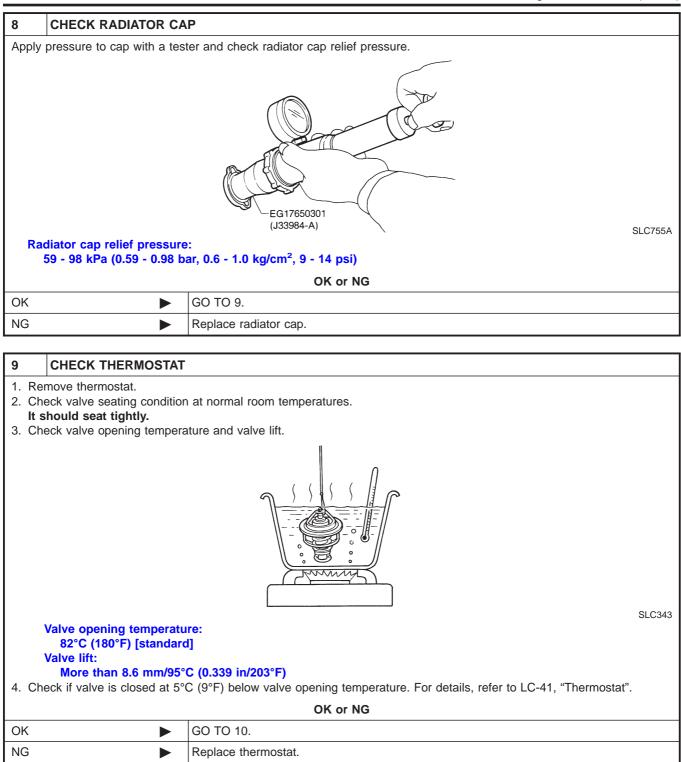
### **Without CONSULT-II**

- 1. Turn ignition switch "OFF".
- 2. Reconnect cooling fan relays-2 and -3.
- 3. Turn air conditioner switch and blower fan switch "OFF".
- 4. Disconnect engine coolant temperature sensor harness connector.
- 5. Connect  $150\Omega$  resistor to engine coolant temperature sensor harness connector.
- 6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.

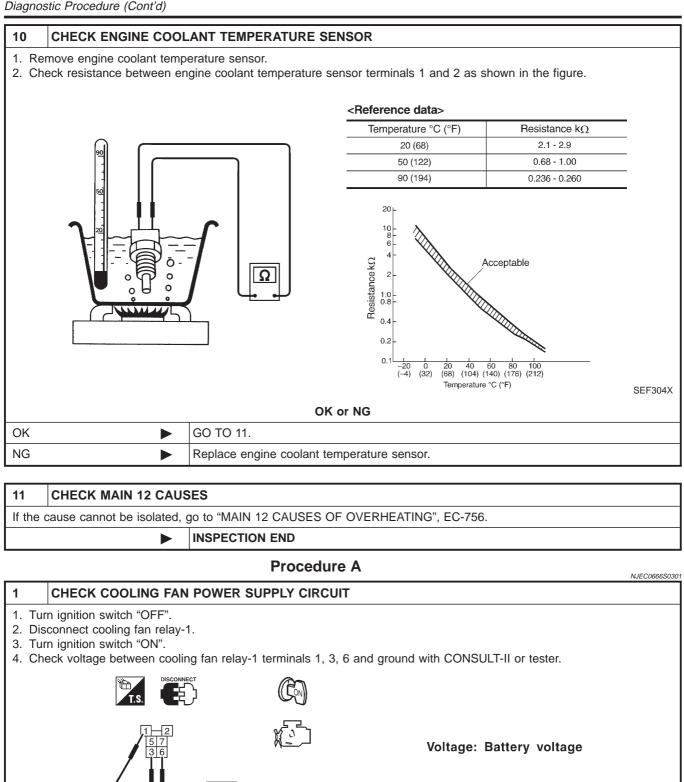




Repair or replace.



Diagnostic Procedure (Cont'd)



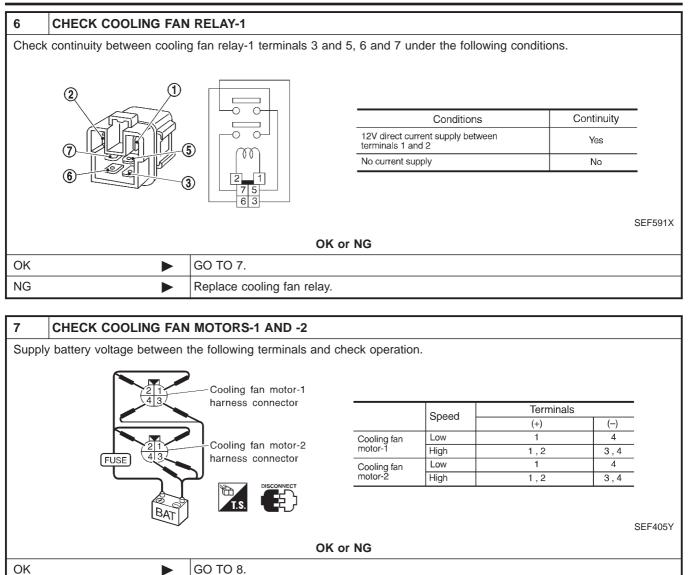
		SEF590X
	OK or NG	
OK	GO TO 3.	
NG	GO TO 2.	

Ð e

### Diagnostic Procedure (Cont'd 2 DETECT MALFUNCTIONING PART Check the following. • Fuse block (J/B) connector E104 • 10A fuse 40A fusible links · Harness for open or short between cooling fan relay-1 and fuse • Harness for open or short between cooling fan relay-1 and battery Repair open circuit or short to ground or short to power in harness or connectors. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 3 1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector. // /. / .0// Cooling fan motor-2 harness connector 11 Cooling fan motor-1 harness connector SEF385Y 3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 6. 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. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 4 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 219 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG GO TO 6. OK GO TO 5. NG

5	DETECT MALFUNCTIONING PART			
Check the following. • Harness connectors E75, F36 • Harness for open or short between cooling fan relay-1 and ECM				
	Repair open circuit or short to ground or short to power in harness or connectors.			

NG

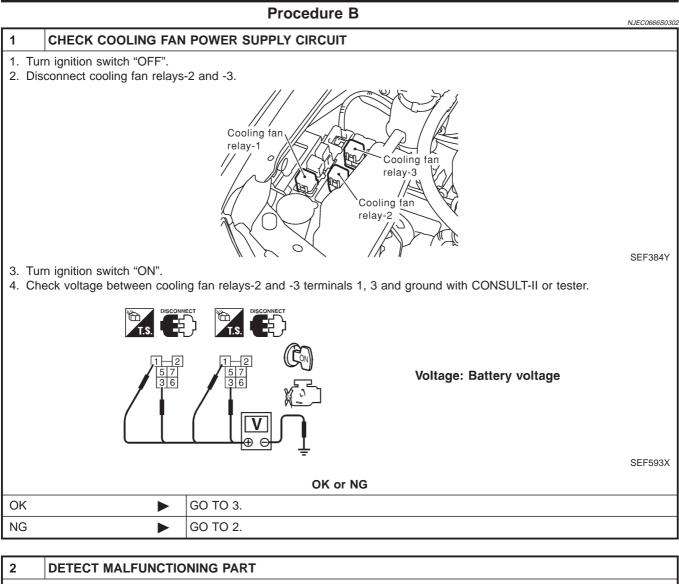


8	CHECK INTERMITTENT INCIDENT		
Perform	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.		
	► INSPECTION END		

Replace cooling fan motors.

YD

Diagnostic Procedure (Cont'd)



Check the following.

• Harness for open or short between cooling fan relays-2 and -3 and fuse

• Harness for open or short between cooling fan relays-2 and -3 and fusible link

Repair harness or connectors.

YD

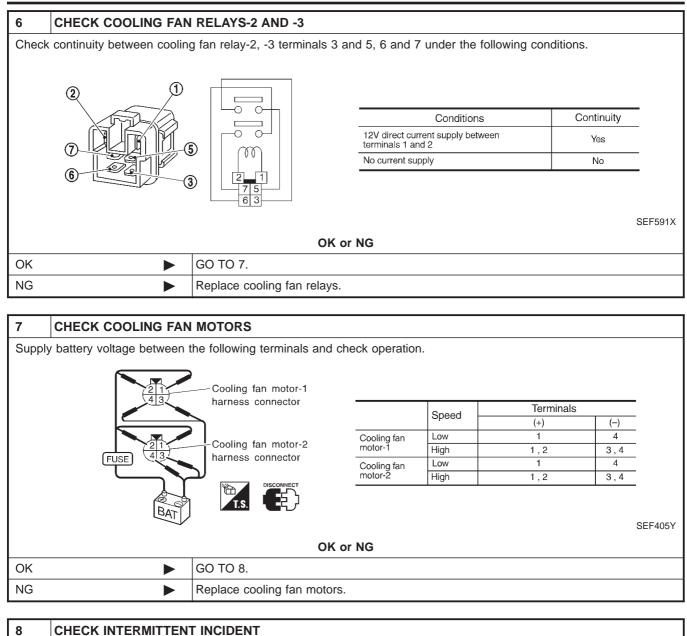
3	CHECK COOLING FAN	I GROUND CIRCUIT FOR OPEN AND SHORT		
1. Tur	n ignition switch "OFF".			
	2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.			
terr 4. Als 5. Cho terr	<ol> <li>2. Disconnect cooling fail motor-1 namess connector harness connector harness connector harness connector harness connector harness connector</li> <li>3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and body ground. Refer to Wiring Diagram. Continuity should exist.</li> <li>4. Also check harness for short to ground and short to power.</li> <li>5. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2, cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3, cooling fan relay-3 terminal 7 and body ground. Refer to Wiring Diagram. Continuity should exist.</li> </ol>			
		to ground and short to power. OK or NG		
ОК	•	GO TO 4.		
NG		Repair open circuit or short to ground or short to power in harness or connectors.		
4	CHECK COOLING FAN	OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT		
2. Cho Ref	<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 221 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>			
	OK or NG			
OK		GO TO 6.		
NG	•	GO TO 5.		
5	DETECT MALFUNCTIO	NING PART		

Check the following.

• Harness connectors E74, F35

• Harness for open or short between cooling fan relays-2 and -3 and ECM

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



1. Perform "TROUBLE DIAGNO	SIS FOR INTERMITTENT INCIDENT", EC-665.
	INSPECTION END

INSPECTION END

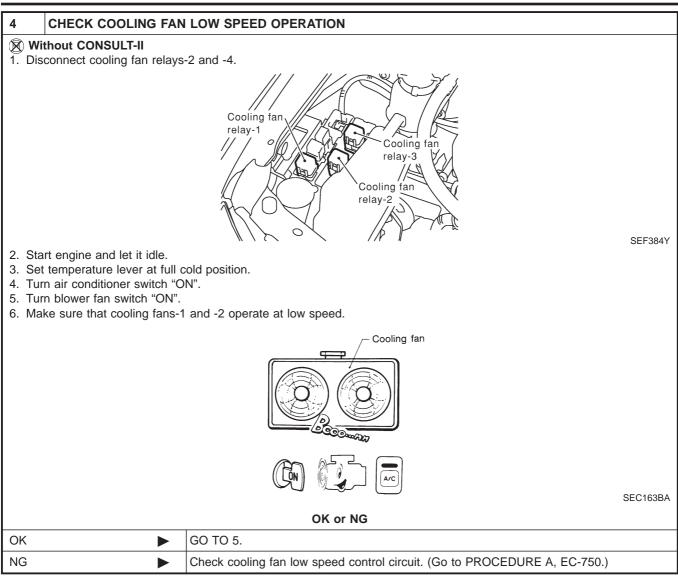
### HATCHBACK

		HATCHEACK	NJEC0666S04		
1	INSPECTION START				
Do yo	Do you have CONSULT-II?				
		Yes or No			
Yes		GO TO 2.			
No		GO TO 4.			

Diagnostic Procedure (Cont'd)

2 CHECK COOLING FAI	N LOW SPEED OPERATION		
With CONSULT-II			
1. Disconnect cooling fan relay:	s-2 and -4.		
2. Turn ignition switch "ON".	Cooling fan relay-1 Cooling fan relay-2	SEF384Y	
	"ACTIVE TEST" mode with CONSULT-II.		
	ACTIVE TEST       COOLING FAN     OFF       MONITOR     COOLAN TEMP/S     XXX 'C		
		SEF646X	
4. Make sure that cooling fans-	1 and -2 operate at low speed.	SEF040A	
	OK or NG		
OK 🕨	GO TO 3.		
NG	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-750.)		
	N HIGH SPEED OPERATION		
<ol> <li>With CONSULT-II</li> <li>Turn ignition switch "OFF".</li> <li>Reconnect cooling fan relays</li> <li>Turn ignition switch "ON".</li> <li>Perform "COOLING FAN" in</li> </ol>	s-2 and -4. "ACTIVE TEST" mode with CONSULT-II.		
	ACTIVE TEST		
	COOLING FAN OFF MONITOR		
	COOLAN TEMP/S XXX 'C		
		SEF111X	
5. Make sure that cooling fans-1 and -2 operate at high speed.			
ОК	OK or NG GO TO 6.		
NG	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-753.)		

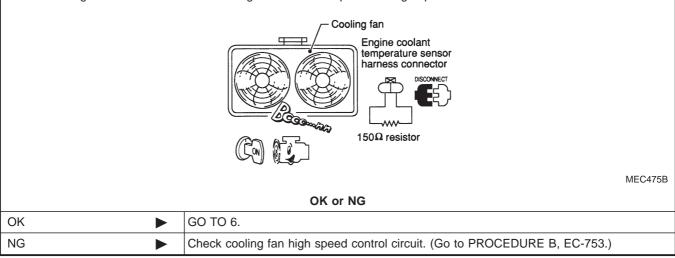
YD



### 5 CHECK COOLING FAN HIGH SPEED OPERATION

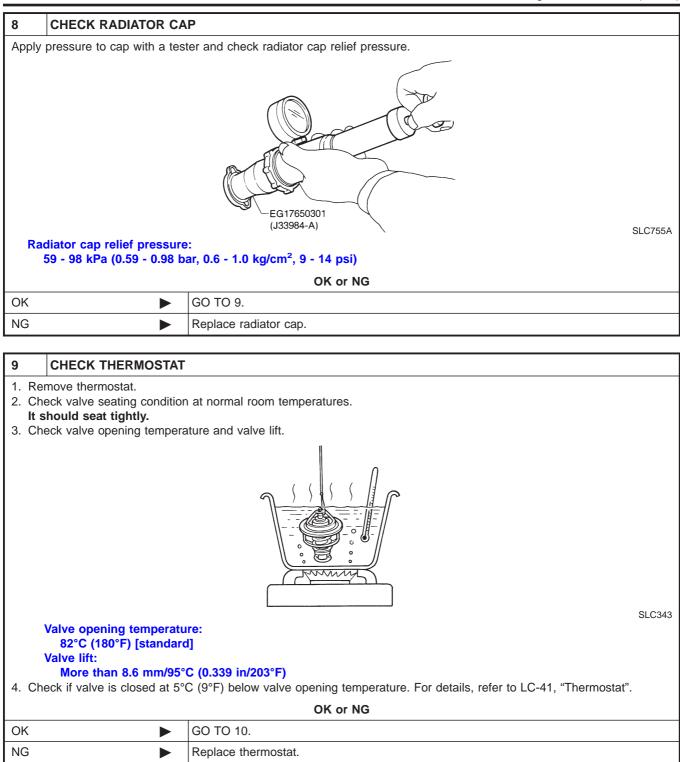
### **Without CONSULT-II**

- 1. Turn ignition switch "OFF".
- 2. Reconnect cooling fan relays-2 and -4.
- 3. Turn air conditioner switch and blower fan switch "OFF".
- 4. Disconnect engine coolant temperature sensor harness connector.
- 5. Connect  $150\Omega$  resistor to engine coolant temperature sensor harness connector.
- 6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.



