SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

APPLICATION NOTICE 15
How to Check Vehicle Type 15

VQ TYPE 1

INDEX FOR DTC 16
DTC No. Index 16
Alphabetical Index 19
PRECAUTIONS 22
Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” 22
On Board Diagnostic (OBD) System of Engine 22
Precaution 22
PREPARATION 26
Special Service Tools 26
Commercial Service Tools 27
ENGINE CONTROL SYSTEM 28
System Diagram 28
Multiport Fuel Injection (MFI) System 29
Electronic Ignition (EI) System 31
Fuel Cut Control (at No Load and High Engine Speed) 32
AIR CONDITIONING CUT CONTROL 33
Input/Output Signal Chart 33
System Description 33
AUTOMATIC SPEED CONTROL DEVICE (ASCD).. 34
System Description 34
Component Description 35
CAN COMMUNICATION 36
System Description 36
EVAPORATIVE EMISSION SYSTEM 37
Description 37
Component Inspection 40
POSITIVE CRANKCASE VENTILATION 41
Description 41
Component Inspection 41
NATS (NISSAN ANTI-THEFT SYSTEM) 43
Description 43
ON BOARD DIAGNOSTIC (OBD) SYSTEM 44
Introduction 44
Two Trip Detection Logic 44
Emission-related Diagnostic Information 45
Malfunction Indicator Lamp (MIL) 57
OBD System Operation Chart 59
BASIC SERVICE PROCEDURE 65
Basic Inspection 65
Idle Speed and Ignition Timing Check 69
Accelerator Pedal Released Position Learning 71
Throttle Valve Closed Position Learning 71
Idle Air Volume Learning 71
Fuel Pressure Check 74
TROUBLE DIAGNOSIS 77
Trouble Diagnosis Introduction 77
DTC Inspection Priority Chart 83
Fail-safe Chart 84
Symptom Matrix Chart 85
Engine Control Component Parts Location 89
Vacuum Hose Drawing 96
Circuit Diagram 97
ECM Harness Connector Terminal Layout 99
ECM Terminals and Reference Value 99
CONSULT-II Function (ENGINE) 108
Generic Scan Tool (GST) Function 119
CONSULT-II Reference Value in Data Monitor 122
Major Sensor Reference Graph in Data Monitor Mode 125
TROUBLE DIAGNOSIS - SPECIFICATION VALUE 127
Description 127
Testing Condition 127
Inspection Procedure 127
Diagnostic Procedure 128
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT 137
Description 137
Diagnostic Procedure 137
POWER SUPPLY AND GROUND CIRCUIT 138
Wiring Diagram 138

Diagnostic Procedure 141
Ground Inspection 145
DTC U1000, U1001 CAN COMMUNICATION LINE 146
Description 146
On Board Diagnosis Logic 146
DTC Confirmation Procedure 146
Wiring Diagram 147
Diagnostic Procedure 148
DTC P0011, P0021 IVT CONTROL 149
Description 149
CONSULT-II Reference Value in Data Monitor Mode .149
On Board Diagnosis Logic 150
DTC Confirmation Procedure 150
Diagnostic Procedure 151
Component Inspection 152
Removal and Installation 153
DTC P0037, P0038, P0057, P0058 HO2S2 HEATER 154
Description 154
CONSULT-II Reference Value in Data Monitor Mode .154
On Board Diagnosis Logic 154
DTC Confirmation Procedure 155
Wiring Diagram 156
Diagnostic Procedure 159
Component Inspection 161
Removal and Installation 162
DTC P0102, P0103 MAF SENSOR 163
Component Description 163
CONSULT-II Reference Value in Data Monitor Mode .163
On Board Diagnosis Logic 163
DTC Confirmation Procedure 164
Wiring Diagram 165
Diagnostic Procedure 166
Component Inspection 168
Removal and Installation 169
DTC P0112, P0113 IAT SENSOR 170
Component Description 170
On Board Diagnosis Logic 170
DTC Confirmation Procedure 170
Wiring Diagram 172
Diagnostic Procedure 173
Component Inspection 174
Removal and Installation 174
DTC P0117, P0118 ECT SENSOR 175
Component Description 175
On Board Diagnosis Logic 175
DTC Confirmation Procedure 176
Wiring Diagram 177
Diagnostic Procedure 178
Component Inspection 179
Removal and Installation 179
DTC P0122, P0123 TP SENSOR 180
Component Description 180
CONSULT-II Reference Value in Data Monitor Mode .180
On Board Diagnosis Logic 180
DTC Confirmation Procedure 181
Wiring Diagram 182
Diagnostic Procedure 184
Component Inspection 186
Removal and Installation 186
DTC P0138, P0158 HO2S2 187
Component Description 187
CONSULT-II Reference Value in Data Monitor Mode .187
On Board Diagnosis Logic 187
DTC Confirmation Procedure 188
Wiring Diagram 189
Diagnostic Procedure 192
Component Inspection 194
Removal and Installation 195
DTC P0139, P0159 HO2S2 196
Component Description 196
CONSULT-II Reference Value in Data Monitor Mode .196
On Board Diagnosis Logic 196
DTC Confirmation Procedure 197
Overall Function Check 198
Wiring Diagram 199
Diagnostic Procedure 202
Component Inspection 205
Removal and Installation 206
DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION 207
On Board Diagnosis Logic 207
DTC Confirmation Procedure 207
Wiring Diagram 209
Diagnostic Procedure 213
DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION 219
On Board Diagnosis Logic 219
DTC Confirmation Procedure 219
Wiring Diagram 221
Diagnostic Procedure 225
DTC P0222, P0223 TP SENSOR 231
Component Description 231
CONSULT-II Reference Value in Data Monitor Mode .231
On Board Diagnosis Logic 231
DTC Confirmation Procedure 232
Wiring Diagram 233
Diagnostic Procedure 235
Component Inspection 237
Removal and Installation 237
DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE 238
On Board Diagnosis Logic 238
DTC Confirmation Procedure 238
Diagnostic Procedure 239
DTC P0327, P0328, P0332, P0333 KS 247
Component Description 247
On Board Diagnosis Logic 247
DTC Confirmation Procedure 247
Wiring Diagram 248
Diagnostic Procedure 249

Component Inspection 251
Removal and Installation 251
DTC P0335 CKP SENSOR (POS) 252
Component Description 252
CONSULT-II Reference Value in Data Monitor Mode 252
On Board Diagnosis Logic 252
DTC Confirmation Procedure 253
Wiring Diagram 254
Diagnostic Procedure 256
Component Inspection 258
Removal and Installation 258
DTC P0340, P0345 CMP SENSOR (PHASE) 259
Component Description 259
CONSULT-II Reference Value in Data Monitor Mode 259
On Board Diagnosis Logic 259
DTC Confirmation Procedure 260
Wiring Diagram 261
Diagnostic Procedure 264
Component Inspection 267
Removal and Installation 267
DTC P0420, P0430 THREE WAY CATALYST FUNCTION 268
On Board Diagnosis Logic 268
DTC Confirmation Procedure 268
Overall Function Check 269
Diagnostic Procedure 270
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 274
Description 274
CONSULT-II Reference Value in Data Monitor Mode 274
On Board Diagnosis Logic 275
DTC Confirmation Procedure 275
Wiring Diagram 276
Diagnostic Procedure 278
Component Inspection 279
Removal and Installation 280
DTC P0500 VSS 281
Description 281
On Board Diagnosis Logic 281
DTC Confirmation Procedure 281
Overall Function Check 281
Diagnostic Procedure 282
DTC P0550 PSP SENSOR 283
Component Description 283
CONSULT-II Reference Value in Data Monitor Mode 283
On Board Diagnosis Logic 283
DTC Confirmation Procedure 283
Wiring Diagram 284
Diagnostic Procedure 285
Component Inspection 287
Removal and Installation 287
DTC P0605 ECM 288
Component Description 288
On Board Diagnosis Logic 288
DTC Confirmation Procedure 288
Diagnostic Procedure 289
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER 291
Description 291
CONSULT-II Reference Value in Data Monitor Mode 291
On Board Diagnosis Logic 291
DTC Confirmation Procedure 291
Wiring Diagram 293
Diagnostic Procedure 296
Component Inspection 298
Removal and Installation 298
DTC P1065 ECM POWER SUPPLY 299
Component Description 299
On Board Diagnosis Logic 299
DTC Confirmation Procedure 299
Wiring Diagram 300
Diagnostic Procedure 301
DTC P1111, P1136 IVT CONTROL SOLENOID VALVE 303
Component Description 303
CONSULT-II Reference Value in Data Monitor Mode 303
On Board Diagnosis Logic 303
DTC Confirmation Procedure 303
Wiring Diagram 304
Diagnostic Procedure 308
Component Inspection 309
Removal and Installation 309
DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 310
Component Description 310
On Board Diagnosis Logic 310
DTC Confirmation Procedure 310
Diagnostic Procedure 311
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION 312
Description 312
On Board Diagnosis Logic 312
DTC Confirmation Procedure 312
Wiring Diagram 313
Diagnostic Procedure 314
Component Inspection 317
Removal and Installation 317
DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY 318
Component Description 318
CONSULT-II Reference Value in Data Monitor Mode 318
On Board Diagnosis Logic 318
DTC Confirmation Procedure 318
Wiring Diagram 320
Diagnostic Procedure 321
DTC P1128 THROTTLE CONTROL MOTOR 324
Component Description 324
On Board Diagnosis Logic 324
DTC Confirmation Procedure 324
Wiring Diagram 325

Diagnostic Procedure 326
Component Inspection 327
Removal and Installation 328
DTC P1146, P1166 HO2S2 329
Component Description 329
CONSULT-II Reference Value in Data Monitor Mode 329
On Board Diagnosis Logic 329
DTC Confirmation Procedure 330
Overall Function Check 331
Wiring Diagram 332
Diagnostic Procedure 335
Component Inspection 338
Removal and Installation 339
DTC P1147, P1167 HO2S2 340
Component Description 340
CONSULT-II Reference Value in Data Monitor Mode 340
On Board Diagnosis Logic 340
DTC Confirmation Procedure 341
Overall Function Check 342
Wiring Diagram 343
Diagnostic Procedure 346
Component Inspection 349
Removal and Installation 350
DTC P1217 ENGINE OVER TEMPERATURE 351
Description 351
CONSULT-II Reference Value in Data Monitor Mode 352
On Board Diagnosis Logic 353
Overall Function Check 353
Wiring Diagram 355
Diagnostic Procedure 357
Main 12 Causes of Overheating 359
Component Inspection 360
DTC P1225 TP SENSOR 361
Component Description 361
On Board Diagnosis Logic 361
DTC Confirmation Procedure 361
Diagnostic Procedure 362
Removal and Installation 362
DTC P1226 TP SENSOR 363
Component Description 363
On Board Diagnosis Logic 363
DTC Confirmation Procedure 363
Diagnostic Procedure 364
Removal and Installation 364
DTC P1229 SENSOR POWER SUPPLY 365
On Board Diagnosis Logic 365
DTC Confirmation Procedure 365
Wiring Diagram 366
Diagnostic Procedure 369
DTC P1271, P1281 A/F SENSOR 1 372
Component Description 372
CONSULT-II Reference Value in Data Monitor Mode 372
On Board Diagnosis Logic 372
DTC Confirmation Procedure 372
Wiring Diagram 374
Diagnostic Procedure 377
Removal and Installation 380
DTC P1272, P1282 A/F SENSOR 1 381
Component Description 381
CONSULT-II Reference Value in Data Monitor Mode 381
On Board Diagnosis Logic 381
DTC Confirmation Procedure 381
Wiring Diagram 383
Diagnostic Procedure 386
Removal and Installation 389
DTC P1273, P1283 A/F SENSOR 1 390
Component Description 390
CONSULT-II Reference Value in Data Monitor Mode 390
On Board Diagnosis Logic 390
DTC Confirmation Procedure 390
Wiring Diagram 392
Diagnostic Procedure 395
Removal and Installation 399
DTC P1274, P1284 A/F SENSOR 1 400
Component Description 400
CONSULT-II Reference Value in Data Monitor Mode 400
On Board Diagnosis Logic 400
DTC Confirmation Procedure 400
Wiring Diagram 402
Diagnostic Procedure 405
Removal and Installation 409
DTC P1276, P1286 A/F SENSOR 1 410
Component Description 410
CONSULT-II Reference Value in Data Monitor Mode 410
On Board Diagnosis Logic 410
DTC Confirmation Procedure 410
Overall Function Check 411
Wiring Diagram 413
Diagnostic Procedure 416
Removal and Installation 419
DTC P1278, P1288 A/F SENSOR 1 420
Component Description 420
CONSULT-II Reference Value in Data Monitor Mode 420
On Board Diagnosis Logic 420
DTC Confirmation Procedure 421
Wiring Diagram 423
Diagnostic Procedure 426
Removal and Installation 431
DTC P1279, P1289 A/F SENSOR 1 432
Component Description 432
CONSULT-II Reference Value in Data Monitor Mode 432
On Board Diagnosis Logic 432
DTC Confirmation Procedure 433
Wiring Diagram 435
Diagnostic Procedure 438
Removal and Installation 443
DTC P1564 ASCD STEERING SWITCH 444
Component Description 444

CONSULT-II Reference Value in Data Monitor Mode . 444
On Board Diagnosis Logic 444
DTC Confirmation Procedure 445
Wiring Diagram 446
Diagnostic Procedure 447
Component Inspection 450
DTC P1572 ASCD BRAKE SWITCH 451
Component Description 451
CONSULT-II Reference Value in Data Monitor Mode . 451
On Board Diagnosis Logic 451
DTC Confirmation Procedure 452
Wiring Diagram 453
Diagnostic Procedure 454
Component Inspection 462
DTC P1574 ASCD VEHICLE SPEED SENSOR ... 464
Component Description 464
On Board Diagnosis Logic 464
DTC Confirmation Procedure 464
Diagnostic Procedure 465
DTC P1706 PNP SWITCH 466
Component Description 466
CONSULT-II Reference Value in Data Monitor Mode . 466
On Board Diagnosis Logic 466
DTC Confirmation Procedure 466
Overall Function Check 467
Wiring Diagram 468
Diagnostic Procedure 469
DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR) 472
Description 472
CONSULT-II Reference Value in Data Monitor Mode . 472
On Board Diagnosis Logic 472
Diagnostic Procedure 472
DTC P1805 BRAKE SWITCH 473
Description 473
CONSULT-II Reference Value in Data Monitor Mode . 473
On Board Diagnosis Logic 473
DTC Confirmation Procedure 473
Wiring Diagram 474
Diagnostic Procedure 475
Component Inspection 477
DTC P2122, P2123 APP SENSOR 478
Component Description 478
CONSULT-II Reference Value in Data Monitor Mode . 478
On Board Diagnosis Logic 478
DTC Confirmation Procedure 479
Wiring Diagram 480
Diagnostic Procedure 481
Component Inspection 483
Removal and Installation 483
DTC P2127, P2128 APP SENSOR 484
Component Description 484
CONSULT-II Reference Value in Data Monitor Mode . 484
On Board Diagnosis Logic 484
DTC Confirmation Procedure 485
Wiring Diagram 486
Diagnostic Procedure 488
Component Inspection 490
Removal and Installation 490
DTC P2135 TP SENSOR 491
Component Description 491
CONSULT-II Reference Value in Data Monitor Mode . 491
On Board Diagnosis Logic 491
DTC Confirmation Procedure 492
Wiring Diagram 493
Diagnostic Procedure 495
Component Inspection 497
Removal and Installation 498
DTC P2138 APP SENSOR 499
Component Description 499
CONSULT-II Reference Value in Data Monitor Mode . 499
On Board Diagnosis Logic 499
DTC Confirmation Procedure 500
Wiring Diagram 501
Diagnostic Procedure 503
Component Inspection 505
Removal and Installation 506
ASCD BRAKE SWITCH 507
Component Description 507
CONSULT-II Reference Value in Data Monitor Mode . 507
Wiring Diagram 508
Diagnostic Procedure 509
Component Inspection 518
ASCD INDICATOR 520
Component Description 520
CONSULT-II Reference Value in Data Monitor Mode . 520
Wiring Diagram 521
Diagnostic Procedure 522
ELECTRICAL LOAD SIGNAL 523
Description 523
CONSULT-II Reference Value in Data Monitor Mode . 523
Diagnostic Procedure 523
EVAP CANISTER VENT CONTROL VALVE 525
Component Description 525
Wiring Diagram 526
Diagnostic Procedure 527
Component Inspection 529
FUEL INJECTOR 530
Component Description 530
CONSULT-II Reference Value in Data Monitor Mode . 530
Wiring Diagram 531
Diagnostic Procedure 532
Component Inspection 536
Removal and Installation 536

FUEL PUMP 537
Description 537
CONSULT-II Reference Value in Data Monitor Mode 537
Wiring Diagram 538
Diagnostic Procedure 539
Component Inspection 542
Removal and Installation 542
IGNITION SIGNAL 543
Component Description 543
Wiring Diagram 544
Diagnostic Procedure 549
Component Inspection 554
Removal and Installation 555
REFRIGERANT PRESSURE SENSOR 556
Component Description 556
Wiring Diagram 557
Diagnostic Procedure 558
Removal and Installation 561
VIAS 562
Description 562
CONSULT-II Reference Value in Data Monitor Mode 563
Wiring Diagram 564
Diagnostic Procedure 566
Component Inspection 569
Removal and Installation 570
MIL AND DATA LINK CONNECTOR 571
Wiring Diagram 571
SERVICE DATA AND SPECIFICATIONS (SDS) ... 573
Fuel Pressure 573
Idle Speed and Ignition Timing 573
Calculated Load Value 573
Mass Air Flow Sensor 573
Intake Air Temperature Sensor 573
Engine Coolant Temperature Sensor 573
Air Fuel Ratio (A/F) Sensor 1 Heater 573
Heated Oxygen sensor 2 Heater 573
Crankshaft Position Sensor (POS) 573
Camshaft Position Sensor (PHASE) 573
Throttle Control Motor 573
Fuel Injector 574
Fuel Pump 574

VQ TYPE 2

INDEX FOR DTC 575
DTC No. Index 575
Alphabetical Index 577
PRECAUTIONS 579
Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” 579
On Board Diagnostic (OBD) System of Engine ... 579
Precaution 579
PREPARATION 583
Special Service Tools 583
Commercial Service Tools 584
ENGINE CONTROL SYSTEM 585
System Diagram 585
Multiport Fuel Injection (MFI) System 586
Electronic Ignition (EI) System 588
Fuel Cut Control (at No Load and High Engine Speed) 589
AIR CONDITIONING CUT CONTROL 590
Input/Output Signal Chart 590
System Description 590
AUTOMATIC SPEED CONTROL DEVICE (ASCD). 591
System Description 591
Component Description 592
CAN COMMUNICATION 593
System Description 593
EVAPORATIVE EMISSION SYSTEM 594
Description 594
Component Inspection 597
POSITIVE CRANKCASE VENTILATION 598
Description 598
Component Inspection 598
NATS (NISSAN ANTI-THEFT SYSTEM) 600
Description 600
ON BOARD DIAGNOSTIC (OBD) SYSTEM 601
Introduction 601
Two Trip Detection Logic 601
Emission-Related Diagnostic Information 601
Malfunction Indicator Lamp (MIL) 605
BASIC SERVICE PROCEDURE 608
Basic Inspection 608
Idle Speed and Ignition Timing Check 612
Accelerator Pedal Released Position Learning 614
Throttle Valve Closed Position Learning 614
Idle Air Volume Learning 614
Fuel Pressure Check 617
TROUBLE DIAGNOSIS 620
Trouble Diagnosis Introduction 620
DTC Inspection Priority Chart 626
Fail-Safe Chart 627
Symptom Matrix Chart 628
Engine Control Component Parts Location 632
Vacuum Hose Drawing 639
Circuit Diagram 640
ECM Harness Connector Terminal Layout 642
ECM Terminals and Reference Value 642
CONSULT-II Function (ENGINE) 651
CONSULT-II Reference Value in Data Monitor 662
Major Sensor Reference Graph in Data Monitor Mode 665
TROUBLE DIAGNOSIS - SPECIFICATION VALUE. 667
Description 667
Testing Condition 667
Inspection Procedure 667
Diagnostic Procedure 668
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT 677
Description 677
Diagnostic Procedure 677
POWER SUPPLY AND GROUND CIRCUIT 678
Wiring Diagram 678

Diagnostic Procedure 681
Ground Inspection 685
DTC U1000, U1001 CAN COMMUNICATION LINE 686
Description 686
On Board Diagnosis Logic 686
DTC Confirmation Procedure 686
Wiring Diagram 687
Diagnostic Procedure 688
DTC P0011, P0021 IVT CONTROL 689
Description 689
CONSULT-II Reference Value in Data Monitor Mode 689
On Board Diagnosis Logic 690
DTC Confirmation Procedure 690
Overall Function Check 691
Diagnostic Procedure 691
Component Inspection 692
Removal and Installation 693
DTC P0102, P0103 MAF SENSOR 694
Component Description 694
CONSULT-II Reference Value in Data Monitor Mode 694
On Board Diagnosis Logic 694
DTC Confirmation Procedure 695
Wiring Diagram 696
Diagnostic Procedure 697
Component Inspection 699
Removal and Installation 700
DTC P0117, P0118 ECT SENSOR 701
Component Description 701
On Board Diagnosis Logic 701
DTC Confirmation Procedure 702
Wiring Diagram 703
Diagnostic Procedure 704
Component Inspection 705
Removal and Installation 705
DTC P0122, P0123 TP SENSOR 706
Component Description 706
CONSULT-II Reference Value in Data Monitor Mode 706
On Board Diagnosis Logic 706
DTC Confirmation Procedure 707
Wiring Diagram 708
Diagnostic Procedure 710
Component Inspection 712
Removal and Installation 712
DTC P0222, P0223 TP SENSOR 713
Component Description 713
CONSULT-II Reference Value in Data Monitor Mode 713
On Board Diagnosis Logic 713
DTC Confirmation Procedure 714
Wiring Diagram 715
Diagnostic Procedure 717
Component Inspection 719
Removal and Installation 719
DTC P0327, P0328, P0332, P0333 KS 720
Component Description 720
On Board Diagnosis Logic 720
DTC Confirmation Procedure 720
Wiring Diagram 721
Diagnostic Procedure 722
Component Inspection 724
Removal and Installation 724
DTC P0335 CKP SENSOR (POS) 725
Component Description 725
CONSULT-II Reference Value in Data Monitor Mode 725
On Board Diagnosis Logic 725
DTC Confirmation Procedure 726
Wiring Diagram 727
Diagnostic Procedure 729
Component Inspection 731
Removal and Installation 731
DTC P0340, P0345 CMP SENSOR (PHASE) 732
Component Description 732
CONSULT-II Reference Value in Data Monitor Mode 732
On Board Diagnosis Logic 732
DTC Confirmation Procedure 733
Wiring Diagram 734
Diagnostic Procedure 737
Component Inspection 740
Removal and Installation 740
DTC P0550 PSP SENSOR 741
Component Description 741
CONSULT-II Reference Value in Data Monitor Mode 741
On Board Diagnosis Logic 741
DTC Confirmation Procedure 741
Wiring Diagram 742
Diagnostic Procedure 743
Component Inspection 745
Removal and Installation 745
DTC P0605 ECM 746
Component Description 746
On Board Diagnosis Logic 746
DTC Confirmation Procedure 746
Diagnostic Procedure 748
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER 749
Description 749
CONSULT-II Reference Value in Data Monitor Mode 749
On Board Diagnosis Logic 749
DTC Confirmation Procedure 749
Wiring Diagram 751
Diagnostic Procedure 754
Component Inspection 756
Removal and Installation 756
DTC P1065 ECM POWER SUPPLY 757
Component Description 757
On Board Diagnosis Logic 757
DTC Confirmation Procedure 757
Wiring Diagram 758
Diagnostic Procedure 759
DTC P1111, P1136 IVT CONTROL SOLENOID

VALVE 761
Component Description 761
CONSULT-II Reference Value in Data Monitor Mode 761
On Board Diagnosis Logic 761
DTC Confirmation Procedure 761
Wiring Diagram 763
Diagnostic Procedure 767
Component Inspection 768
Removal and Installation 768
DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 769
Component Description 769
On Board Diagnosis Logic 769
DTC Confirmation Procedure 769
Diagnostic Procedure 770
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION 772
Description 772
On Board Diagnosis Logic 772
DTC Confirmation Procedure 772
Wiring Diagram 773
Diagnostic Procedure 774
Component Inspection 777
Removal and Installation 777
DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY 778
Component Description 778
CONSULT-II Reference Value in Data Monitor Mode 778
On Board Diagnosis Logic 778
DTC Confirmation Procedure 778
Wiring Diagram 780
Diagnostic Procedure 781
DTC P1128 THROTTLE CONTROL MOTOR 784
Component Description 784
On Board Diagnosis Logic 784
DTC Confirmation Procedure 784
Wiring Diagram 785
Diagnostic Procedure 786
Component Inspection 787
Removal and Installation 788
DTC P1217 ENGINE OVER TEMPERATURE 789
Description 789
CONSULT-II Reference Value in Data Monitor Mode 790
On Board Diagnosis Logic 791
Overall Function Check 791
Wiring Diagram 793
Diagnostic Procedure 795
Main 12 Causes of Overheating 797
Component Inspection 798
DTC P1225 TP SENSOR 799
Component Description 799
On Board Diagnosis Logic 799
DTC Confirmation Procedure 799
Diagnostic Procedure 800
Removal and Installation 800
DTC P1226 TP SENSOR 801
Component Description 801
On Board Diagnosis Logic 801
DTC Confirmation Procedure 801
Diagnostic Procedure 802
Removal and Installation 802
DTC P1229 SENSOR POWER SUPPLY 803
On Board Diagnosis Logic 803
DTC Confirmation Procedure 803
Wiring Diagram 804
Diagnostic Procedure 807
DTC P1271, P1281 A/F SENSOR 1 810
Component Description 810
CONSULT-II Reference Value in Data Monitor Mode 810
On Board Diagnosis Logic 810
DTC Confirmation Procedure 810
Overall Function Check 811
Wiring Diagram 812
Diagnostic Procedure 815
Removal and Installation 818
DTC P1272, P1282 A/F SENSOR 1 819
Component Description 819
CONSULT-II Reference Value in Data Monitor Mode 819
On Board Diagnosis Logic 819
DTC Confirmation Procedure 819
Overall Function Check 820
Wiring Diagram 821
Diagnostic Procedure 824
Removal and Installation 827
DTC P1276, P1286 A/F SENSOR 1 828
Component Description 828
CONSULT-II Reference Value in Data Monitor Mode 828
On Board Diagnosis Logic 828
Overall Function Check 828
Wiring Diagram 830
Diagnostic Procedure 833
Removal and Installation 836
DTC P1564 ASCD STEERING SWITCH 837
Component Description 837
CONSULT-II Reference Value in Data Monitor Mode 837
On Board Diagnosis Logic 837
DTC Confirmation Procedure 838
Wiring Diagram 839
Diagnostic Procedure 840
Component Inspection 843
DTC P1572 ASCD BRAKE SWITCH 844
Component Description 844
CONSULT-II Reference Value in Data Monitor Mode 844
On Board Diagnosis Logic 844
DTC Confirmation Procedure 845
Overall Function Check 845
Wiring Diagram 847
Diagnostic Procedure 848
Component Inspection 856

DTC P1706 PNP SWITCH 858
Component Description 858
CONSULT-II Reference Value in Data Monitor Mode 858
On Board Diagnosis Logic 858
Overall Function Check 858
Wiring Diagram 859
Diagnostic Procedure 860
DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR) 863
Description 863
CONSULT-II Reference Value in Data Monitor Mode 863
On Board Diagnosis Logic 863
Diagnostic Procedure 863
DTC P1805 BRAKE SWITCH 864
Description 864
CONSULT-II Reference Value in Data Monitor Mode 864
On Board Diagnosis Logic 864
DTC Confirmation Procedure 864
Wiring Diagram 866
Diagnostic Procedure 867
Component Inspection 869
DTC P2122, P2123 APP SENSOR 870
Component Description 870
CONSULT-II Reference Value in Data Monitor Mode 870
On Board Diagnosis Logic 870
DTC Confirmation Procedure 871
Wiring Diagram 872
Diagnostic Procedure 873
Component Inspection 875
Removal and Installation 875
DTC P2127, P2128 APP SENSOR 876
Component Description 876
CONSULT-II Reference Value in Data Monitor Mode 876
On Board Diagnosis Logic 876
DTC Confirmation Procedure 877
Wiring Diagram 878
Diagnostic Procedure 880
Component Inspection 882
Removal and Installation 882
DTC P2135 TP SENSOR 883
Component Description 883
CONSULT-II Reference Value in Data Monitor Mode 883
On Board Diagnosis Logic 883
DTC Confirmation Procedure 884
Wiring Diagram 885
Diagnostic Procedure 887
Component Inspection 889
Removal and Installation 890
DTC P2138 APP SENSOR 891
Component Description 891
CONSULT-II Reference Value in Data Monitor Mode 891
On Board Diagnosis Logic 891
DTC Confirmation Procedure 892
Wiring Diagram 893
Diagnostic Procedure 895
Component Inspection 897
Removal and Installation 898
ASCD BRAKE SWITCH 899
Component Description 899
CONSULT-II Reference Value in Data Monitor Mode 899
Wiring Diagram 900
Diagnostic Procedure 901
Component Inspection 910
ASCD INDICATOR 912
Component Description 912
CONSULT-II Reference Value in Data Monitor Mode 912
Wiring Diagram 913
Diagnostic Procedure 914
ELECTRICAL LOAD SIGNAL 915
Description 915
CONSULT-II Reference Value in Data Monitor Mode 915
Diagnostic Procedure 915
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 917
Description 917
CONSULT-II Reference Value in Data Monitor Mode 917
Wiring Diagram 918
Diagnostic Procedure 920
Component Inspection 923
Removal and Installation 923
EVAP CANISTER VENT CONTROL VALVE 924
Component Description 924
Wiring Diagram 925
Diagnostic Procedure 926
Component Inspection 928
FUEL INJECTOR 929
Component Description 929
CONSULT-II Reference Value in Data Monitor Mode 929
Wiring Diagram 930
Diagnostic Procedure 931
Component Inspection 935
Removal and Installation 935
FUEL PUMP 936
Description 936
CONSULT-II Reference Value in Data Monitor Mode 936
Wiring Diagram 937
Diagnostic Procedure 938
Component Inspection 941
Removal and Installation 941
HO2S2 942
Component Description 942
CONSULT-II Reference Value in Data Monitor Mode 942
Wiring Diagram 943
Diagnostic Procedure 946

Component Inspection 949
Removal and Installation 950
HO2S2 HEATER 951
Description 951
CONSULT-II Reference Value in Data Monitor Mode 951
Wiring Diagram 952
Diagnostic Procedure 955
Component Inspection 958
Removal and Installation 958
IAT SENSOR 959
Component Description 959
Wiring Diagram 960
Diagnostic Procedure 961
Component Inspection 963
Removal and Installation 963
IGNITION SIGNAL 964
Component Description 964
Wiring Diagram 965
Diagnostic Procedure 970
Component Inspection 975
Removal and Installation 976
REFRIGERANT PRESSURE SENSOR 977
Component Description 977
Wiring Diagram 978
Diagnostic Procedure 979
Removal and Installation 982
VIAS 983
Description 983
CONSULT-II Reference Value in Data Monitor Mode 984
Wiring Diagram 985
Diagnostic Procedure 987
Component Inspection 990
Removal and Installation 991
VSS 992
Description 992
Diagnostic Procedure 992
MIL AND DATA LINK CONNECTOR 993
Wiring Diagram 993
SERVICE DATA AND SPECIFICATIONS (SDS) ... 995
Fuel Pressure 995
Idle Speed and Ignition Timing 995
Mass Air Flow Sensor 995
Intake Air Temperature Sensor 995
Engine Coolant Temperature Sensor 995
Air Fuel Ratio (A/F) Sensor 1 Heater 995
Heated Oxygen sensor 2 Heater 995
Crankshaft Position Sensor (POS) 995
Camshaft Position Sensor (PHASE) 995
Throttle Control Motor 995
Fuel Injector 995
Fuel Pump 995

YD

INDEX FOR DTC 996
DTC No. Index 996
Alphabetical Index 998
PRECAUTIONS 1000
Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” 1000
On Board Diagnostic (OBD) System of Engine 1000
Precautions 1000
PREPARATION 1003
Special Service Tools 1003
Commercial Service Tools 1003
ENGINE CONTROL SYSTEM 1004
System Diagram 1004
Vacuum Hose Drawing 1005
System Chart 1007
Fuel Injection Control System 1007
Fuel Injection Timing Control System 1009
Air Conditioning Cut Control 1009
Fuel Cut Control (At No Load & High Engine Speed) 1009
Crankcase Ventilation System 1010
CAN Communication 1011
BASIC SERVICE PROCEDURE 1012
Fuel Filter 1012
Fuel Pump Learning Value Clearing 1013
Injector Adjustment Value Registration 1014
ON BOARD DIAGNOSTIC (OBD) SYSTEM 1016
DTC Detection Logic 1016
Diagnostic Trouble Code (DTC) 1016
Freeze Frame Data 1017
NATS (Nissan Anti-theft System) 1017
Malfunction Indicator Lamp (MIL) 1017
Relationship Between MIL, DTC, CONSULT-II and Driving Patterns 1020
TROUBLE DIAGNOSIS 1022
Trouble Diagnosis Introduction 1022
DTC Inspection Priority Chart 1026
Basic Inspection 1027
Symptom Matrix Chart 1031
Engine Control Component Parts Location 1035
Circuit Diagram 1039
ECM Harness Connector Terminal Layout 1041
ECM Terminals And Reference Value 1041
CONSULT-II Function (ENGINE) 1047
CONSULT-II Reference Value in Data Monitor Mode 1054
Major Sensor Reference Graph in Data Monitor Mode 1057
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT 1058
Description 1058
Diagnostic Procedure 1058
POWER SUPPLY AND GROUND CIRCUIT 1059
ECM Terminals and Reference Value 1059
Wiring Diagram 1060
Diagnostic Procedure 1061
Ground Inspection 1066
DTC U1000 CAN COMMUNICATION LINE 1067
Description 1067
On Board Diagnosis Logic 1067
DTC Confirmation Procedure 1067