6	CHECK COOLING SYS	STEM FOR LEAK		
Tes CAUT	Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm <sup>2</sup> , 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage.			
Hose adapter EG17650301 (J33984-A)				
Press	SLC754A Pressure should not drop.			
		OK or NG		
OK		GO TO 8.		
NG		GO TO 7.		
7	DETECT MALFUNCTION	DNING PART		
Check the following for leak. <ul> <li>Hose</li> <li>Radiator</li> <li>Water pump (Refer to LC-39, "Water Pump".)</li> </ul>				

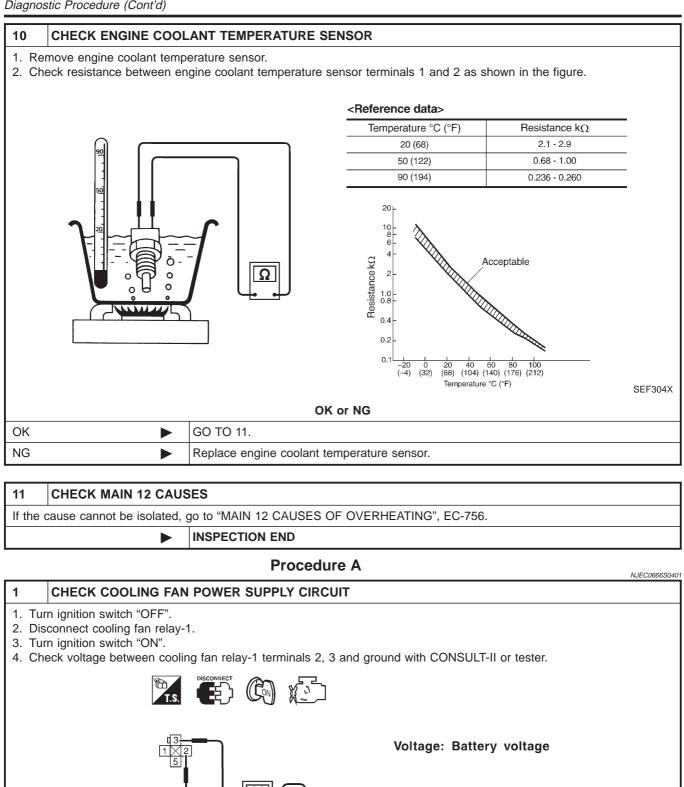
Repair or replace.



Diagnostic Procedure (Cont'd)

OK

NG



SEF899Y

OK or NG

Ð

GO TO 3.

GO TO 2.

YD

# 2 DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E104
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-1 and fuse

• Harness for open or short between cooling fan relay-1 and battery

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

### 3 CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector. // /. / .0// Cooling fan motor-2 harness connector 11 Cooling fan motor-1 harness connector SEF385Y 3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-2 terminal 2 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK GO TO 4. NG Repair open circuit or short to ground or short to power in harness or connectors.

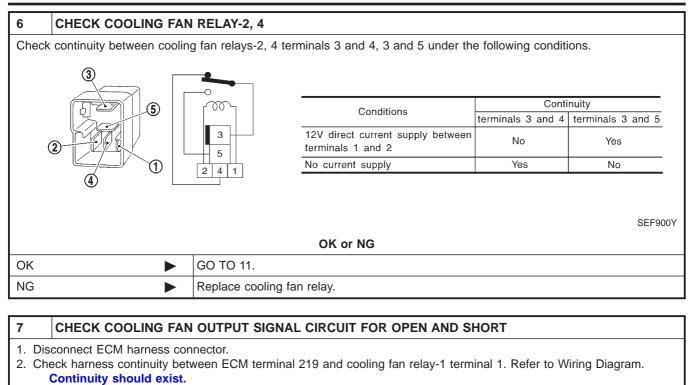
# CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT-II Check harness continuity between cooling fan motor-1 terminal 2 and cooling fan motor-2 terminal 1. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power.

OK of NG			
ОК	GO TO 7.		
NG 🕨	GO TO 5.		

5	CHECK COOLING FAN	N GROUND CIRCUIT FOR OPEN AND SHORT-III			
2. Che rela	<ol> <li>Disconnect cooling fan relays-2, 4.</li> <li>Check harness continuity between cooling fan motor-1 terminal 2 and cooling fan relays-2, 4 terminal 3, cooling fan relays-2, 4 terminal 4 and cooling fan motor-2 terminal 1. Refer to Wiring Diagram.         Continuity should exist.     </li> <li>Also check harness for short to ground and short to power.</li> </ol>				
OK or NG					
ОК		GO TO 6.			
NG 🕨		Repair open circuit or short to ground or short to power in harness or connectors.			

ΥD

Diagnostic Procedure (Cont'd)



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

OK or NG			
ОК	•	GO TO 9.	
NG		GO TO 8.	

### DETECT MALFUNCTIONING PART

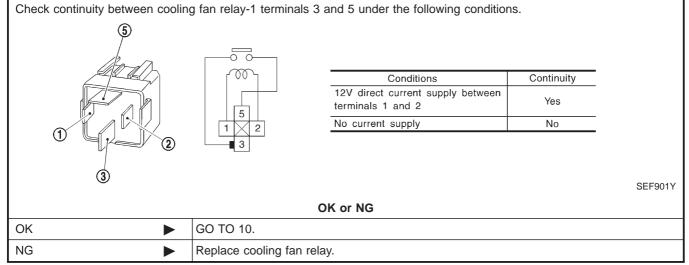
Check the following.

8

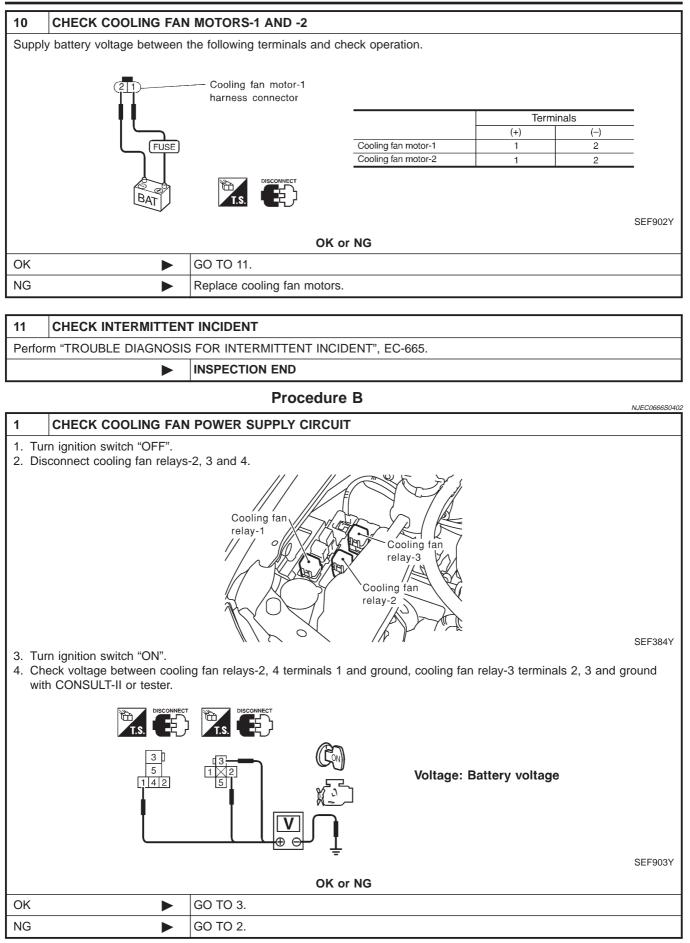
- Harness connectors E75, F36
- Harness for open or short between cooling fan relay-1 and ECM

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

# 9 CHECK COOLING FAN RELAY-1



Diagnostic Procedure (Cont'd)



Diagnostic Procedure (Cont'd)

### 2 DETECT MALFUNCTIONING PART

Check the following.

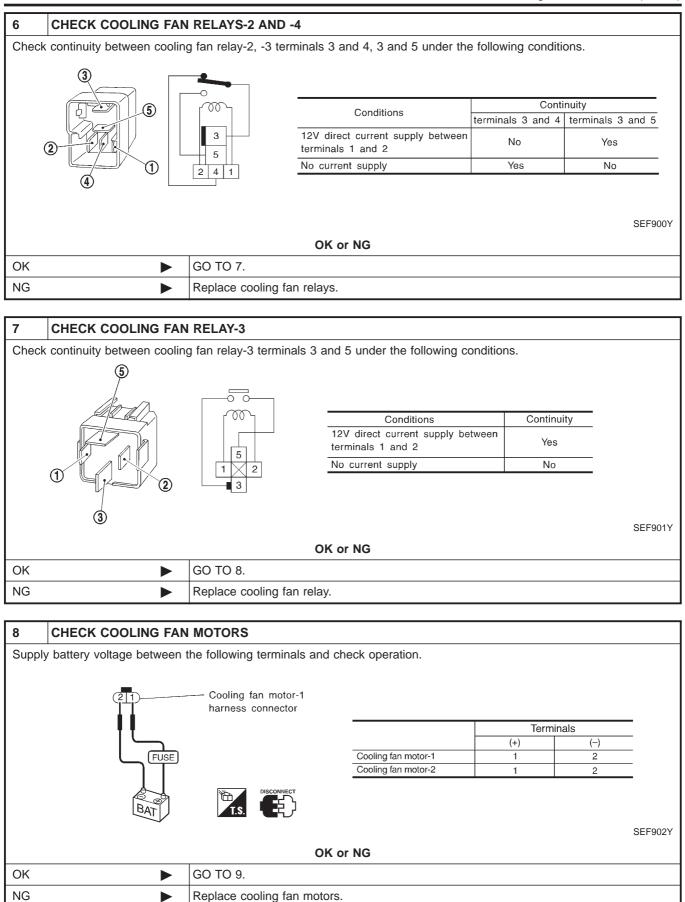
- 40A fusible link
- Harness for open or short between cooling fan relays-2, 3, 4 and fuse
- Harness for open or short between cooling fan relay-3 and fusible link

Repair harness or connectors.

### 3 CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-2 harness connector. Cooling fan motor-2 harness connector Cooling fan motor-1 harness connector 7 SEF385Y 3. Check harness continuity between cooling fan relays-2, 4 terminal 5 and body ground, cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK GO TO 4. NG Repair open circuit or short to ground or short to power in harness or connectors.

CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT				
1. Disconnect ECM harness connector.				
<ol> <li>Check harness continuity between ECM terminal 221 and cooling fan relays-2, 4 terminal 2, cooling fan relay-3 terminal 1. Refer to Wiring Diagram.         Continuity should exist.     </li> <li>Also check harness for short to ground and short to power.</li> </ol>				
OK or NG				
_				

5	DETECT MALFUNCTIO	NING PART		
Check	Check the following.			
	<ul> <li>Harness connectors E74, F35 or E75, F36</li> </ul>			
<ul> <li>Hari</li> </ul>	<ul> <li>Harness for open or short between cooling fan relays-2, 3, 4 and ECM</li> </ul>			
		Repair open circuit or short to ground or short to power in harness or connectors.		



### 9 CHECK INTERMITTENT INCIDENT

1. Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

► INSPECTION END

### Main 12 Causes of Overheating

				s of Overneating	NJEC0667
Engine	Step	Inspection item	Equipment	Condition	Reference page
OFF	1	<ul><li>Blocked radiator</li><li>Blocked radiator grille</li><li>Blocked bumper</li></ul>	• Visual	No blocking	_
	2	Coolant mixture	Coolant tester	50 - 50% coolant mixture	See MA-16, "RECOM- MENDED FLUIDS AND LUBRICANTS".
	3	Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See LC-18, "Changing Engine Coolant".
	4	Radiator cap	<ul> <li>Pressure tester</li> </ul>	78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm <sup>2</sup> , 11 - 14 psi)	See LC-38, "System Check".
ON*2	5	Coolant leaks	Visual	No leaks	See LC-38, "System Check".
ON*2	6	Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-41, "Thermostat" and "Radiator".
ON*1	7	<ul> <li>Cooling fan</li> </ul>	CONSULT-II	Operating	See Trouble Diagnosis for DTC P1217, EC-730.
OFF	8	Combustion gas leak	Color checker chemi- cal tester 4 Gas ana- lyzer	Negative	
ON* <sup>3</sup>	9	Coolant temperature     gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driv- ing and idling	See LC-44, "Changing Engine Coolant".
OFF*4	10	Coolant return from reservoir tank to radia- tor	Visual	Should be initial level in reservoir tank	See LC-45, "REFILLING ENGINE COOLANT".
OFF	11	Cylinder head	<ul> <li>Straight gauge feeler gauge</li> </ul>	0.1mm (0.004 in) Maxi- mum distortion (warping)	See EM-122, "Inspec- tion".
	12	Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-144, "Inspec- tion".

\*1: Turn the ignition switch ON.

\*2: Engine running at 3,000 rpm for 10 minutes.

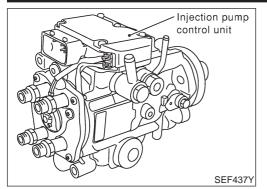
\*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

\*4: After 60 minutes of cool down time.

For more information, refer to LC-47, "OVERHEATING CAUSE ANALYSIS".

YD

**YD** Description



#### Description SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0728

Remarks: Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
FUEL TEMP SEN	• Engine: After warming up	More than 40°C (104°F)	
SPILL/V	• Engine: After warming up, idle the	Approx. 12 - 13°CA	
INT/A VOLUME	• Engine: After warming up, idle the	Approx. 150 - 450 mg/st	
F/CUT SIGNAL	Engine: After warming up     Idle		ON

NJEC0727

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

## **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V
317	Ρ	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V

## **On Board Diagnosis Logic**

NJEC0730

		10200700
DTC	Malfunction is detected when	Check Items (Possible cause)
P1241 0707	<ul> <li>Fuel injection timing control system does not function properly.</li> </ul>	<ul> <li>Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)</li> <li>Electronic control fuel injection pump</li> <li>Improper fuel quality</li> </ul>

(P) WITH CONSULT-II

2 DATA MONI	TOR
MONITOR	NO DTC
CKPS-RPM (TDC)	XXX rpm

## **DTC Confirmation Procedure**

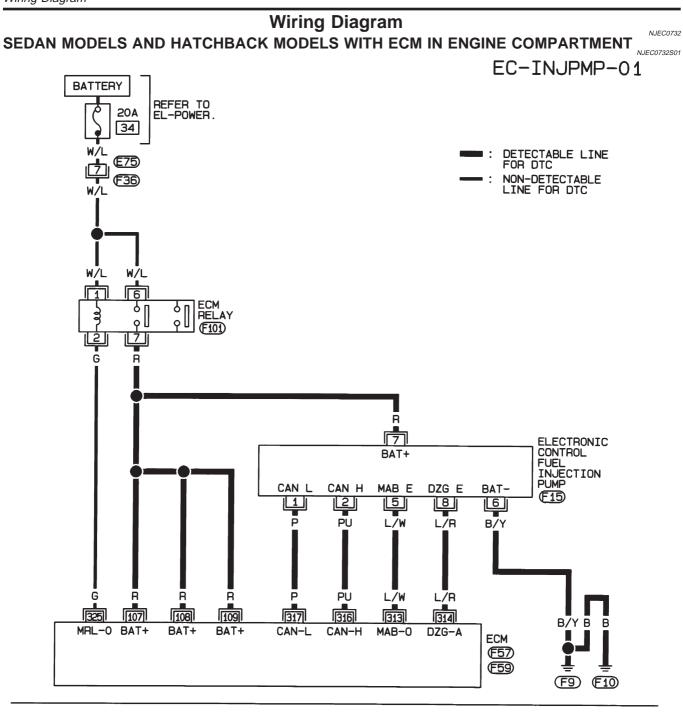
NJEC0731

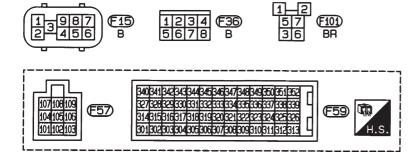
- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) Keep engine speed at more than 2,000 rpm for at least 10 seconds.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-762.

NJEC0729

### **WITHOUT CONSULT-II**

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Keep engine speed at more than 2,000 rpm for at least 10 seconds.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-762.

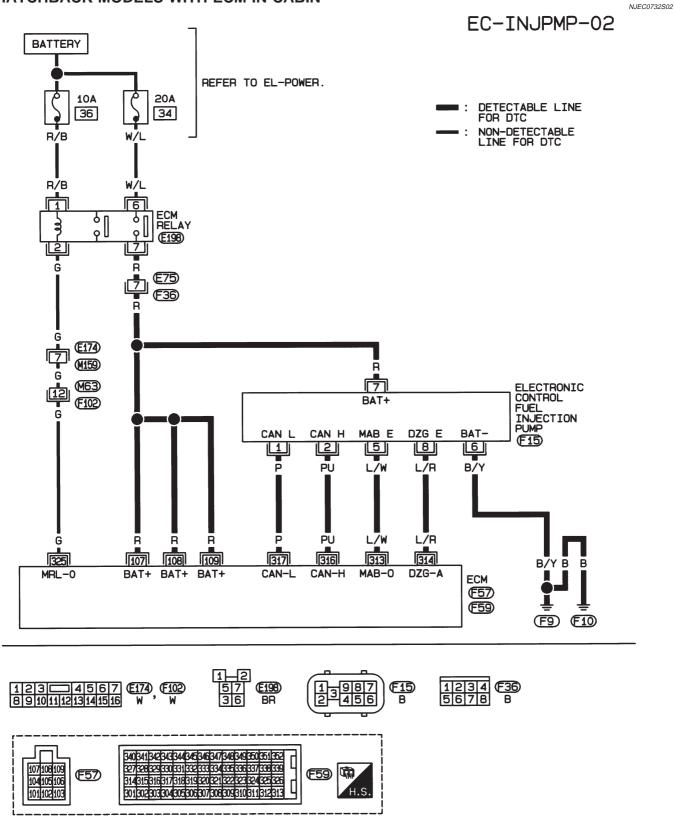




HEC825

EC-760

#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

#### **Diagnostic Procedure**

## 1 INSPECTION START

1. Turn ignition switch "OFF".

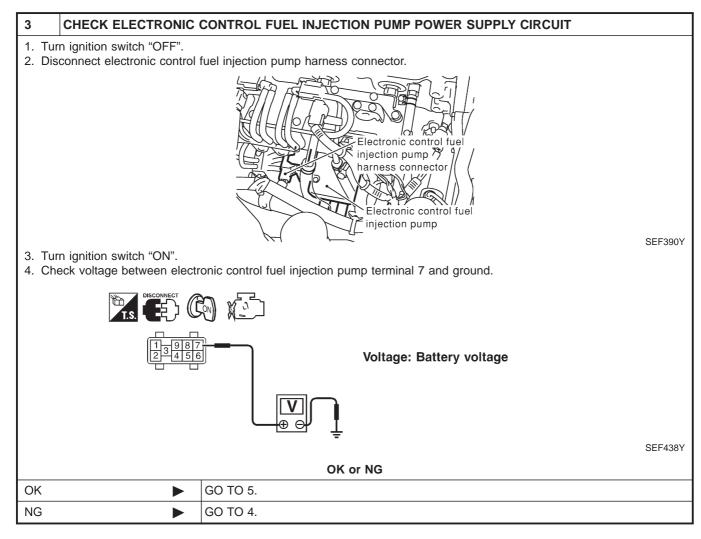
2. Perform "AIR BREEDING", EC-625, and "WATER DRAINING", EC-625.

GO TO 2.

#### 2 PERFORM DTC CONFIRMATION PROCEDURE AGAIN

Perform "DTC Confirmation Procedure", EC-758 again.

OK or NG		
OK		INSPECTION END
NG DO TO 3.		



#### 4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36 (Hatchback models with ECM in cabin)
- Harness for open or short between electronic control fuel injection pump and ECM
- Harness for open or short between electronic control fuel injection pump and ECM relay

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

## EC-762

YD

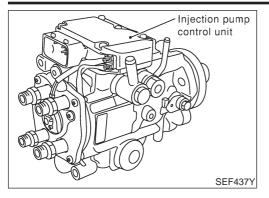
NJEC0733

5 CHECK ELEC	TRONIC CONTROL FUEL INJECTION PUMP		UIT FOR OPEN AND SHORT	
gram. Continuity shou	tinuity between electronic control fuel injection pur	np terminal 6 and	ground. Refer to Wiring Dia-	
	OK or NG			
ОК	► GO TO 6.			
NG	Repair open circuit or short to ground open circuit or short to ground open circuit or short to ground open circuit ope	r short to power i	n harness or connectors.	
6 CHECK COM	MUNICATION LINE FOR OPEN AND SHORT			
1. Check continuity between the following terminals. Refer to Wiring Diagram.				
	Electronic control fuel injection pump	ECM		
	1	317		
	2	316		
	5	313		
	8	314		
Continuity shou	<b>uld exist.</b> s for short to ground and short to power.		MTBL0462	
	OK or NG			
OK	► GO TO 7.			
NG				
		•		
7 CHECK INTER	RMITTENT INCIDENT			

7	CHECK INTERMITTENT INCIDENT			
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.			
	OK or NG			
ОК	OK  Replace electronic control fuel injection pump.			
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.			

EC-763

Description



### Description SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0715

Remarks: Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION
FUEL TEMP SEN	Engine: After warming up	More than 40°C (104°F)
SPILL/V	• Engine: After warming up, idle the	Approx. 12 - 13°CA
INT/A VOLUME	• Engine: After warming up, idle the	Approx. 150 - 450 mg/st
F/CUT SIGNAL	Engine: After warming up	ON

NJEC0714

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

## **ECM Terminals and Reference Value**

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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Ρ	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V

## **On Board Diagnosis Logic**

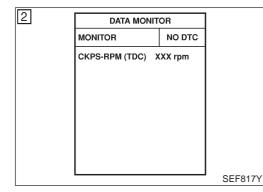
NJEC0717

'n

NJEC0716

		10200111
DTC	Malfunction is detected when	Check Items (Possible cause)
P1251 0704	<ul> <li>Spill valve (Built-into electronic control fuel injec- tion pump) does not function properly.</li> </ul>	<ul> <li>Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)</li> <li>Electronic control fuel injection pump</li> </ul>

(P) WITH CONSULT-II



## **DTC Confirmation Procedure**

NJEC0718

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-769.

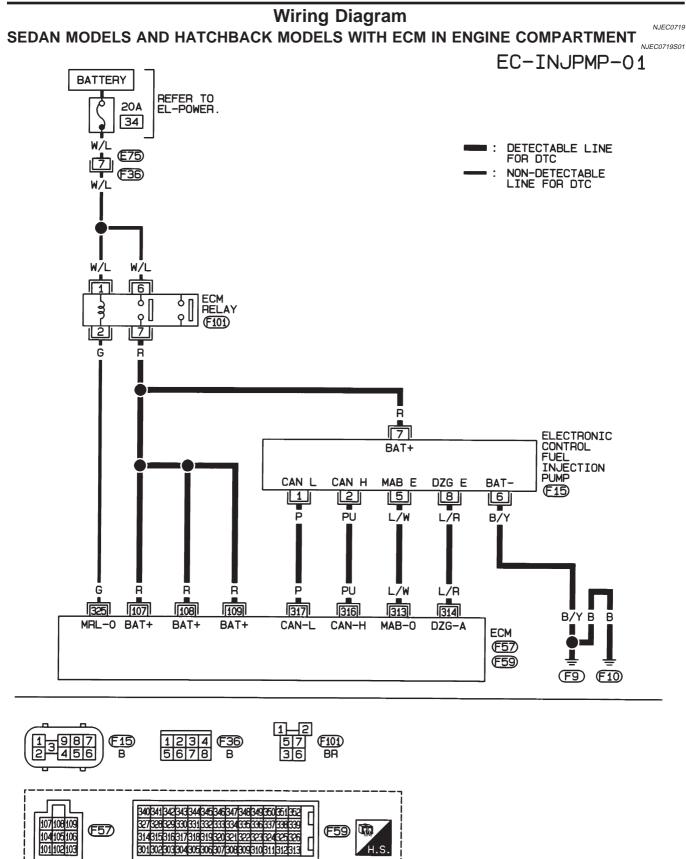
#### **WITHOUT CONSULT-II**

Turn ignition switch "ON" and wait at least 2 seconds.

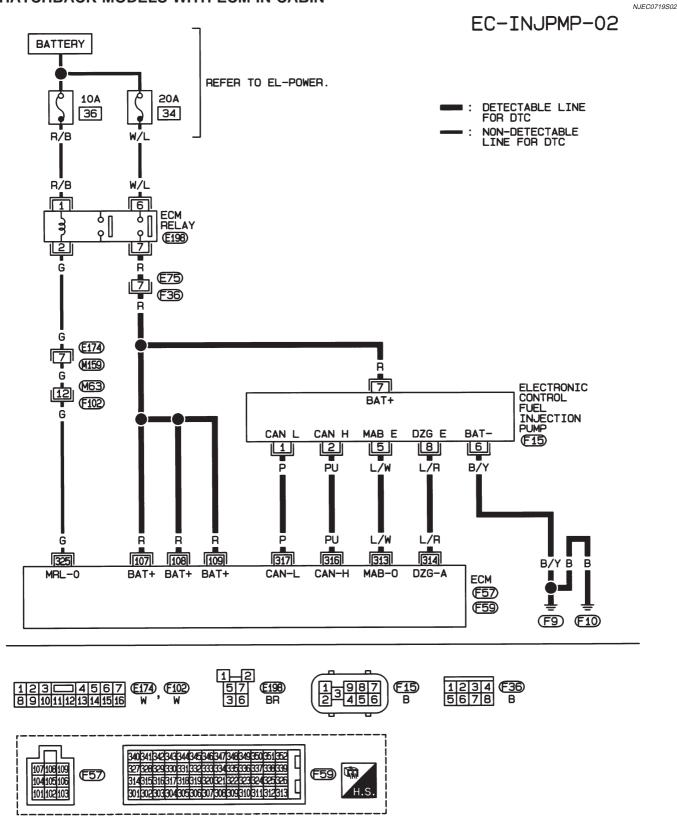
EC-765

- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-769.

**YD** Wiring Diagram

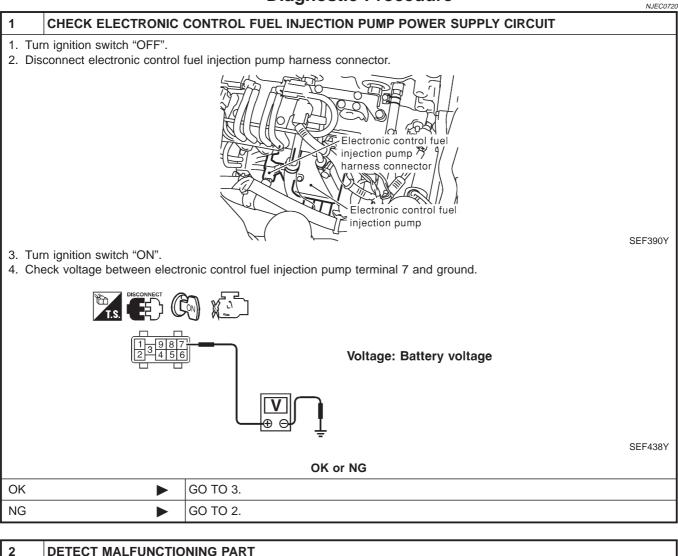


#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

## **Diagnostic Procedure**



Check the following.

• Harness connector E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- · Harness for open or short between electronic control fuel injection pump and ECM relay

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

# 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

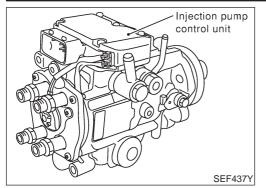
Diagnostic Procedure (Cont'd)

4	CHECK COMMUNICATI	TION LINE FOR OPEN AND SHORT			
1. C	heck continuity between the	following terminals. Refer to Wiring Diag	ram.		
		Electronic control fuel injection pump	ECM		
		1	317		
		2	316		
		5	313		
		8	314		
				MTBL0462	
2. A	Continuity should exist. Iso check harness for short to	o ground and short to power.			
		OK or NG			

ОК	GO TO 5.
NG	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTEN				
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.				
	OK or NG				
ОК	OK   Replace electronic control fuel injection pump.				
NG		Repair open circuit or short to ground or short to power in harness or connectors.			

**YD** Description



#### Description SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0701

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	• Engine: After warming up, idle the	Engine: After warming up, idle the engine.	
INT/A VOLUME	Engine: After warming up, idle the engine.		Approx. 150 - 450 mg/st
F/CUT SIGNAL	Engine: After warming up     Idle		ON

NJEC0700

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

## **ECM Terminals and Reference Value**

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

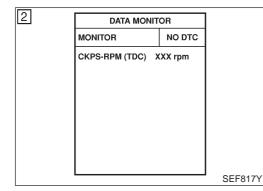
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Р	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V

## **On Board Diagnosis Logic**

NJEC0703

DTC	Malfunction is detected when	Check Items (Possible cause)
P1337 0702	<ul> <li>Injection pump control unit input signal [Crank- shaft position sensor (TDC) signal] processing function is malfunctioning.</li> </ul>	<ul> <li>Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)</li> <li>Electronic control fuel injection pump</li> </ul>



## DTC Confirmation Procedure

NJEC0704

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC P0335 is detected, go to "Diagnostic procedure", EC-698.

If DTC P1337 is detected, go to "Diagnostic Procedure", EC-776.

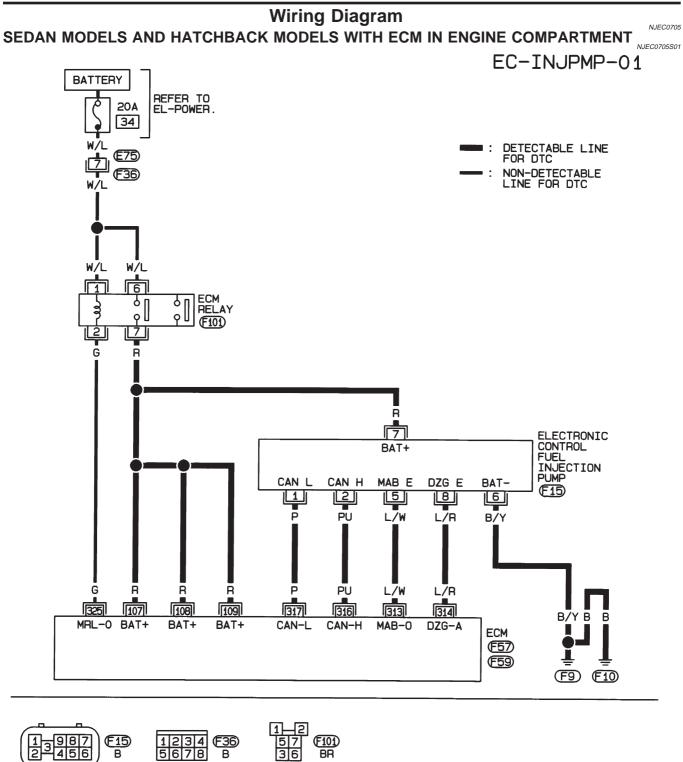
NJEC0702

'n

## **WITHOUT CONSULT-II**

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC P0335 is detected, go to "Diagnostic Procedure", EC-698.