Wiring Diagram 1068
Diagnostic Procedure 1069
DTC P0016 CKP - CMP CORRELATION 1070
On Board Diagnosis Logic 1070
DTC Confirmation Procedure 1070
Diagnostic Procedure 1070
DTC P0088 FUEL SYSTEM 1072
On Board Diagnosis Logic 1072
DTC Confirmation Procedure 1072
Diagnostic Procedure 1072
Removal and Installation 1073
DTC P0089 FUEL PUMP 1074
On Board Diagnosis Logic 1074
DTC Confirmation Procedure 1074
Diagnostic Procedure 1075
Removal and Installation 1075
DTC P0093 FUEL SYSTEM 1076
On Board Diagnosis Logic 1076
DTC Confirmation Procedure 1076
Diagnostic Procedure 1077
Component Inspection 1078
Removal and Installation 1079
DTC P0102, P0103 MAF SENSOR 1080
Component Description 1080
CONSULT-II Reference Value in Data Monitor Mode 1080
ECM Terminals and Reference Value 1080
On Board Diagnosis Logic 1081
DTC Confirmation Procedure 1081
Wiring Diagram 1082
Diagnostic Procedure 1083
Component Inspection 1084
Removal and Installation 1085
DTC P0112, P0113 IAT SENSOR 1086
Component Description 1086
On Board Diagnosis Logic 1086
DTC Confirmation Procedure 1086
Wiring Diagram 1088
Diagnostic Procedure 1089
Component Inspection 1090
Removal and Installation 1090
DTC P0117, P0118 ECT SENSOR 1091
Description 1091
On Board Diagnosis Logic 1091
DTC Confirmation Procedure 1091
Wiring Diagram 1093
Diagnostic Procedure 1094
Component Inspection 1095
Removal and Installation 1095
DTC P0122, P0123 APP SENSOR 1096
Description 1096
CONSULT-II Reference Value in Data Monitor Mode 1096
ECM Terminals and Reference Value 1096
On Board Diagnosis Logic 1097
DTC Confirmation Procedure 1097
Wiring Diagram 1098
Diagnostic Procedure 1099
Component Inspection 1100
Removal and Installation 1100
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR 1101
Description 1101
CONSULT-II Reference Value in Data Monitor Mode 1101
ECM Terminals and Reference Value 1101
On Board Diagnosis Logic 1101
DTC Confirmation Procedure 1102
Wiring Diagram 1103
Diagnostic Procedure 1104
Removal and Installation 1105
DTC P0192, P0193 FRP SENSOR 1106
Description 1106
CONSULT-II Reference Value in Data Monitor Mode 1106
ECM Terminals and Reference Value 1106
On Board Diagnosis Logic 1106
DTC Confirmation Procedure 1107
Wiring Diagram 1108
Diagnostic Procedure 1109
Component Inspection 1110
Removal and Installation 1110
DTC P0200 FUEL INJECTOR 1111
On Board Diagnosis Logic 1111
DTC Confirmation Procedure 1111
Diagnostic Procedure 1111
DTC P0201 - P0204 FUEL INJECTOR 1113
Component Description 1113
CONSULT-II Reference Value in Data Monitor Mode 1113
ECM Terminals and Reference Value 1113
On Board Diagnosis Logic 1114
DTC Confirmation Procedure 1115
Wiring Diagram 1116
Diagnostic Procedure 1117
Component Inspection 1118
Removal and Installation 1119
DTC P0217 ENGINE OVER TEMPERATURE 1120
Description 1120
CONSULT-II Reference Value in Data Monitor Mode 1121
On Board Diagnosis Logic 1121
Overall Function Check 1121
Wiring Diagram 1123
Diagnostic Procedure 1125
Main 12 Causes of Overheating 1128
Component Inspection 1129
DTC P0222, P0223 APP SENSOR 1130
Description 1130
CONSULT-II Reference Value in Data Monitor Mode 1130
ECM Terminals and Reference Value 1130
On Board Diagnosis Logic 1131
DTC Confirmation Procedure 1131
Wiring Diagram 1132
Diagnostic Procedure 1133

Component Inspection 1134
Removal and Installation 1134
DTC P0234 TC SYSTEM 1135
Description 1135
ECM Terminals and Reference Value 1135
On Board Diagnosis Logic 1136
Overall Function Check 1136
Wiring Diagram 1137
Diagnostic Procedure 1138
Component Inspection 1140
Removal and Installation 1140
DTC P0237, P0238 TC BOOST SENSOR 1141
Component Description 1141
CONSULT-II Reference Value in Data Monitor Mode 1141
ECM Terminals and Reference Value 1141
On Board Diagnosis Logic 1142
DTC Confirmation Procedure 1142
Wiring Diagram 1143
Diagnostic Procedure 1144
Component Inspection 1146
Removal and Installation 1146
DTC P0335 CKP SENSOR 1147
Description 1147
CONSULT-II Reference Value in Data Monitor Mode 1147
ECM Terminals and Reference Value 1147
On Board Diagnosis Logic 1148
DTC Confirmation Procedure 1148
Wiring Diagram 1149
Diagnostic Procedure 1150
Component Inspection 1152
Removal and Installation 1152
DTC P0336 CKP SENSOR 1153
Description 1153
CONSULT-II Reference Value in Data Monitor Mode 1153
ECM Terminals and Reference Value 1153
On Board Diagnosis Logic 1154
DTC Confirmation Procedure 1154
Wiring Diagram 1155
Diagnostic Procedure 1156
Component Inspection 1158
Removal and Installation 1158
DTC P0340 CMP SENSOR 1159
Description 1159
ECM Terminals and Reference Value 1159
On Board Diagnosis Logic 1160
DTC Confirmation Procedure 1160
Wiring Diagram 1161
Diagnostic Procedure 1162
Component Inspection 1163
Removal and Installation 1164
DTC P0341 CMP SENSOR 1165
Description 1165
ECM Terminals and Reference Value 1165
On Board Diagnosis Logic 1166
DTC Confirmation Procedure 1166
Wiring Diagram 1167
Diagnostic Procedure 1168
Component Inspection 1170
Removal and Installation 1170
DTC P0501 ASCD VEHICLE SPEED SENSOR .. 1171
Component Description 1171
On Board Diagnosis Logic 1171
DTC Confirmation Procedure 1171
Diagnostic Procedure 1172
DTC P0502 ASCD VEHICLE SPEED SENSOR .. 1173
Component Description 1173
On Board Diagnosis Logic 1173
DTC Confirmation Procedure 1173
Diagnostic Procedure 1174
DTC P0503 ASCD VEHICLE SPEED SENSOR .. 1175
Component Description 1175
On Board Diagnosis Logic 1175
DTC Confirmation Procedure 1175
Diagnostic Procedure 1176
DTC P0504 ASCD BRAKE SWITCH 1177
Component Description 1177
CONSULT-II Reference Value in Data Monitor Mode 1177
ECM Terminals and Reference Value 1177
On Board Diagnosis Logic 1178
DTC confirmation Procedure 1178
Wiring Diagram 1180
Diagnostic Procedure 1181
Component Inspection 1190
DTC P0563 BATTERY VOLTAGE 1191
On Board Diagnosis Logic 1191
DTC Confirmation Procedure 1191
Diagnostic Procedure 1191
DTC P0580, P0581 ASCD STEERING SWITCH . 1194
Component Description 1194
CONSULT-II Reference Value in Data Monitor Mode 1194
ECM Terminals and Reference Value 1194
On Board Diagnosis Logic 1195
DTC Confirmation Procedure 1195
Wiring Diagram 1196
Diagnostic Procedure 1197
Component Inspection 1200
DTC P0605 ECM 1201
Description 1201
On Board Diagnosis Logic 1201
DTC Confirmation Procedure 1201
Diagnostic Procedure 1202
DTC P0606 ECM 1203
Description 1203
On Board Diagnosis Logic 1203
DTC Confirmation Procedure 1203
Diagnostic Procedure 1204
DTC P0628, P0629 FUEL PUMP 1205
Description 1205
CONSULT-II Reference Value in Data Monitor Mode 1205
ECM Terminals and Reference Value 1205
On Board Diagnosis Logic 1206
DTC Confirmation Procedure 1206

Wiring Diagram 1207
Diagnostic Procedure 1208
Component Inspection 1209
Removal and Installation 1209
DTC P0642, P0643 SENSOR POWER SUPPLY .1210
ECM Terminals and Reference Value 1210
On Board Diagnosis Logic 1210
DTC Confirmation Procedure 1211
Wiring Diagram 1212
Diagnostic Procedure 1213
DTC P0652, P0653 SENSOR POWER SUPPLY .1215
ECM Terminals and Reference Value 1215
On Board Diagnosis Logic 1216
DTC Confirmation Procedure 1216
Wiring Diagram 1217
Diagnostic Procedure 1218
DTC P0686 ECM RELAY 1220
ECM Terminals and Reference valve 1220
On Board Diagnosis Logic 1220
DTC Confirmation Procedure 1220
Wiring Diagram 1222
Diagnostic Procedure 1223
DTC P1268 - P1271 FUEL INJECTOR 1225
Component Description 1225
CONSULT-II Reference Value in Data Monitor Mode 1225
ECM Terminals and Reference Value 1225
On Board Diagnosis Logic 1226
DTC Confirmation Procedure 1227
Wiring Diagram 1228
Diagnostic Procedure 1229
Component Inspection 1231
Removal and Installation 1232
DTC P1272 FUEL PUMP 1233
Description 1233
CONSULT-II Reference Value in Data Monitor Mode 1233
ECM Terminals and Reference Value 1233
On Board Diagnosis Logic 1234
DTC Confirmation Procedure 1234
Wiring Diagram 1236
Diagnostic Procedure 1237
Component Inspection 1238
Removal and Installation 1238
DTC P1273 FUEL PUMP 1239
Description 1239
CONSULT-II Reference Value in Data Monitor Mode 1239
ECM Terminals and Reference Value 1239
On Board Diagnosis Logic 1240
DTC Confirmation Procedure 1240
Wiring Diagram 1242
Diagnostic Procedure 1243
Component Inspection 1245
Removal and Installation 1245
DTC P1274 FUEL PUMP 1246
Description 1246
CONSULT-II Reference Value in Data Monitor Mode 1246
ECM Terminals and Reference Value 1246
On Board Diagnosis Logic 1247
DTC Confirmation Procedure 1247
Wiring Diagram 1248
Diagnostic Procedure 1249
Component Inspection 1250
Removal and Installation 1250
DTC P1275 FUEL PUMP 1251
Description 1251
CONSULT-II Reference Value in Data Monitor Mode 1251
ECM Terminals and Reference Value 1251
On Board Diagnosis Logic 1252
DTC Confirmation Procedure 1252
Wiring Diagram 1254
Diagnostic Procedure 1255
Component Inspection 1256
Removal and Installation 1256
DTC P1616 ECM 1257
Description 1257
On Board Diagnosis Logic 1257
DTC Confirmation Procedure 1257
Diagnostic Procedure 1258
DTC P1622 INJECTOR ADJUSTMENT VALUE ..1259
Description 1259
On Board Diagnosis Logic 1259
DTC Confirmation Procedure 1259
Diagnostic Procedure 1260
DTC P1623 INJECTOR ADJUSTMENT VALUE ..1261
Description 1261
On Board Diagnosis Logic 1261
DTC Confirmation Procedure 1261
Diagnostic Procedure 1262
DTC P2135 APP SENSOR 1263
Description 1263
CONSULT-II Reference Value in Data Monitor Mode 1263
ECM Terminals and Reference Value 1263
On Board Diagnosis Logic 1264
DTC Confirmation Procedure 1264
Wiring Diagram 1265
Diagnostic Procedure 1266
Component Inspection 1267
Removal and Installation 1268
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY 1269
Component Description 1269
CONSULT-II Reference Value in Data Monitor Mode 1269
ECM Terminals and Reference Value 1269
On Board Diagnosis Logic 1270
DTC Confirmation Procedure 1271
Wiring Diagram 1272
Diagnostic Procedure 1273
DTC P2147, P2148 FUEL INJECTOR CIRCUIT ..1274
Component Description 1274
CONSULT-II Reference Value in Data Monitor Mode 1274
ECM Terminals and Reference Value 1274

On Board Diagnosis Logic 1275
DTC Confirmation Procedure 1276
Wiring Diagram 1277
Diagnostic Procedure 1278
Component Inspection 1280
Removal and Installation 1280
DTC P2228, P2229 BARO SENSOR 1281
Description 1281
On Board Diagnosis Logic 1281
DTC Confirmation Procedure 1281
Diagnostic Procedure 1282
GLOW CONTROL SYSTEM 1283
Description 1283
Wiring Diagram 1284
Diagnostic Procedure 1285
Component Inspection 1289
Removal and Installation 1289
EGR VOLUME CONTROL SYSTEM 1290
Description 1290
CONSULT-II Reference Value in Data Monitor Mode 1291
ECM Terminals and Reference Value 1291
Wiring Diagram 1292
Diagnostic Procedure 1293
Component Inspection 1295
Removal and Installation 1296
TC BOOST CONTROL SOLENOID VALVE 1297
Description 1297
ECM Terminals and Reference Value 1298
Wiring Diagram 1299
Diagnostic Procedure 1300
Component Inspection 1301
Removal and Installation 1301
INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE 1302
Description 1302
ECM Terminals and Reference Value 1302
Wiring Diagram 1303
Diagnostic Procedure 1304
Component Inspection 1306
REFRIGERANT PRESSURE SENSOR 1307
Component Description 1307
ECM Terminals and Reference Value 1307
Wiring Diagram 1308
Diagnostic Procedure 1309
Removal and Installation 1311
BRAKE SWITCH 1312
Description 1312
CONSULT-II Reference Value in Data Monitor Mode 1312
ECM Terminals and Reference Value 1312
Wiring Diagram 1313
Diagnostic Procedure 1314
Component Inspection 1323
PNP SWITCH 1324
Description 1324
CONSULT-II Reference Value in Data Monitor Mode 1324
ECM Terminals and Reference Value 1324
Wiring Diagram 1325
Diagnostic Procedure 1326
START SIGNAL 1330
Wiring Diagram 1330
Diagnostic Procedure 1331
ASCD INDICATOR 1333
Component Description 1333
Wiring Diagram 1334
Diagnostic Procedure 1335
MIL AND DATA LINK CONNECTOR 1336
Wiring Diagram 1336
AUTOMATIC SPEED CONTROL DEVICE (ASCD) 1337
System Description 1337
Component Description 1338
SERVICE DATA AND SPECIFICATIONS (SDS) ..1339
General Specifications 1339
Mass Air Flow Sensor 1339
Intake Air Temperature Sensor 1339
Engine Coolant Temperature Sensor 1339
Fuel Rail Pressure Sensor 1339
Fuel Injector 1339
Glow Plug 1339
EGR Volume Control Valve 1339
Crankshaft Position Sensor 1339
Camshaft Position Sensor 1339
Fuel Pump 1340

APPLICATION NOTICE

PFP:00000

How to Check Vehicle Type

GBS000H9

Check the vehicle type (refer to GI-54, "IDENTIFICATION INFORMATION") to confirm the service information in EC section.

Service information	Remarks
VQ TYPE 1	Models for Australia
VQ TYPE 2	Models except for Australia

INDEX FOR DTC

PFP:00024

DTC No. Index

GBS000HA

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	EC-146
U1001	1001*4	CAN COMM CIRCUIT	EC-146
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—
P0011	0011	INT/V TIM CONT-B1	EC-149
P0021	0021	INT/V TIM CONT-B2	EC-149
P0037	0037	HO2S2 HTR (B1)	EC-154
P0038	0038	HO2S2 HTR (B1)	EC-154
P0057	0057	HO2S2 HTR (B2)	EC-154
P0058	0058	HO2S2 HTR (B2)	EC-154
P0102	0102	MAF SEN/CIRCUIT	EC-163
P0103	0103	MAF SEN/CIRCUIT	EC-163
P0112	0112	IAT SEN/CIRCUIT	EC-170
P0113	0113	IAT SEN/CIRCUIT	EC-170
P0117	0117	ECT SEN/CIRC	EC-175
P0118	0118	ECT SEN/CIRC	EC-175
P0122	0122	TP SEN 2/CIRC	EC-180
P0123	0123	TP SEN 2/CIRC	EC-180
P0138	0138	HO2S2 (B1)	EC-187
P0139	0139	HO2S2 (B1)	EC-196
P0158	0158	HO2S2 (B2)	EC-187
P0159	0159	HO2S2 (B2)	EC-196
P0171	0171	FUEL SYS-LEAN-B1	EC-207
P0172	0172	FUEL SYS-RICH-B1	EC-219
P0174	0174	FUEL SYS-LEAN-B2	EC-207
P0175	0175	FUEL SYS-RICH-B2	EC-219
P0222	0222	TP SEN 1/CIRC	EC-231
P0223	0223	TP SEN 1/CIRC	EC-231
P0300	0300	MULTI CYL MISFIRE	EC-238
P0301	0301	CYL 1 MISFIRE	EC-238
P0302	0302	CYL 2 MISFIRE	EC-238
P0303	0303	CYL 3 MISFIRE	EC-238
P0304	0304	CYL 4 MISFIRE	EC-238
P0305	0305	CYL 5 MISFIRE	EC-238
P0306	0306	CYL 6 MISFIRE	EC-238
P0327	0327	KNOCK SEN/CIRC-B1	EC-247
P0328	0328	KNOCK SEN/CIRC-B1	EC-247

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0332	0332	KNOCK SEN/CIRC-B2	EC-247
P0333	0333	KNOCK SEN/CIRC-B2	EC-247
P0335	0335	CKP SEN/CIRCUIT	EC-252
P0340	0340	CMP SEN/CIRC-B1	EC-259
P0345	0345	CMP SEN/CIRC-B2	EC-259
P0420	0420	TW CATALYST SYS-B1	EC-268
P0430	0430	TW CATALYST SYS-B2	EC-268
P0444	0444	PURG VOLUME CONT/V	EC-274
P0445	0445	PURG VOLUME CONT/V	EC-274
P0500	0500	VEH SPEED SEN/CIRC	EC-281
P0550	0550	PW ST P SEN/CIRC	EC-283
P0605	0605	ECM	EC-288
P1031	1031	A/F SEN1 HTR (B1)	EC-291
P1032	1032	A/F SEN1 HTR (B1)	EC-291
P1051	1051	A/F SEN1 HTR (B2)	EC-291
P1052	1052	A/F SEN1 HTR (B2)	EC-291
P1065	1065	ECM BACK UP/CIRCUIT	EC-299
P1111	1111	INT/V TIM V/CIR-B1	EC-303
P1121	1121	ETC ACTR	EC-310
P1122	1122	ETC FUNCTION/CIRC	EC-312
P1124	1124	ETC MOT PWR	EC-318
P1126	1126	ETC MOT PWR	EC-318
P1128	1128	ETC MOT	EC-324
P1136	1136	INT/V TIM V/CIR-B2	EC-303
P1146	1146	HO2S2 (B1)	EC-329
P1147	1147	HO2S2 (B1)	EC-340
P1166	1166	HO2S2 (B2)	EC-329
P1167	1167	HO2S2 (B2)	EC-340
P1217	1217	ENG OVER TEMP	EC-351
P1225	1225	CTP LEARNING	EC-361
P1226	1226	CTP LEARNING	EC-363
P1229	1229	SENSOR POWER/CIRC	EC-365
P1271	1271	A/F SENSOR1 (B1)	EC-372
P1272	1272	A/F SENSOR1 (B1)	EC-381
P1273	1273	A/F SENSOR1 (B1)	EC-390
P1274	1274	A/F SENSOR1 (B1)	EC-400
P1276	1276	A/F SENSOR1 (B1)	EC-410
P1278	1278	A/F SENSOR1 (B1)	EC-420
P1279	1279	A/F SENSOR1 (B1)	EC-432
P1281	1281	A/F SENSOR1 (B2)	EC-372
P1282	1282	A/F SENSOR1 (B2)	EC-381
P1283	1283	A/F SENSOR1 (B2)	EC-390

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P1284	1284	A/F SENSOR1 (B2)	EC-400
P1286	1286	A/F SENSOR1 (B2)	EC-410
P1288	1288	A/F SENSOR1 (B2)	EC-420
P1289	1289	A/F SENSOR1 (B2)	EC-432
P1564	1564	ASCD SW	EC-444
P1572	1572	ASCD BRAKE SW	EC-451
P1574	1574	ASCD VHL SPD SEN	EC-464
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-43
P1706	1706	P-N POS SW/CIRCUIT	EC-466
P1715	1715	IN PLUY SPEED	EC-472
P1805	1805	BRAKE SW/CIRCUIT	EC-473
P2122	2122	APP SEN 1/CIRC	EC-478
P2123	2123	APP SEN 1/CIRC	EC-478
P2127	2127	APP SEN 2/CIRC	EC-484
P2128	2128	APP SEN 2/CIRC	EC-484
P2135	2135	TP SENSOR	EC-491
P2138	2138	APP SENSOR	EC-499

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.

Alphabetical Index

GBS000HB

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
A/F SENSOR1 (B1)	P1271	1271	EC-372
A/F SENSOR1 (B1)	P1272	1272	EC-381
A/F SENSOR1 (B1)	P1273	1273	EC-390
A/F SENSOR1 (B1)	P1274	1274	EC-400
A/F SENSOR1 (B1)	P1276	1276	EC-410
A/F SENSOR1 (B1)	P1278	1278	EC-420
A/F SENSOR1 (B1)	P1279	1279	EC-432
A/F SENSOR1 (B2)	P1281	1281	EC-372
A/F SENSOR1 (B2)	P1282	1282	EC-381
A/F SENSOR1 (B2)	P1283	1283	EC-390
A/F SENSOR1 (B2)	P1284	1284	EC-400
A/F SENSOR1 (B2)	P1286	1286	EC-410
A/F SENSOR1 (B2)	P1288	1288	EC-420
A/F SENSOR1 (B2)	P1289	1289	EC-432
A/F SEN1 HTR (B1)	P1031	1031	EC-291
A/F SEN1 HTR (B1)	P1032	1032	EC-291
A/F SEN1 HTR (B2)	P1051	1051	EC-291
A/F SEN1 HTR (B2)	P1052	1052	EC-291
APP SEN 1/CIRC	P2122	2122	EC-478
APP SEN 1/CIRC	P2123	2123	EC-478
APP SEN 2/CIRC	P2127	2127	EC-484
APP SEN 2/CIRC	P2128	2128	EC-484
APP SENSOR	P2138	2138	EC-499
ASCD BRAKE SW	P1572	1572	EC-451
ASCD SW	P1564	1564	EC-444
ASCD VHL SPD SEN	P1574	1574	EC-464
BRAKE SW/CIRCUIT	P1805	1805	EC-473
CAN COMM CIRCUIT	U1000	1000*4	EC-146
CAN COMM CIRCUIT	U1001	1001*4	EC-146
CKP SEN/CIRCUIT	P0335	0335	EC-252
CMP SEN/CIRC-B1	P0340	0340	EC-259
CMP SEN/CIRC-B2	P0345	0345	EC-259
CTP LEARNING	P1225	1225	EC-361
CTP LEARNING	P1226	1226	EC-363
CYL 1 MISFIRE	P0301	0301	EC-238
CYL 2 MISFIRE	P0302	0302	EC-238
CYL 3 MISFIRE	P0303	0303	EC-238
CYL 4 MISFIRE	P0304	0304	EC-238

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
CYL 5 MISFIRE	P0305	0305	EC-238
CYL 6 MISFIRE	P0306	0306	EC-238
ECM	P0605	0605	EC-288
ECM BACK UP/CIRCUIT	P1065	1065	EC-299
ECT SEN/CIRC	P0117	0117	EC-175
ECT SEN/CIRC	P0118	0118	EC-175
ENG OVER TEMP	P1217	1217	EC-351
ETC ACTR	P1121	1121	EC-310
ETC FUNCTION/CIRC	P1122	1122	EC-312
ETC MOT	P1128	1128	EC-324
ETC MOT PWR	P1124	1124	EC-318
ETC MOT PWR	P1126	1126	EC-318
FUEL SYS-LEAN-B1	P0171	0171	EC-207
FUEL SYS-LEAN-B2	P0174	0174	EC-207
FUEL SYS-RICH-B1	P0172	0172	EC-219
FUEL SYS-RICH-B2	P0175	0175	EC-219
HO2S2 (B1)	P0138	0138	EC-187
HO2S2 (B1)	P0139	0139	EC-196
HO2S2 (B1)	P1146	1146	EC-329
HO2S2 (B1)	P1147	1147	EC-340
HO2S2 (B2)	P0158	0158	EC-187
HO2S2 (B2)	P0159	0159	EC-196
HO2S2 (B2)	P1166	1166	EC-329
HO2S2 (B2)	P1167	1167	EC-340
HO2S2 HTR (B1)	P0037	0037	EC-154
HO2S2 HTR (B1)	P0038	0038	EC-154
HO2S2 HTR (B2)	P0057	0057	EC-154
HO2S2 HTR (B2)	P0058	0058	EC-154
IAT SEN/CIRCUIT	P0112	0112	EC-170
IAT SEN/CIRCUIT	P0113	0113	EC-170
IN PULY SPEED	P1715	1715	EC-472
INT/V TIM CONT-B1	P0011	0011	EC-149
INT/V TIM CONT-B2	P0021	0021	EC-149
INT/V TIM V/CIR-B1	P1111	1111	EC-303
INT/V TIM V/CIR-B2	P1136	1136	EC-303
KNOCK SEN/CIRC-B1	P0327	0327	EC-247
KNOCK SEN/CIRC-B1	P0328	0328	EC-247
KNOCK SEN/CIRC-B2	P0332	0332	EC-247
KNOCK SEN/CIRC-B2	P0333	0333	EC-247
MAF SEN/CIRCUIT	P0102	0102	EC-163
MAF SEN/CIRCUIT	P0103	0103	EC-163
MULTI CYL MISFIRE	P0300	0300	EC-238

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EC-43
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—
P-N POS SW/CIRCUIT	P1706	1706	EC-466
PURG VOLUME CONT/V	P0444	0444	EC-274
PURG VOLUME CONT/V	P0445	0445	EC-274
PW ST P SEN/CIRC	P0550	0550	EC-283
SENSOR POWER/CIRC	P1229	1229	EC-365
TP SEN 1/CIRC	P0222	0222	EC-231
TP SEN 1/CIRC	P0223	0223	EC-231
TP SEN 2/CIRC	P0122	0122	EC-180
TP SEN 2/CIRC	P0123	0123	EC-180
TP SENSOR	P2135	2135	EC-491
TW CATALYST SYS-B1	P0420	0420	EC-268
TW CATALYST SYS-B2	P0430	0430	EC-268
VEH SPEED SEN/CIRC	P0500	0500	EC-281

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.

PRECAUTIONS

PFP:00001

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

GBS000HC

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

WARNING:

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

On Board Diagnostic (OBD) System of Engine

GBS000HD

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

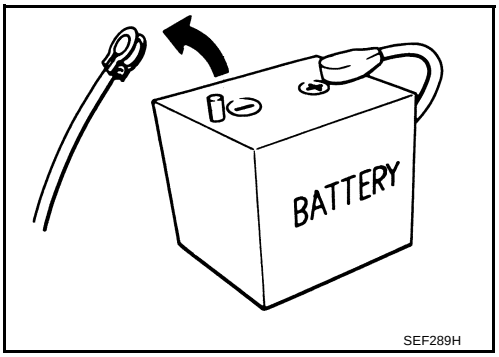
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-65, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precaution

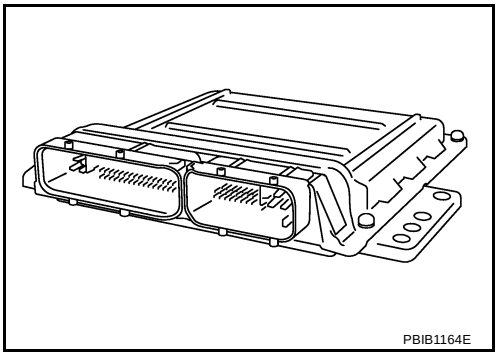
GBS000HE

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

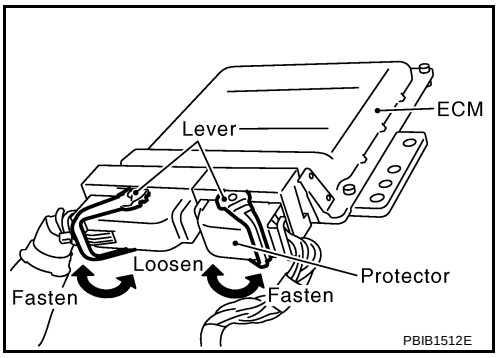


SEF289H

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

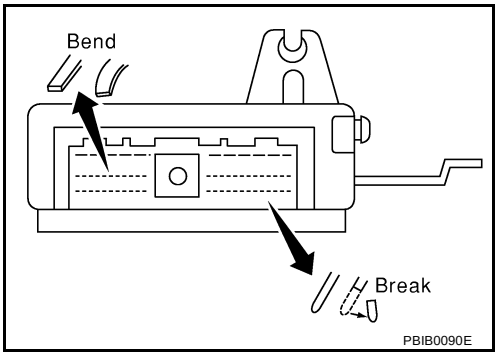

PBIB1164E

- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.



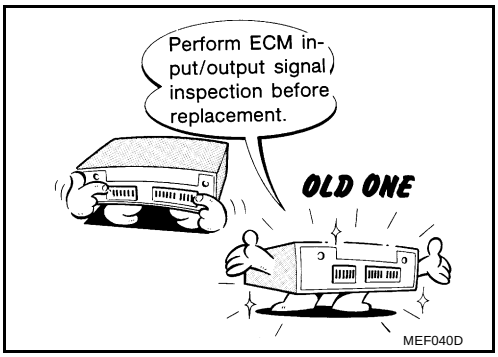
PBIB1512E

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.



PBIB0090E

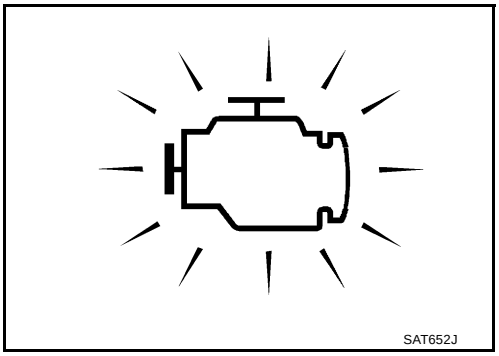
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-99, "ECM Terminals and Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.



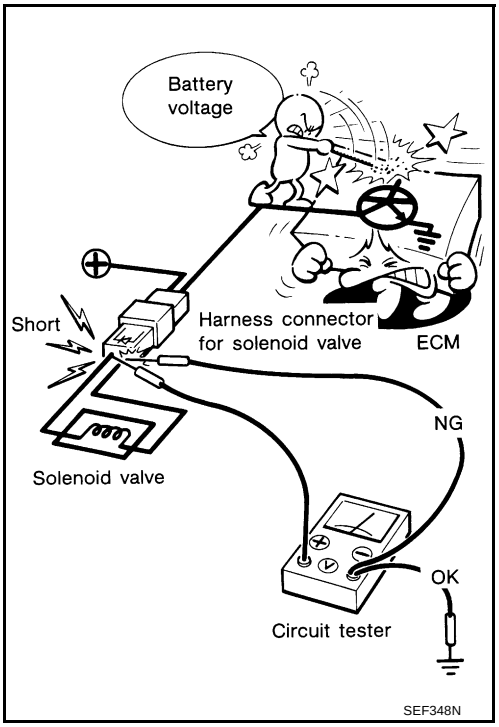
MEF040D

- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).