If DTC P1337 is detected, go to "Diagnostic Procedure", EC-776.





**E15** 

В

HEC825

YD

**F101** 

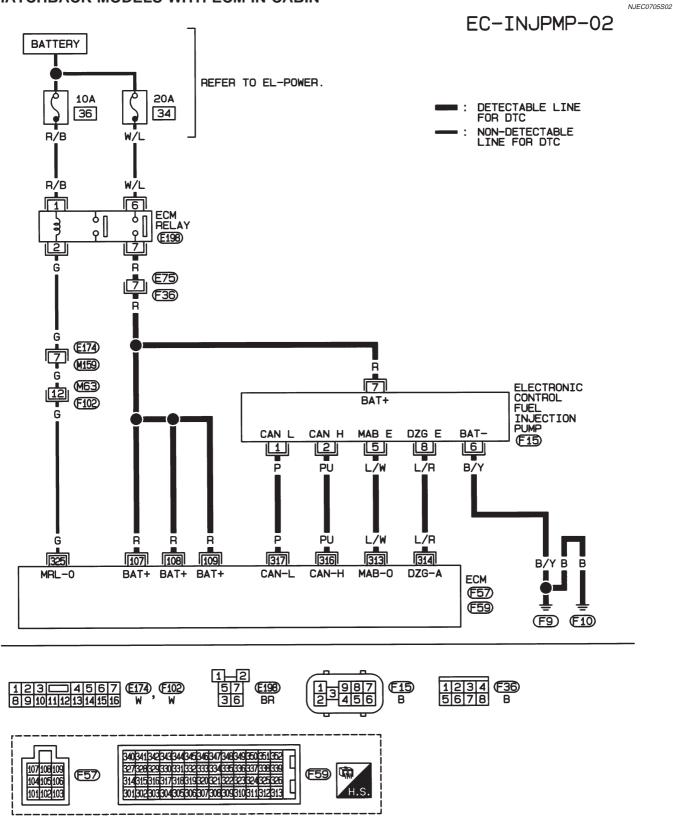
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6

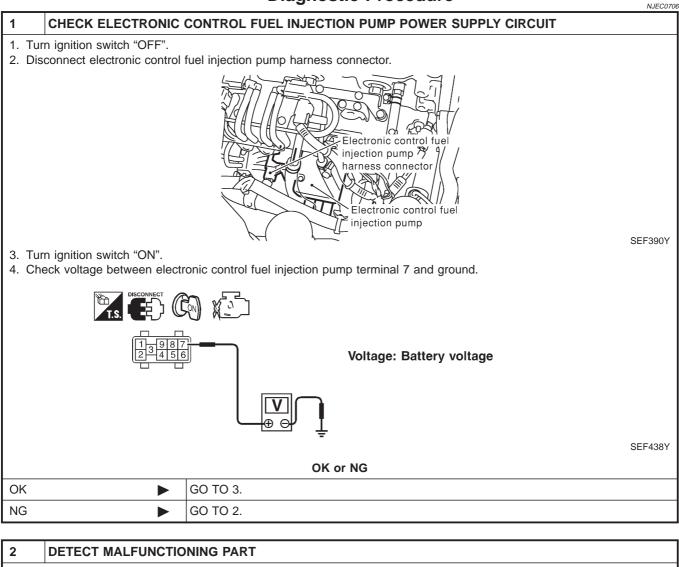
**YD** Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

### **Diagnostic Procedure**



Check the following.

• Harness connectors E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- Harness for open or short between electronic control fuel injection pump and ECM relay

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

# 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

4 CHECK COMMUNICAT	CHECK COMMUNICATION LINE FOR OPEN AND SHORT						
1. Check continuity between the following terminals. Refer to Wiring Diagram.							
	Electronic control fuel injection pump	ECM	•				
	1	317	-				
	2	316					
	5	313					
	-						
Continuity should exist.			MTBL0462				
-	2. Also check harness for short to ground and short to power.						
OK or NG							
ОК	GO TO 5.						

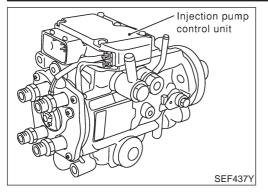
5	CHECK INTERMITTEN			
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.			
	OK or NG			
ОК	OK   Replace electronic control fuel injection pump.			
NG		Repair open circuit or short to ground or short to power in harness or connectors.		

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

NG

## EC-777

YD



### Description SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0694

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	• Engine: After warming up, idle the	Engine: After warming up, idle the engine.	
INT/A VOLUME	Engine: After warming up, idle the engine.		Approx. 150 - 450 mg/st
F/CUT SIGNAL	CUT SIGNAL • Engine: After warming up Idle		ON

NJEC0693

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

## **ECM Terminals and Reference Value**

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.

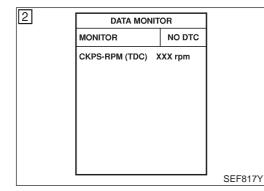
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0.4V
316	PU	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V
317	Р	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V

## **On Board Diagnosis Logic**

 DTC
 Malfunction is detected when ....
 Check Items (Possible cause)

 P1341
 • An improper voltage signal from cam position sensor (Built-into electronic control fuel injection pump) is sent to injection pump control unit.
 • Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)
 • Electronic control fuel injection pump

(I) WITH CONSULT-II



## **DTC Confirmation Procedure**

NJEC0697

NJEC0696

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-783.

#### **WITHOUT CONSULT-II**

Turn ignition switch "ON" and wait at least 2 seconds.

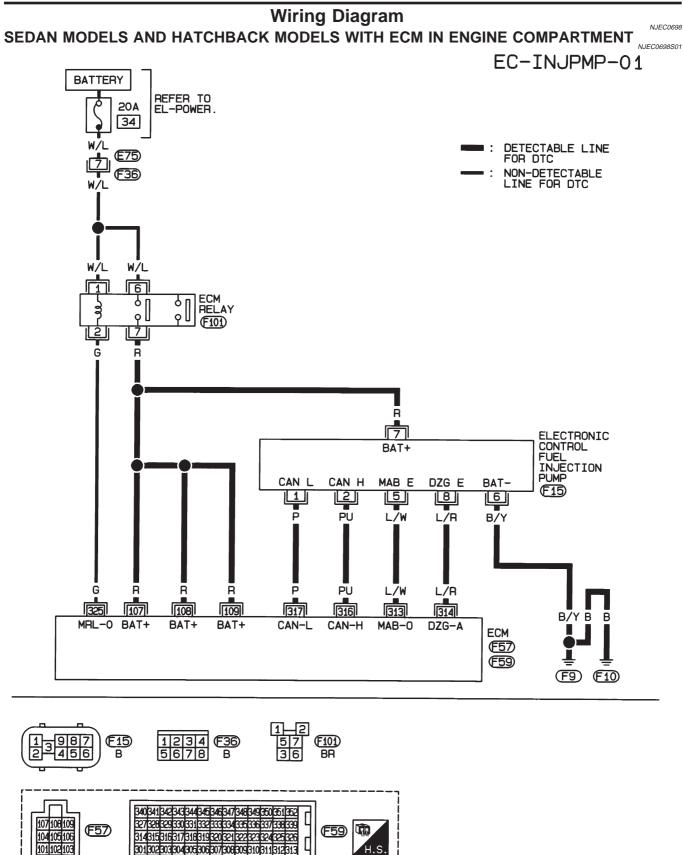
EC-779

YD

NJEC0695

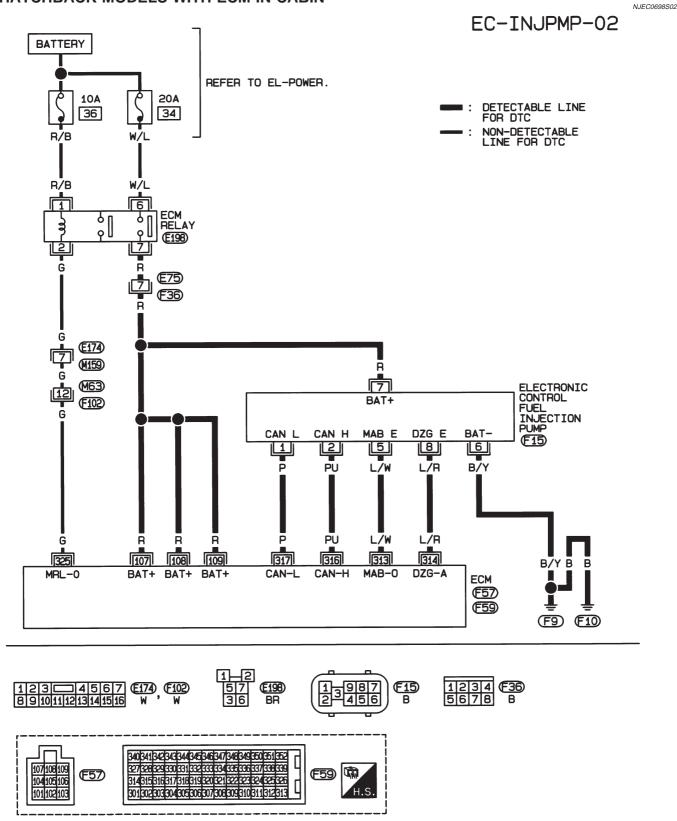
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-783.

YD Wiring Diagram



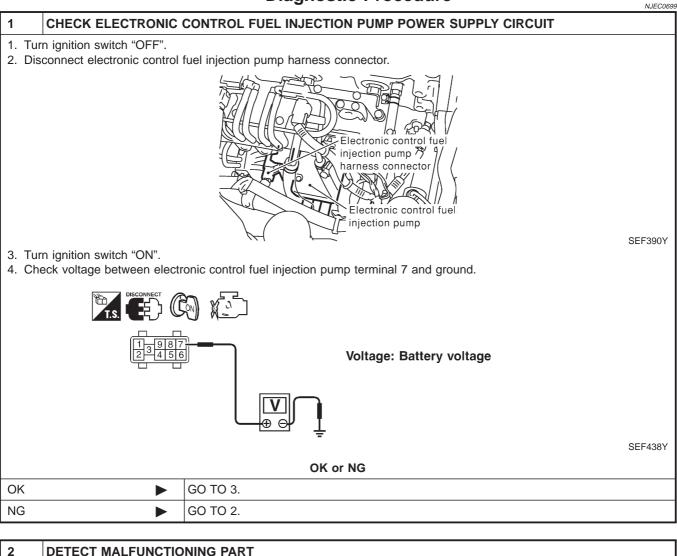
HEC825

#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

## **Diagnostic Procedure**



Check the following.

• Harness connectors E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- · Harness for open or short between electronic control fuel injection pump and ECM relay

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

# 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

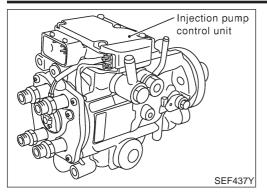
Diagnostic Procedure (Cont'd)

4	CHECK COMMUNICATIO	N LINE FOR OPEN AND SHORT		
1. Cł	neck continuity between the fo	bllowing terminals. Refer to Wiring Diag	ram.	
		Electronic control fuel injection pump	ECM	
		1	317	
		2	316	
		5	313	
		8	314	
2. AI	Continuity should exist. so check harness for short to	around and short to power.		MTBL0462
		OK or NG		

ОК	GO TO 5.
NG 🕨	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.			
	OK or NG		
ОК	OK   Replace electronic control fuel injection pump.		
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.		

**YD** Description



#### Description SYSTEM DESCRIPTION

NJEC0707

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

#### FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

#### FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

#### FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

#### CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

## CONSULT-II Reference Value in Data Monitor Mode

NJEC0708

Remarks: Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
FUEL TEMP SEN	Engine: After warming up	More than 40°C (104°F)	
SPILL/V	Engine: After warming up	Approx. 12 - 13°CA	
INT/A VOLUME	Engine: After warming up, idle the engine.		Approx. 150 - 450 mg/st
F/CUT SIGNAL	Engine: After warming up	Idle	ON

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

## **ECM Terminals and Reference Value**

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.

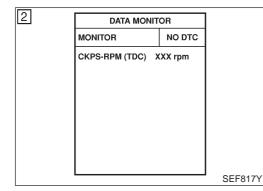
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump       [Engine is running] • Warm-up condition • Idle speed       A		Approximately 0.1V
314	L/R	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.4V
316	PU	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V
317	Ρ	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.5V

## **On Board Diagnosis Logic**

NJEC0710

DTC	Malfunction is detected when	Check Items (Possible cause)
P1600 0703	<ul> <li>Injection pump control unit receives incorrect voltage signal from ECM continuously.</li> </ul>	<ul> <li>Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.)</li> <li>Electronic control fuel injection pump</li> </ul>

(P) WITH CONSULT-II



## **DTC Confirmation Procedure**

NJEC0711

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-790.

#### **WITHOUT CONSULT-II**

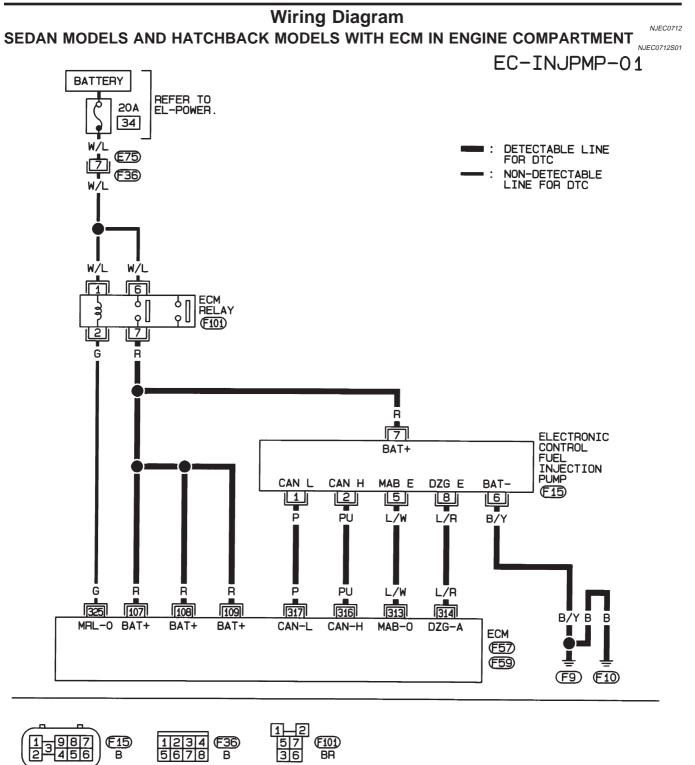
1) Turn ignition switch "ON" and wait at least 2 seconds.

NJEC0709

EC-786

- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-790.