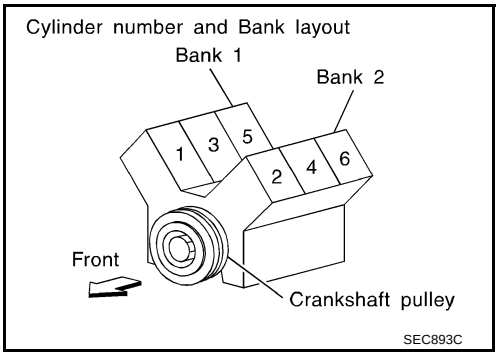
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



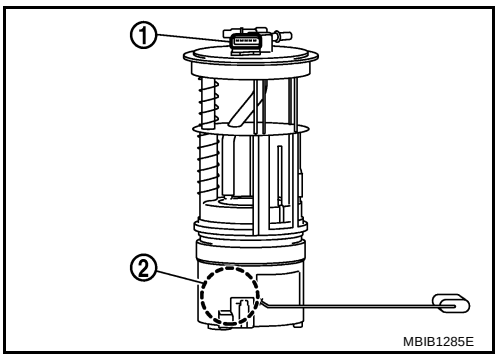
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage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



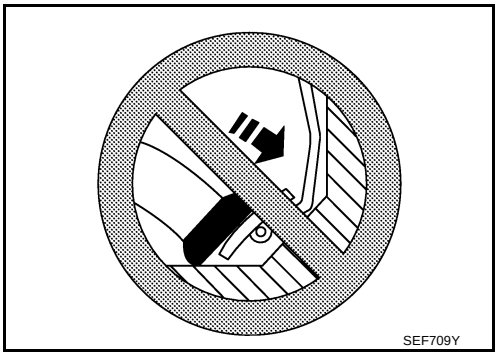
- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**



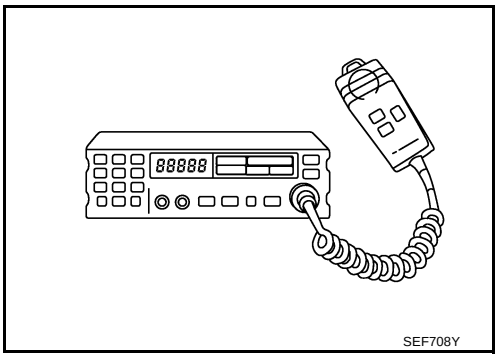
- **Do not operate fuel pump when there is no fuel in lines.**
  - Fuel level sensor unit and fuel pump (1)
  - Fuel pressure regulator (2)
- **Tighten fuel hose clamps to the specified torque.**



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



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

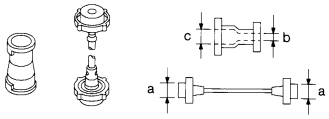
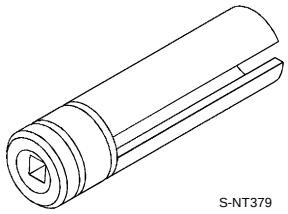
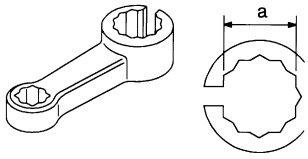
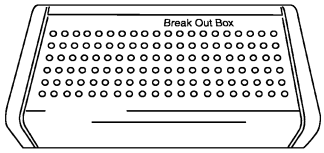
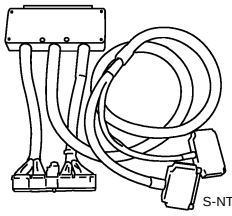
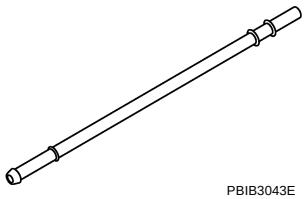


PREPARATION

PFP:00002

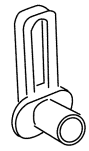
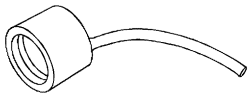
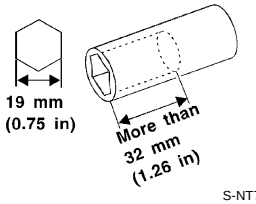
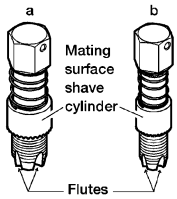
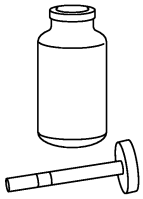
Special Service Tools

GBS000HG

Tool number Tool name		Description
EG17650301 Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening air fuel ratio (A/F) sensor **a: 22 mm (0.87 in)**
KV109E0010 Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester
KV101118400 Fuel tube adapter	 PBIB3043E	Measuring fuel pressure

Commercial Service Tools

GBS000HH

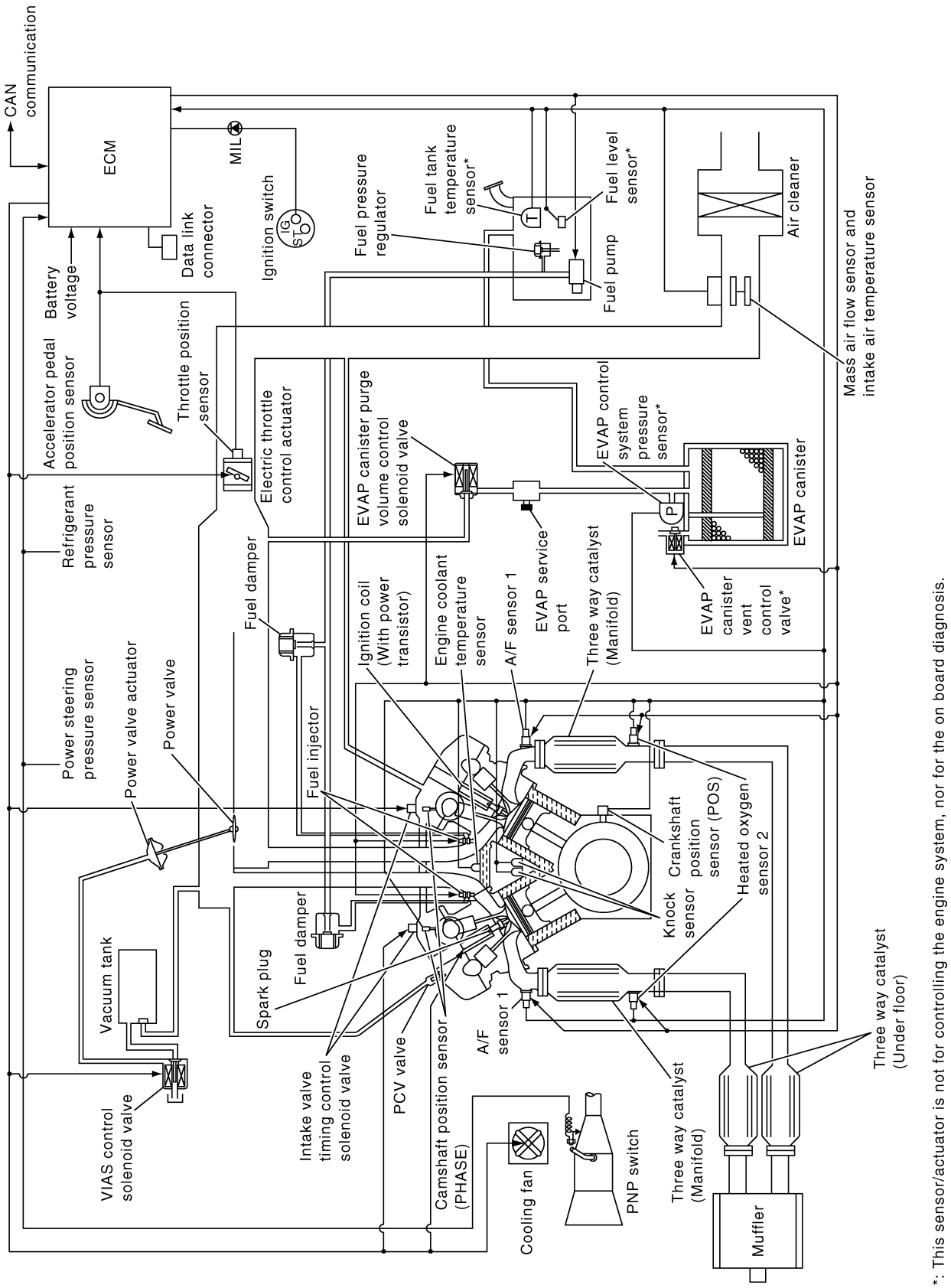
Tool name	Description
Quick connector release  PBIC0198E	Remove fuel tube quick connectors in engine room
Fuel filler cap adapter  S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

GBS000HI



MBIB1265E

Multiport Fuel Injection (MFI) System

GBS000HJ

INPUT/OUTPUT SIGNAL CHART

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

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

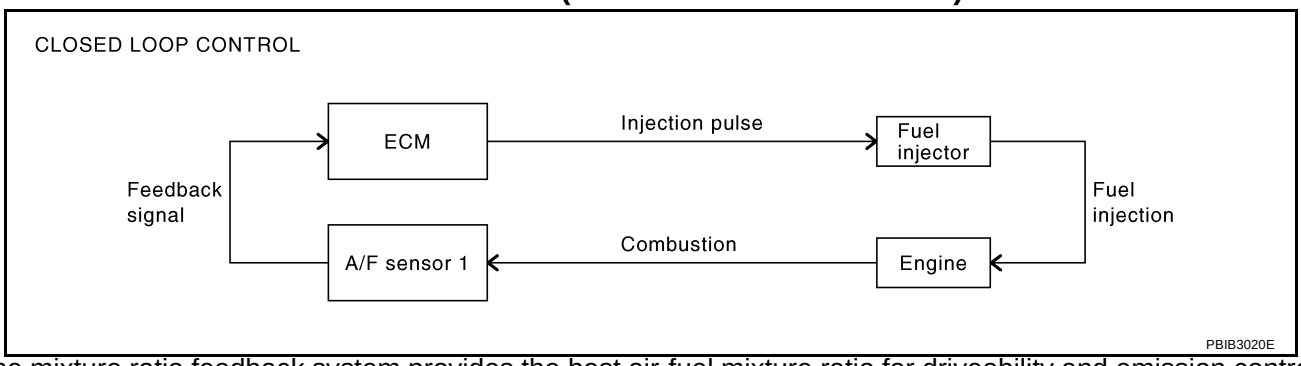
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to EC-372 . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

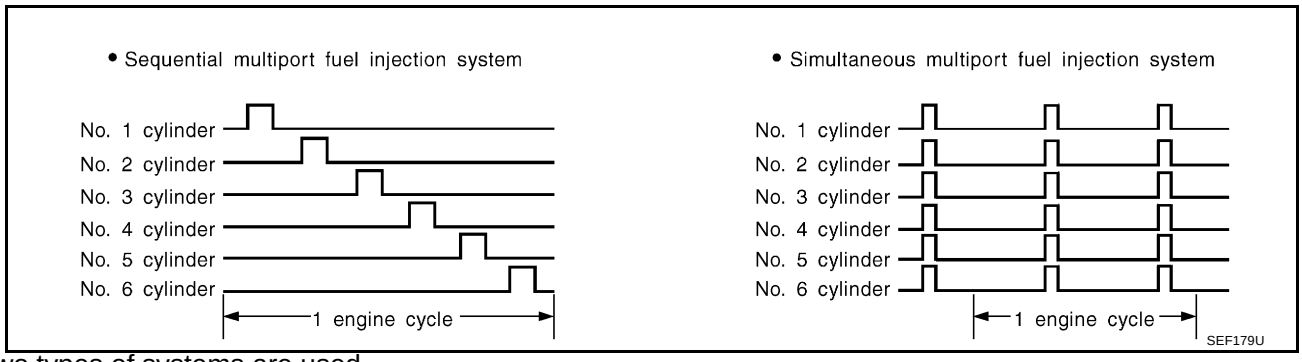
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

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

MIXTURE RATIO SELF-LEARNING CONTROL

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

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

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

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six fuel injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

GBS000HK

INPUT/OUTPUT SIGNAL CHART

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

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1-2-3-4-5-6
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

- During acceleration

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

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

GBS000HL

INPUT/OUTPUT SIGNAL CHART

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

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

SYSTEM DESCRIPTION

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

NOTE:
This function is different from deceleration control listed under EC-29, "Multiport Fuel Injection (MFI) System" .

AIR CONDITIONING CUT CONTROL

PFP:23710

Input/Output Signal Chart

GBS000HM

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

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

System Description

GBS000HN

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

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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

GBS000HO

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

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

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

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

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

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

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

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

COAST OPERATION

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

RESUME OPERATION

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

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 175 km/h (109 MPH)

Component Description

GBS000HP

ASCD STEERING SWITCH

Refer to EC-444 .

ASCD BRAKE SWITCH

Refer to EC-451 and EC-507 .

STOP LAMP SWITCH

Refer to EC-451 , EC-473 and EC-507 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-310 , EC-312 , EC-318 and EC-324 .

ASCD INDICATOR

Refer to EC-520 .

CAN COMMUNICATION

PFP:23710

System Description

GBS000HQ

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-21, "CAN COMMUNICATION" , about CAN communication for detail.

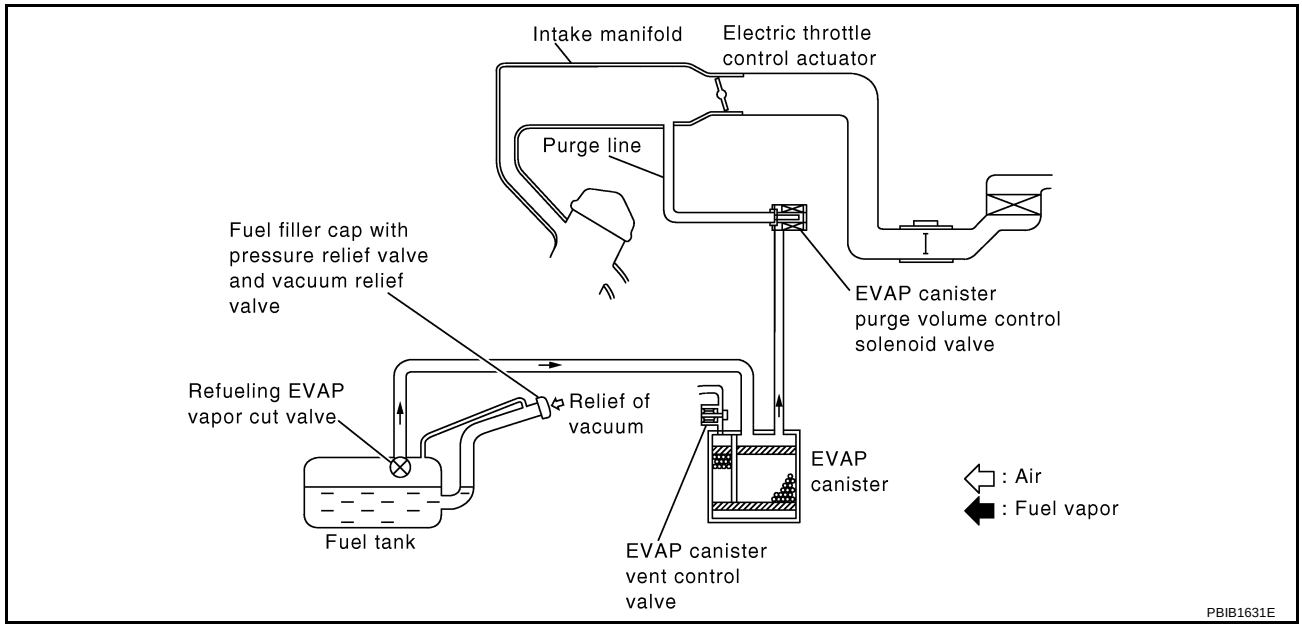
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

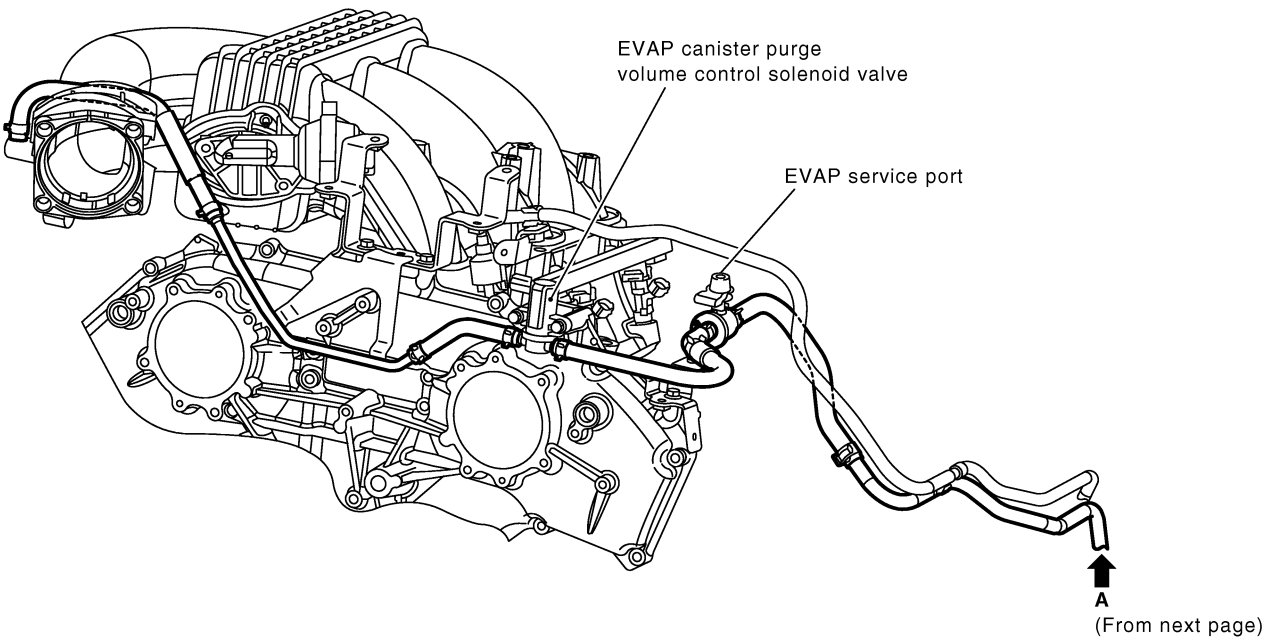
GBS000HR

SYSTEM DESCRIPTION



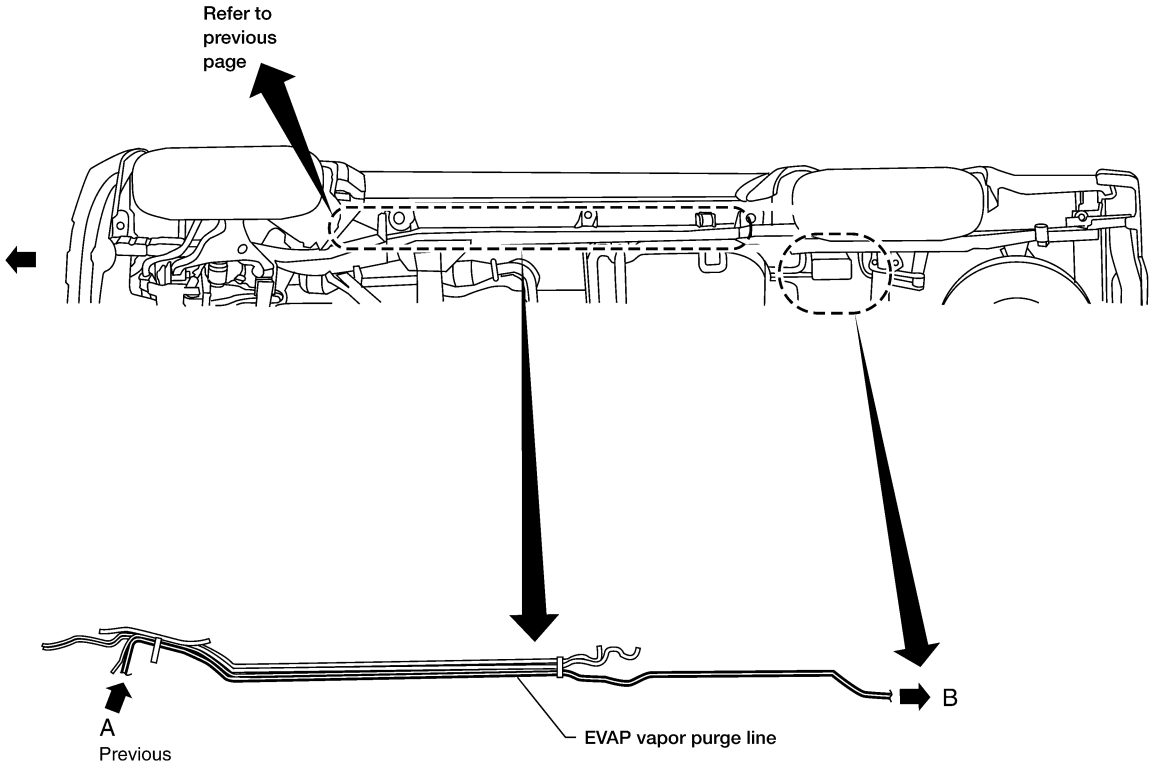
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

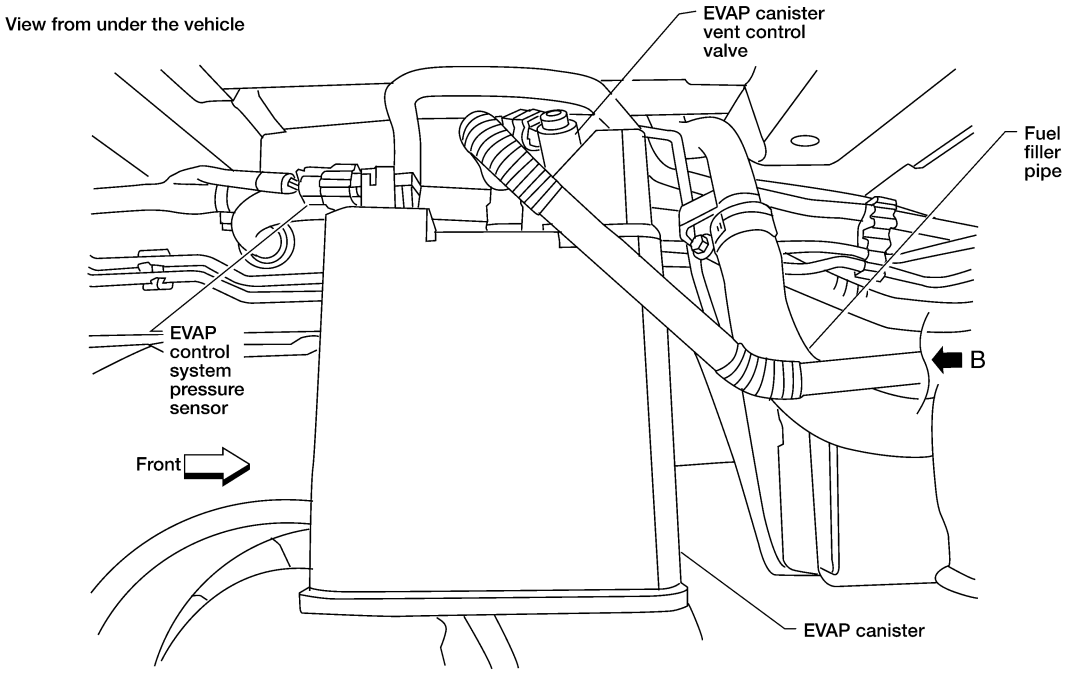
EVAPORATIVE EMISSION LINE DRAWING



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

PBIB2774E


Refer to previous page
A
Previous
B
EVAP vapor purge line


View from under the vehicle
EVAP canister vent control valve
Fuel filler pipe
EVAP control system pressure sensor
Front
B
EVAP canister

BBIA0594E

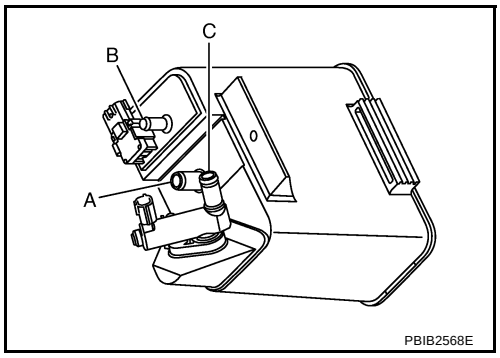
Component Inspection

GBS000HS

EVAP CANISTER

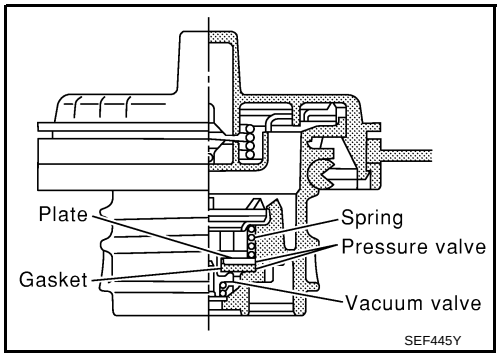
Check EVAP canister as follows:

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



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

1. Wipe clean valve housing.

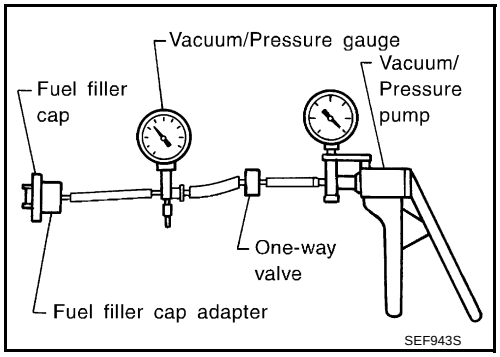


2. Check valve opening pressure and vacuum.

   Pressure: **15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)**

   Vacuum: **–6.0 to –3.3 kPa (–0.060 to –0.033 bar, – 0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)**

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



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-279, "Component Inspection" .

EVAP CANISTER VENT CONTROL VALVE

Refer to EC-529, "Component Inspection" .

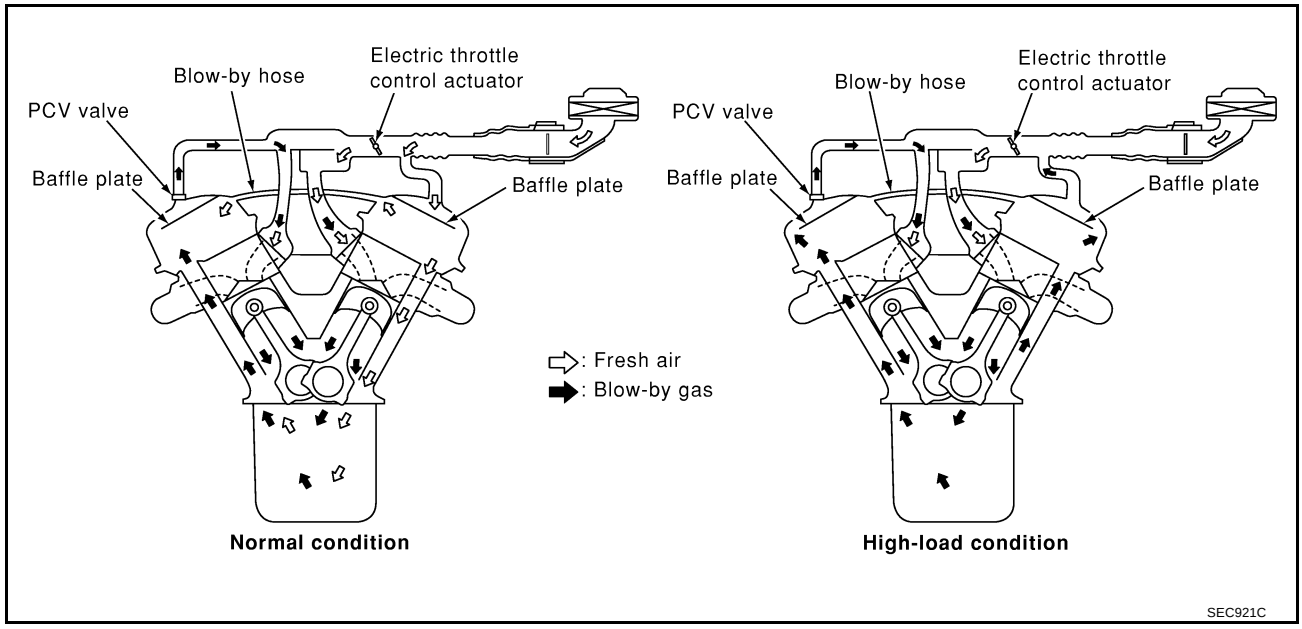
POSITIVE CRANKCASE VENTILATION

PFP:11810

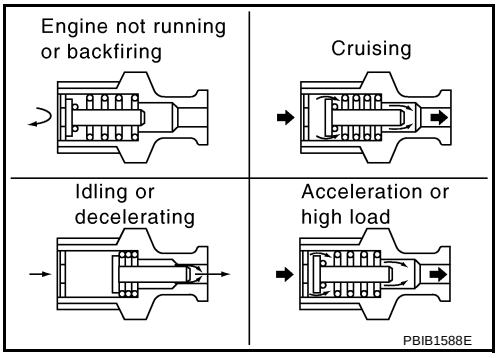
Description

GBS000HT

SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

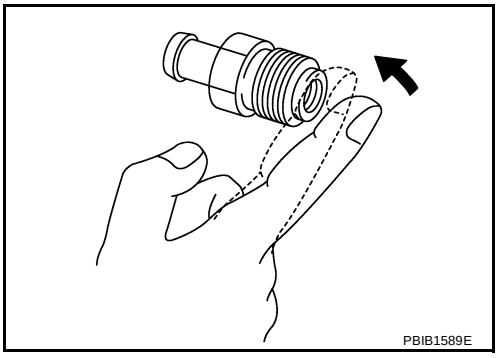


Component Inspection

GBS000HU

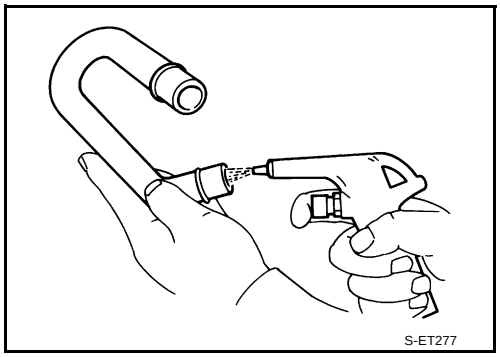
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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



PCV VALVE VENTILATION HOSE

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.



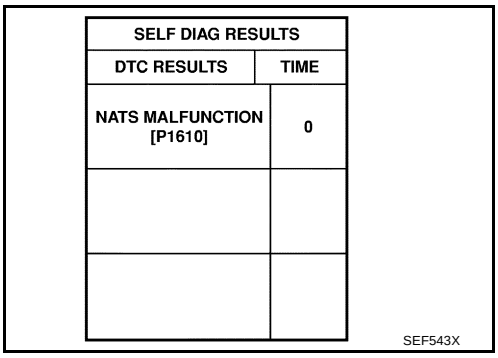
NATS (NISSAN ANTI-THEFT SYSTEM)

PFP:25386

Description

GBS000HV

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-81, "NATS(Nissan Anti-Theft System)" .
- 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 procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II Operation Manual, NATS.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

GBS000HW

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

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Service $03 of ISO 15031-5
Freeze Frame data	Service $02 of ISO 15031-5
System Readiness Test (SRT) code	Service $01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of ISO 15031-5
Calibration ID	Service $09 of ISO 15031-5

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-84 .)

Two Trip Detection Logic

GBS000HX

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

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-45 .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

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

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

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

Emission-related Diagnostic Information

GBS000HY

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page
	CONSULT-II GST*2	ECM*3					
CAN COMM CIRCUIT	U1000	1000*4	—	—	1	×	EC-146
CAN COMM CIRCUIT	U1001	1001*4	—	—	2	—	EC-146
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	2	—	EC-149
INT/V TIM CONT-B2	P0021	0021	—	—	2	—	EC-149
HO2S2 HTR (B1)	P0037	0037	×	×	2	×	EC-154
HO2S2 HTR (B1)	P0038	0038	×	×	2	×	EC-154
HO2S2 HTR (B2)	P0057	0057	×	×	2	×	EC-154
HO2S2 HTR (B2)	P0058	0058	×	×	2	×	EC-154
MAF SEN/CIRCUIT	P0102	0102	—	—	1	×	EC-163
MAF SEN/CIRCUIT	P0103	0103	—	—	1	×	EC-163
IAT SEN/CIRCUIT	P0112	0112	—	—	2	×	EC-170
IAT SEN/CIRCUIT	P0113	0113	—	—	2	×	EC-170
ECT SEN/CIRC	P0117	0117	—	—	1	×	EC-175
ECT SEN/CIRC	P0118	0118	—	—	1	×	EC-175
TP SEN 2/CIRC	P0122	0122	—	—	1	×	EC-180
TP SEN 2/CIRC	P0123	0123	—	—	1	×	EC-180
HO2S2 (B1)	P0138	0138	—	×	2	×	EC-187
HO2S2 (B1)	P0139	0139	×	×	2	×	EC-196
HO2S2 (B2)	P0158	0158	—	×	2	×	EC-187
HO2S2 (B2)	P0159	0159	×	×	2	×	EC-196
FUEL SYS-LEAN-B1	P0171	0171	—	—	2	×	EC-207
FUEL SYS-RICH-B1	P0172	0172	—	—	2	×	EC-219
FUEL SYS-LEAN-B2	P0174	0174	—	—	2	×	EC-207
FUEL SYS-RICH-B2	P0175	0175	—	—	2	×	EC-219
TP SEN 1/CIRC	P0222	0222	—	—	1	×	EC-231
TP SEN 1/CIRC	P0223	0223	—	—	1	×	EC-231
MULTI CYL MISFIRE	P0300	0300	—	—	2	×	EC-238
CYL 1 MISFIRE	P0301	0301	—	—	2	×	EC-238
CYL 2 MISFIRE	P0302	0302	—	—	2	×	EC-238
CYL 3 MISFIRE	P0303	0303	—	—	2	×	EC-238
CYL 4 MISFIRE	P0304	0304	—	—	2	×	EC-238
CYL 5 MISFIRE	P0305	0305	—	—	2	×	EC-238
CYL 6 MISFIRE	P0306	0306	—	—	2	×	EC-238
KNOCK SEN/CIRC-B1	P0327	0327	—	—	2	—	EC-247

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page
	CONSULT-II GST*2	ECM*3					
KNOCK SEN/CIRC-B1	P0328	0328	—	—	2	—	EC-247
KNOCK SEN/CIRC-B2	P0332	0332	—	—	2	—	EC-247
KNOCK SEN/CIRC-B2	P0333	0333	—	—	2	—	EC-247
CKP SEN/CIRCUIT	P0335	0335	—	—	2	×	EC-252
CMP SEN/CIRC-B1	P0340	0340	—	—	2	×	EC-259
CMP SEN/CIRC-B2	P0345	0345	—	—	2	×	EC-259
TW CATALYST SYS-B1	P0420	0420	×	×	2	×	EC-268
TW CATALYST SYS-B2	P0430	0430	×	×	2	×	EC-268
PURG VOLUME CONT/V	P0444	0444	—	—	2	×	EC-274
PURG VOLUME CONT/V	P0445	0445	—	—	2	×	EC-274
VEH SPEED SEN/CIRC	P0500	0500	—	—	2	×	EC-281
PW ST P SEN/CIRC	P0550	0550	—	—	2	—	EC-283
ECM	P0605	0605	—	—	1 or 2	× or —	EC-288
A/F SEN1 HTR (B1)	P1031	1031	×	×	2	×	EC-291
A/F SEN1 HTR (B1)	P1032	1032	×	×	2	×	EC-291
A/F SEN1 HTR (B2)	P1051	1051	×	×	2	×	EC-291
A/F SEN1 HTR (B2)	P1052	1052	×	×	2	×	EC-291
ECM BACK UP/CIRC	P1065	1065	—	—	2	×	EC-299
INT/V TIM V/CIR-B1	P1111	1111	—	—	2	×	EC-303
ETC ACTR	P1121	1121	—	—	1	×	EC-310
ETC FUNCTION/CIRC	P1122	1122	—	—	1	×	EC-312
ETC MOT PWR	P1124	1124	—	—	1	×	EC-318
ETC MOT PWR	P1126	1126	—	—	1	×	EC-318
ETC MOT	P1128	1128	—	—	1	×	EC-324
INT/V TIM V/CIR-B2	P1136	1136	—	—	2	×	EC-303
HO2S2 (B1)	P1146	1146	×	×	2	×	EC-329
HO2S2 (B1)	P1147	1147	×	×	2	×	EC-340
HO2S2 (B2)	P1166	1166	×	×	2	×	EC-329
HO2S2 (B2)	P1167	1167	×	×	2	×	EC-340
ENG OVER TEMP	P1217	1217	—	—	1	×	EC-351
CTP LEARNING	P1225	1225	—	—	2	—	EC-361
CTP LEARNING	P1226	1226	—	—	2	—	EC-363
SENSOR POWER/CIRC	P1229	1229	—	—	1	×	EC-365
A/F SENSOR1 (B1)	P1271	1271	—	×	2	×	EC-372
A/F SENSOR1 (B1)	P1272	1272	—	×	2	×	EC-381
A/F SENSOR1 (B1)	P1273	1273	—	×	2	×	EC-390
A/F SENSOR1 (B1)	P1274	1274	—	×	2	×	EC-400
A/F SENSOR1 (B1)	P1276	1276	—	×	2	×	EC-410
A/F SENSOR1 (B1)	P1278	1278	×	×	2	×	EC-420
A/F SENSOR1 (B1)	P1279	1279	×	×	2	×	EC-432
A/F SENSOR1 (B2)	P1281	1281	—	×	2	×	EC-372
A/F SENSOR1 (B2)	P1282	1282	—	×	2	×	EC-381

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL	Reference page
	CONSULT-II GST*2	ECM*3					
A/F SENSOR1 (B2)	P1283	1283	—	×	2	×	EC-390
A/F SENSOR1 (B2)	P1284	1284	—	×	2	×	EC-400
A/F SENSOR1 (B2)	P1286	1286	—	×	2	×	EC-410
A/F SENSOR1 (B2)	P1288	1288	×	×	2	×	EC-420
A/F SENSOR1 (B2)	P1289	1289	×	×	2	×	EC-432
ASCD SW	P1564	1564	—	—	1	—	EC-444
ASCD BRAKE SW	P1572	1572	—	—	1	—	EC-451
ASCD VHL SPD SEN	P1574	1574	—	—	1	—	EC-464
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	2	—	EC-43
P-N POS SW/CIRCUIT	P1706	1706	—	—	2	×	EC-466
IN PULY SPEED	P1715	1715	—	—	2	—	EC-472
BRAKE SW/CIRCUIT	P1805	1805	—	—	2	—	EC-473
APP SEN 1/CIRC	P2122	2122	—	—	1	×	EC-478
APP SEN 1/CIRC	P2123	2123	—	—	1	×	EC-478
APP SEN 2/CIRC	P2127	2127	—	—	1	×	EC-484
APP SEN 2/CIRC	P2128	2128	—	—	1	×	EC-484
TP SENSOR	P2135	2135	—	—	1	×	EC-491
APP SENSOR	P2138	2138	—	—	1	×	EC-499

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC need CONSULT-II.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-45, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Service $07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-78, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

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

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by ISO 15031-5.
(CONSULT-II also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.
These DTCs are controlled by NISSAN.