Wiring Diagram

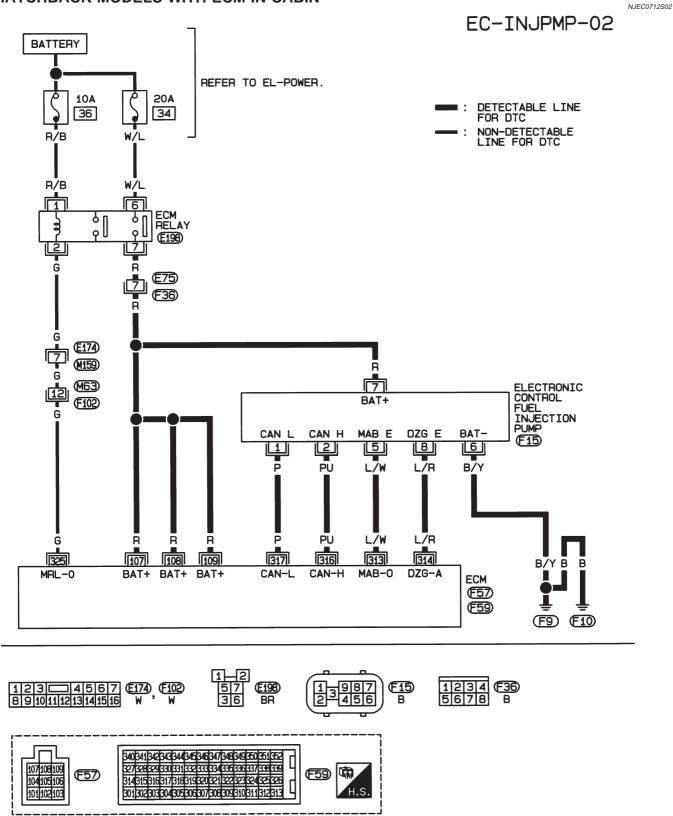




HEC825

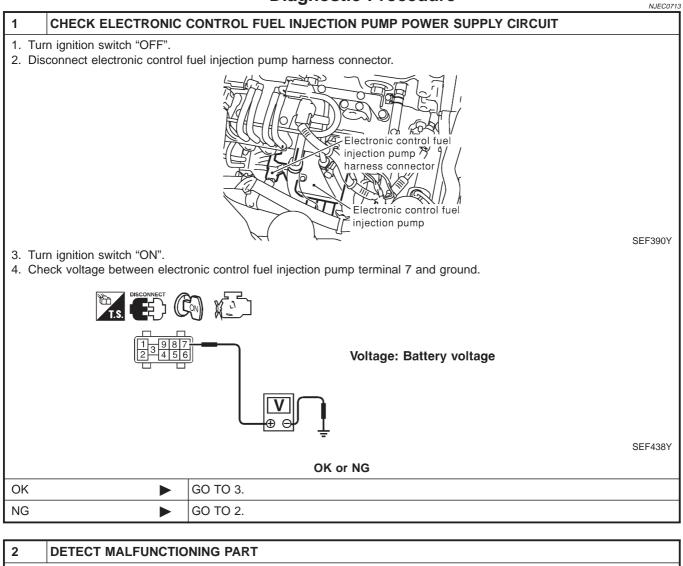
**YD** Wiring Diagram (Cont'd)

#### HATCHBACK MODELS WITH ECM IN CABIN



HEC993

## **Diagnostic Procedure**



Check the following.

• Harness connectors E75, F36 (Hatchback models with ECM in cabin)

- Harness for open or short between electronic control fuel injection pump and ECM
- Harness for open or short between electronic control fuel injection pump and ECM relay

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

# 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK ▶ GO TO 4. NG ▶ Repair open circuit or short to ground or short to power in harness or connectors.

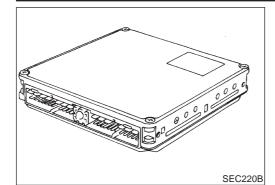
1. C	heck continuity between the	e following terminals. Refer to Wiring Diag	am.	
		Electronic control fuel injection pump	ECM	
		1	317	
		2	316	
		5	313	
		8	314	
				MTBL0462
	Continuity should exist.			
2. A	lso check harness for short	to ground and short to power.		
		OK or NG		
ОК		GO TO 5		

5	CHECK INTERMITTENT	
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.
UN		GO 10 5.

Э	CHECK INTERMITTEN	INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.			
	OK or NG		
ОК	OK   Replace electronic control fuel injection pump.		
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.		

## DTC P1603 ECM 12, DTC P1607 ECM 2

Description

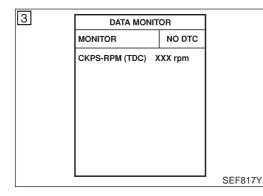


#### Description

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**

DTC	Malfunction is detected when	Check Items (Possible Cause)
P1603 0901	• ECM calculation function is malfunctioning.	ECM (ECCS-D control module)
P1607 0301		



## **DTC Confirmation Procedure**

- WITH CONSULT-II
- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 2 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-793.

#### **WITHOUT CONSULT-II**

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and wait at least 2 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-793.

NJEC0669

NJEC0670

NJEC0670S01

# **Diagnostic Procedure**

		Diagnostic Procedure	NJEC0671		
1	INSPECTION START				
🕘 Wi	) With CONSULT-II				
	rn ignition switch "ON".				
2. Se	lect "SELF DIAG RESULTS	3" mode with CONSULT-II.			
3. Tou	uch "ERASE".				
4. Pe	rform "DTC Confirmation P	rocedure", EC-792, again.			
5. Is t	the DTC P1603 or P1607 d	isplayed again?			
🕅 Wi	ithout CONSULT-II				
	1. Turn ignition switch "ON".				
2. Era	2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.				
3. Pe	3. Perform "DTC Confirmation Procedure", EC-792, again.				
4. Pe	4. Perform "Diagnostic Test Mode II (Self-diagnostic results)".				
5. Is t	5. Is the DTC 0301 or 0901 displayed again?				
	Yes or No				
Yes		Replace ECM.			
No		INSPECTION END			

# YD

N.IEC0744

# **ECM Terminals and Reference Value**

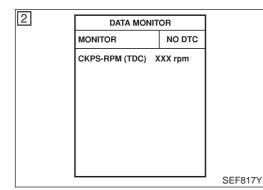
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

# 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
107 108 109	R R R	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
325	G	ECM relay (Self-shutoff)	<ul> <li>[Ignition switch "ON"]</li> <li>[Ignition switch "OFF"]</li> <li>For a few seconds after turning ignition switch "OFF"</li> </ul>	0 - 1V
			<ul> <li>[Ignition switch "OFF"]</li> <li>A few seconds passed after turning ignition switch "OFF"</li> </ul>	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "OFF"]	OV
507	W/R	Ignition switch	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

# **On Board Diagnosis Logic**

# DTC Malfunction is detected when .... Check Items (Possible Cause) P1620 • An irregular voltage signal from the ECM relay is sent to ECM. • Harness or connectors (ECM relay circuit is open or shorted.) • ECM relay



# **DTC Confirmation Procedure**

NJEC0746 NJEC0746S01

NJEC0746S02

1) Turn ignition switch "ON".

WITH CONSULT-II

- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-797.

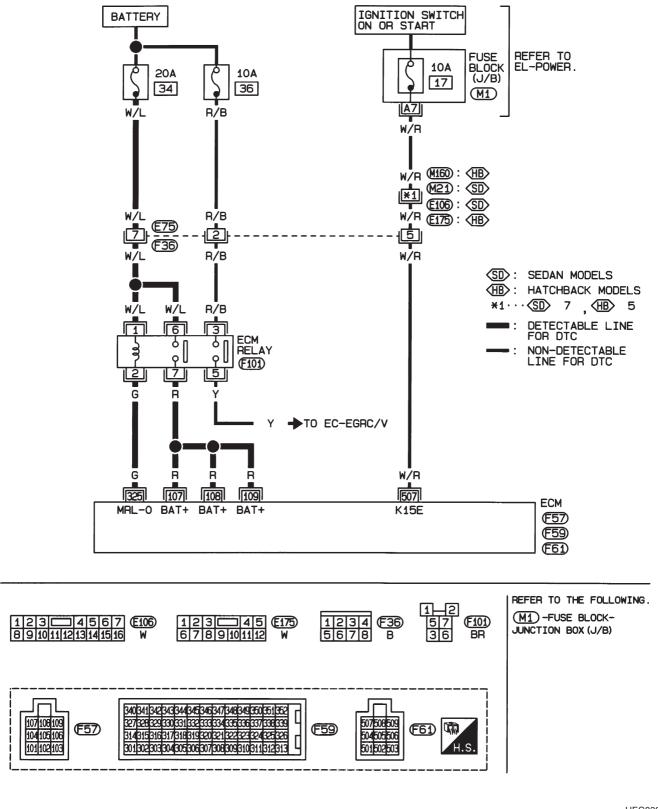
# **WITHOUT CONSULT-II**

- 1) Turn ignition switch "ON".
- 2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-797.

# Wiring Diagram

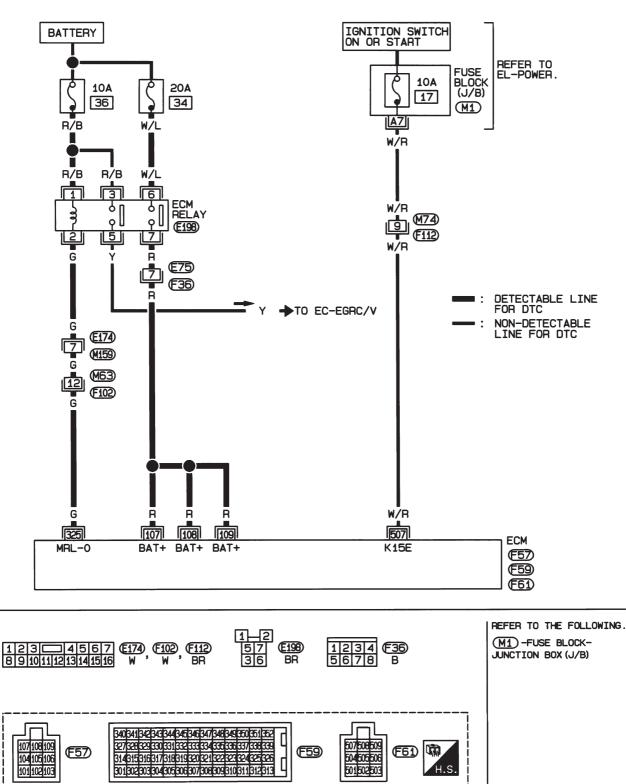
SEDAN MODELS AND HATCHBACK MODELS WITH ECM IN ENGINE COMPARTMENT

EC-ECMRLY-01



Wiring Diagram (Cont'd)

# HATCHBACK MODELS WITH ECM IN CABIN



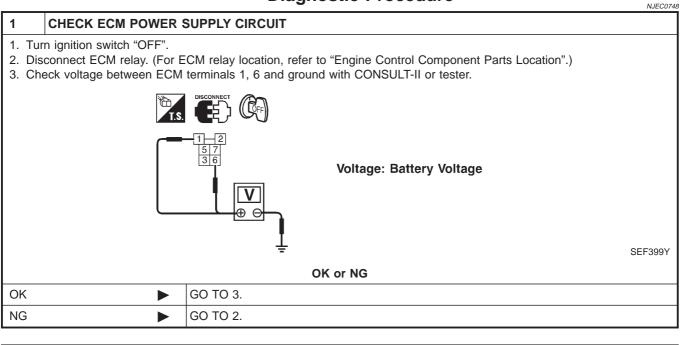
YD

NJEC0747S02

EC-ECMRLY-02

# DTC P1620 ECM RLY

# **Diagnostic Procedure**



# 2 DETECT MALFUNCTIONING PART

Check the following.

1. Harness connectors E75, F36 (Sedan models and hatchback models with ECM in engine compartment)

2. 20A fuse

3. 10A fuse (Hatchback models with ECM in cabin)

4. Harness for open and short between ECM relay and battery

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

# 3 CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 107, 108, 109 and ECM relay 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 5. NG ● Repair open circuit or short to ground or short to power in harness or connectors.

4	DETECT MALFUNCTIO	NING PART	
	Check the following.		
1. Har	1. Harness connectors E75, F36 (New H/B)		
2. Har	2. Harness for open and short between ECM and ECM relay		
		Repair open circuit or short to ground or short to power in harness or connectors.	

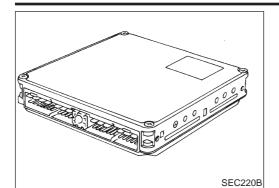
# DTC P1620 ECM RLY

5	CHECK ECM OUTPUT	SIGNAL CIRCUIT FO	R OPEN AND SHORT		
	eck harness continuity betw Continuity should exist. to check harness for short		and ECM relay terminal 2. I	Refer to Wiring Diagram.	
2. 713			OK or NG		
ок		GO TO 7.			
NG	• •	GO TO 7. GO TO 6.			
NG		GO TO 6.			
6	DETECT MALFUNCTIO				
Check 1. Ha 2. Ha	the following. rness connectors E174, M rness connectors M63, F10 rness for open and short b	159 (New H/B) 02 (New H/B)	relay		
	•	Repair open circuit or s	short to ground or short to pe	ower in harness or conne	ectors.
	CHECK ECM RELAY ply 12V direct current betw eck continuity between EC			Continuity	
			12V direct current supply between terminals 1 and 2 OFF	Yes No	 SEF296X
			OK or NG		
ОК		GO TO 8.			
NG	•	Replace ECM relay.			

8	CHECK INTERMITTENT	INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.		
		INSPECTION END

# DTC P1621 ECM 15



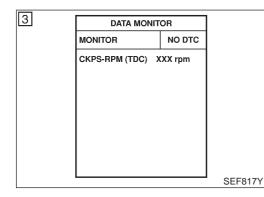


# Description

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

DTC	Malfunction is detected when	Check Items (Possible Cause)
P1621	• ECM input signal processing function is malfunc-	ECM
0903	tioning.	(ECCS-D control module)



# **DTC Confirmation Procedure**

NJEC0751 NJEC0751S01

NJEC0750

- WITH CONSULT-II1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-800.

# **WITHOUT CONSULT-II**

- Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-800.

# DTC P1621 ECM 15

1

# **Diagnostic Procedure**

### 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", EC-799, again.
- 5. Is the DTC P1621 displayed again?

## Without CONSULT-II

- 1. Turn ignition switch "ON".
- 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
- 3. Perform "DTC Confirmation Procedure", EC-799, again.
- 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)".
- 5. Is the DTC 0903 displayed again?

### Yes or No

Yes	Replace ECM.
No	INSPECTION END

# YD

NJEC0752

# DTC P1660 BATTERY VOLTAGE

On Board Diagnosis Logic

# **On Board Diagnosis Logic**

The ECM checks if battery voltage is within the tolerance range for the engine control system.

DTC	Malfunction is detected when	Check Items (Possible Cause)
P1660 0502	<ul> <li>An abnormally high or low voltage from the battery is sent to ECM.</li> </ul>	<ul><li>Incorrect jump starting</li><li>Battery</li><li>Alternator</li><li>ECM</li></ul>

# **DTC Confirmation Procedure**

NJEC1259

NJEC1260

ΥD

NJEC1258

# With CONSULT-II

- 1) Check the following.
- Jumper cables are connected for jump starting.
- Battery or alternator has been replaced. If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-801.
- 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly.
- 3) Check that the alternator functions properly. Refer to SC-30, "Trouble Diagnosis".
- 4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 5) Wait one minute.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-801. If DTC is not detected, go to next step.
- 7) Start engine and wait one minute at idle.
- 8) If DTC is detected, go to "Diagnostic Procedure", EC-801.

# **Without CONSULT-II**

# 1) Check the following.

- Jumper cables are connected for jump starting.
- Battery or alternator has been replaced.
   If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-801.
- 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly.
- 3) Check that the alternator functions properly. Refer to SC-30, "Trouble Diagnosis".
- 4) Turn ignition switch "ON" and wait one minute.
- 5) Turn ignition switch "OFF", wait 5 seconds and then turn "ON".
- 6) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM.
- 7) If DTC is detected, go to "Diagnostic Procedure", EC-801. If DTC is not detected, go to next step.
- 8) Start engine and wait one minute at idle.
- 9) Turn ignition switch "OFF", wait 5 seconds and then turn "ON".
- 10) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM.
- 11) If DTC is detected, go to "Diagnostic Procedure", EC-801.