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

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

DTC display

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

1st trip DTC display

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

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-111, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items
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 EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of ISO 15031-5.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

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

SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
HO2S	1	Air fuel ratio (A/F) sensor 1	P1278, P1288
		Air fuel ratio (A/F) sensor 1	P1279, P1289
		Heated oxygen sensor 2	P0139, P0159
		Heated oxygen sensor 2	P1146, P1166
		Heated oxygen sensor 2	P1147, P1167
HO2S HTR	1	Air fuel ratio (A/F) sensor 1 heater	P1031, P1032, P1051, P1052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

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

SRT Set Timing

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

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

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

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

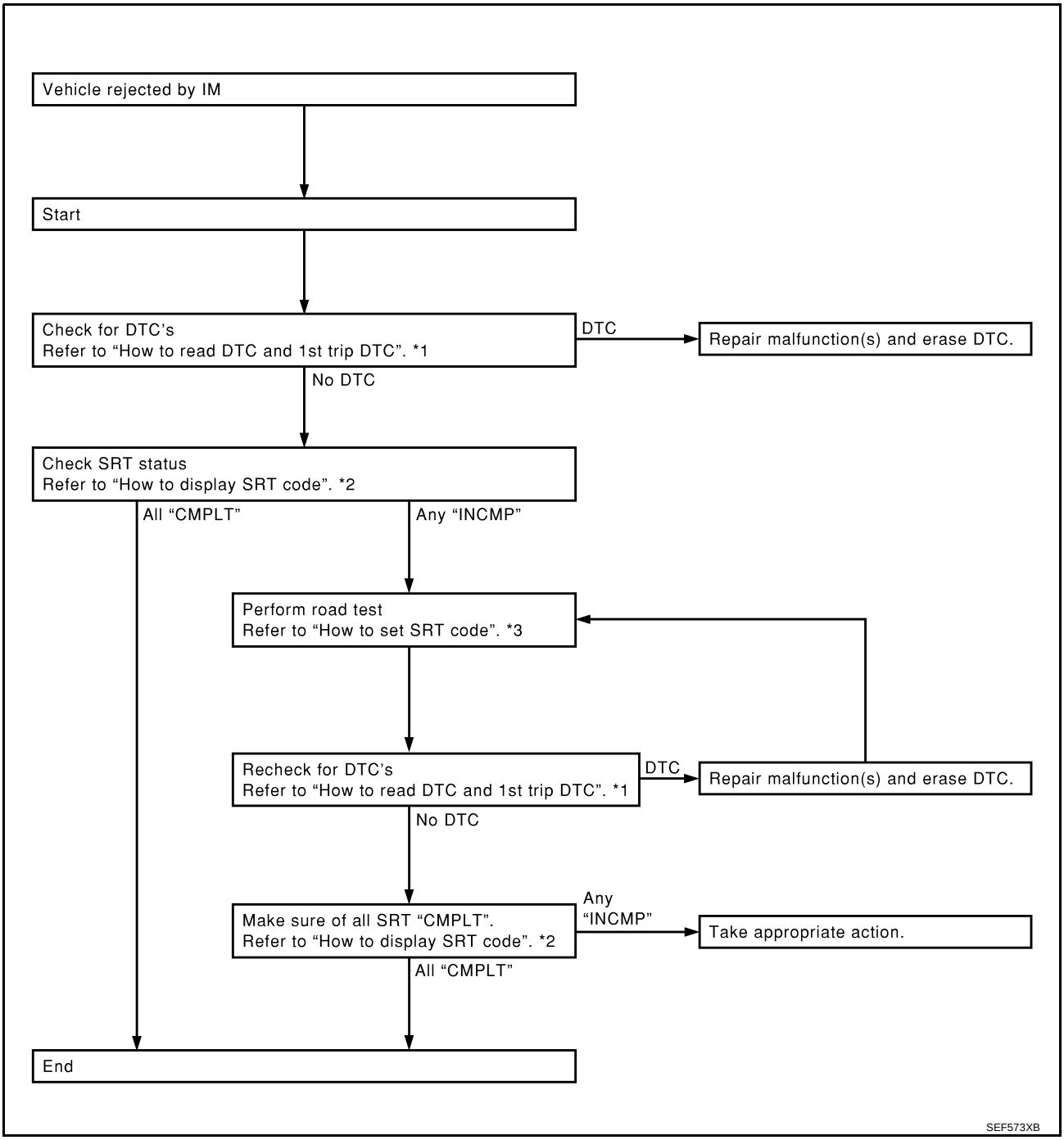
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses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

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

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

SRT Service Procedure

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



*1 EC-47 *2 EC-51 *3 EC-52

How to Display SRT Code

WITH CONSULT-II

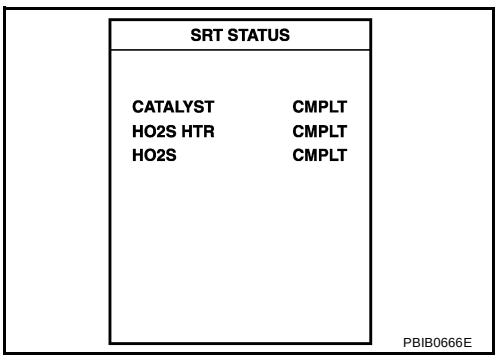
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

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

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

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

"CMPLT" means the self-diagnosis is complete and SRT is set.



WITH GST

Selecting Service $01 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.

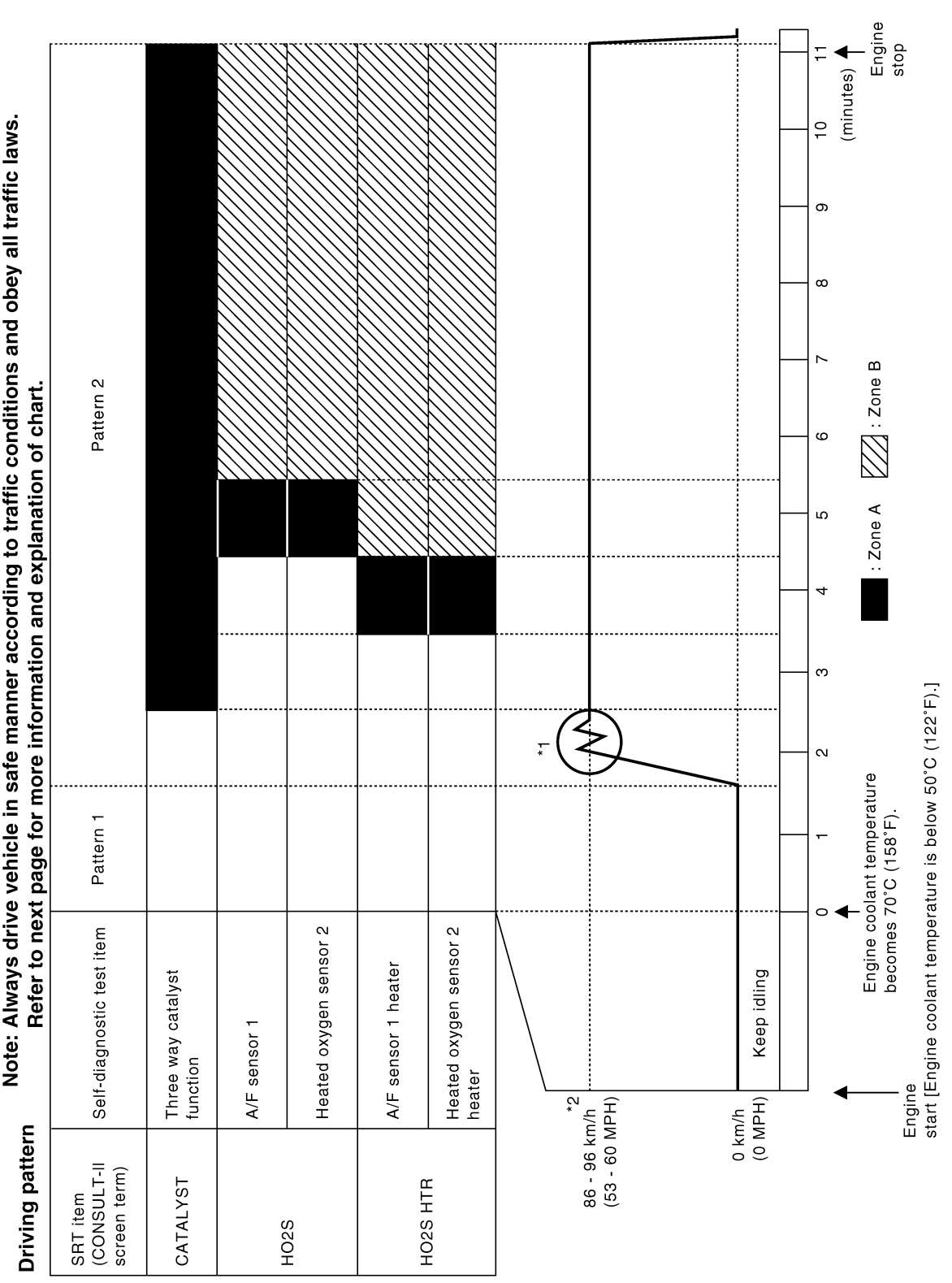
WITH CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on EC-49, "SRT Item" .

WITHOUT CONSULT-II

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

Driving Pattern



PBIB2661E

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

*: Normal conditions refer to the following:

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

Pattern 1:

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

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 GST is advised.
Suggested Transmission Gear Position for A/T models
Set the selector lever in the D position with the overdrive switch turned ON.

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

The following is the information specified in Service $06 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.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.
		P0420	02H	81H	Min.
	Three way catalyst function (Bank 2)	P0430	03H	02H	Max.
		P0430	04H	82H	Min.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
HO2S	Air fuel ratio (A/F) sensor 1 (Bank 1)	P1271	41H	8EH	Min.
		P1272	42H	0EH	Max.
		P1273	43H	0EH	Max.
		P1274	44H	8EH	Min.
		P1278	45H	8EH	Min.
		P1276	46H	0EH	Max.
		P1276	47H	8EH	Min.
		P1279	48H	8EH	Min.
	Air fuel ratio (A/F) sensor 1 (Bank 2)	P1281	4CH	8FH	Min.
		P1282	4DH	0FH	Max.
		P1283	4EH	0FH	Max.
		P1284	4FH	8FH	Min.
		P1288	50H	8FH	Min.
		P1286	51H	0FH	Max.
		P1286	52H	8FH	Min.
		P1289	53H	8FH	Min.
	Heated oxygen sensor 2 (Bank 1)	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
	Heated oxygen sensor 2 (Bank 2)	P0159	21H	87H	Min.
		P1167	22H	87H	Min.
		P1166	23H	07H	Max.
		P0158	24H	07H	Max.
HO2S HEATER	Air fuel ratio (A/F) sensor 1 heater (Bank 1)	P1032	57H	10H	Max.
		P1031	58H	90H	Min.
	Air fuel ratio (A/F) sensor 1 heater (Bank 2)	P1052	59H	11H	Max.
		P1051	5AH	91H	Min.
	Heated oxygen sensor 2 heater (Bank 1)	P0038	2DH	0AH	Max.
		P0037	2EH	8AH	Min.
	Heated oxygen sensor 2 heater (Bank 2)	P0058	2FH	0BH	Max.
		P0057	30H	8BH	Min.

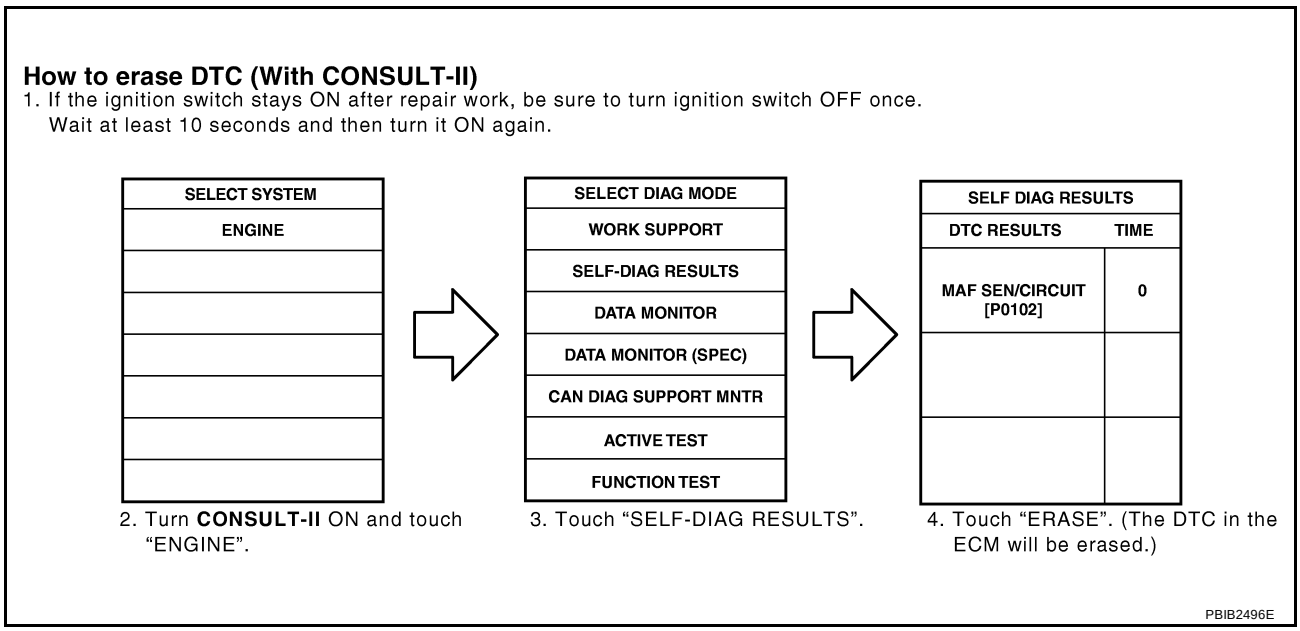
HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

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

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



With GST

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

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. Select Service $04 with GST (Generic Scan Tool).

No Tools

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 depressing the accelerator pedal. Refer to EC-58, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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

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

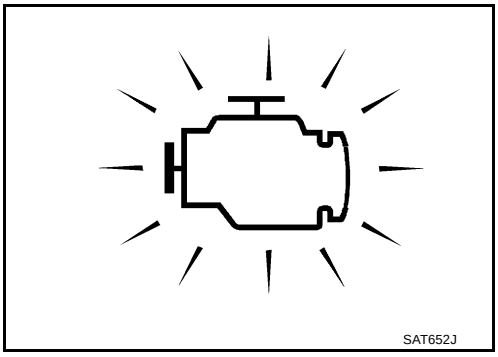
Malfunction Indicator Lamp (MIL)

GBS000HZ

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not light up, refer to DI-32, "WARNING LAMPS" , or see EC-571 .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.


SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

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

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

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

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

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

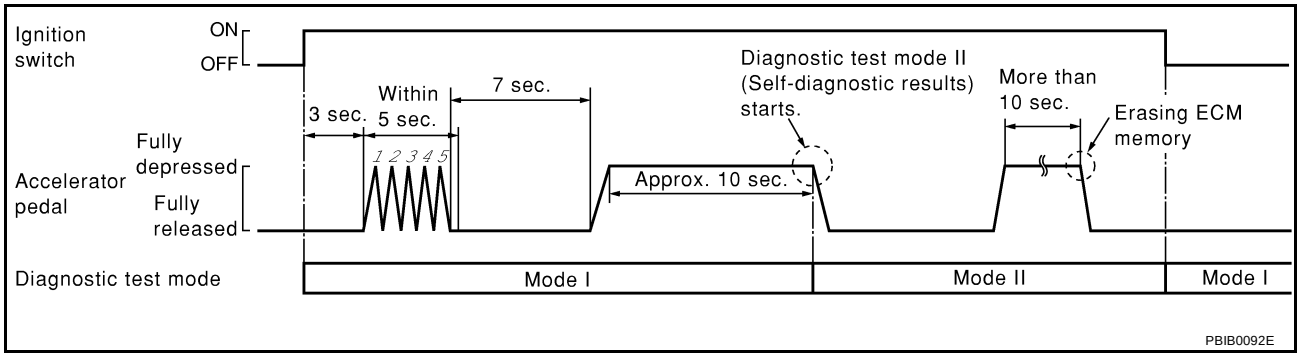
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

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

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-58, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-32, "WARNING LAMPS" or see EC-571 .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

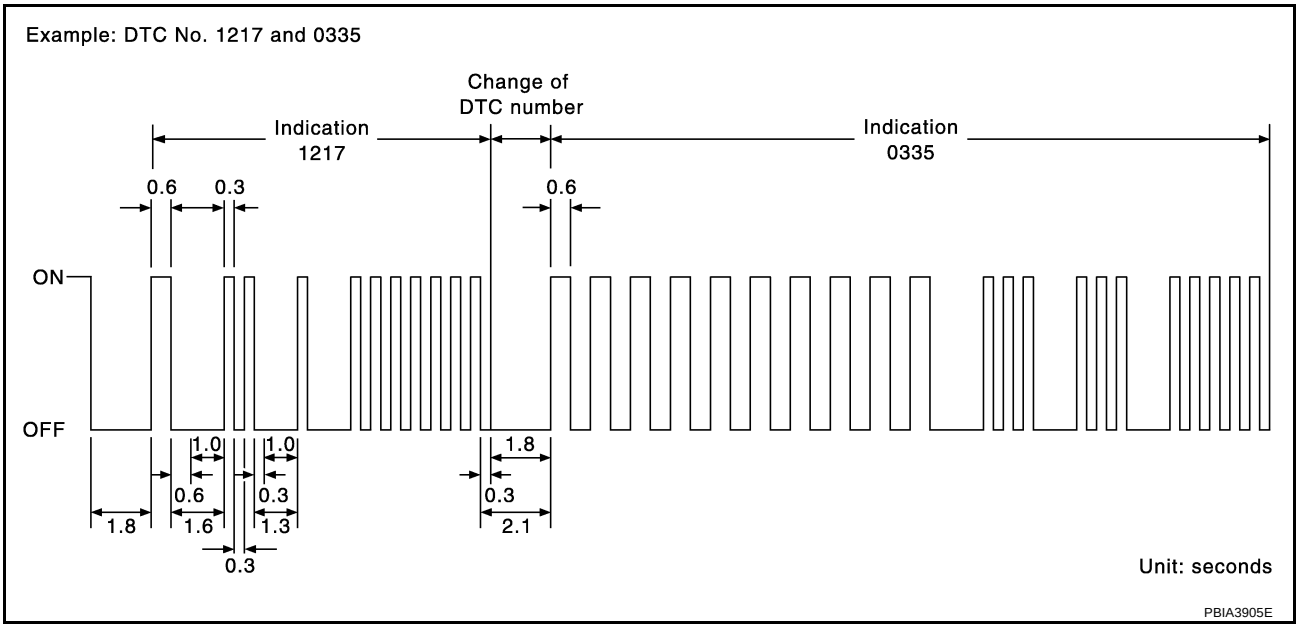
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

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

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

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

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



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-16, "INDEX FOR DTC")

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

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-58, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .

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

OBD System Operation Chart

GBS000I0

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

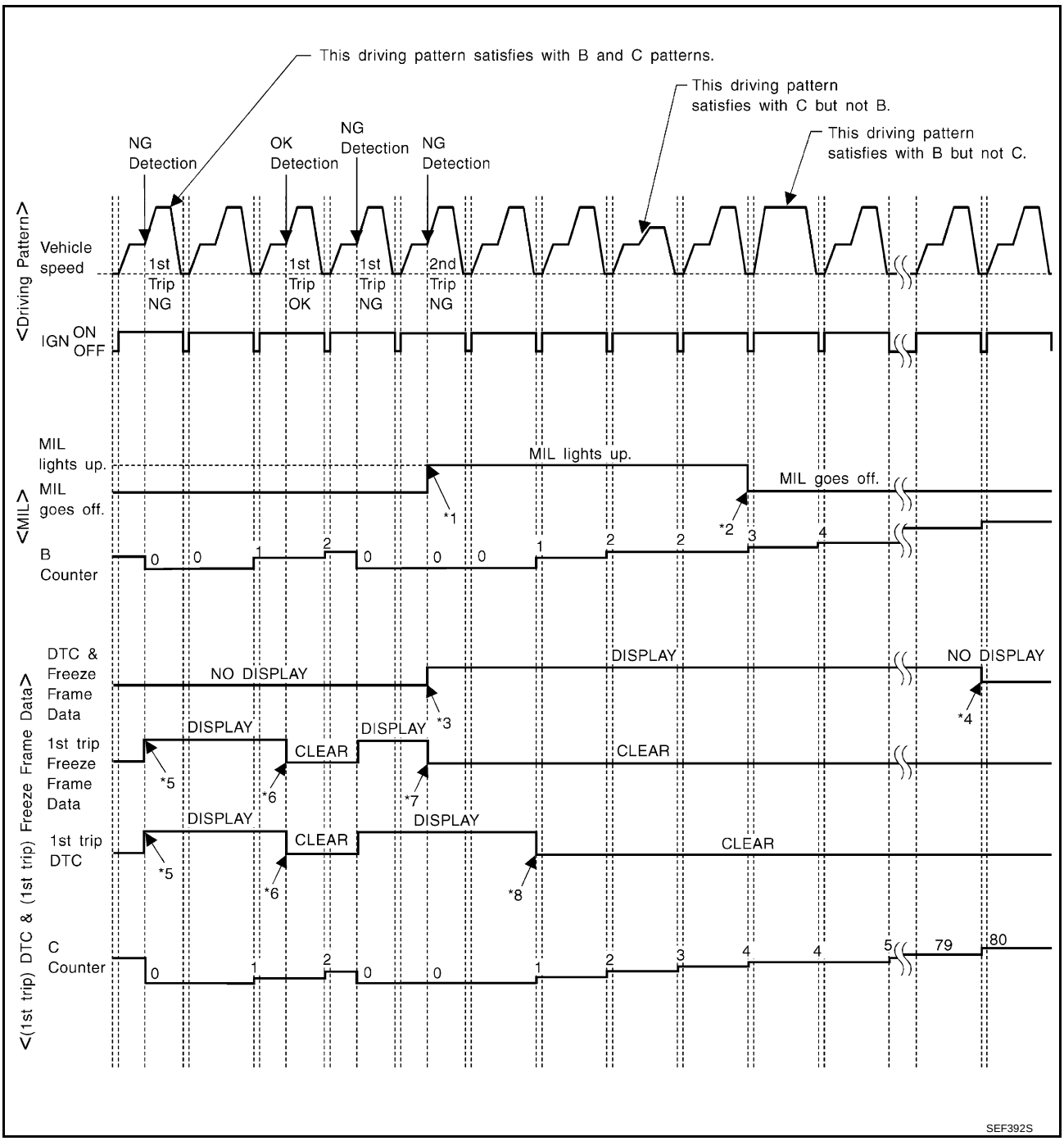
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-44, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

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

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see EC-62 .
For details about patterns A and B under Other, see EC-64 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

<Driving Pattern C>

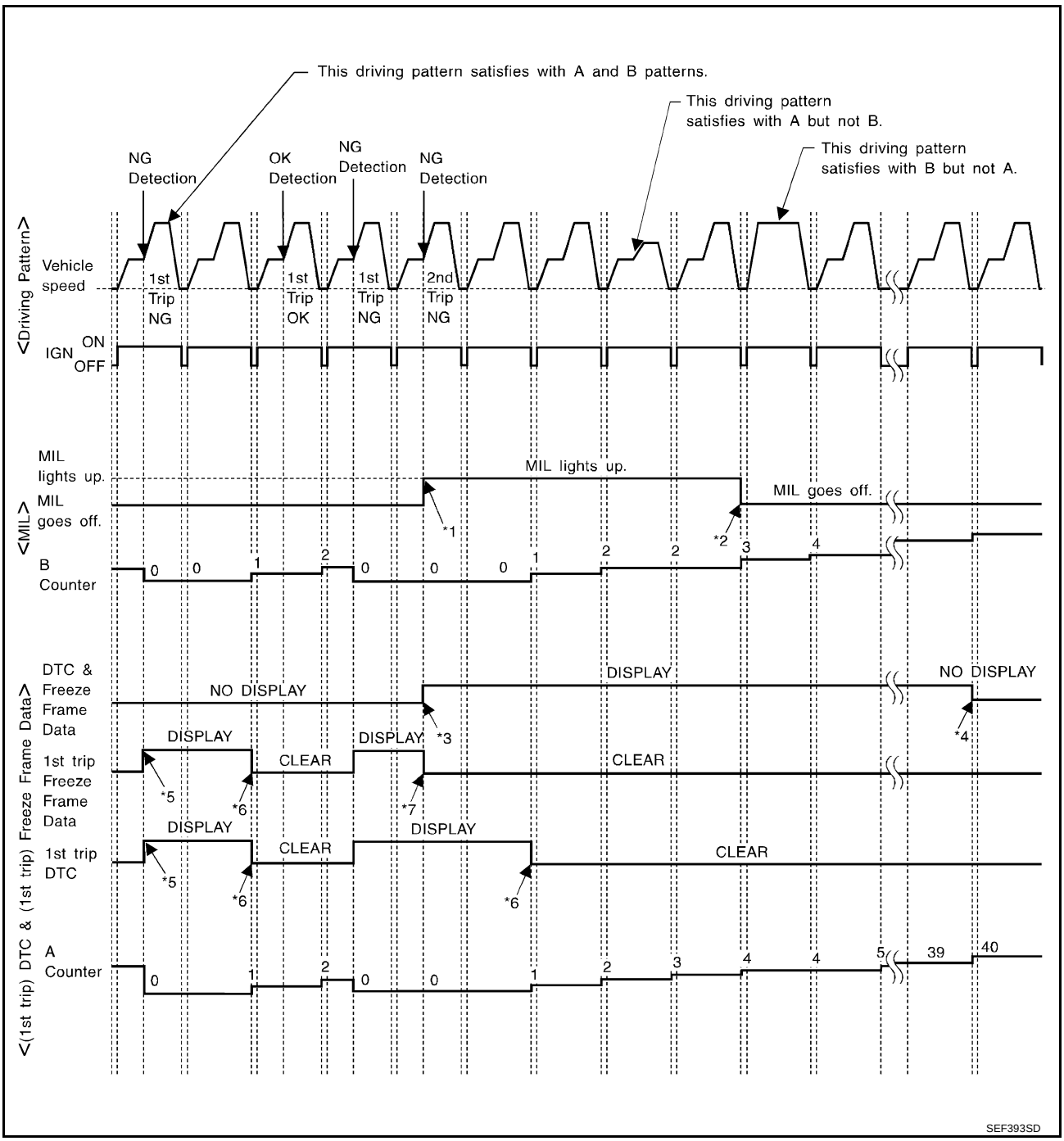
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T)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

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

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

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

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



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

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

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

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

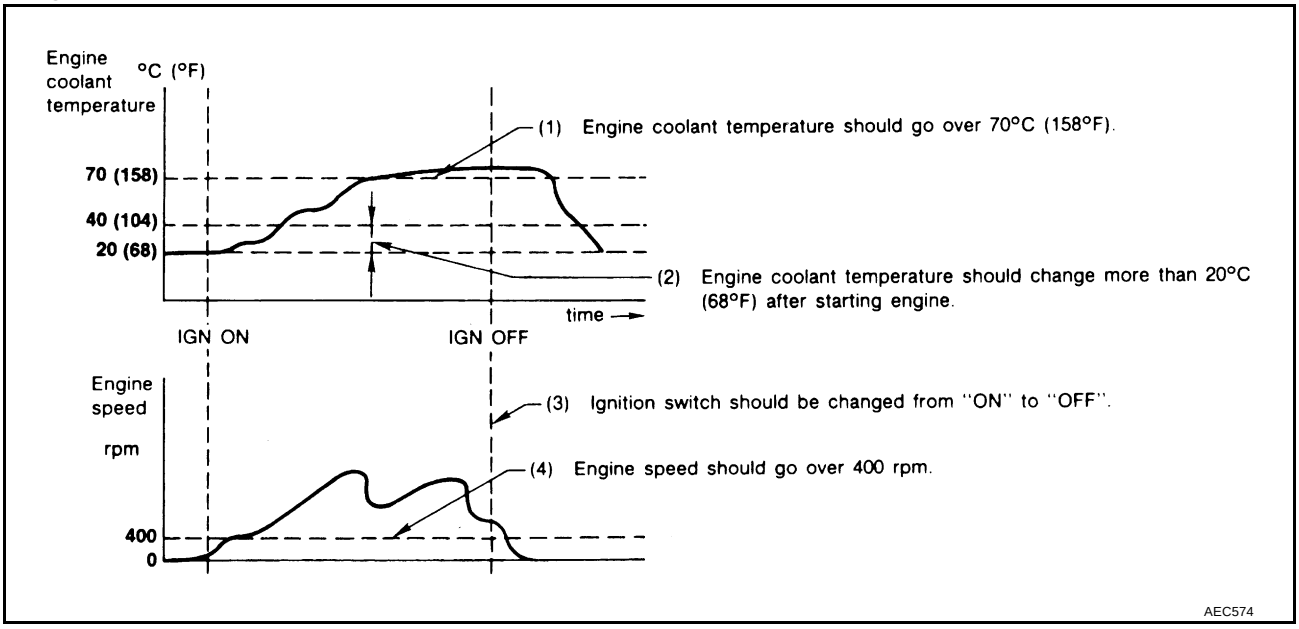
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

<Driving Pattern A>



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

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

BASIC SERVICE PROCEDURE

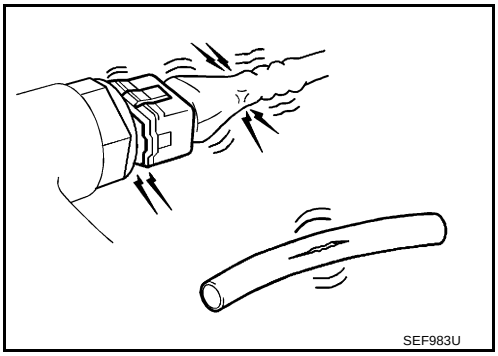
PFP:00018

Basic Inspection

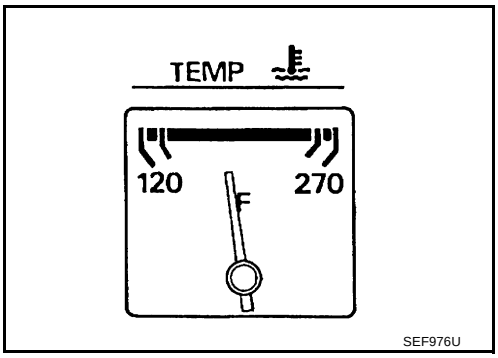
GBS000I1

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
   - Harness connectors for improper connections
   - Wiring harness for improper connections, pinches and cut
   - Vacuum hoses for splits, kinks and improper connections
   - Hoses and ducts for leaks
   - Air cleaner clogging
   - Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
   - Headlamp switch is OFF.
   - Air conditioner switch is OFF.
   - Rear window defogger switch is OFF.
   - Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.

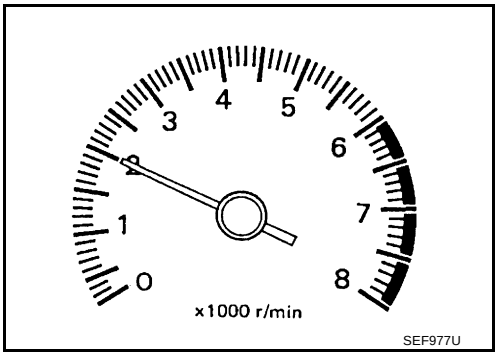


SEF976U

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

OK or NG

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



SEF977U

2. REPAIR OR REPLACE

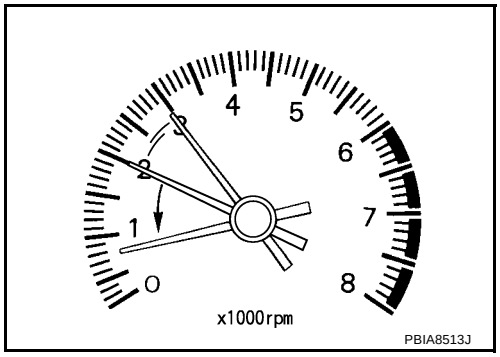
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

With CONSULT-II

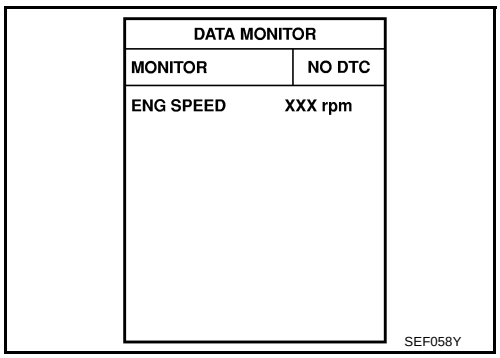
1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-69, "IDLE SPEED" .

   A/T: 625 ± 50 rpm (in P or N position)

   M/T: 625 ± 50 rpm (in Neutral position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-69, "IDLE SPEED" .

   A/T: 625 ± 50 rpm (in P or N position)

   M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

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

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-71, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-71, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

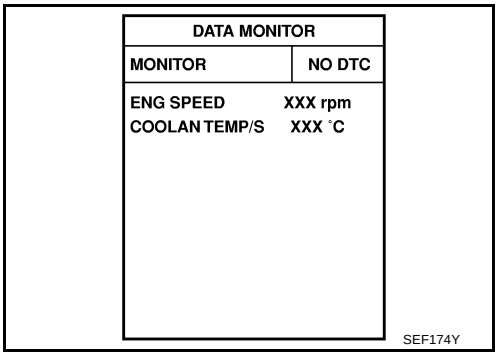
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-69, "IDLE SPEED" .

A/T: 625 ± 50 rpm (in P or N position)
M/T: 625 ± 50 rpm (in Neutral position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-69, "IDLE SPEED" .

A/T: 625 ± 50 rpm (in P or N position)
M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

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

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-259 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-252 .

OK or NG

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

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .

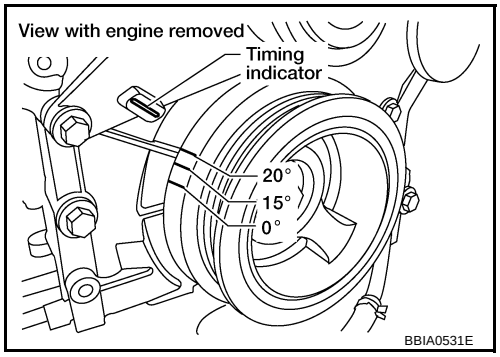
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-70, "IGNITION TIMING" .

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

M/T: 15 ± 5° BTDC (in Neutral position)



OK or NG

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

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-71, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-71, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

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

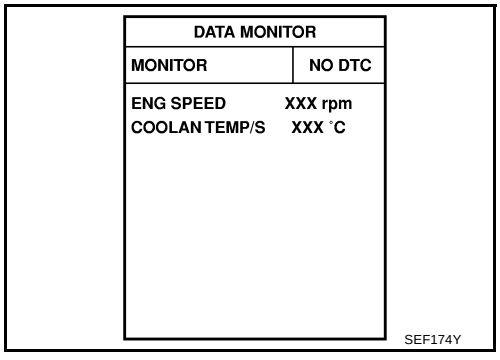
14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.
   Refer to EC-69, "IDLE SPEED" .

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   Refer to EC-69, "IDLE SPEED" .

A/T: 625 ± 50 rpm (in P or N position)

M/T: 625 ± 50 rpm (in Neutral position)

OK or NG

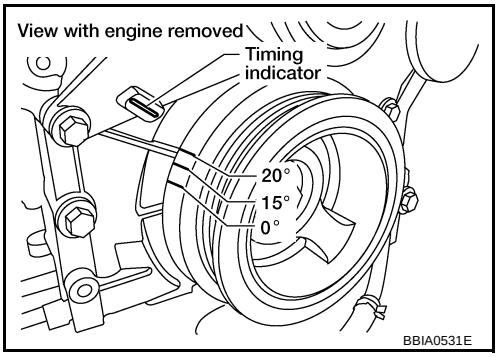
OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-70, "IGNITION TIMING" .

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

M/T: 15 ± 5° BTDC (in Neutral position)



OK or NG

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

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-53, "TIMING CHAIN" .

OK or NG

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

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-259 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-252 .

OK or NG

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

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .

>> GO TO 4.

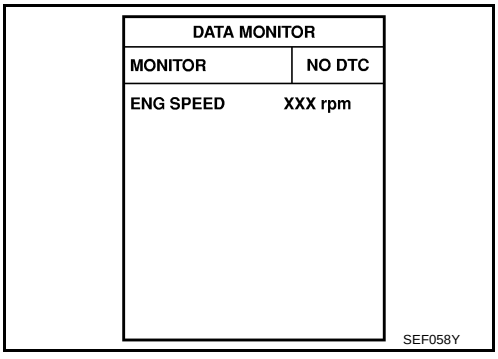
Idle Speed and Ignition Timing Check

GBS000I2

IDLE SPEED

With CONSULT-II

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



With GST

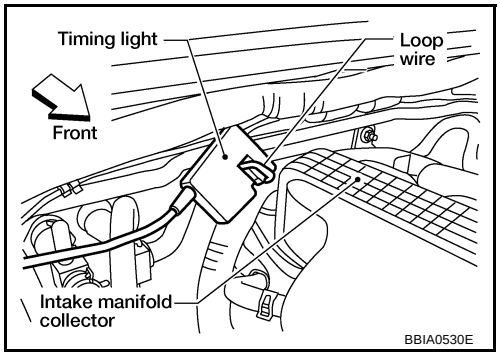
Check idle speed with GST.

IGNITION TIMING

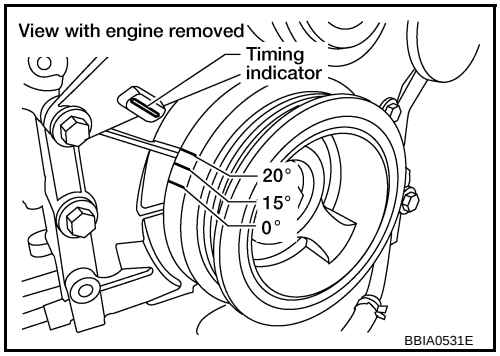
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire as shown.

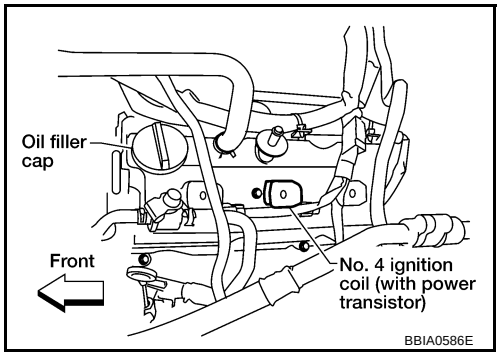


2. Check ignition timing.

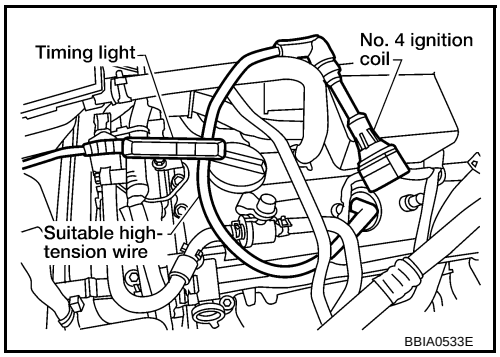


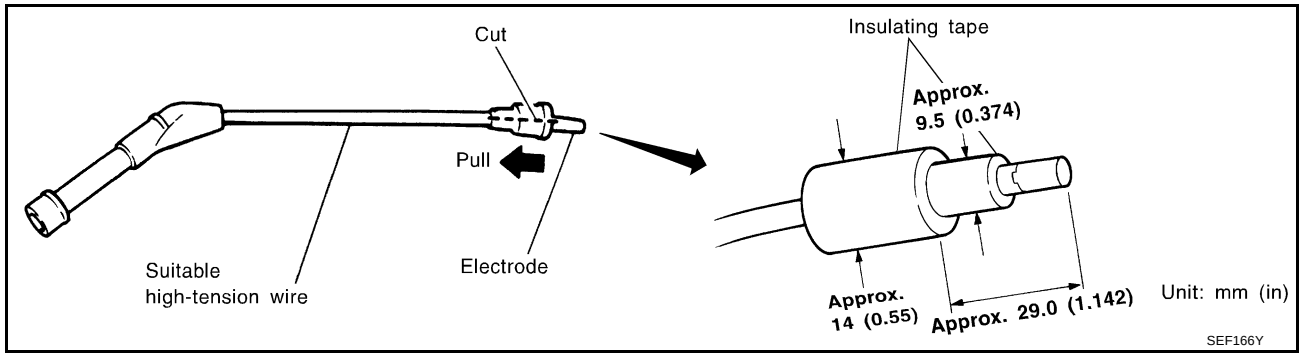
Method B

1. Remove No. 4 ignition coil.

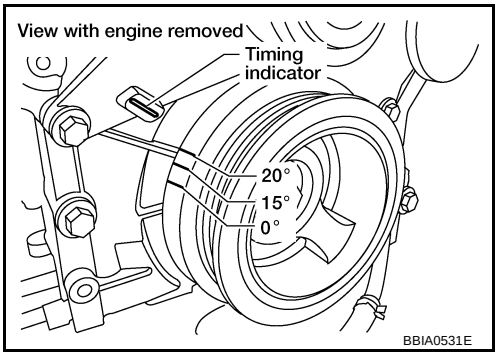


2. Connect No. 4 ignition coil and No. 4 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



Accelerator Pedal Released Position Learning

GBS000I3

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

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

Throttle Valve Closed Position Learning

GBS000I4

DESCRIPTION

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

OPERATION PROCEDURE

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

Idle Air Volume Learning

GBS000I5

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

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

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

– A/T models

• With CONSULT-II: Drive vehicle until “ATF TEMP SE 1” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
• Without CONSULT-II: Drive vehicle for 10 minutes.

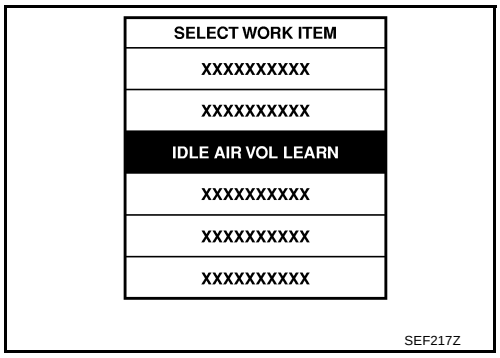
– M/T models

• Driver vehicle for 10 minutes.

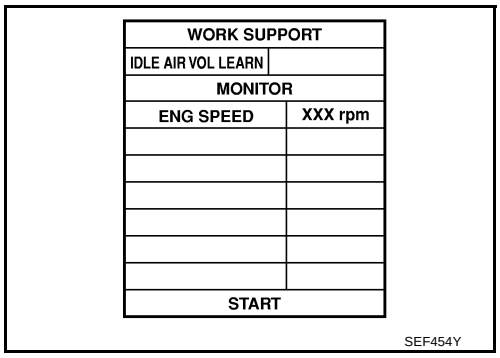
OPERATION PROCEDURE

With CONSULT-II

1. Perform EC-71, "Accelerator Pedal Released Position Learning" .
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.

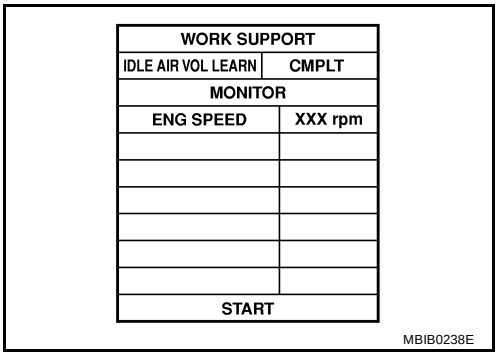


6. Touch “START” and wait 20 seconds.



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

ITEM	SPECIFICATION
Idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)



Without CONSULT-II

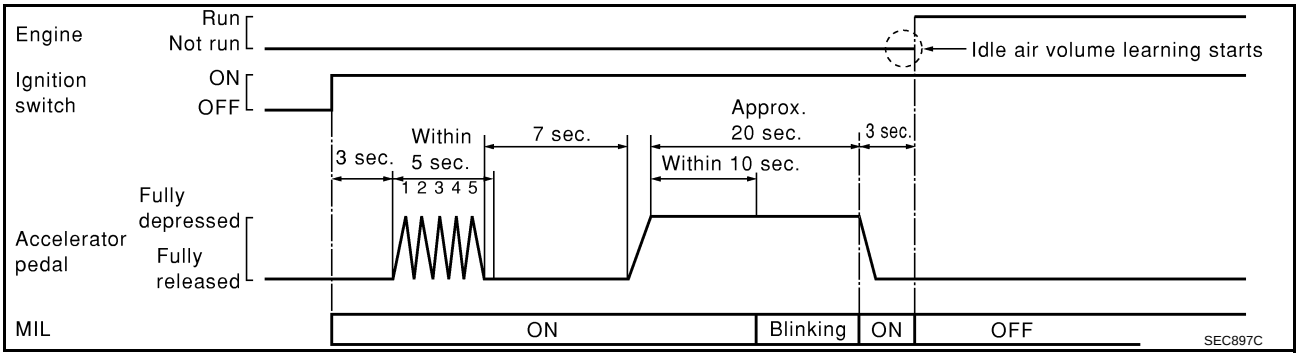
NOTE:

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

1. Perform EC-71, "Accelerator Pedal Released Position Learning" .
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, then turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

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



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

ITEM	SPECIFICATION
Idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

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

DIAGNOSTIC PROCEDURE

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

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**

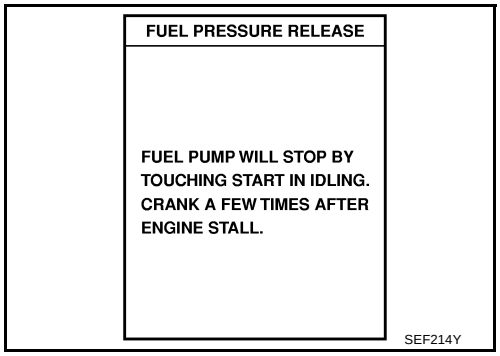
Fuel Pressure Check

GBS000I6

FUEL PRESSURE RELEASE

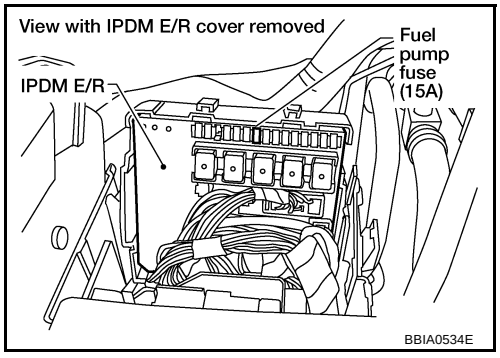
With CONSULT-II

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



Without CONSULT-II

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



FUEL PRESSURE CHECK

CAUTION:

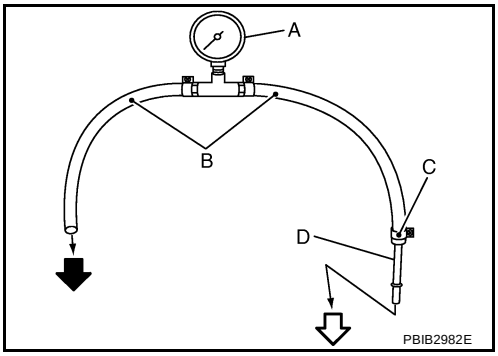
- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because D40 models do not have fuel return system.

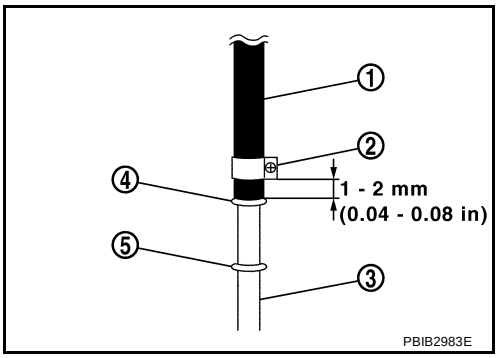
1. Release fuel pressure to zero. Refer to EC-74, "FUEL PRESSURE RELEASE" .

2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.



- ⇦: To quick connector
- ⬅: To fuel tube (engine side)
- C: Clamp
- Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
- To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
- Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
- Use Pressure Gauge to check fuel pressure.

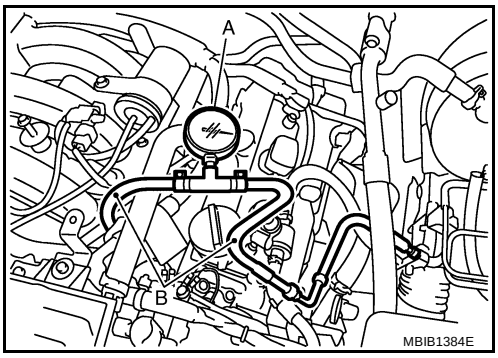
3. Remove fuel hose. Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .
   - Do not twist or kink fuel hose because it is plastic hose.
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.



   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).

   Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.
5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.



   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

   At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

If OK, replace fuel pressure regulator.
If NG, repair or replace.

TROUBLE DIAGNOSIS

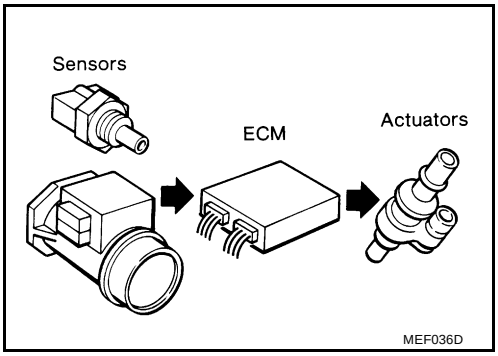
PFP:00004

Trouble Diagnosis Introduction

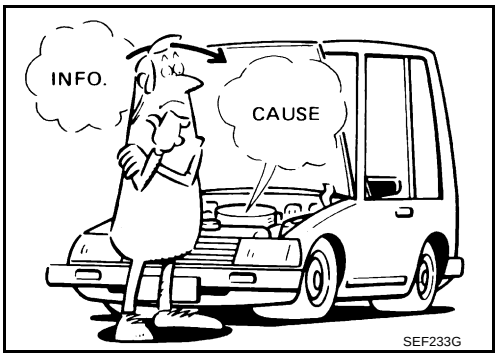
GBS000I7

INTRODUCTION

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



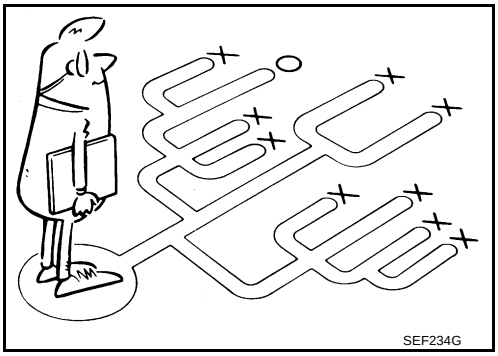
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



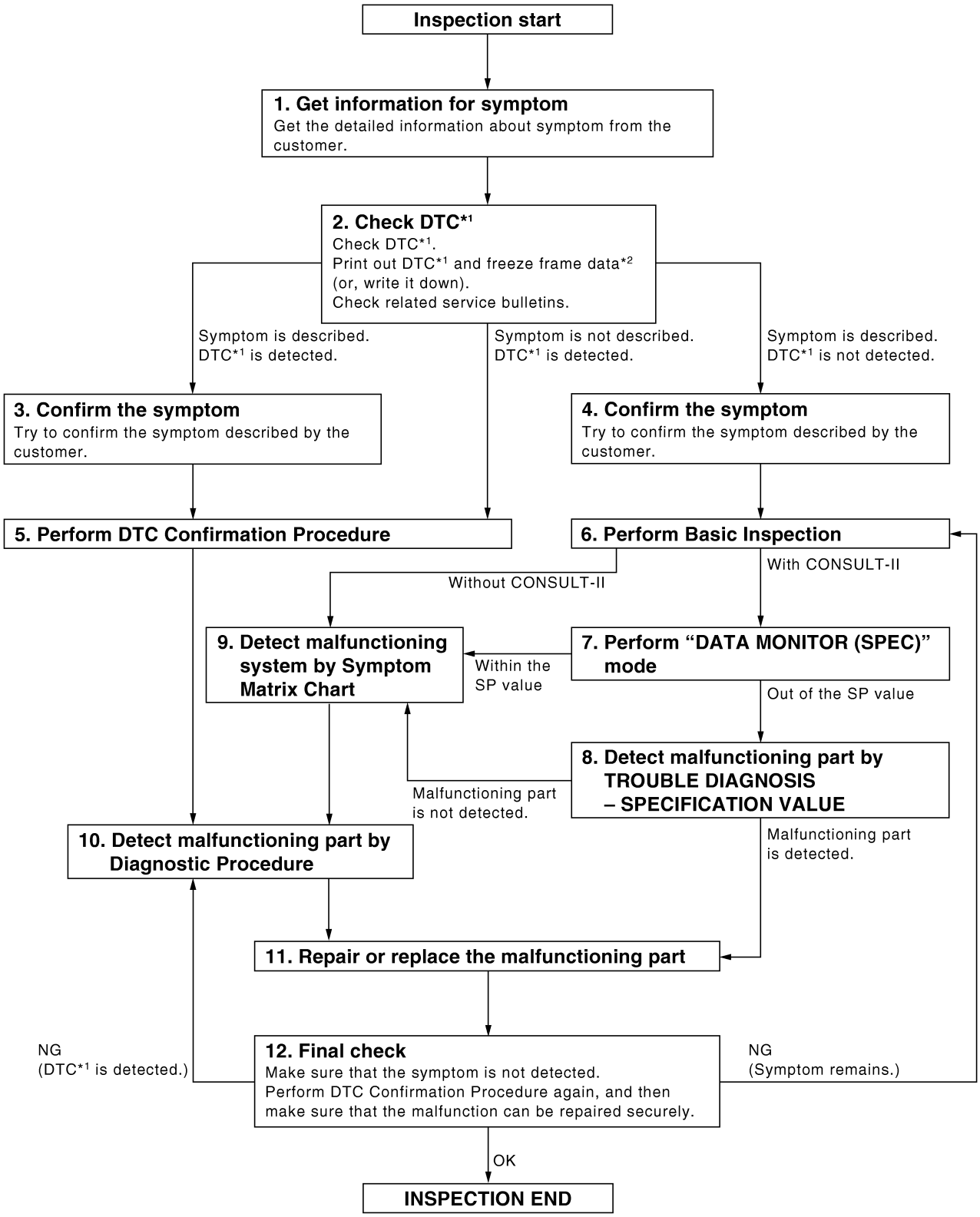
A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the Work Flow on EC-78 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on EC-82 should be used.

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



WORK FLOW
Overall Sequence



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

PBIB2267E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the EC-81, "DIAGNOSTIC WORKSHEET" .

>> GO TO 2.

2. CHECK DTC*1

1. Check DTC*1 .
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2 . (Print them out with CONSULT-II or GST.)
- Erase DTC*1 . (Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-85 .)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*1 , and then make sure that DTC*1 is detected again.
At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on “DATA MONITOR (AUTO TRIG)”.
If two or more DTCs*1 are detected, refer to EC-83, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

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

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

6. PERFORM BASIC INSPECTION

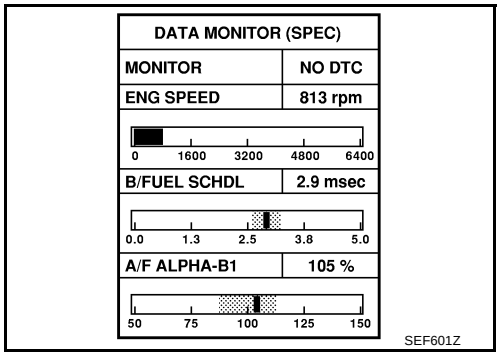
Perform EC-65, "Basic Inspection" .

With CONSULT-II>>GO TO 7.
Without CONSULT-II>>GO TO 9.

7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT-II

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1”, “A/F ALPHA-B2” are within the SP value using CONSULT-II “DATA MONITOR (SPEC)” mode. Refer to EC-128, "Diagnostic Procedure" .



Are they within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

Is malfunctioning part detected?

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

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-85, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to EC-122, "CONSULT-II Reference Value in Data Monitor" , EC-99, "ECM Terminals and Reference Value" .

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM. (Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-53, "Driving Pattern" .
3. **INSPECTION END**

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

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

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

KEY POINTS

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

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

LEC031A

DTC Inspection Priority Chart

GBS000I8

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

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0327 P0328 P0332 P0333 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 P0345 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P1229 Sensor power supply ● P1610 - P1615 NATS ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	● P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater ● P0138 P0139 P0158 P0159 P1146 P1147 P1166 P1167 Heated oxygen sensor 2 ● P0444 P0445 EVAP canister purge volume control solenoid valve ● P0550 Power steering pressure sensor ● P1031 P1032 P1051 P1052 Air fuel ratio (A/F) sensor 1 heater ● P1065 ECM power supply ● P1111 P1136 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT) ● P1271 P1272 P1273 P1274 P1276 P1278 P1279 P1281 P1282 P1283 P1284 P1286 P1288 P1289 Air fuel ratio (A/F) sensor 1 ● P1805 Brake switch
3	● P0011 P0021 Intake valve timing control ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0300 - P0306 Misfire ● P0420 P0430 Three way catalyst function ● P1121 Electric throttle control actuator ● P1564 ASCD steering switch ● P1572 ASCD brake switch ● P1574 ASCD vehicle speed sensor ● P1715 Turbine revolution sensor

Fail-safe Chart

GBS000I9

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

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.
		Condition: Just as ignition switch is turned ON or START — Engine coolant temperature decided (CONSULT-II display): 40°C (104°F)
		Condition: More than approx. 4 minutes after ignition ON or START — Engine coolant temperature decided (CONSULT-II display): 80°C (176°F)
		Condition: Except as shown above — Engine coolant temperature decided (CONSULT-II display): 40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

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

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

Symptom Matrix Chart

SYSTEM — BASIC ENGINE CONTROL SYSTEM

GBS000IA

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-537
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-74
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-530
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-37
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-41
	Incorrect idle speed adjustment						1	1	1	1		1			EC-65
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-310, EC-312
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-65
	Ignition circuit	1	1	2	2	2		2	2			2			EC-543
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-138
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-163
Engine coolant temperature sensor circuit							3			3					EC-175
Air fuel ratio (A/F) sensor			1	2	3	2		2	2			2			EC-372, EC-381, EC-390, EC-400, EC-410, EC-420, EC-432
Throttle position sensor circuit							2			2					EC-180, EC-231, EC-361, EC-363, EC-491
Accelerator pedal position sensor circuit				3	2	1									EC-365, EC-478, EC-484, EC-499
Knock sensor circuit				2								3			EC-247
Crankshaft position sensor (POS) circuit		2	2												EC-252
Camshaft position sensor (PHASE) circuit		3	2												EC-259
Vehicle speed signal circuit			2	3		3						3			EC-281
Power steering pressure sensor circuit			2					3	3						EC-283

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-288, EC-299
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-303
PNP switch circuit			3		3		3	3			3			EC-466
VIAS control solenoid valve circuit					1									EC-562
Refrigerant pressure sensor circuit		2				3			3		4			EC-556
Electrical load signal circuit							3							EC-523
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-32
ABS actuator and electric unit (control unit)			4											BRC-8

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-5
	Fuel piping			5	5	5		5	5			5			FL-3
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

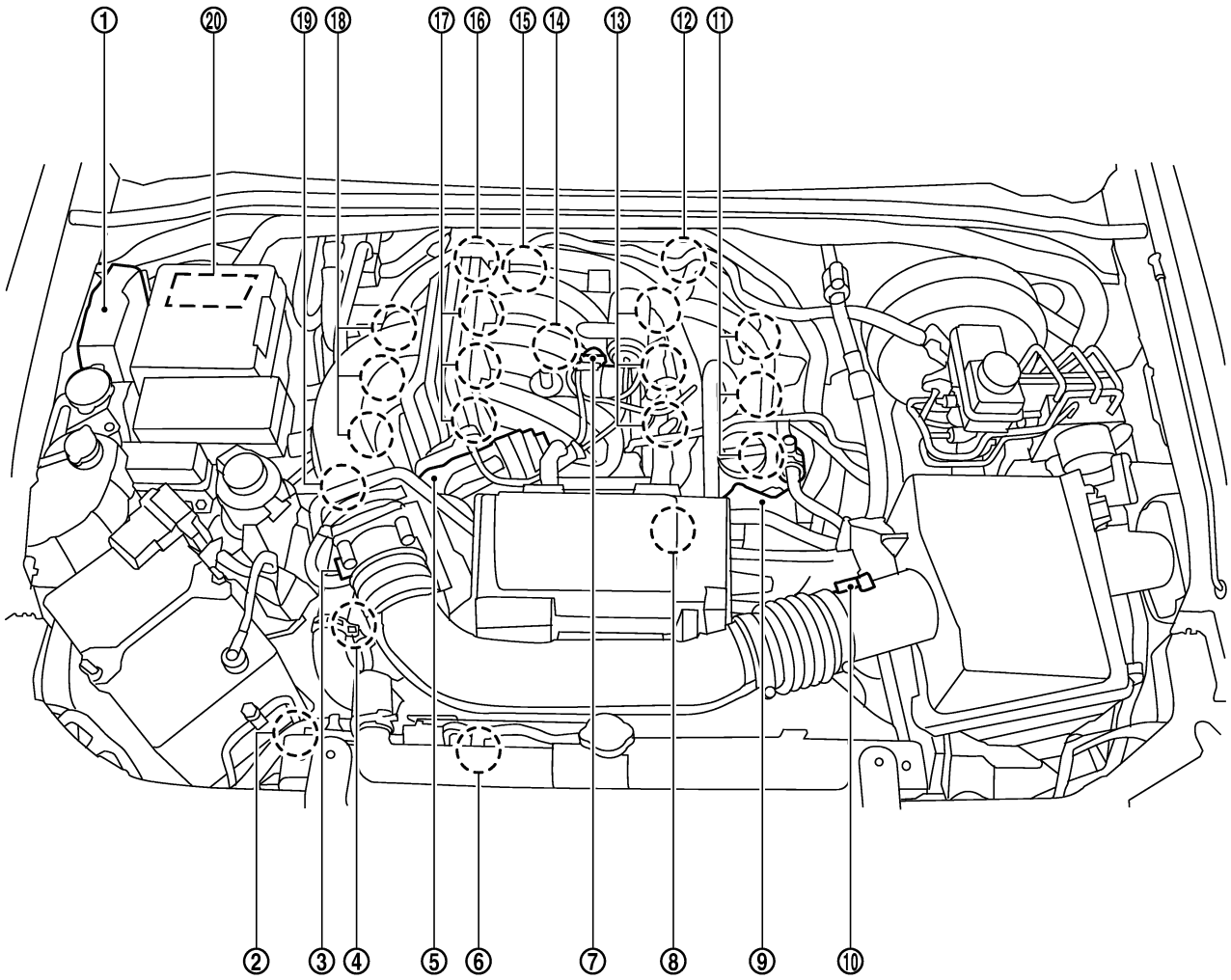
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct		5	5		5		5	5			5			EM-17
	Air cleaner														EM-17
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-17
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														EM-18, EM-21
Cranking	Battery	1	1	1		1		1	1			1		1	SC-5
	Generator circuit														SC-14
	Starter circuit	3													SC-30
	Signal plate	6													EM-107
	PNP switch	4													MT-12, AT-104
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-91
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-107
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-53
	Camshaft														EM-73
	Intake valve timing control														EM-53
	Intake valve												3		EM-91
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-23, EX-2
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-28, LU-13 , LU-10 , LU-11
	Oil level (Low)/Filthy oil														LU-7

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-13
	Thermostat									5					CO-27
	Water pump														CO-23
	Water gallery														CO-29
	Cooling fan									5					CO-21
	Coolant level (Low)/Contaminated coolant									5					CO-10
NATS (Nissan Anti-theft system)		1	1												BL-81 or EC-43

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

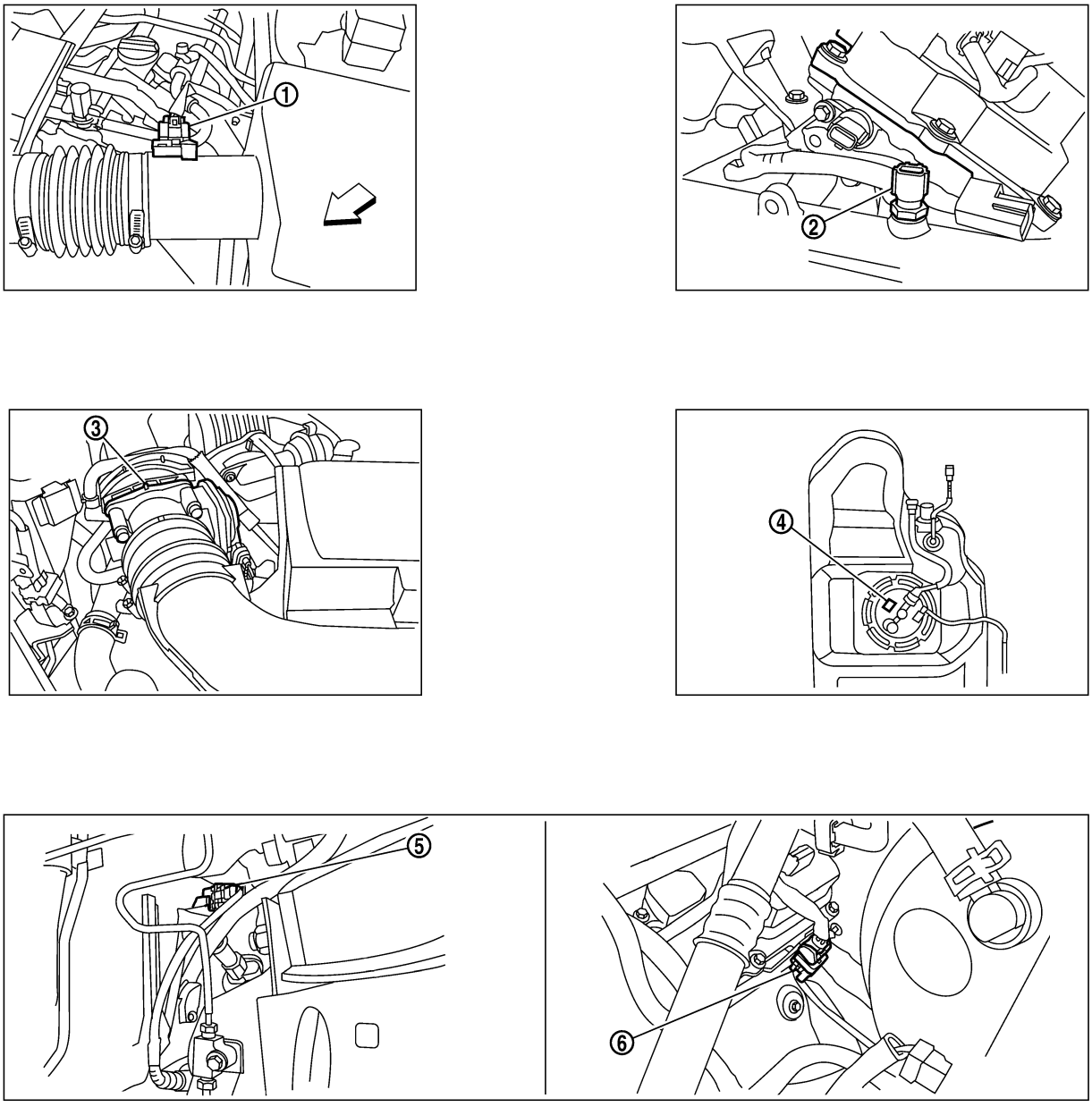
Engine Control Component Parts Location

GBS000IB



MBIB1270E

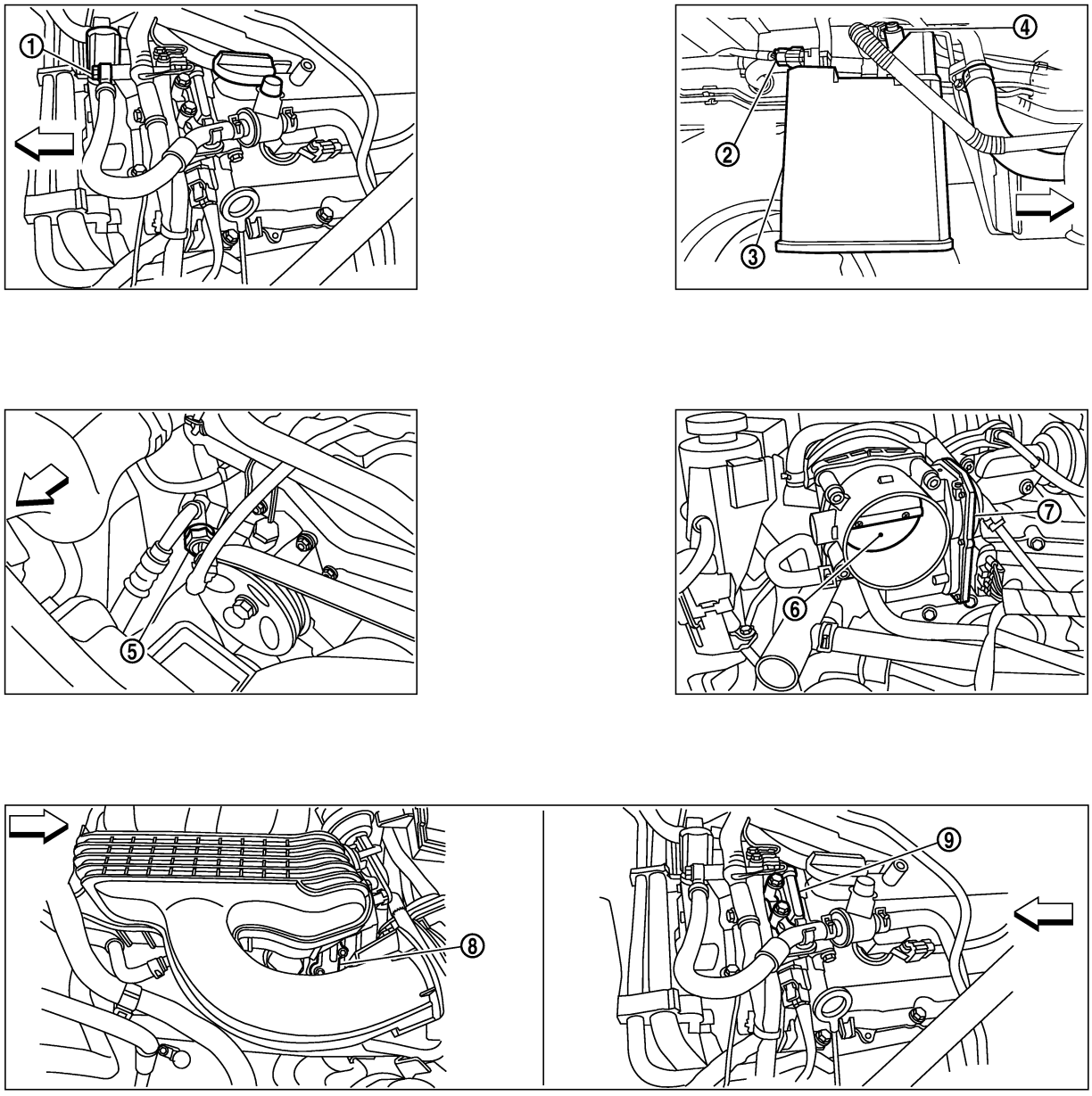
1. ECM
2. Refrigerant pressure sensor
3. Electric throttle control actuator
4. Power steering pressure sensor
5. Power valve actuator
6. Cooling fan motor
7. VIAS control solenoid valve
8. EVAP canister purge volume control solenoid valve
9. Intake valve timing control solenoid valve (bank 2)
10. Mass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