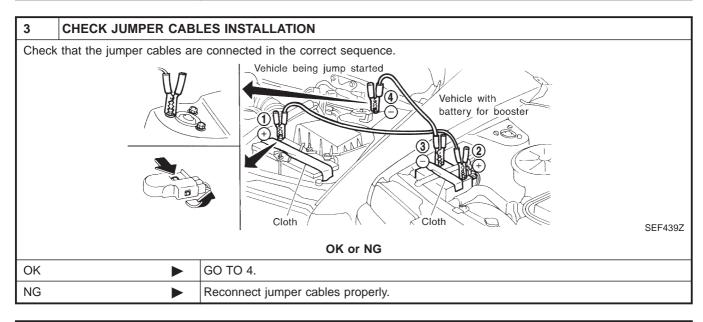
# **Diagnostic Procedure**

1	INSPECTION START			
Are jur	Are jumper cables connected for the jump starting?			
	Yes or No			
Yes	•	GO TO 3.		
No	•	GO TO 2.		

# DTC P1660 BATTERY VOLTAGE

Diagnostic Procedure (Cont'd)

2	CHECK BATTERY AND ALTERNATOR		
	Check that the proper type of battery and alternator is installed. Refer to SC-38, "Battery" and SC-39, "Alternator".		
	OK or NG		
OK		GO TO 5.	
NG		Replace with a proper one.	



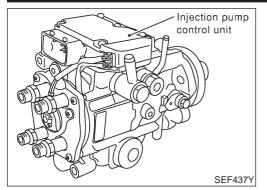
4	CHECK BATTERY FOR BOOSTER			
Check	Check that the battery for the booster is a 12V battery.			
	OK or NG			
OK	•	GO TO 5.		
NG	•	Change the vehicle for booster.		

PERFORM DTC CONFIRMATION PROCEDURE AGAIN			
Perform "DTC Confirmation Procedure", EC-801, again.			
OK or NG			
	GO TO 6.		
	Replace ECM.		

6	CHECK ELECTRICAL PARTS DAMAGE			
<ul><li>Check the following for damage.</li><li>Wiring harness and harness connectors for burn</li><li>Fuses for short</li></ul>				
OK or NG				
OK	OK INSPECTION END			
NG	NG  Repair or replace malfunctioning part.			

# DTC P1690 P5-PUMP C/MODULE

**YD** Description



# Description SYSTEM DESCRIPTION

NJEC0721

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators built-into electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

# FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

# FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

# FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

# CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

# CONSULT-II Reference Value in Data Monitor Mode

NJEC0722

Remarks: Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
FUEL TEMP SEN	Engine: After warming up	More than 40°C (104°F)	
SPILL/V	• Engine: After warming up, idle the	Approx. 12 - 13°CA	
INT/A VOLUME	• Engine: After warming up, idle the	Approx. 150 - 450 mg/st	
F/CUT SIGNAL	Engine: After warming up	Idle	ON

# DTC P1690 P5-PUMP C/MODULE

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

MONITOR ITEM	CONDITION	SPECIFICATION
BARO SEN	• Ignition switch: ON	Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm <sup>2</sup> , 14.59 psi) Approx. 1,000 m (3,218 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm <sup>2</sup> , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm <sup>2</sup> , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm <sup>2</sup> , 11.36 psi)

# **ECM Terminals and Reference Value**

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

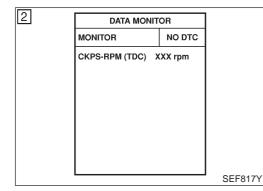
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
313	L/W	Electronic control fuel injection pump	[Engine is running] • Warm-up condition • Idle speed	Approximately 0.1V
314	L/R	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 0.4V
316	PU	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V
317	Ρ	Electronic control fuel injection pump	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> </ul>	Approximately 2.5V

# **On Board Diagnosis Logic**

NJEC0724

DTC	Malfunction is detected when	Check Items (Possible cause)
P1690 0705	<ul> <li>Injection pump control unit does not function properly.</li> </ul>	Electronic control fuel injection pump



# DTC Confirmation Procedure

NJEC0725

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-805.

# **WITHOUT CONSULT-II**

Turn ignition switch "ON" and wait at least 2 seconds.

YD

NJEC0723

EC-804

# DTC P1690 P5-PUMP C/MODULE

NJEC0726

- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-805.

# **Diagnostic Procedure**

1	INSPECTION START				
1. Turi 2. Sel 3. Tou	<ul> <li>With CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>2. Select "SELF DIAG RESULTS" mode with CONSULT-II.</li> <li>3. Touch "ERASE".</li> </ul>				
	form "DTC Confirmation P he DTC P1690 displayed a				
1. Turi 2. Era 3. Per 4. Per	<ul> <li>Without CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.</li> <li>3. Perform "DTC Confirmation Procedure", EC-804, again.</li> <li>4. Perform "Diagnostic Test Mode II (Self-diagnostic results)".</li> <li>5. Is the DTC 0705 displayed again?</li> </ul>				
Yes or No					
Yes   Replace electronic control fuel injection pump.					
No INSPECTION END					

# Description SYSTEM DESCRIPTION

	YD
Ì	

### NJEC0760 NJEC0760S01

NJEC0760S02

Sensor	Input Signal to ECM	ECM Func- tion	Actuator	
Crankshaft position sensor (TDC)	Engine speed	Glow	Glow lamp, Glow relay	
Engine coolant tempera- ture sensor			↓ Glow plugs	

When engine coolant temperature is more than approximately 75°C (167°F), the glow relay turns off.

When coolant temperature is lower than approximately  $75^{\circ}C$  (167°F):

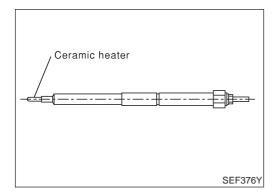
Ignition switch ON

After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.

- Cranking The glow relay turns ON, allowing current to flow through glow plug.
- Starting

After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

The glow indicator lamp turns ON for a certain period of time in relation to engine cooalnt temperature at the time glow relay is turned ON.



# **COMPONENT DESCRIPTION**

Glow Plug

The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.

ΥD

NJEC0761

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

# **CAUTION:**

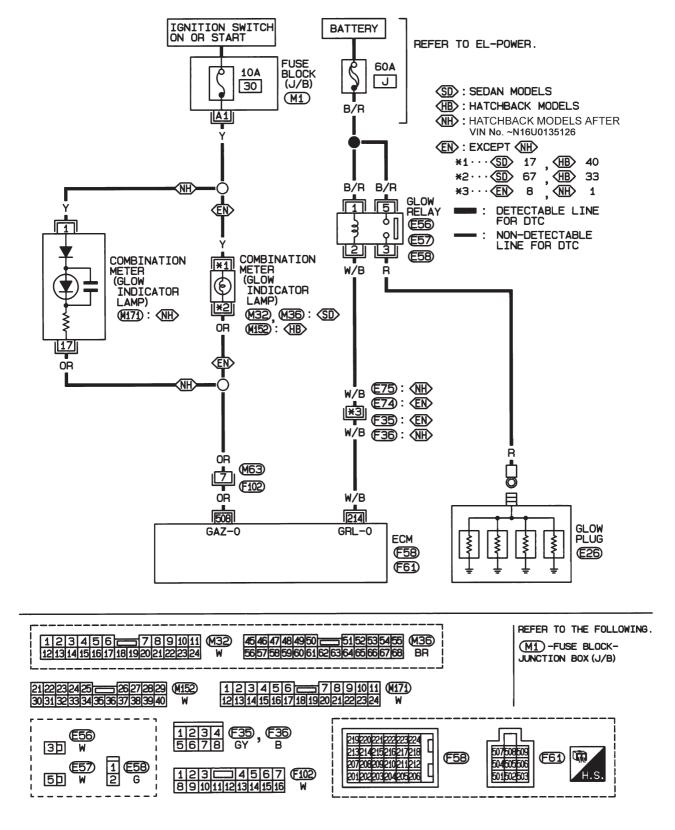
# Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
214	W/B	Glow relay	Refer to "SYSTEM DESCRIPTION", EC-806.	
509	OR Glow inc		<ul><li>[Ignition switch "ON"]</li><li>Glow indicator lamp is "ON"</li></ul>	Approximately 1V
508		Glow indicator lamp	<ul><li>[Ignition switch "ON"]</li><li>Glow indicator lamp is "OFF"</li></ul>	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

Wiring Diagram

EC-GLOW-01



NEF337A

YD

N.IEC0762

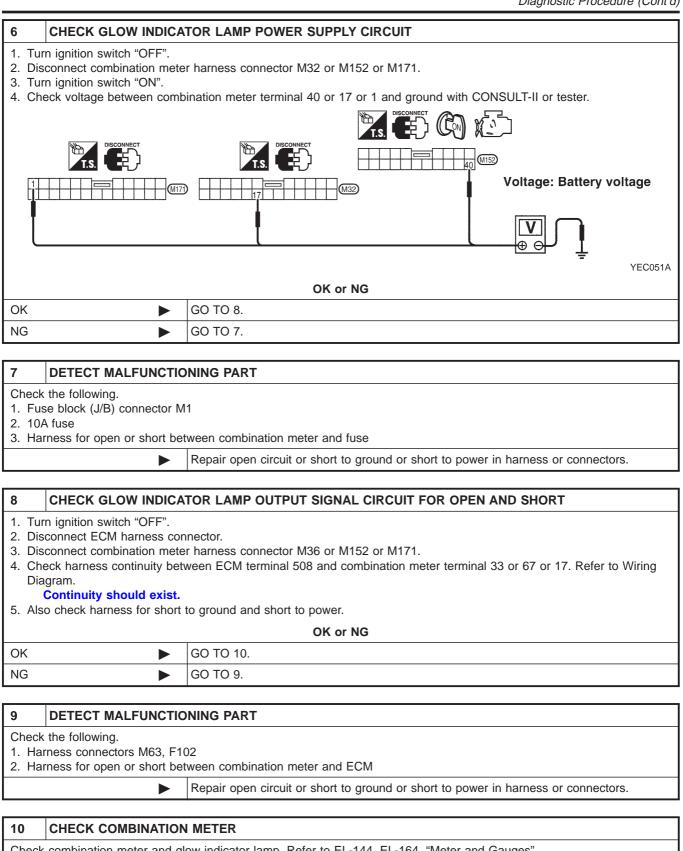
# Diagnostic Procedure

		Diagnostic i roccutic	NJEC0763		
1	INSPECTION START				
Check	Check fuel level, fuel supplying system, starter motor, etc.				
	OK or NG				
OK	•	GO TO 2.			
NG	•	Correct.			

2	CHECK INSTALLAT	ION			
Check	that glow plug nut and	all glow plug connecting plate nuts are installed properly.			
	Connecting plate nuts (0.14 - 0.22, 13 - 19) Glow plug harness connector ) (0.20 - 0.30, 18 - 26) (0.20 - 0.30, 18 - 26)				
		OK or NG			
OK (W	/ith CONSULT-II)	GO TO 3.			
OK (W II)	/ithout CONSULT-	GO TO 4.			
NG		Install properly.			

3	CHECK GLOW INDICATOR LAMP OPERATION					
1. Tur 2. Sel	<ul> <li>With CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.</li> <li>3. Confirm that "COOLAN TEMP/S" indicates below 75°C (167°F). If it indicates above 75°C (167°F), cool down engine.</li> </ul>					
			DATA MON	ITOR	1	
			MONITOR	NO DTC		
			COOLAN TEMP/S	XXX °C		
					OFFRANK	
4. Tur	n ignition switch "OFF", wa	ait at least 5 seco	onds and then t	turn "ON".	SEF013Y	
5. Ma	•				nore after turning ignition switch "ON", and then	
			OK or N	NG		
ОК		GO TO 5.				
NG		GO TO 6.				

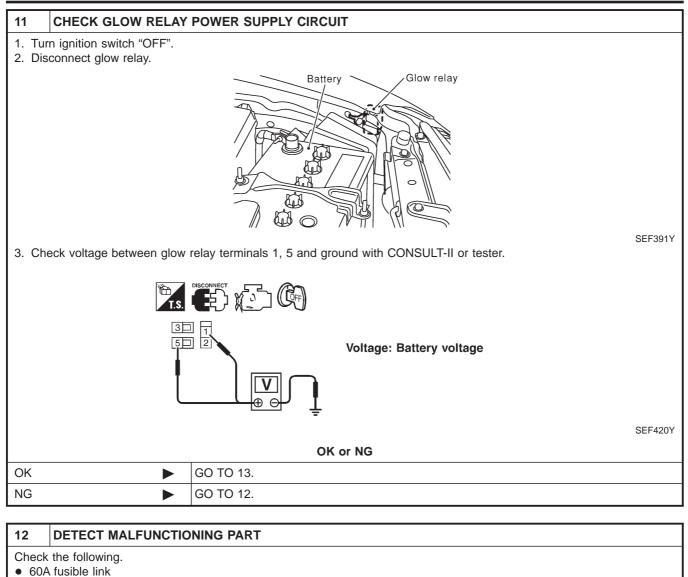
Diagnostic Procedure (Cont'd)			
4 CHECK GLOW INDICA	TOR LAMP OPERATION		
<ul> <li>CHECK GLOW INDICATOR LAMP OPERATION</li> <li>Without CONSULT-II</li> <li>1. Turn ignition switch "ON".</li> <li>Confirm that the voltage between ECM terminal 347 (Engine coolant temperature sensor signal) and ground is above 1.36V. If it is below 1.36V, cool down engine.</li> </ul>			
SEF442Z 3. Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4. Make sure that glow indicator lamp is turned "ON" for 1.5 seconds or more after turning ignition switch "ON", and then turned "OFF". OK or NG			
OK 🕨	GO TO 5.	GO TO 5.	
NG	GO TO 6.		
5 CHECK GLOW CONTR	OL SYSTEM OVERALL FUN	CTION	
<ol> <li>Turn ignition switch "OFF".</li> <li>Set voltmeter probe between glow plug and engine body.</li> <li>Turn ignition switch "ON".</li> <li>Check the voltage between glow plug and engine body under the following conditions.</li> </ol>			
A COLO	A A	Conditions	Voltage
		For 20 seconds after turning ignition switch "ON"	Battery voltage
		More than 20 seconds after turning ignition switch "ON"	Approx. 0V
OK or NG			



Check combinatio	Check combination meter and glow indicator lamp. Refer to EL-144, EL-164, "Meter and Gauges".		
OK or NG			
ОК	OK 🕨 GO TO 18.		
NG  Repair or replace combination meter or glow indicator lamp.			

YD

Diagnostic Procedure (Cont'd)



• Harness for open or short between glow relay and battery

Repair harness or connectors.

# 13 CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 214 and glow relay terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK Image: NG Image: NG

# 14 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E74, F35 or E75, F36
- Harness for open or short between glow relay and ECM
   Repair open circuit or sho

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

15 CHECK HARNESS CO	NTINUITY BETWEEN GLOW I	RELAY AND GLOW PLUG FO	DR OPEN AND SHORT
<ol> <li>Disconnect glow plug harness connector.</li> <li>Check harness continuity between glow relay terminal 3 and glow plug harness connector. Refer to Wiring Diagram. Continuity should exist.</li> </ol>			
3. Also check harness for short	OK or N	C	
OK 🕨	GO TO 16.	6	
NG	Repair open circuit or short to g	round or short to power in harn	ess or connectors
16 CHECK GLOW RELAY	,		
	relay terminals 3 and 5 under the	following conditions.	
		Conditions	Continuity
		12V direct current supply between terminals 1 and 2	Yes
<u>3-11</u>		No current supply	No
		Operation takes less than 1 s	econd.
			SEF433Y
	OK or N	G	
OK ►	GO TO 17.		
NG	Replace glow relay.		
17 CHECK GLOW PLUG			
<ol> <li>CHECK GLOW PLUG</li> <li>Remove glow plug connecting plate.</li> <li>Check glow plug resistance.</li> </ol>			
Resistance: Approximately 0.8Ω [at 25°C (77°F)]			
<ul> <li>NOTE:</li> <li>Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.</li> <li>If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.</li> <li>If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.</li> <li>Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.</li> <li>If 17.7 - 22.5 N·m (1.8 - 2.3 kg-m, 13 - 16 ft-lb)</li> </ul>			
OK 🕨	GO TO 18.		
NG ►	Replace glow plug.		
	·		

YD

Diagnostic Procedure (Cont'd)

 18
 CHECK INTERMITTENT INCIDENT

 Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

 INSPECTION END

# Description SYSTEM DESCRIPTION

Description

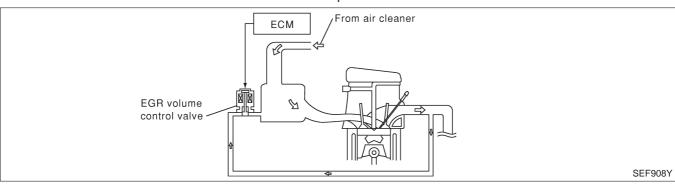
ΥD

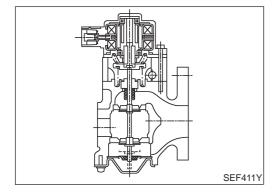
	0.0.2	•	NJEC0764S01
Sensor	Input Signal to ECM	ECM Function	Actuator
Electronic controlled fuel injection pump	Fuel injection signal		
Crankshaft position sensor (TDC)	Engine speed		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal	EGR volume con-	EGR volume control valve
Accelerator position sensor	Accelerator position		
Mass air flow sensor	Amount of intake air		
conditioner switch Air conditioner operation			
Electrical load	Electrical load signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle





# COMPONENT DESCRIPTION EGR Volume Control Valve

NJEC0764S02

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

# CONSULT-II Reference Value in Data Monitor Mode

### Specification data are reference values.

NJEC0765

NJEC0766

MONITOR ITEM	CONDITION		SPECIFICATION
	<ul> <li>Engine: After warming up</li> <li>Air conditioner switch: "OFF"</li> </ul>	After one minute at idle	More than 10 step
	<ul><li>Shift lever: Neutral position</li><li>No-load</li></ul>	Revving engine up to 3,200 rpm	0 step

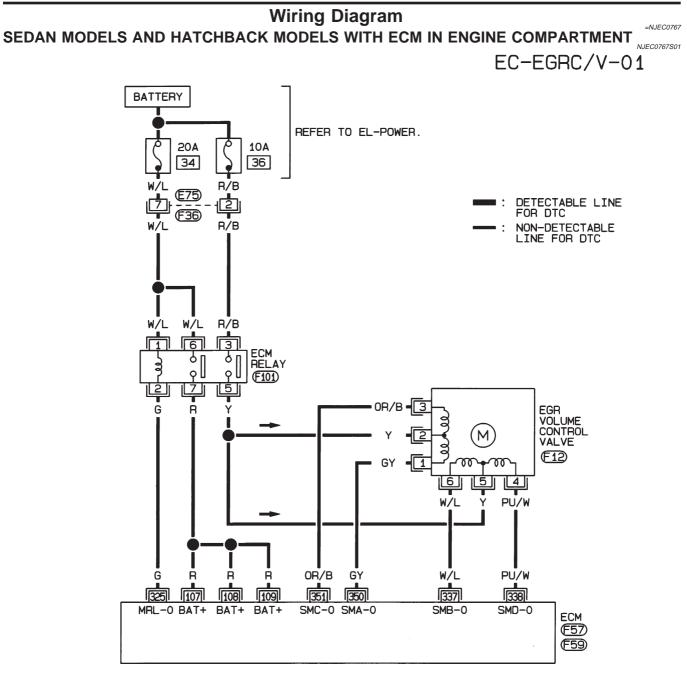
# **ECM Terminals and Reference Value**

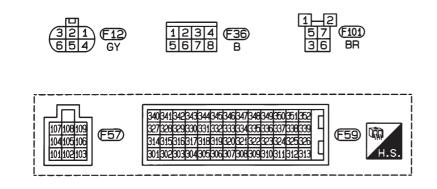
Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

# 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.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA(DC Voltage)
337 338 350 351	W/L PU/W GY OR/B	EGR volume control valve	[Engine is running] • Warm-up condition • Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

YD Wiring Diagram

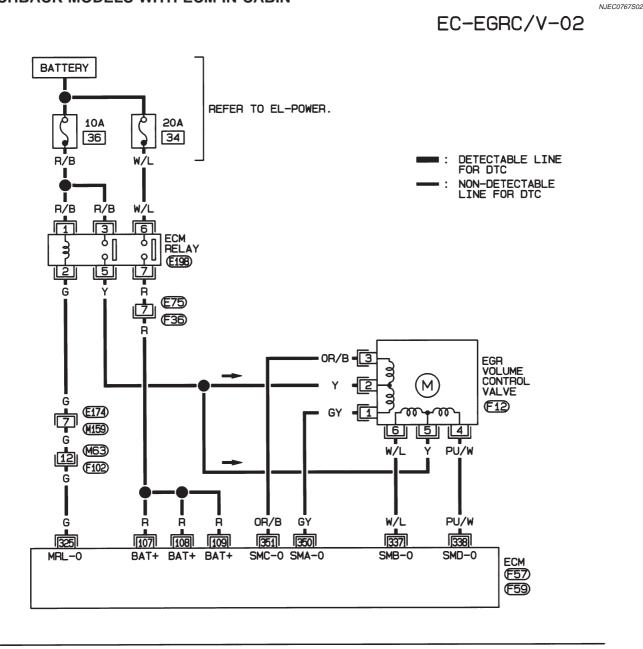


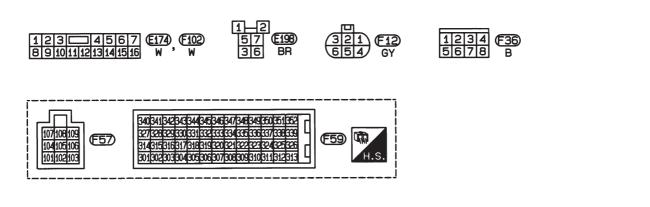


HEC831

Wiring Diagram (Cont'd)

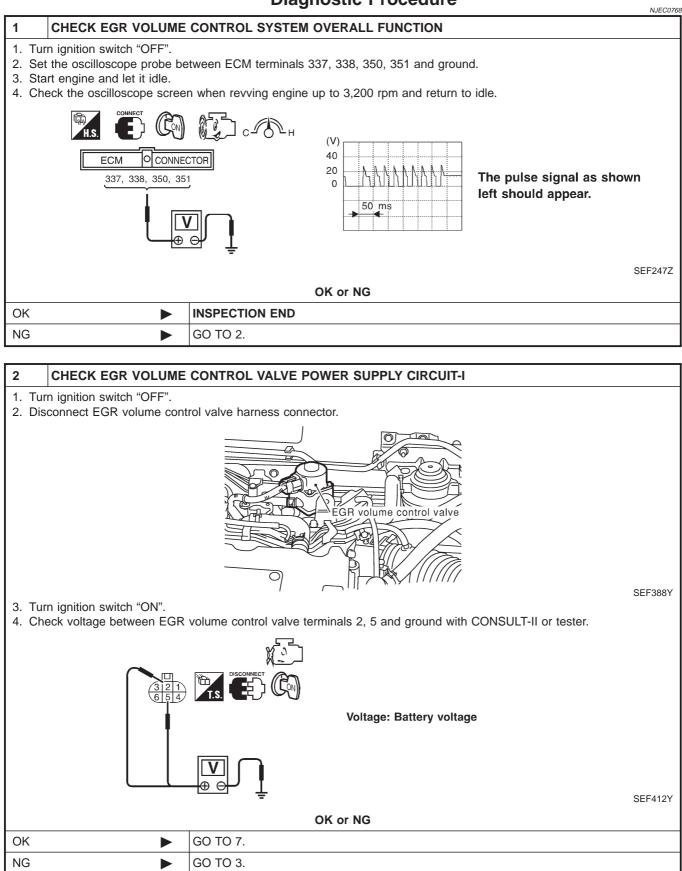
# HATCHBACK MODELS WITH ECM IN CABIN



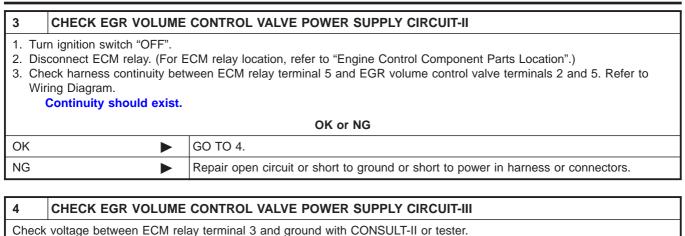


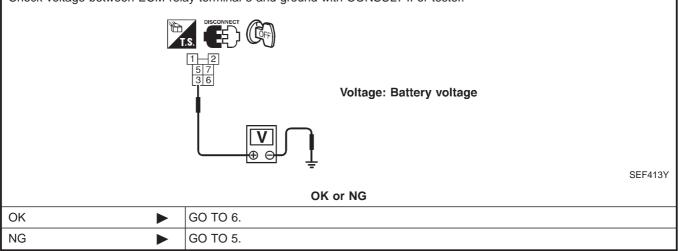
HEC996

# **Diagnostic Procedure**



Diagnostic Procedure (Cont'd)





# 5 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E75, F36 (Sedan models and hatchback models with ECM in engine compartment)
- 10A fuse

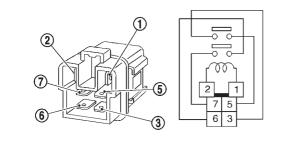
6

• 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.

# 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

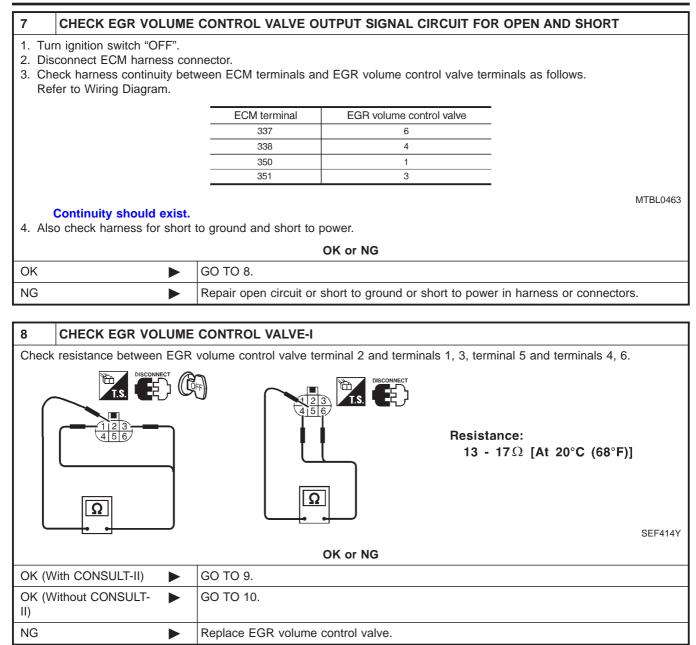
 OK or NG

 OK
 GO TO 7.

 NG
 Replace ECM relay.

Diagnostic Procedure (Cont'd)

'n

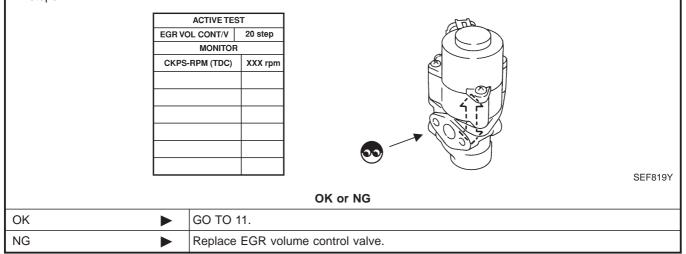


Diagnostic Procedure (Cont'd)

# 9 CHECK EGR VOLUME CONTROL VALVE-II

# (I) With CONSULT-II

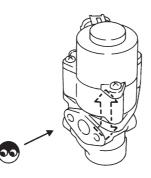
- 1. Remove EGR volume control valve.
- 2. Reconnect ECM harness connector and EGR volume control valve harness connector.
- 3. Turn ignition switch "ON".
- 4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
- 5. Check that EGR volume control valve shaft moves smoothy forward and backward according to the valve opening steps.



# 10 CHECK EGR VOLUME CONTROL VALVE-II

### **Without CONSULT-II**

- 1. Remove EGR volume control valve.
- 2. Reconnect ECM harness connector and EGR volume control valve harness connector.
- 3. Turn ignition switch "ON" and "OFF".
- 4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.



SEF560W

OK or NG		
OK 🕨 GO TO 11.		
NG  Replace EGR volume control valve.		

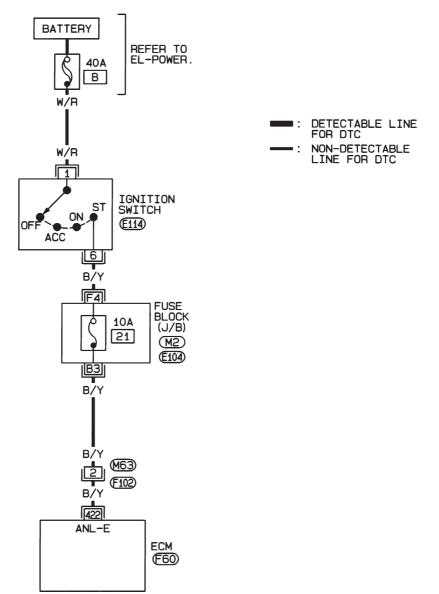
11	CHECK INTERMITTENT INCIDENT		
Refer	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.		
	► INSPECTION END		

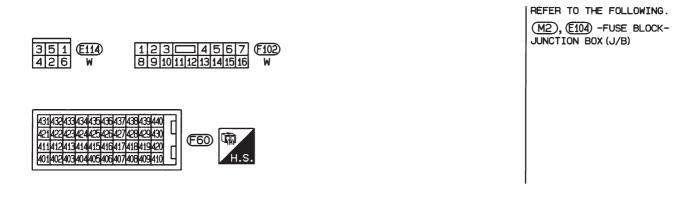
YD Wiring Diagram

NJEC0769





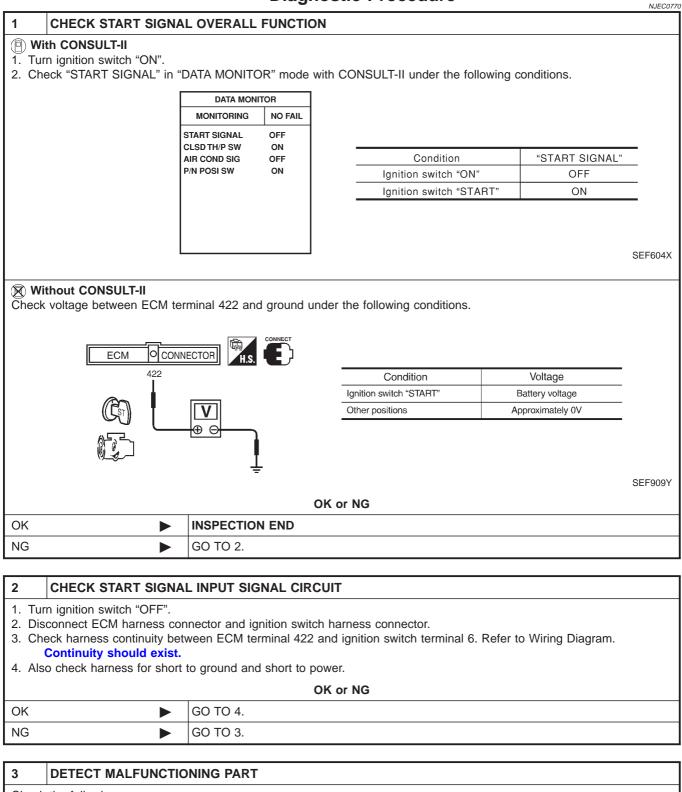




HEC834

# **START SIGNAL**

# **Diagnostic Procedure**



Check the following.