MBIB1271E

⇦ : Vehicle front

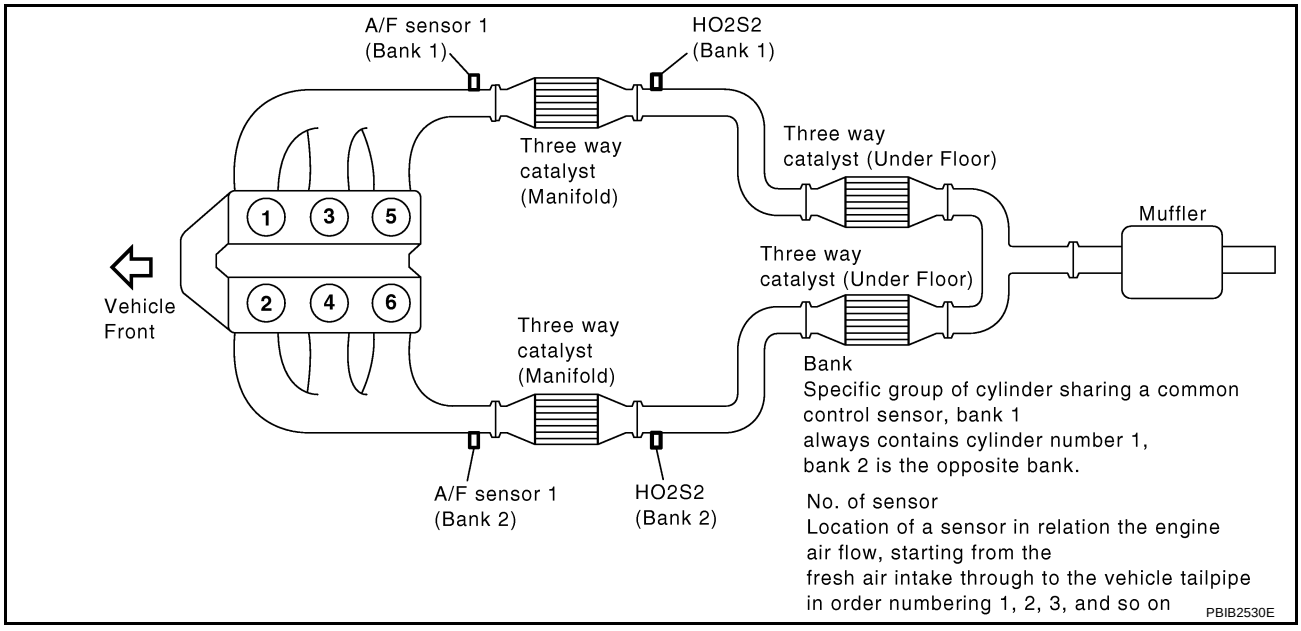
1. Mass air flow sensor
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Fuel level sensor unit and fuel pump harness connector
5. Air fuel ratio (A/F) sensor 1 (bank 1) harness connector
6. Air fuel ratio (A/F) sensor 1 (bank 2) harness connector

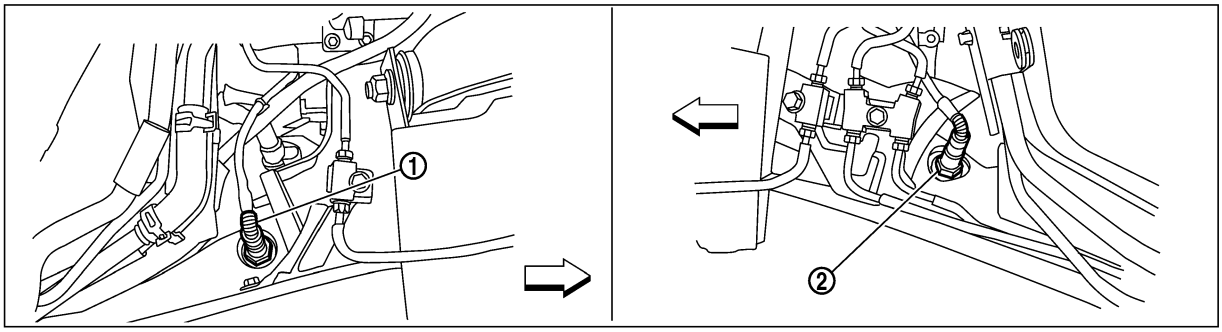


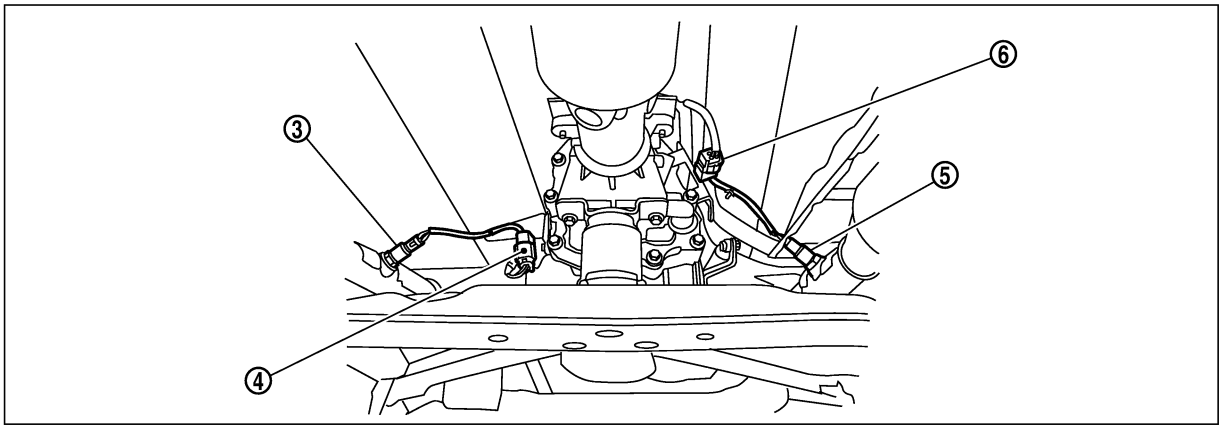
MBIB1409E

⇦ : Vehicle front

1. EVAP canister purge volume control solenoid valve
2. EVAP control system pressure sensor
3. EVAP canister
4. EVAP canister vent control valve
5. Power steering pressure sensor
6. Throttle valve
7. Electric throttle control actuator
8. Intake valve timing control solenoid valve (bank 1)
9. Intake valve timing control solenoid valve (bank 2)



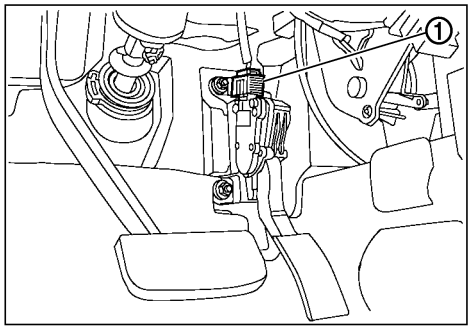


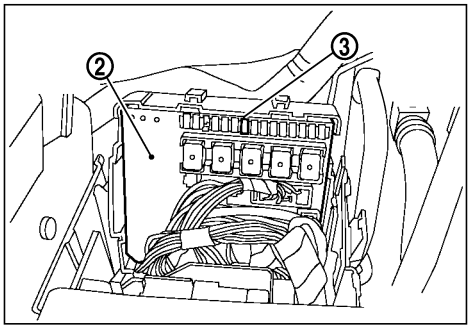


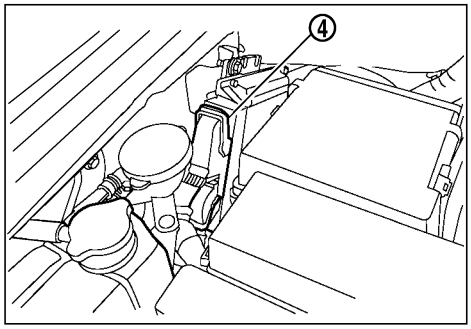
MBIB1273E

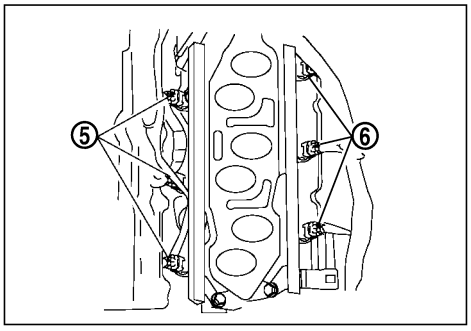
⇦ : Vehicle front

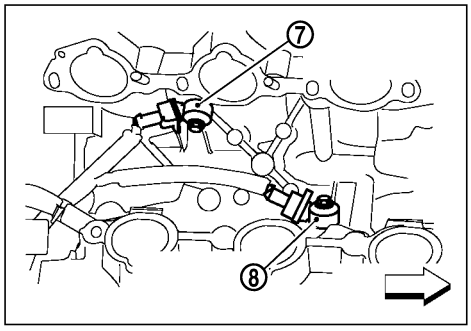
1. Air fuel ratio (A/F) sensor 1 (bank 1)
2. Air fuel ratio (A/F) sensor 1 (bank 2)
3. Heated oxygen sensor 2 (bank 2)
4. Heated oxygen sensor 2 (bank 2) harness connector
5. Heated oxygen sensor 2 (bank 1)
6. Heated oxygen sensor 2 (bank 1) harness connector







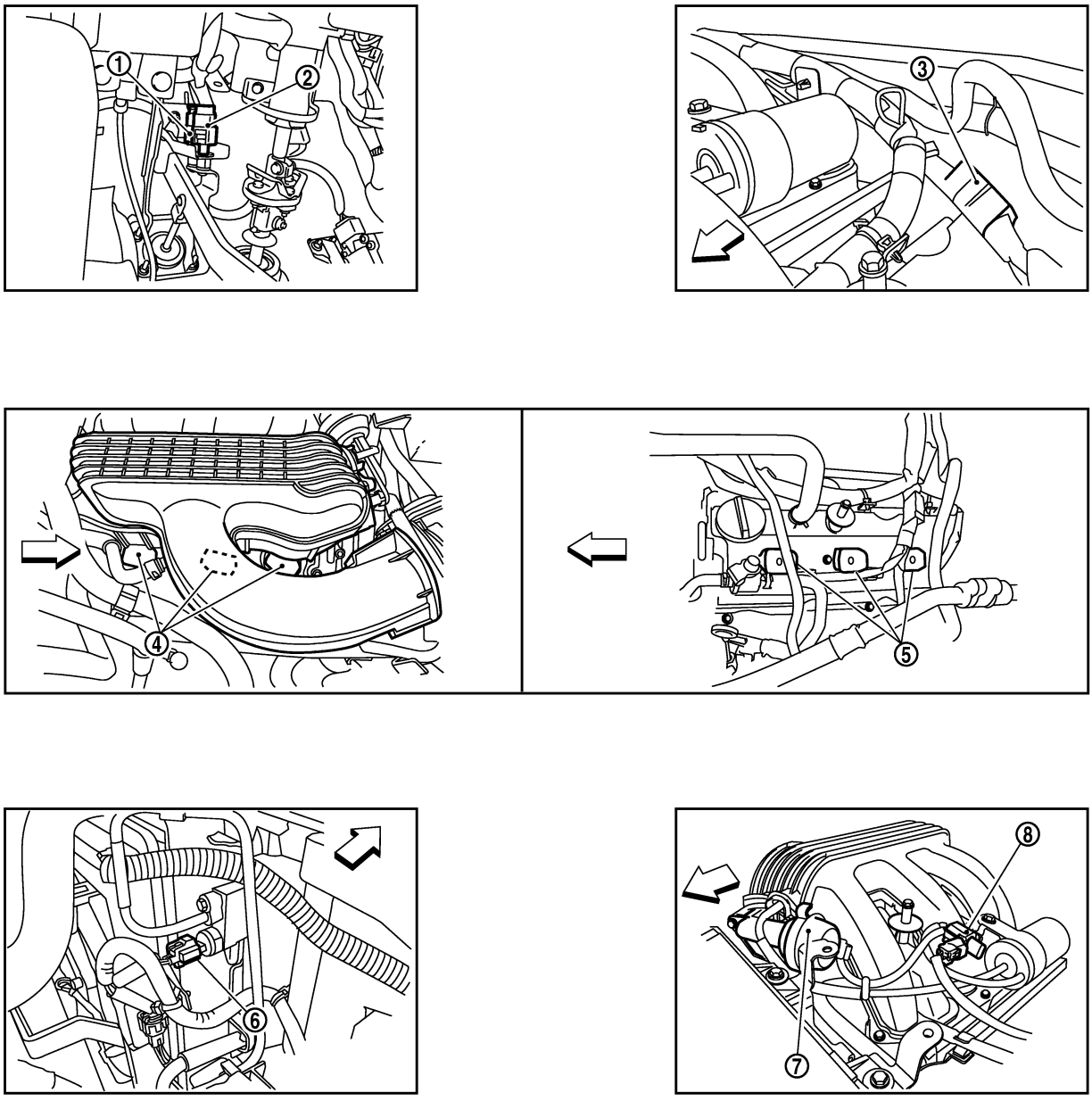




MBIB1274E

⇦ : Vehicle front

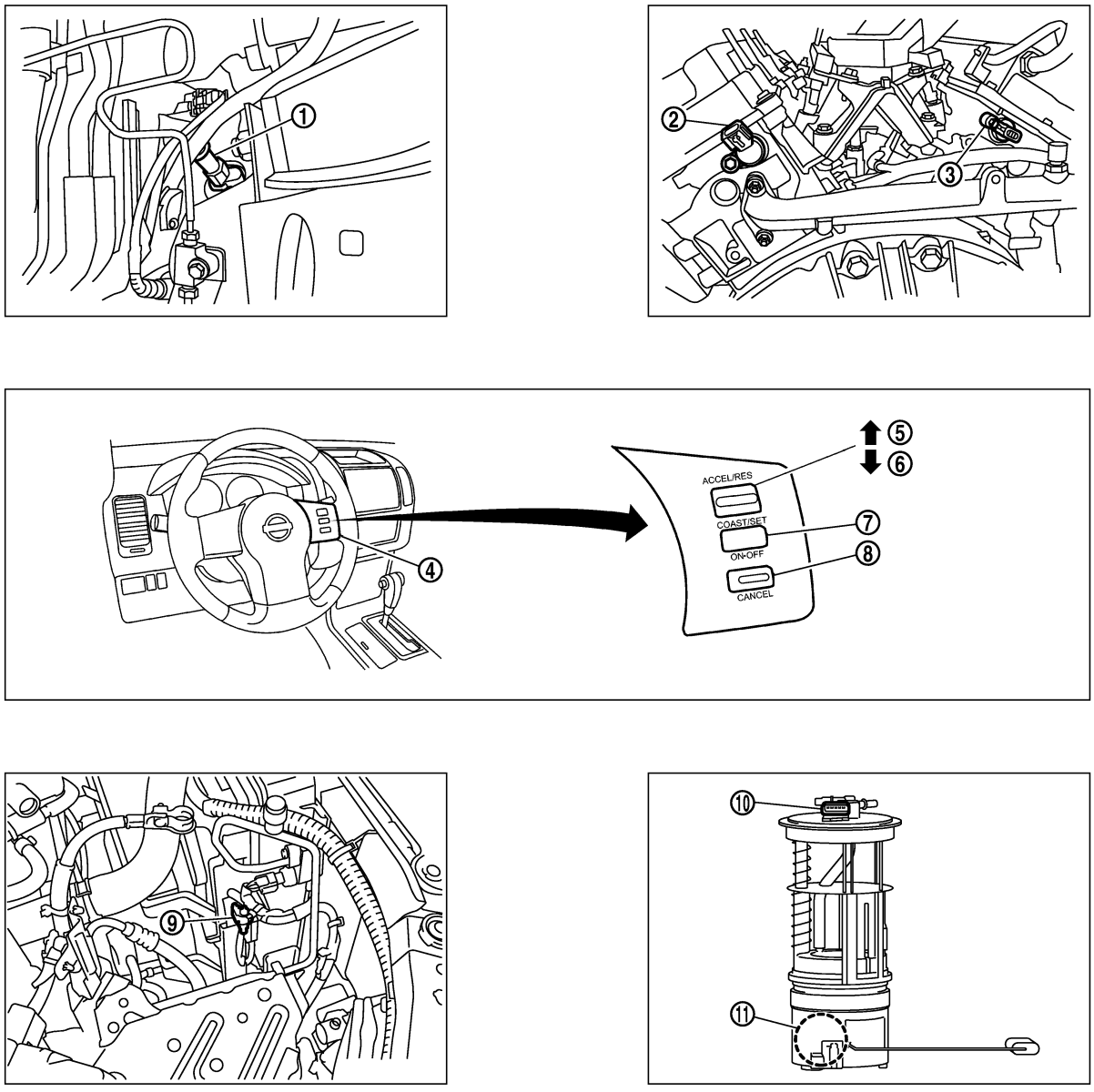
1. Accelerator pedal position sensor harness connector
2. IPDM E/R
3. Fuel pump fuse (15A)
4. ECM harness connectors
5. Fuel injector (bank 1) harness connector
6. Fuel injector (bank 2) harness connector
7. Knock sensor (bank 2)
8. Knock sensor (bank 1)



MBIB1275E

⇦ : Vehicle front

1. ASCD brake switch
2. Stop lamp switch
3. Condenser-1
4. Ignition coil (with power transistor) (bank 1)
5. Ignition coil (with power transistor) (bank 2)
6. Refrigerant pressure sensor harness connector
7. Power valve actuator
8. VIAS control solenoid valve

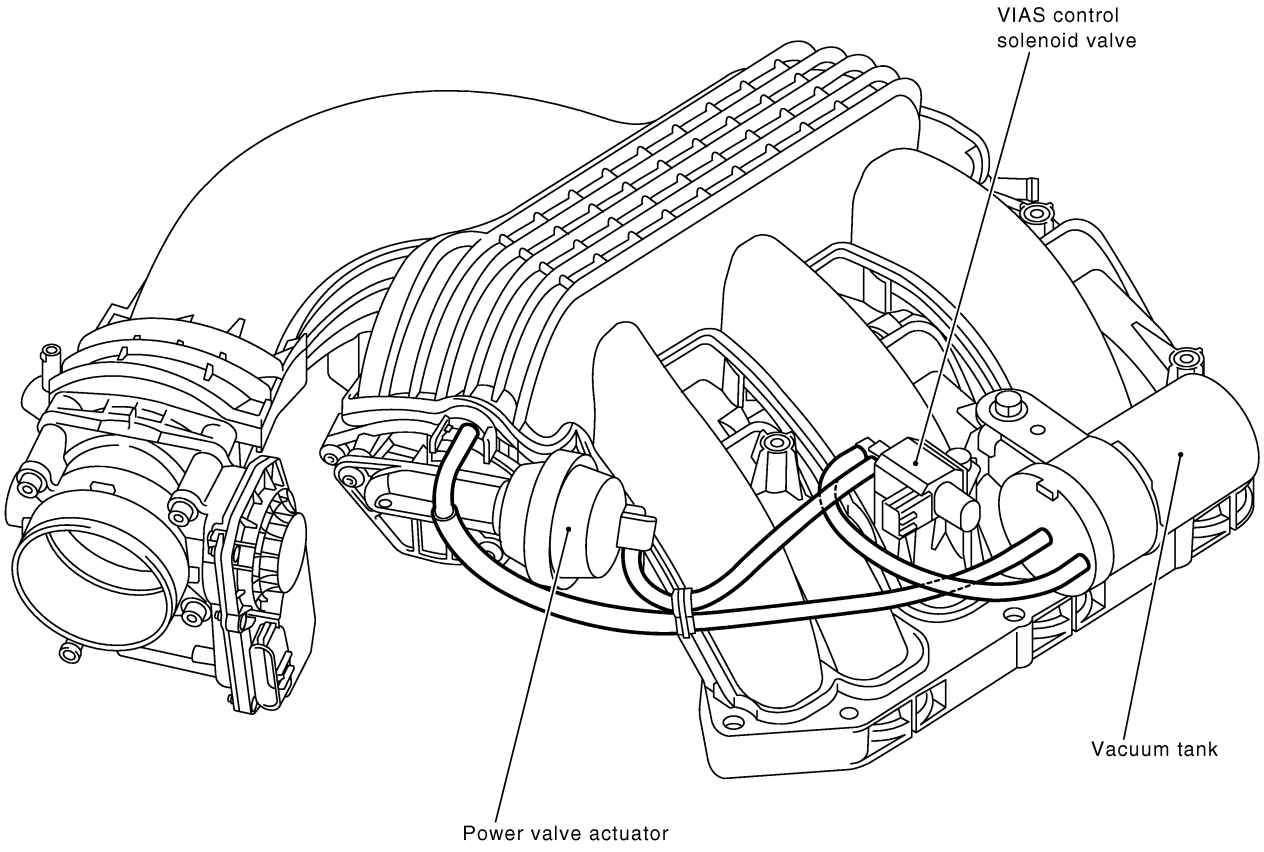


MBIB1276E

1. Crankshaft position sensor (POS)
2. Camshaft position sensor (PHASE) (bank 2)
3. Camshaft position sensor (PHASE) (bank 1)
4. ASCD steering switch
5. RESUME/ACCELERATE switch
6. SET/COAST switch
7. MAIN switch
8. CANCEL switch
9. Cooling fan control motor harness connector
10. Fuel level sensor unit and fuel pump
11. Fuel pressure regulator

Vacuum Hose Drawing

GBS000IC



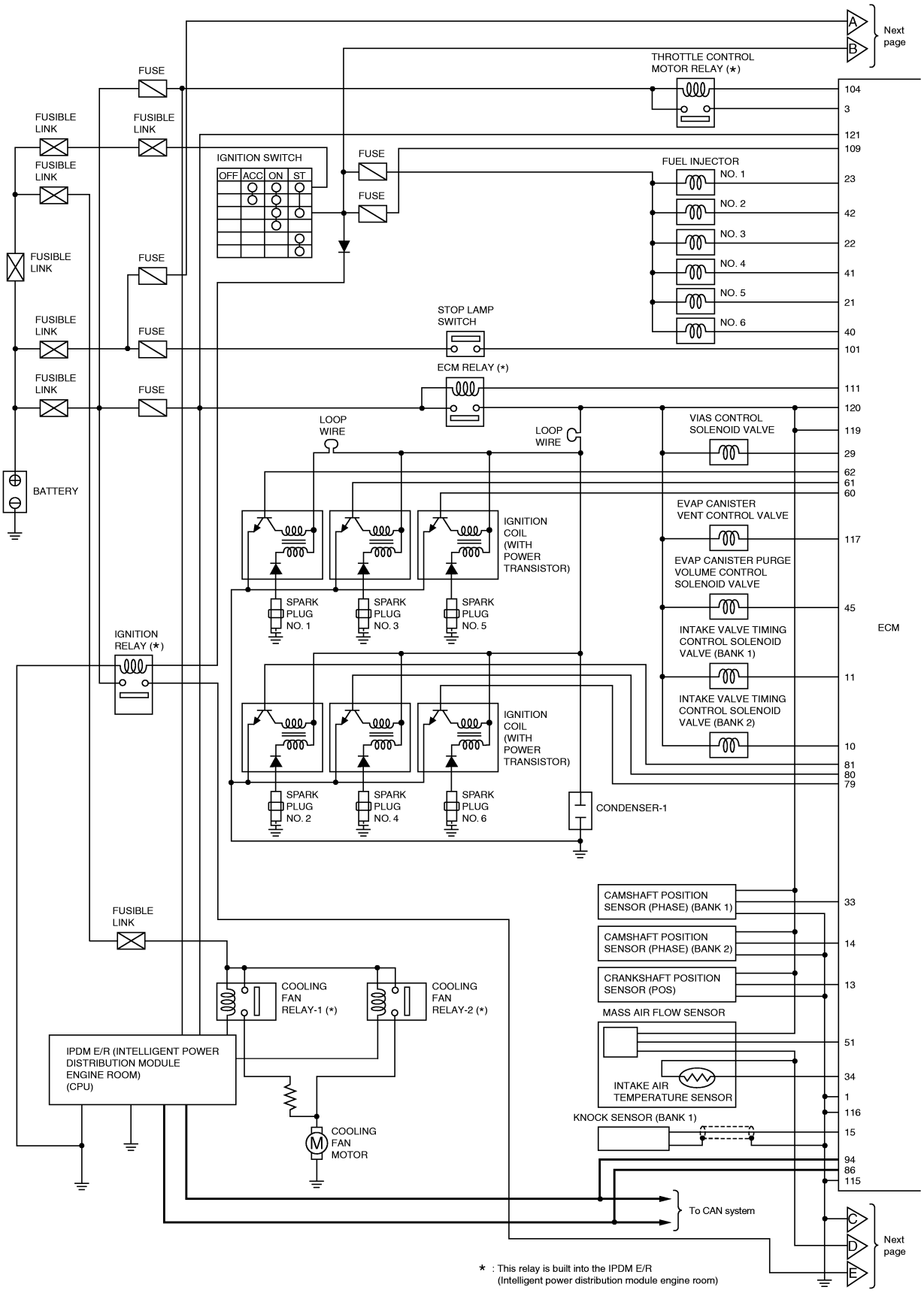
NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB2529E

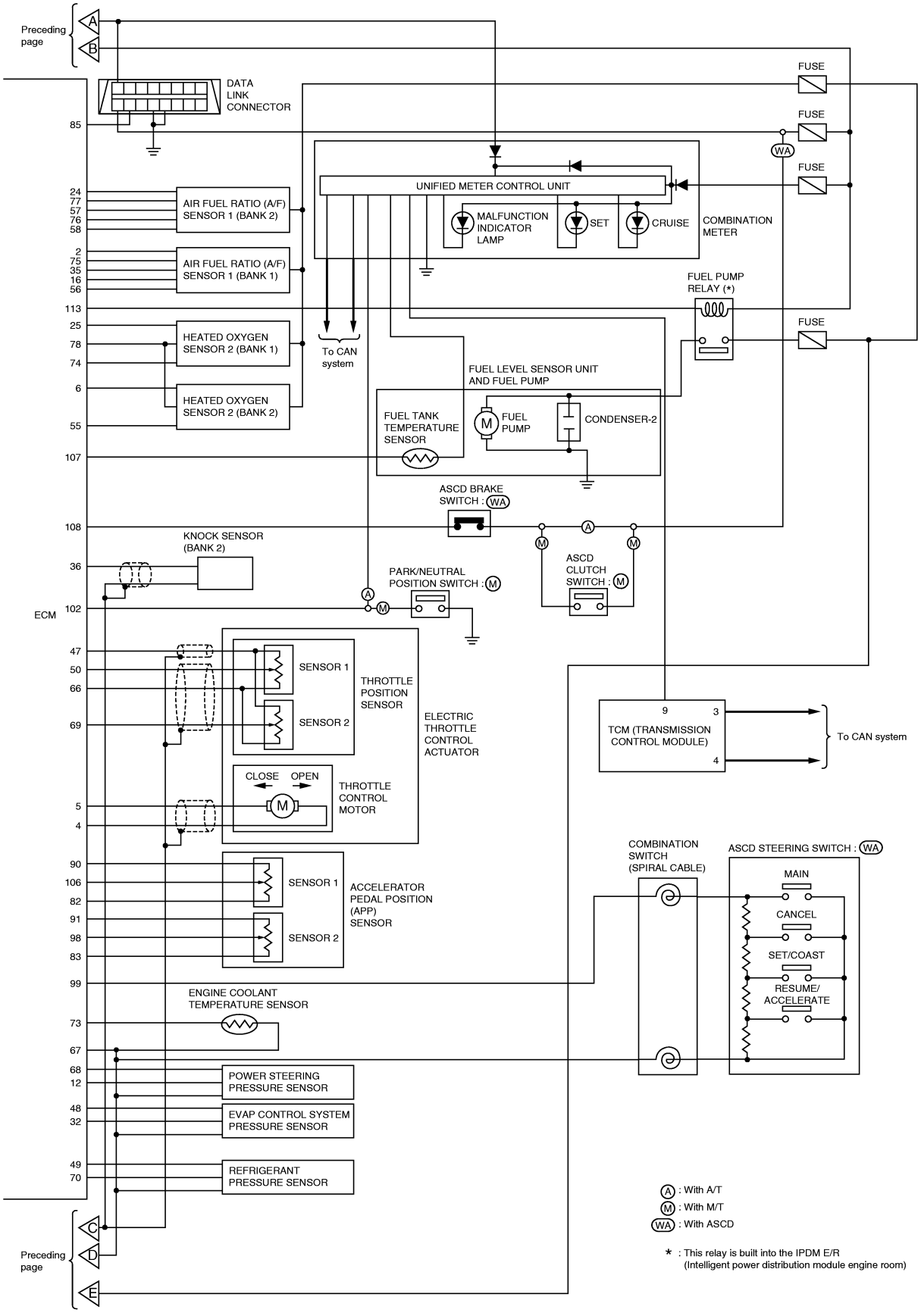
Refer to EC-28, "System Diagram" for Vacuum Control System.

Circuit Diagram

GBS000ID



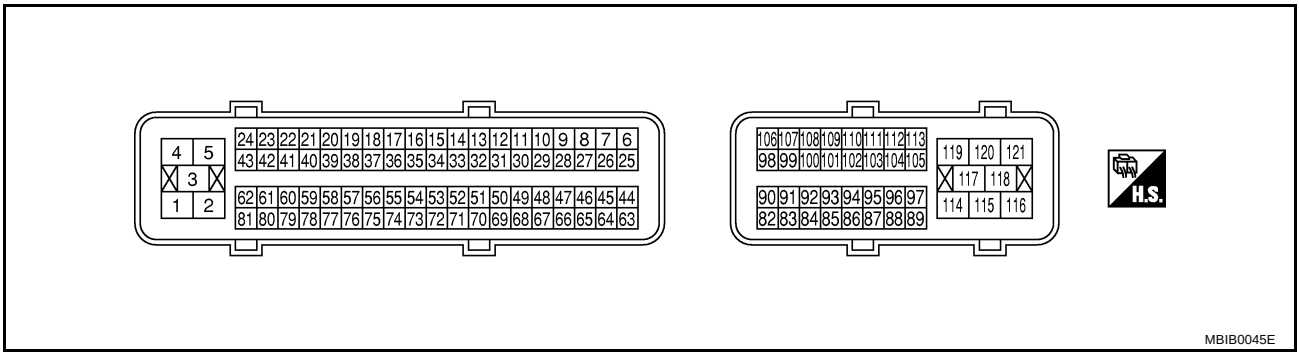
MBWA1272E


Preceding page
A
B
DATA LINK CONNECTOR
85
FUSE
FUSE
FUSE
WA
UNIFIED METER CONTROL UNIT
MALFUNCTION INDICATOR LAMP
SET
CRUISE
COMBINATION METER
24
77
57
76
58
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
2
75
35
16
56
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
FUEL PUMP RELAY (*)
113
25
78
74
HEATED OXYGEN SENSOR 2 (BANK 1)
To CAN system
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
6
55
HEATED OXYGEN SENSOR 2 (BANK 2)
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
CONDENSER-2
107
ASCD BRAKE SWITCH : WA
108
KNOCK SENSOR (BANK 2)
36
ASCD CLUTCH SWITCH : M
PARK/NEUTRAL POSITION SWITCH : M
ECM
102
47
50
66
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
69
ELECTRIC THROTTLE CONTROL ACTUATOR
9
3
TCM (TRANSMISSION CONTROL MODULE)
4
To CAN system
CLOSE
OPEN
5
4
THROTTLE CONTROL MOTOR
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH : WA
90
106
82
91
98
83
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION (APP) SENSOR
MAIN
CANCEL
SET/COAST
RESUME/ ACCELERATE
99
ENGINE COOLANT TEMPERATURE SENSOR
73
67
68
12
POWER STEERING PRESSURE SENSOR
48
32
EVAP CONTROL SYSTEM PRESSURE SENSOR
49
70
REFRIGERANT PRESSURE SENSOR
A : With A/T
M : With M/T
WA : With ASCD
* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room)
Preceding page
C
D
E

MBWA1418E

ECM Harness Connector Terminal Layout

GBS000IE

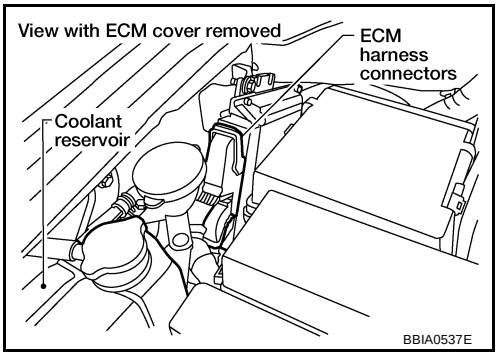


ECM Terminals and Reference Value

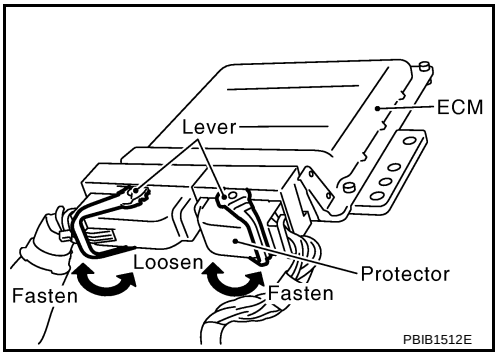
GBS000IF

PREPARATION

1. ECM located in the engine room passenger side behind reservoir tank.
2. Remove ECM harness connector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

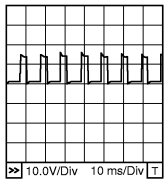


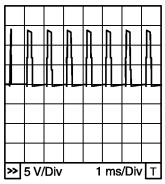
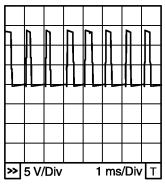
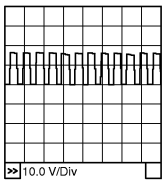
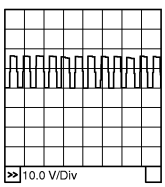
ECM INSPECTION TABLE

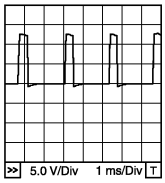
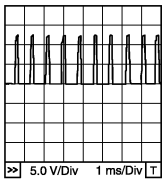
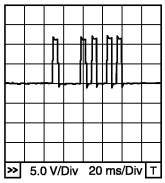
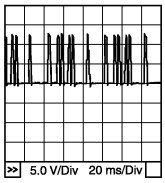
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

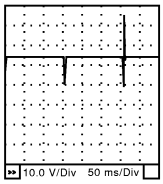
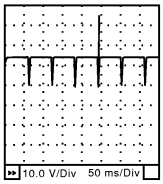
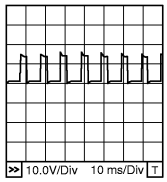
CAUTION:

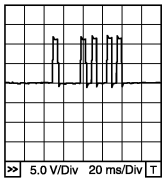
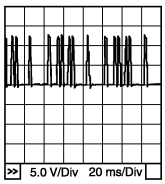
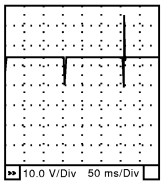
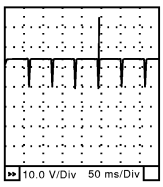
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

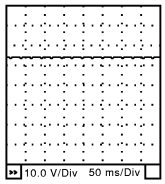
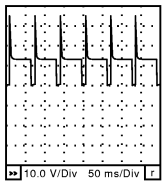
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

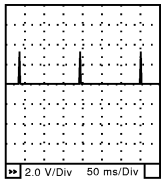
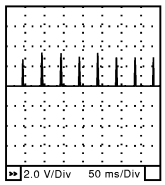
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
10	W	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
11	V	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E

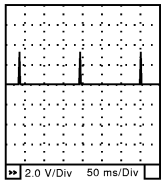
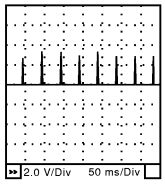
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] ● Steering wheel: Not being turned	0.4 - 0.8V
13	G	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] ● Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
14	Y	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
15	W	Knock sensor (Bank 1)	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
29	GR	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
32	W	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
36	W	Knock sensor (Bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
48	SB	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
51	P	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
70	BR	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
73	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
85	SB	Data link connector	**[Ignition switch: ON]** ● CONSULT-II or GST: Disconnected	Approximately 5V - Battery voltage (11 - 14V)
86	P	CAN communication line	**[Ignition switch: ON]**	Approximately 1.1 - 2.3V Output voltage varies with the communication status.
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch: ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	SB	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	BATTERY VOLTAGE (11 - 14V)
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
117	G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	V	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

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

CONSULT-II Function (ENGINE)

GBS000IG

FUNCTION

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

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×	×	×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Air fuel ratio (A/F) sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Wheel sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		ASCD steering switch		×		×	×			
		ASCD brake switch		×		×	×			
		ASCD clutch switch		×		×	×			
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Air fuel ratio (A/F) sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Intake valve timing control solenoid valve		×		×	×	×		
		VIAS control solenoid valve				×	×	×		
		Calculated load value			×	×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

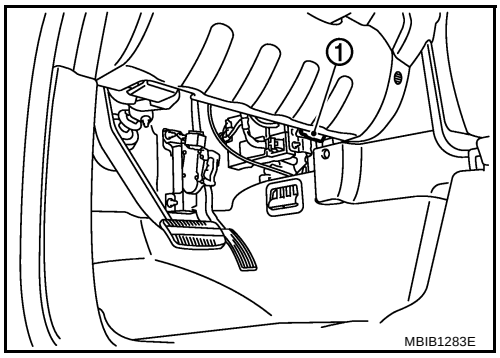
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-111 .

INSPECTION PROCEDURE

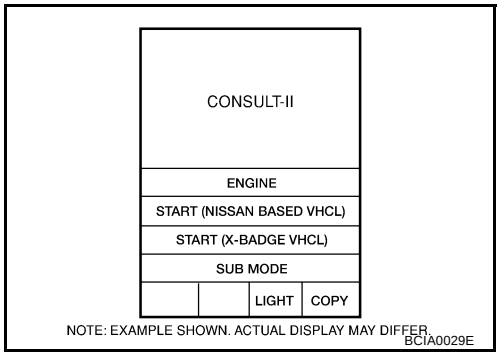
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

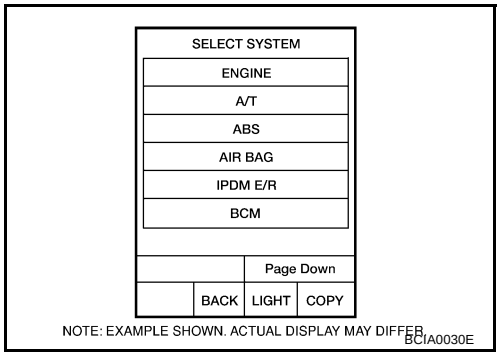
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector (1), which is located under LH dash panel near the hood opener handle.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

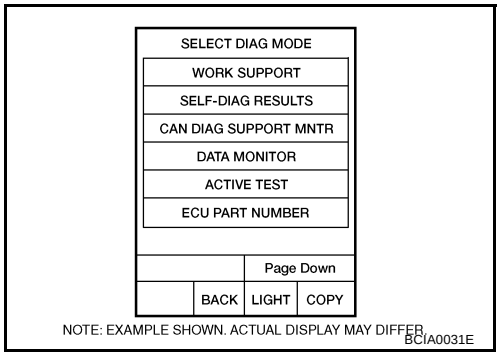


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-47, "CONSULT-II Data Link Connector (DLC) Circuit" .



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

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



WORK SUPPORT MODE

Work Item

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

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-45, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-16, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2	● One mode in the following is displayed. “Mode2”: Open loop due to detected system malfunction “Mode3”: Open loop due to driving conditions (power enrichment, deceleration enleanment) “Mode4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “Mode5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
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
Monitored Item

×: Applicable

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

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● Calculated load value indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW [g·m/s]			● Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ● The advance angle becomes larger as the value increases.	
INT/V SOL (B2) [%]				
VIAS S/V [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve is operating. OFF: VIAS control solenoid valve is not operating.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]		×	● The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
I/P PULLY SPD [rpm]			● Indicates the engine speed computed from the turbine revolution sensor signal.	
VEHICLE SPEED [km/h] or [MPH]			● Indicates the vehicle speed computed from the revolution sensor signal.	
IDL A/V LEARN [YET/CMPLT]			● Display the condition of idle air volume learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MIL is activated.	
A/F S1 HTR (B1) [%]			● Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. ● The current flow to the heater becomes larger as the value increases.	
A/F S1 HTR (B2) [%]				
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			● Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW [ON/OFF]			● Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1 [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
BRAKE SW2 [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
CRUISE LAMP [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only # is displayed if item is unable to be measured. ● Figures with #s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

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

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● Air fuel ratio (A/F) sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● Cut off each fuel injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN*	● Ignition switch: ON ● Turn the cooling fan HI, LOW and OFF using CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan motor ● IPDM E/R
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VIAS SOL VALVE	● Ignition switch: ON ● Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-49, "SYSTEM READINESS TEST (SRT) CODE" .

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

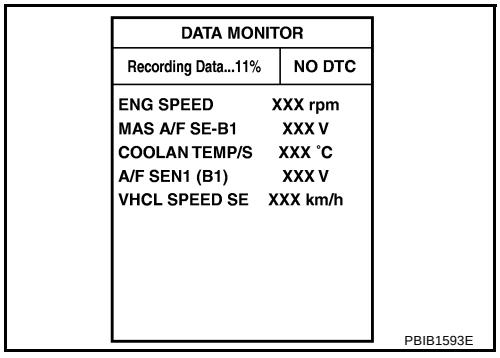
Test mode	Test item	Condition	Reference page
A/F SEN1	A/F SEN1 (B1) P1276	Refer to corresponding trouble diagnosis for DTC.	EC-410
	A/F SEN1 (B1) P1278/P1279		EC-420, EC-432
	A/F SEN1 (B2) P1286		EC-410
	A/F SEN1 (B2) P1288/P1289		EC-420, EC-432
HO2S2	HO2S2 (B1) P0139		EC-196
	HO2S2 (B1) P1146		EC-329
	HO2S2 (B1) P1147		EC-340
	HO2S2 (B2) P0159		EC-196
	HO2S2 (B2) P1166		EC-329
	HO2S2 (B2) P1167		EC-340

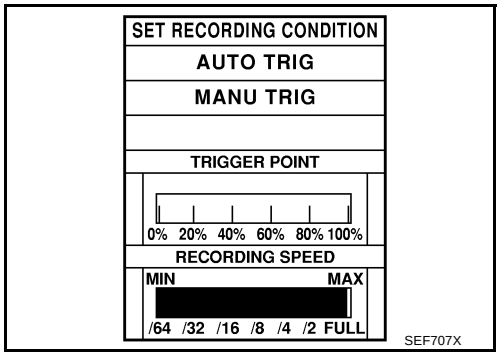
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

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

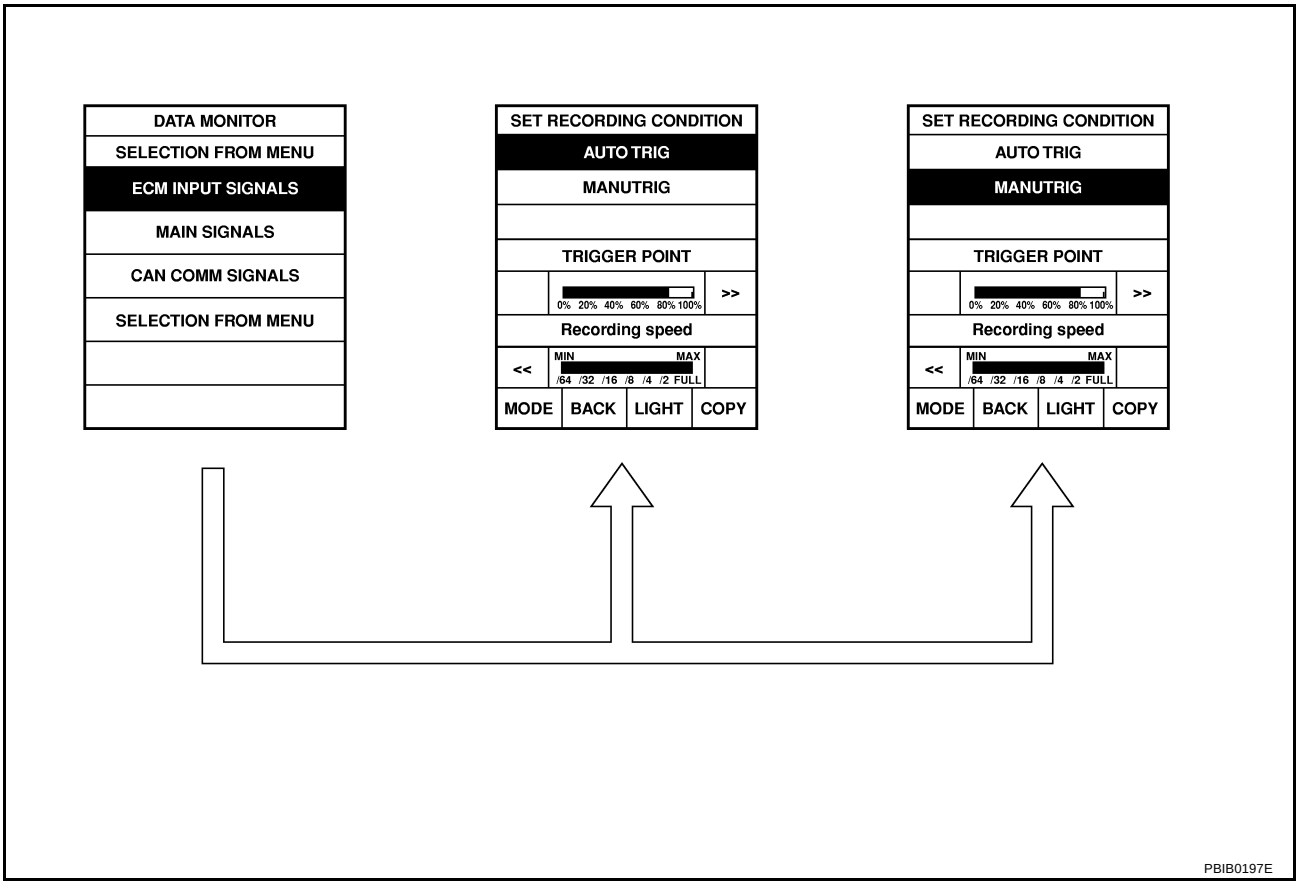
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.
2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.





Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “INCIDENT SIMULATION TESTS” in GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

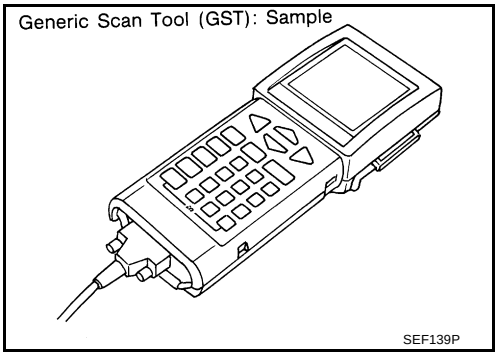


Generic Scan Tool (GST) Function

GBS000IH

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name GST or Generic Scan Tool is used in this service manual.

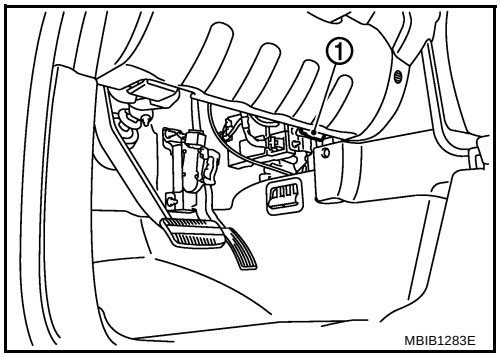


FUNCTION

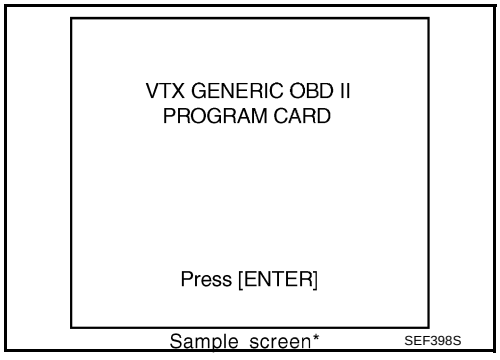
Diagnostic test mode		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-111, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Service $03	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (Service $01) ● Clear diagnostic trouble codes (Service $03) ● Clear trouble code for freeze frame data (Service $01) ● Clear freeze frame data (Service $02) ● Reset status of system monitoring test (Service $01) ● Clear on board monitoring test results (Service $06 and Service $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related power train components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service is not applicable on this vehicle.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

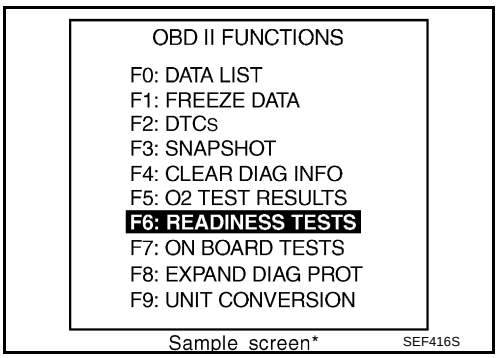
1. Turn ignition switch OFF.
2. Connect GST to data link connector (1), which is located under LH dash panel near the hood opener handle.



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



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



CONSULT-II Reference Value in Data Monitor

GBS000II

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	See EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd	ON
		Rear window defogger switch and lighting switch is OFF	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON

MONITOR ITEM	CONDITION		SPECIFICATION
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	13 - 18° BTDC
		2,000 rpm	25 - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	5 - 35%
		2,500 rpm	5 - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0 - 50%
VIAS S/V	● Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	● Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	● Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the speedometer indication
VEHICLE SPEED	● Turn drive wheels and compare the CONSULT-II value with speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1) A/F S1 HTR (B2)	● Engine: After warming up, idle the engine		0 - 100%
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
SET VHCL SPD	● Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	● Ignition switch: ON	MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40km/h (25MPH) and 175km/h (109MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

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

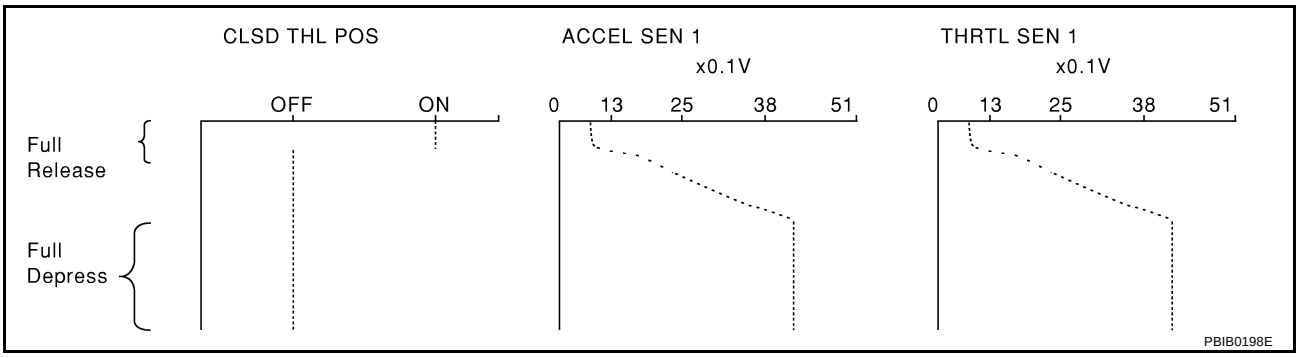
Major Sensor Reference Graph in Data Monitor Mode

GBS000IJ

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

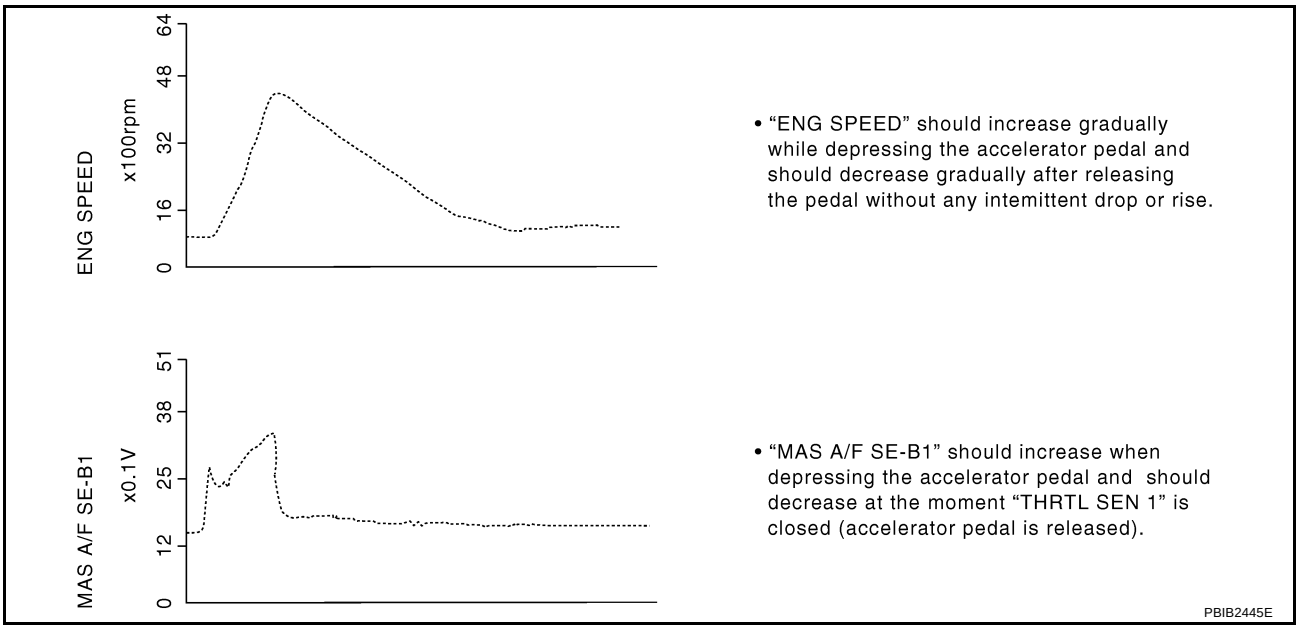
CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

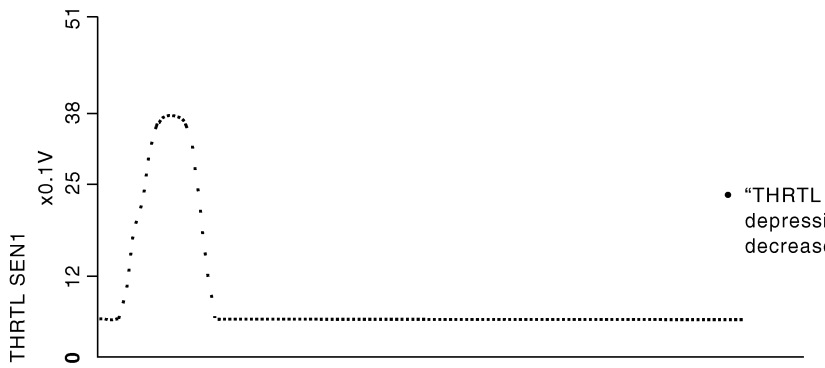
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T), 1st position (M/T).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or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



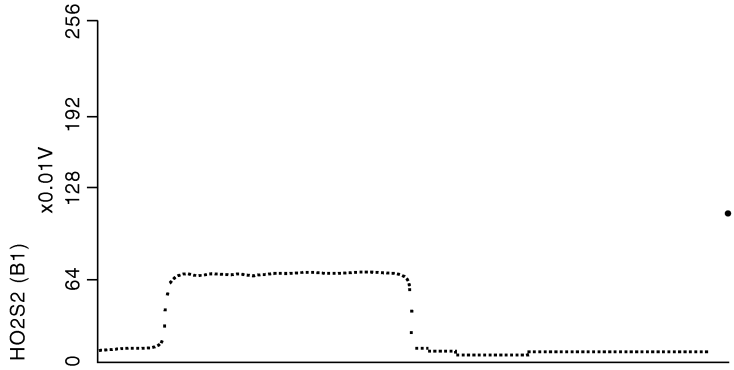
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

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

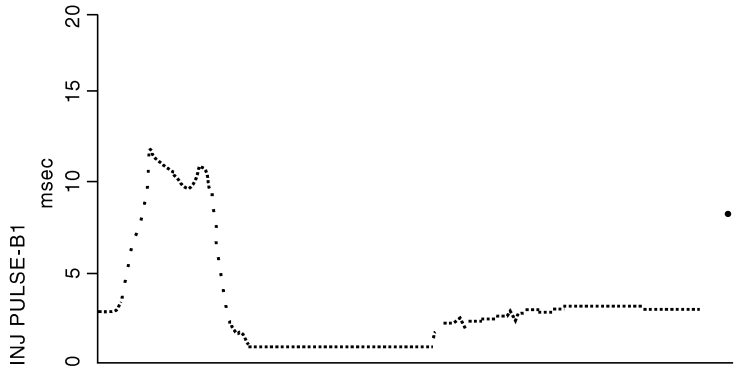




- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.



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



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

PBIB2099E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

GBS000IK

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

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

Testing Condition

GBS000IL

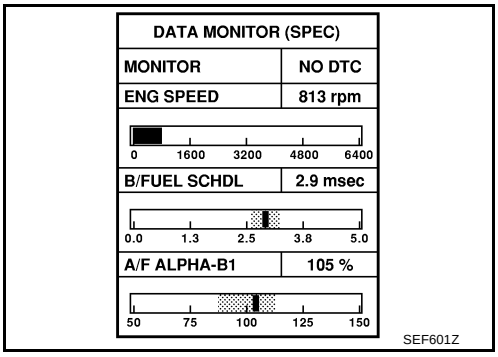
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
  - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

GBS000IM

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

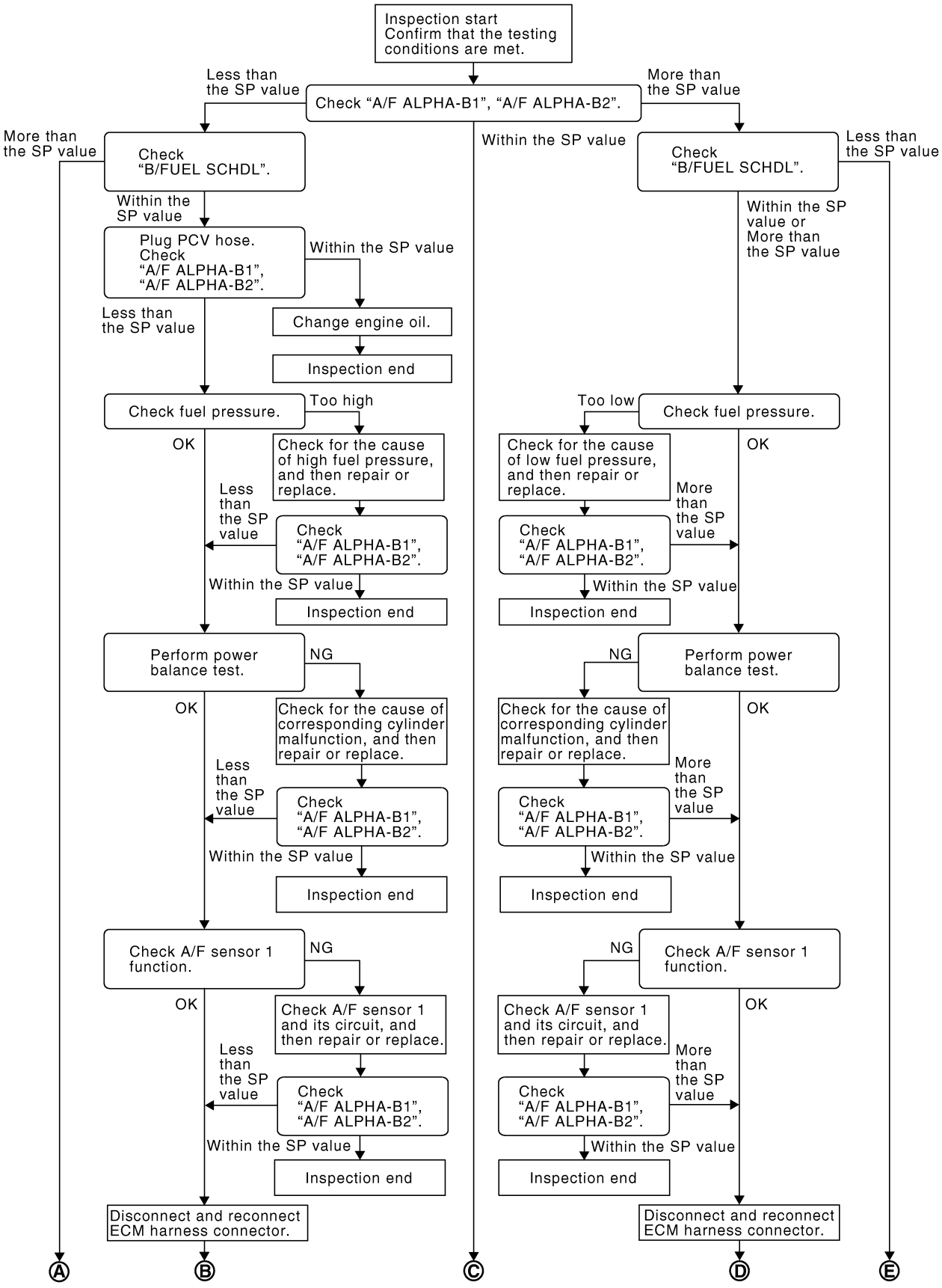
1. Perform EC-65, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-128, "Diagnostic Procedure" .



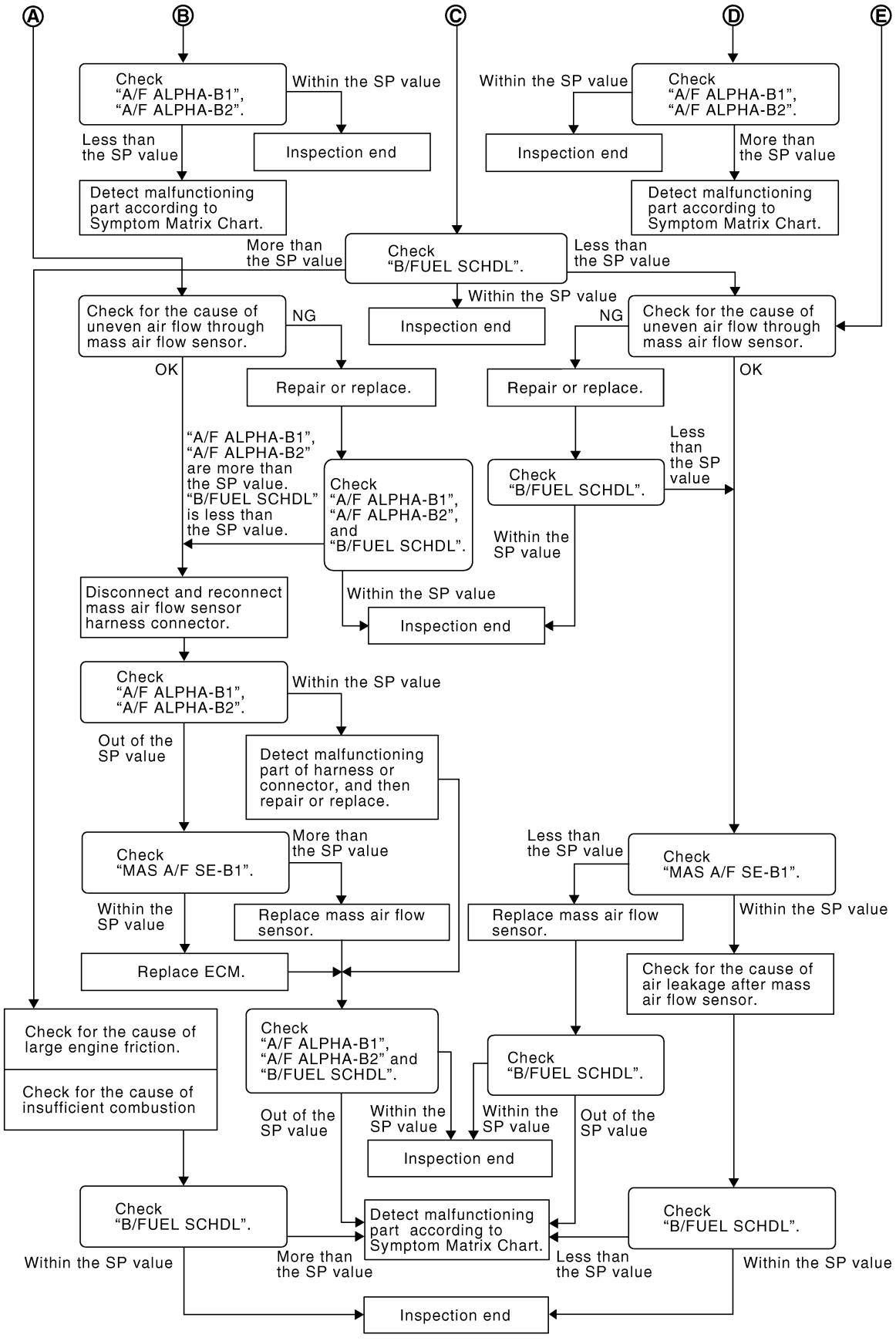
Diagnostic Procedure

GBS000IN

OVERALL SEQUENCE



PBIB2268E


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Less than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1", "A/F ALPHA-B2" are more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL".
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Within the SP value
Inspection end
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Within the SP value
Replace mass air flow sensor.
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1", "A/F ALPHA-B2" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Inspection end
Within the SP value
Check "B/FUEL SCHDL".
Out of the SP value
Check "B/FUEL SCHDL".
Within the SP value
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end

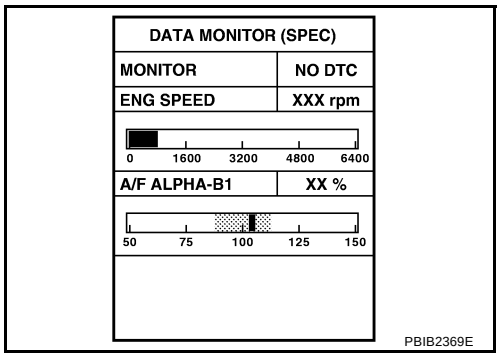
PBIB2548E

DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-127, "Testing Condition" .
3. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

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

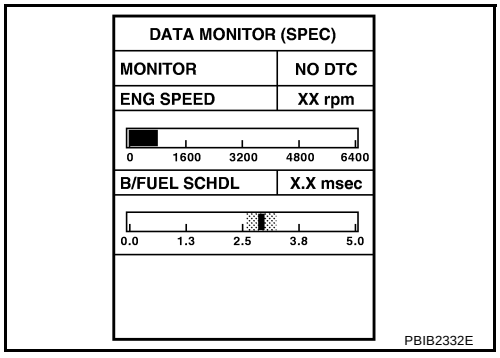


OK or NG

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

2. CHECK “B/FUEL SCHDL”

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

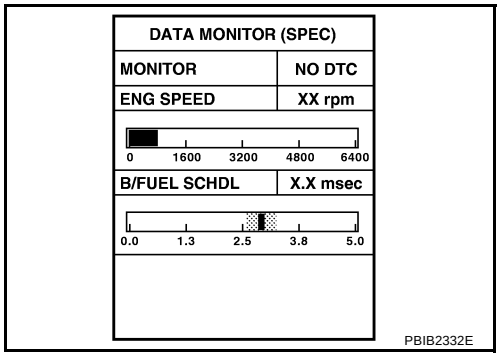


OK or NG

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

3. CHECK “B/FUEL SCHDL”

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



OK or NG

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

4. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

OK or NG

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

5. CHANGE ENGINE OIL

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

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-74, "Fuel Pressure Check" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-74 . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-537 .)