Harness connectors M63, F102

• 10A fuse

• Fuse block (J/B) connectors M2, E104

• Harness for open or short between ECM and ignition switch

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

# **START SIGNAL**

4 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.

► INSPECTION END

Description

# Description

When the gear position is in "Neutral", neutral position is "ON". ECM detects the position because the continuity of the line (the "ON" signal) exists.

# CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW		Shift lever: Neutral	ON
	<ul> <li>Ignition switch: ON</li> </ul>	Except above	OFF

On models not equipped with park/neutral position (PNP) switch, "OFF" is always displayed regardless of gear shift position.

# **ECM Terminals and Reference Value**

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.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110 0/05	1	<ul><li>[Ignition switch "ON"]</li><li>Gear position is "Neutral"</li></ul>	Approximately 0V	
418	418 G/OR switch		<ul><li>[Ignition switch "ON"]</li><li>Except the above gear position</li></ul>	BATTERY VOLTAGE (11 - 14V)

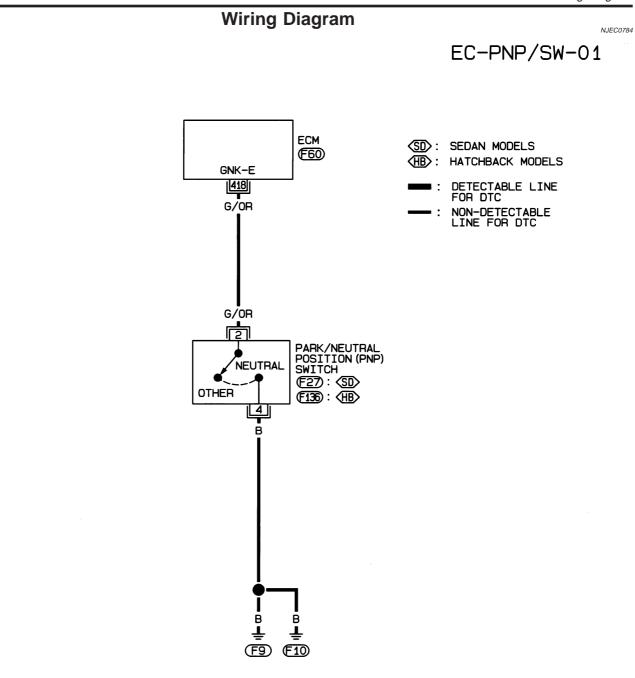
NJEC0782

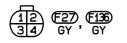
YD

NJEC0783

Wiring Diagram

YD





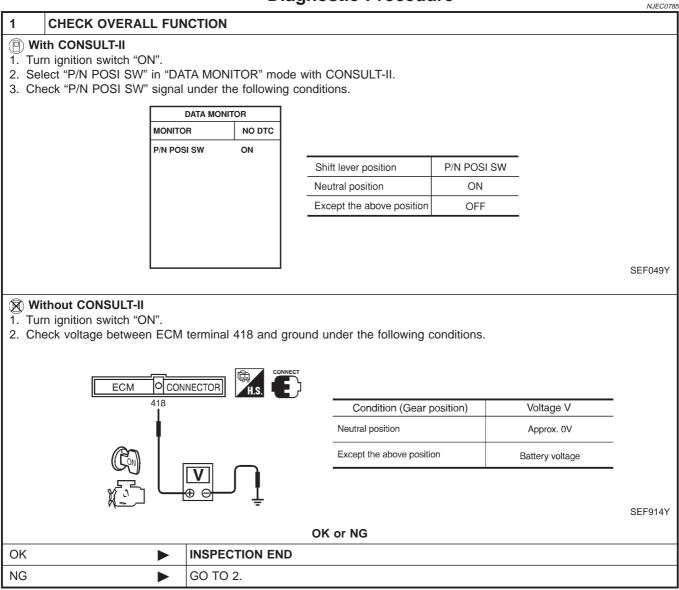


HEC888

# PARK/NEUTRAL POSITION (PNP) SWITCH (WHERE FITTED)

Diagnostic Procedure

# **Diagnostic Procedure**



# PARK/NEUTRAL POSITION (PNP) SWITCH (WHERE FITTED)

Diagnostic Procedure (Cont'd)

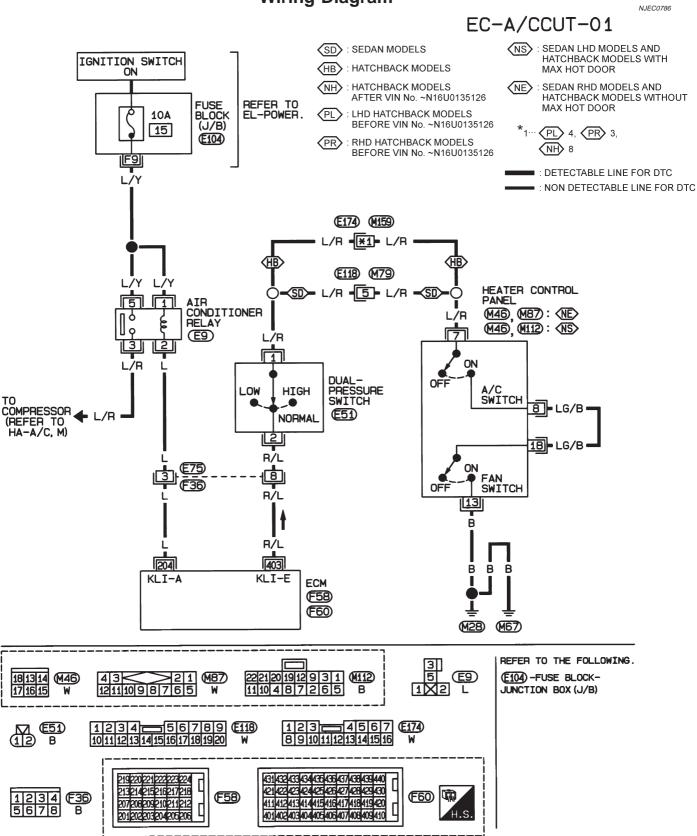
2 CHECK PNP SWITCH	GROUND CIRCUIT FOR OPEN AND SHORT		
1. Turn ignition switch "OFF".			
	ition (PNP) switch harness connector.		
	PNP switch harness connector Air cleaner		
Continuity should exist	<ol> <li>Check harness continuity between PNP switch terminal 4 and body ground. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> </ol>		
	OK or NG		
ОК 🕨	GO TO 3.		
NG	NG  Repair open circuit or short to ground or short to power in harness or connectors.		
3 CHECK PNP SWITCH	INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT		
Continuity should exist	tween ECM terminal 418 and PNP switch terminal 2. Refer to Wiring Diagram.		
ОК	GO TO 4.		
NG	Repair open circuit or short to ground or short to power in harness or connectors.		
4 CHECK PARK/NEUT	AL POSITION (PNP) SWITCH		
Refer to MT-21, "Position Swite	h Check".		
	OK or NG		
ОК	GO TO 5.		
NG	Replace park/neutral position (PNP) switch.		

5	CHECK INTERMITTENT INCIDENT					
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-665.						
	•	INSPECTION END				

# **AIR CONDITIONER CONTROL**

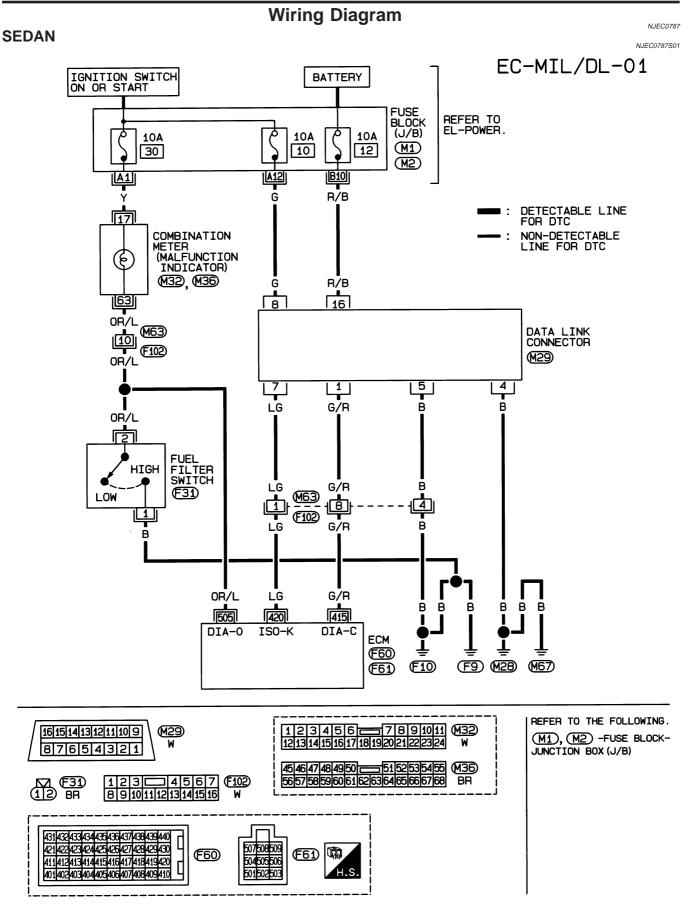
Wiring Diagram





# **MI & DATA LINK CONNECTORS**

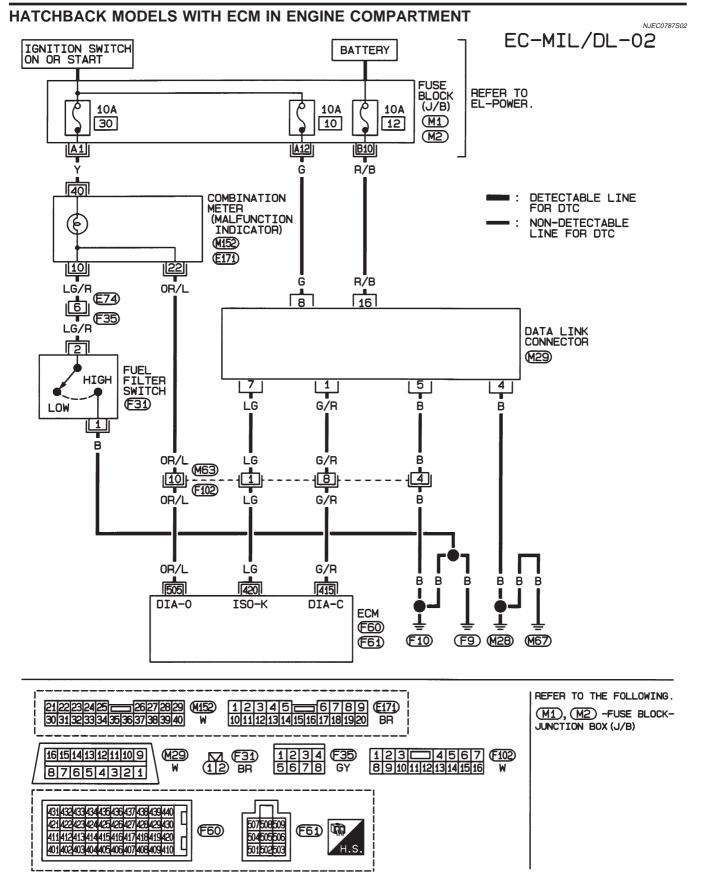
YD Wiring Diagram



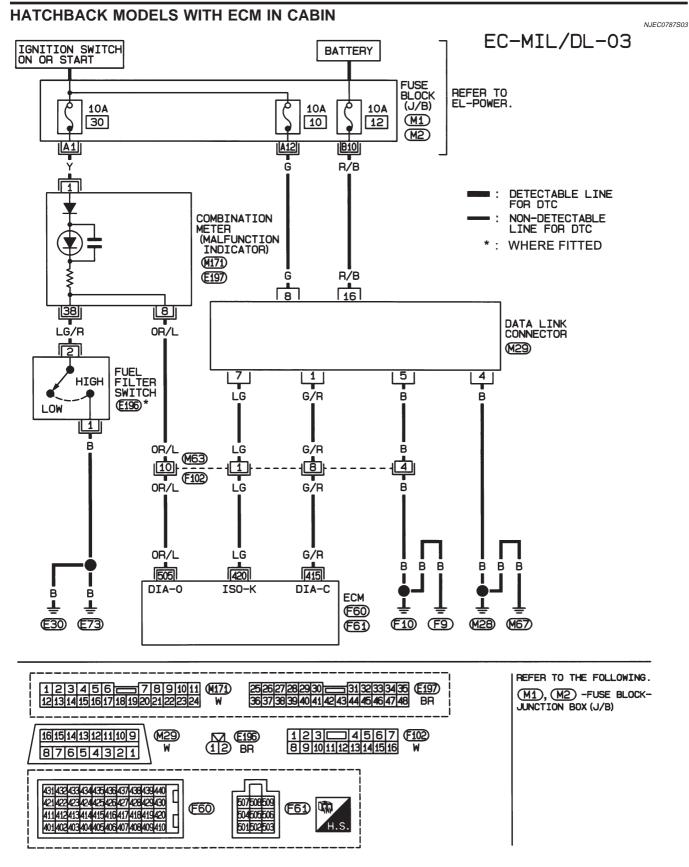
HEC889

# **MI & DATA LINK CONNECTORS**

Wiring Diagram (Cont'd)



HEC842



NEF339A

# SERVICE DATA AND SPECIFICATIONS (SDS)

YD

General Specifications

	General	Specific		<sub>NJEC0788</sub> Jnit: rpm
Engine		YD22DDT		
Idle speed	725±25			
Maximum engine speed	4,900			
	Injection	Nozzle		
			Unit: kPa (bar, kg/c	<sup>NJEC0790</sup> cm², psi)
	New		21,476 - 22,457 (214.7 - 224.5, 219 - 229, 3,114 - 3,256)	
Initial injection pressure	Limit		18,275 (182.7, 186, 2,650)	
	Engine (	Coolant	Temperature Sensor	NJEC0791
Temperature °C (°F)		Resistance kΩ		NJECOTAT
20 (68)		2.1 - 2.9		
50 (122)		0.68 - 1.00		
90 (194)		0.236 - 0.260		
	Cranksh	aft Posi	tion Sensor (TDC)	NJEC0792
Resistance [at 20°C (68°F)] Ω			495 - 605	NJLC0732
	Glow Plu	Jg		NJEC0793
Resistance [at 25°C (77°F)] Ω		0.8		HULCOF SC
	Accelera	itor Pos	ition Sensor	NJEC0794
Throttle valve conditions		Resistance between terminals 2 and 4 k $\Omega$ [at 25°C (77°F		
Completely closed		0.9 - 1.3		
Partially open		0.9 - 2.1		
Completely open			1.7 - 2.1	
	EGR Vol	ume Co	ntrol Valve	NJEC0795
Resistance [at 25°C (77°F)] Ω			13 - 17	