2. If NG, repair or replace the malfunctioning part. (Refer to EC-74 .)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

OK or NG

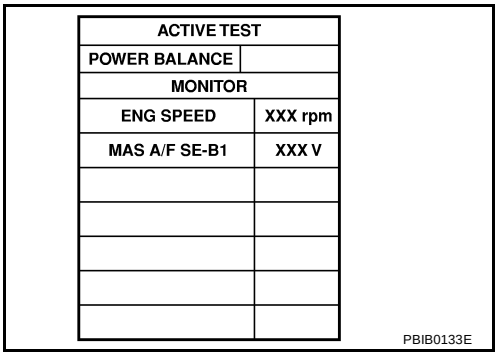
OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

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

OK or NG

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



10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-543 .)
- Fuel injector and its circuit (Refer to EC-530 .)
- Intake air leakage
- Low compression pressure (Refer to EM-91, "CHECKING COMPRESSION PRESSURE" .)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

OK or NG

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

12. CHECK A/F SENSOR 1 FUNCTION

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

- For DTC P1271, P1281, refer to EC-372, "DTC Confirmation Procedure" .
- For DTC P1272, P1282, refer to EC-381, "DTC Confirmation Procedure" .
- For DTC P1273, P1283, refer to EC-390, "DTC Confirmation Procedure" .
- For DTC P1274, P1284, refer to EC-400, "DTC Confirmation Procedure" .
- For DTC P1276, P1286, refer to EC-410, "DTC Confirmation Procedure" .
- For DTC P1278, P1288, refer to EC-421, "DTC Confirmation Procedure" .
- For DTC P1279, P1289, refer to EC-433, "DTC Confirmation Procedure" .

OK or NG

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

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

OK or NG

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

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

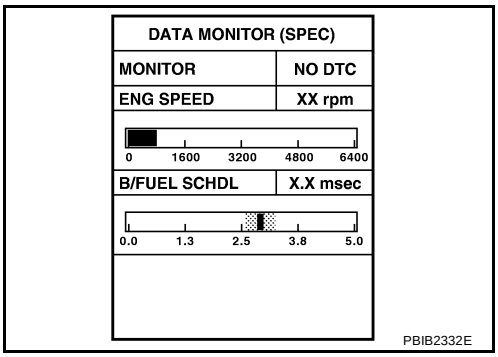
1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-85, "Symptom Matrix Chart" .

17. CHECK “B/FUEL SCHDL”

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



OK or NG

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

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.

– Engine oil level is too high
– Engine oil viscosity
– Belt tension of power steering, alternator, A/C compressor, etc. is excessive
– Noise from engine
– Noise from transmission, etc.

2. Check for the cause of insufficient combustion. Refer to the following.

– Valve clearance malfunction
– Intake valve timing control function malfunction
– Camshaft sprocket installation malfunction, etc.

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

19. CHECK INTAKE SYSTEM

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

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

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1”, “A/F ALPHA-B2” are less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-163 .
2. GO TO 29.

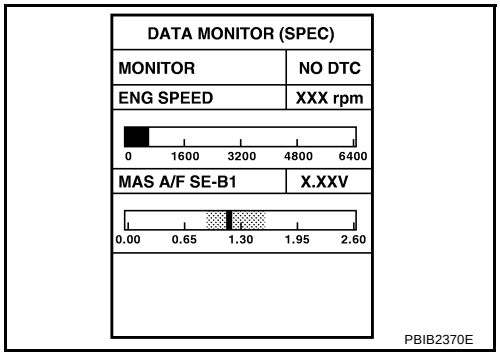
NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

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

OK or NG

OK >> GO TO 24.
NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-71, "Accelerator Pedal Released Position Learning" .
4. Perform EC-71, "Throttle Valve Closed Position Learning" .
5. Perform EC-71, "Idle Air Volume Learning" .

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

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

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

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

OK or NG

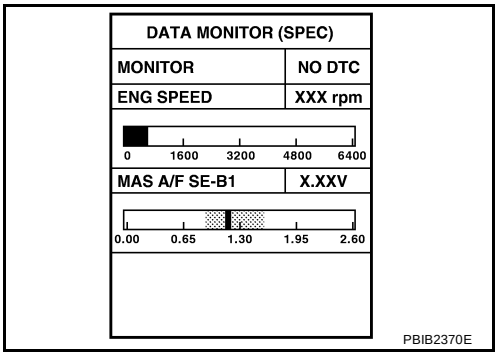
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

27. CHECK “MAS A/F SE-B1”

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

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



28. CHECK INTAKE SYSTEM

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

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

>> GO TO 30.

29. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-85, "Symptom Matrix Chart" .

30. CHECK “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-85, "Symptom Matrix Chart" .

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

GBS000IO

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

Common Intermittent Incidents Report Situations

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

Diagnostic Procedure

GBS000IP

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-145, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" , "INCIDENT SIMULATION TESTS".

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

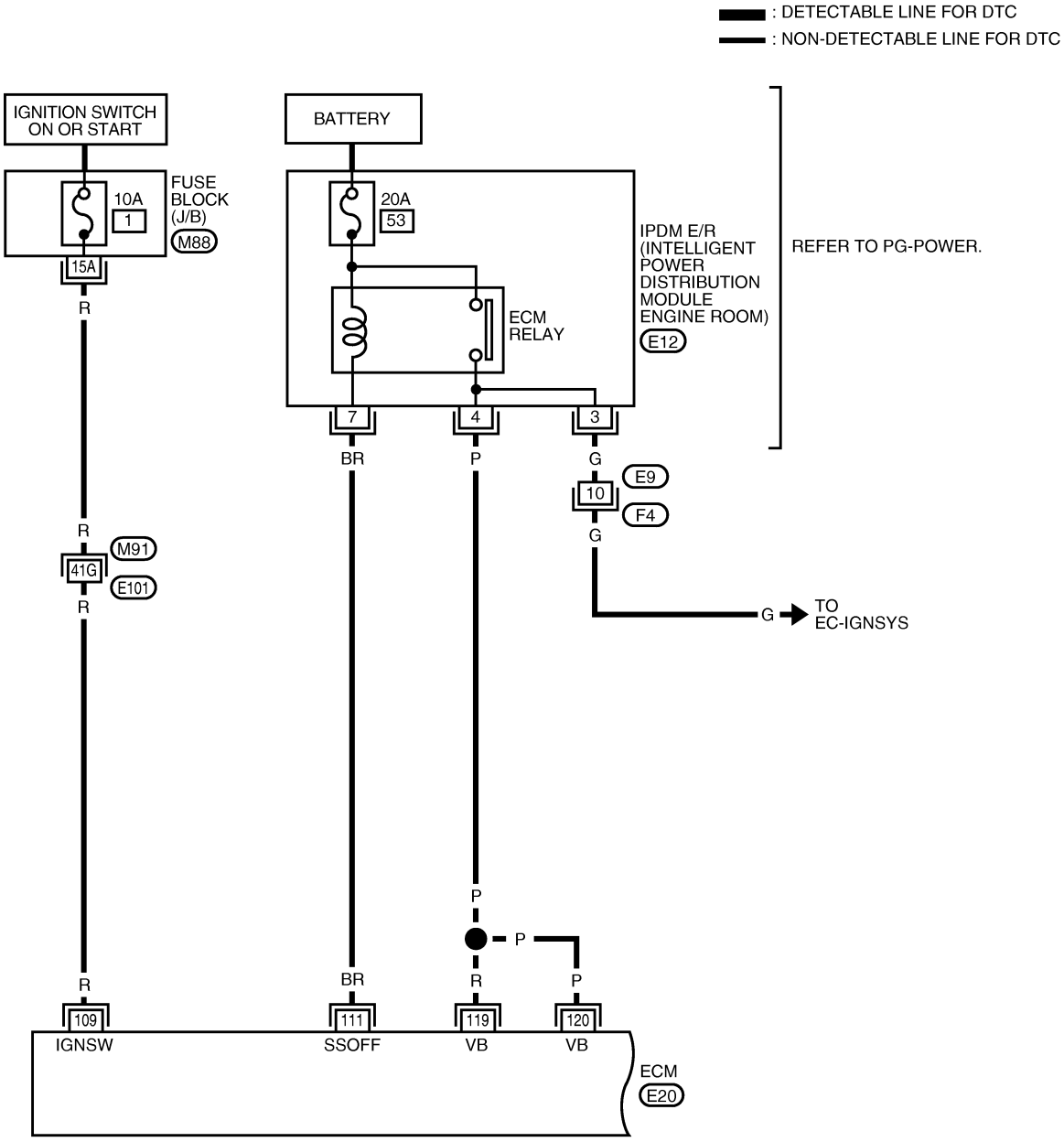
POWER SUPPLY AND GROUND CIRCUIT

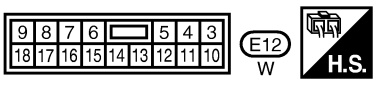
PFP:24110

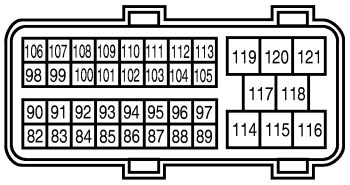
Wiring Diagram

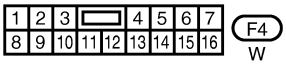
GBS000IQ

EC-MAIN-01









REFER TO THE FOLLOWING.
M91 - SUPER MULTIPLE JUNCTION (SMJ)
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1274E

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

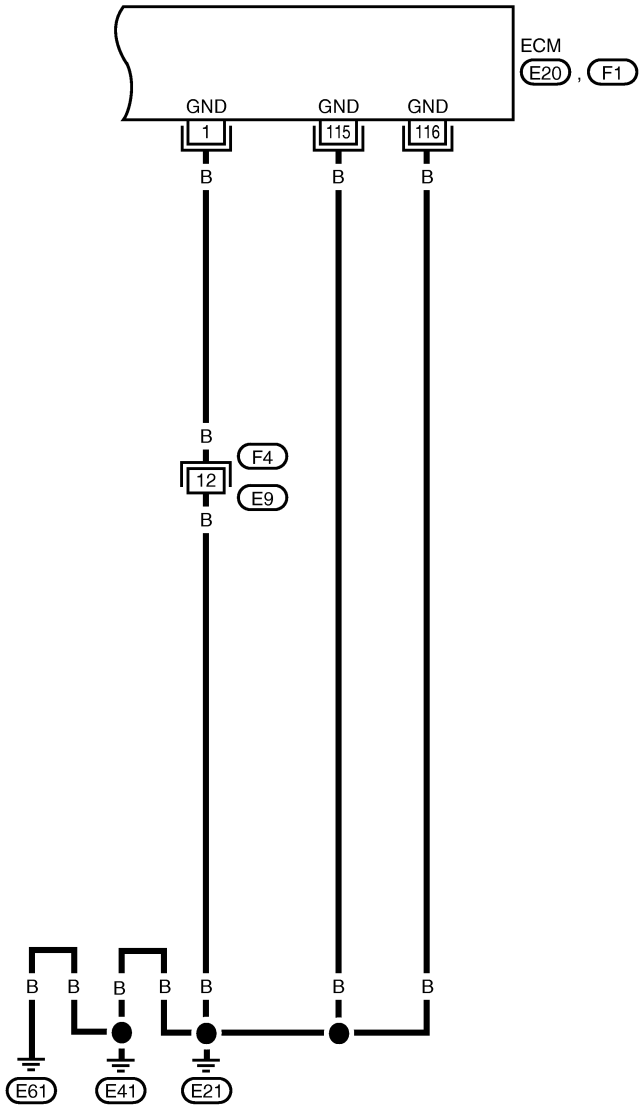
CAUTION:

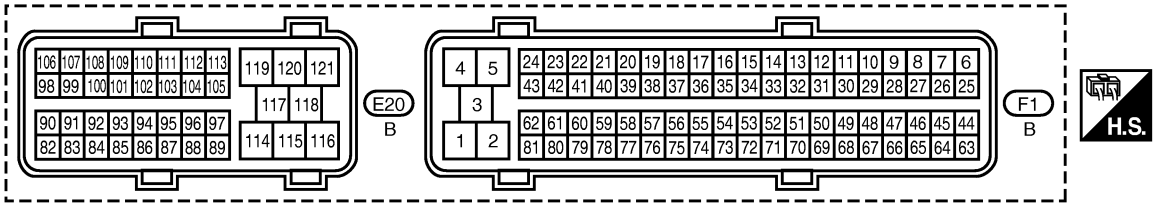
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

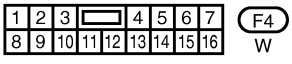
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-MAIN-02

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







MBWA1275E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground

Diagnostic Procedure

GBS000IR

1. INSPECTION START

Start engine.

Is engine running?

Yes or No

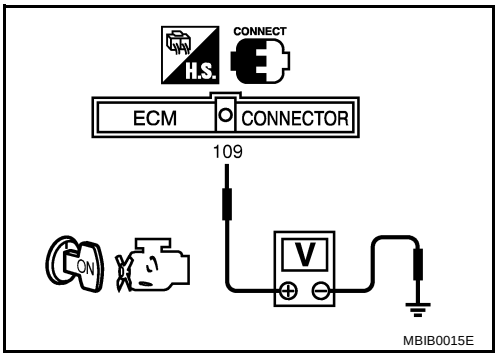
Yes >> GO TO 8.

No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

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

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.

NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

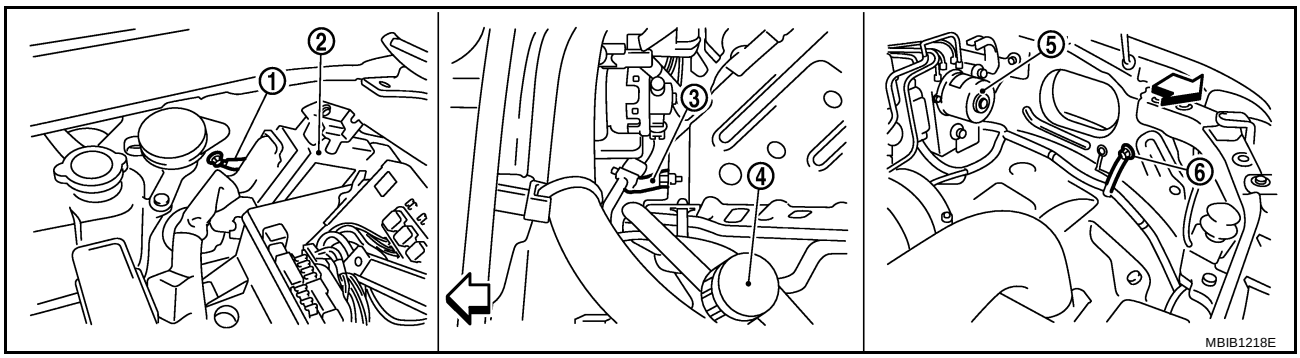
Check the following.

- Harness connectors M91, E101
- Fuse block (J/B) connector M88
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

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

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

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

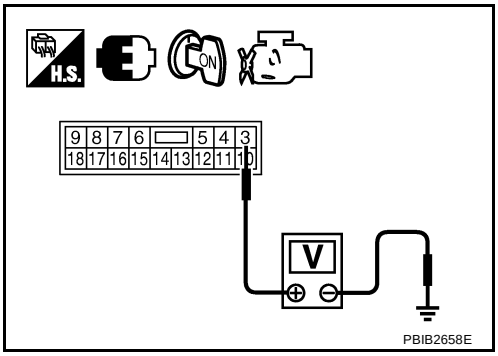
- Harness connectors F4, E9
- Harness for open or short between ECM and ground

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

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R connector E12 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



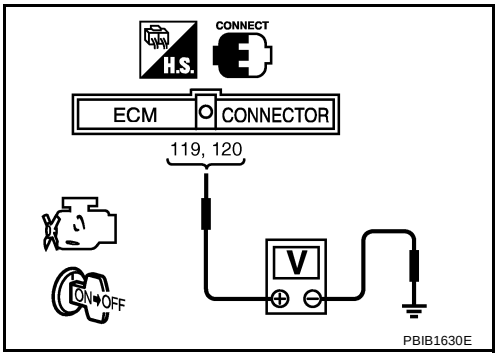
OK or NG

OK >> Go to EC-543, "IGNITION SIGNAL" .
NG >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

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



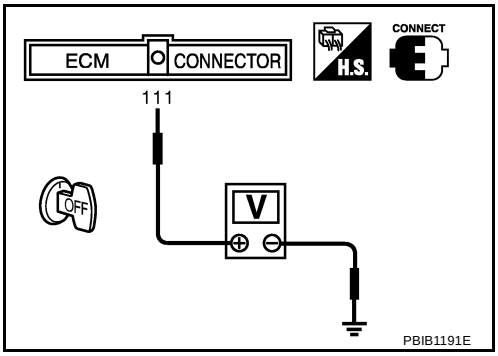
OK or NG

OK >> GO TO 13.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

Check voltage between ECM terminal 111 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 7.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

12. CHECK 20A FUSE

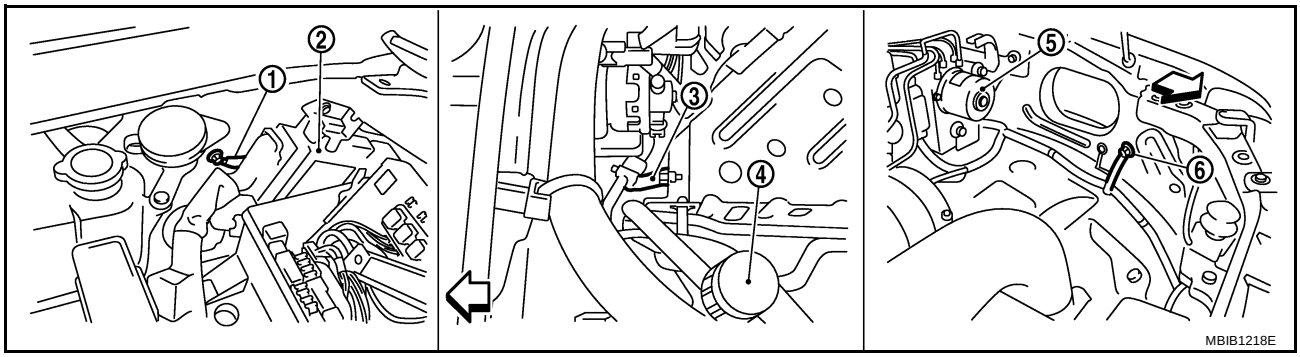
1. Disconnect 20 A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 16.
NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

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

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

Continuity should exist.

2. Also check harness for short to power.

OK or NG

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

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

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

16. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

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

Ground Inspection

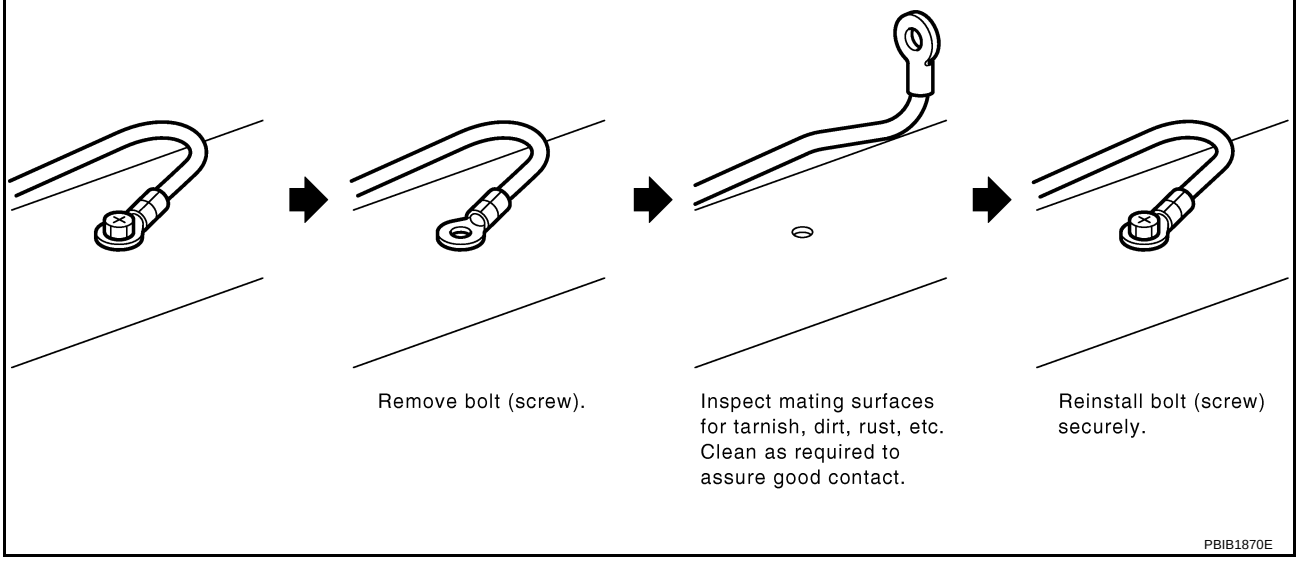
GBS000IS

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-27, "Ground Distribution" .

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

GBS000IT

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

On Board Diagnosis Logic

GBS000IU

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

*1: **This self-diagnosis has the one trip detection logic.**
*2: **The MIL will not light up for this diagnosis.**

DTC Confirmation Procedure

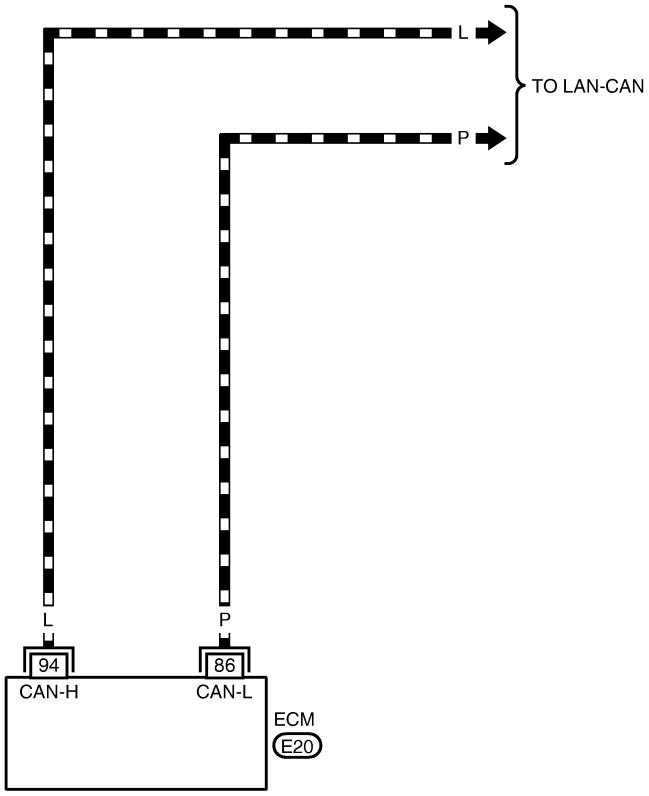
GBS000IV

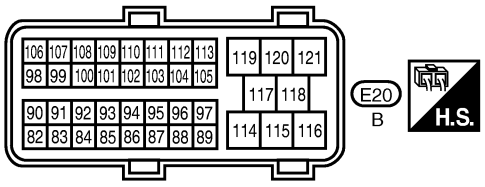
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-148, "Diagnostic Procedure" .

Wiring Diagram

GBS000IW

EC-CAN-01





MBWA1276E

Diagnostic Procedure

GBS000IX

Go to LAN-3, "Precautions When Using CONSULT-II" .

DTC P0011, P0021 IVT CONTROL

PFP:23796

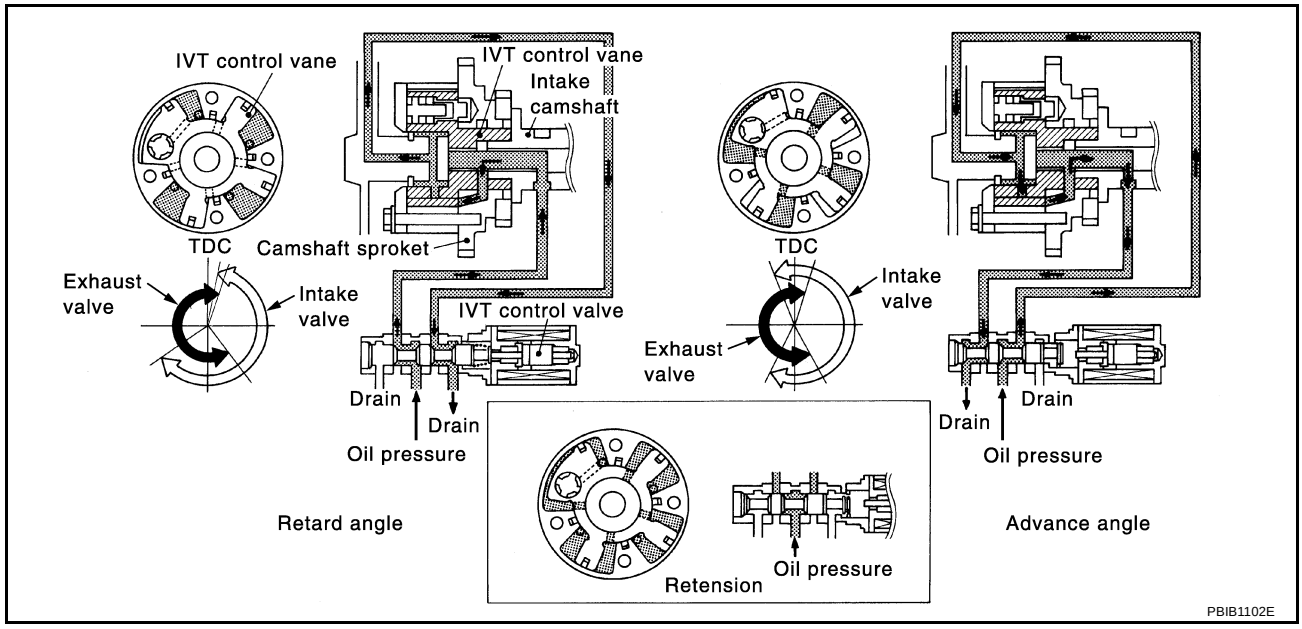
Description

GBS000IY

SYSTEM DESCRIPTION

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

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



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

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

CONSULT-II Reference Value in Data Monitor Mode

GBS000IZ

Specification data are reference values.

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

On Board Diagnosis Logic

GBS000J0

The MIL will not light up for this diagnosis.

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

FAIL-SAFE MODE

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

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

DTC Confirmation Procedure

GBS000J1

CAUTION:
Always drive at a safe speed.

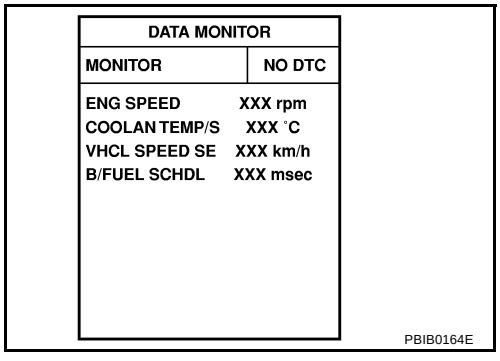
NOTE:

- **If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to EC-303 .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

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



ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go toEC-151, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)

Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If the 1st trip DTC is detected, go to EC-151, "Diagnostic Procedure" .

WITH GST

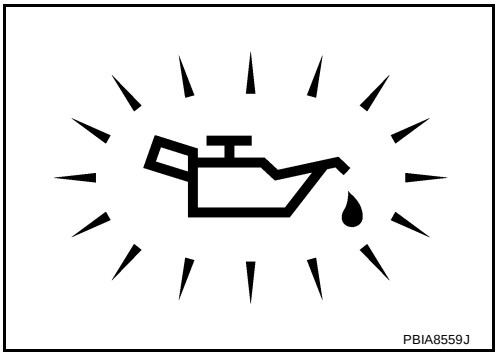
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

GBS000J2

1. CHECK OIL PRESSURE WARNING LAMP

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



OK or NG

OK >> GO TO 2.
KG >> Go to LU-7, "ENGINE OIL PRESSURE CHECK" .

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-152, "Component Inspection" .

OK or NG

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

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-258, "Component Inspection" .

OK or NG

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

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-267, "Component Inspection" .

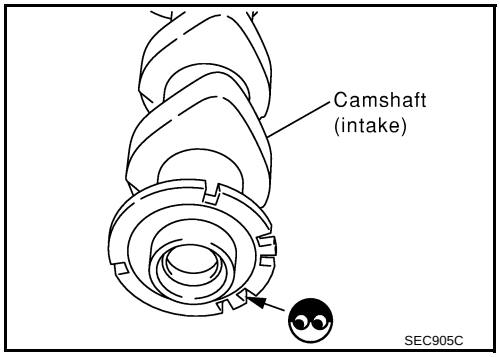
OK or NG

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

5. CHECK CAMSHAFT (INTAKE)

Check the following.

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



OK or NG

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

6. CHECK TIMING CHAIN INSTALLATION

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

Yes or No

Yes >> Check timing chain installation. Refer to EM-53, "TIMING CHAIN" .
No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-82, "Inspection of Camshaft Sprocket (INT) Oil Groove" .

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-254 for CKP sensor (POS) and EC-261 for CMP sensor (PHASE).

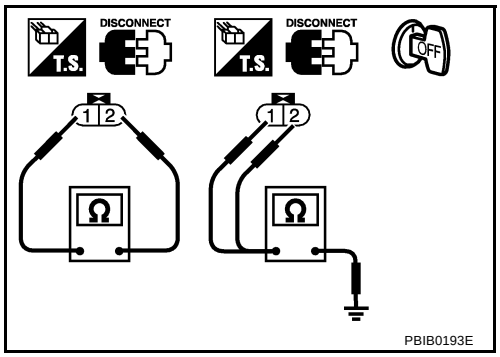
>> **INSPECTION END**

Component Inspection

GBS000J3

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

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



Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

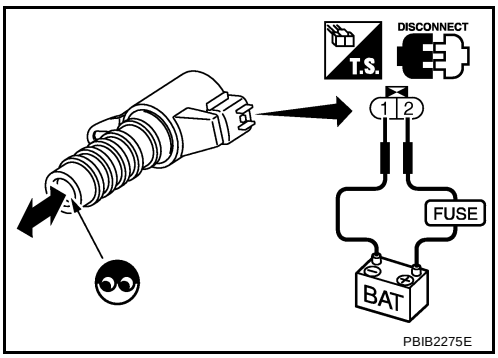
If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

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

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



GBS000J4

Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-53, "TIMING CHAIN" .

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PFP:226A0

Description

GBS000J5

SYSTEM DESCRIPTION

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

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

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

GBS000J6

Specification data are reference values.

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

On Board Diagnosis Logic

GBS000J7

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

DTC Confirmation Procedure

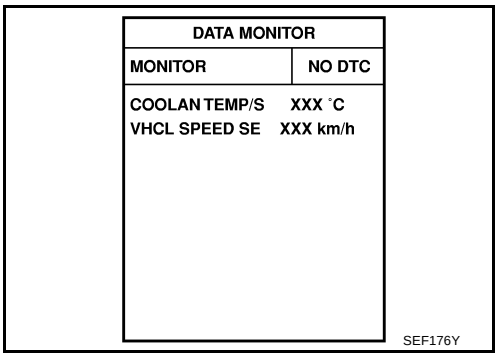
GBS000J8

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

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

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start the engine and keep the engine speed between 3,500 rpm and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-159, "Diagnostic Procedure" .



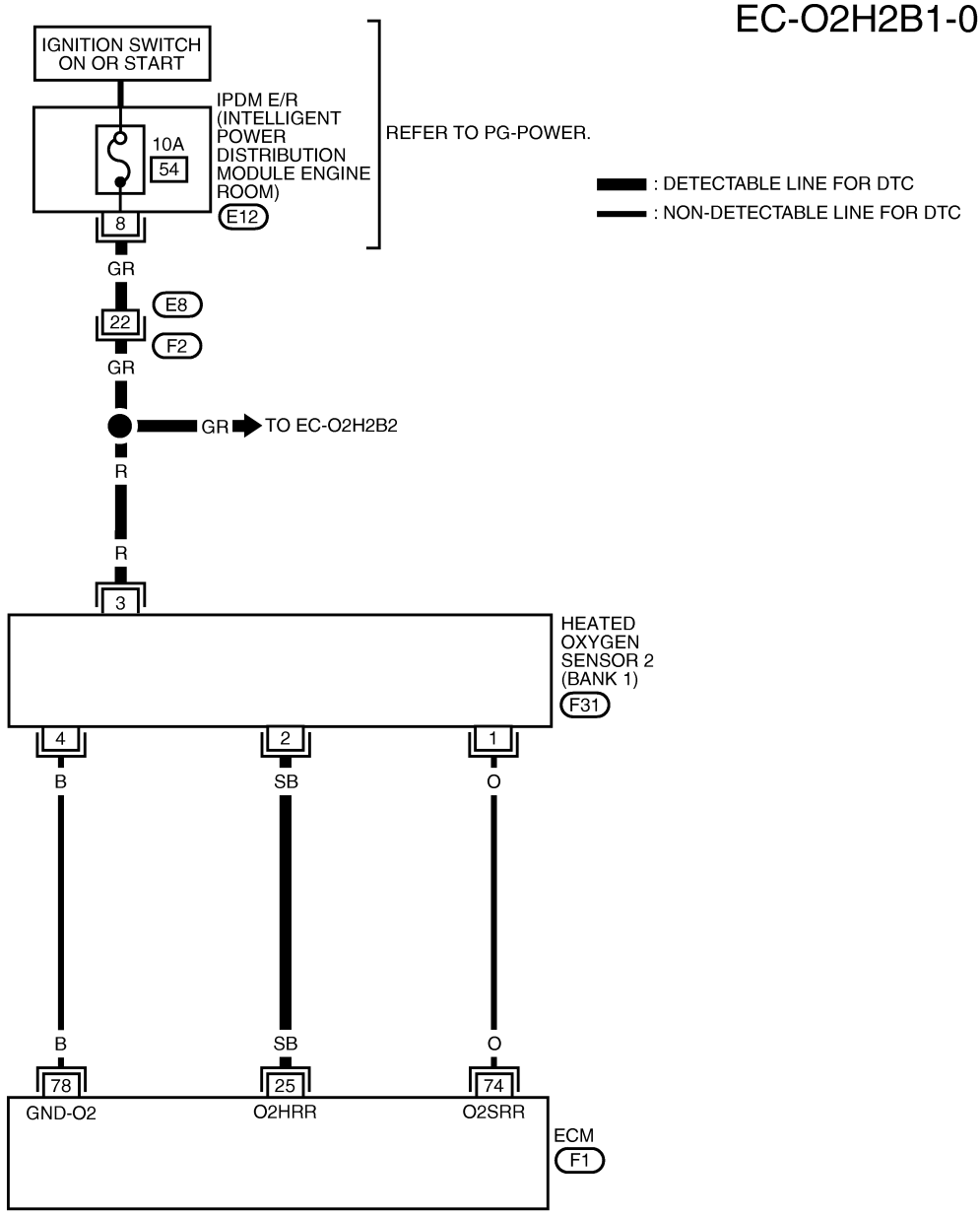
WITH GST

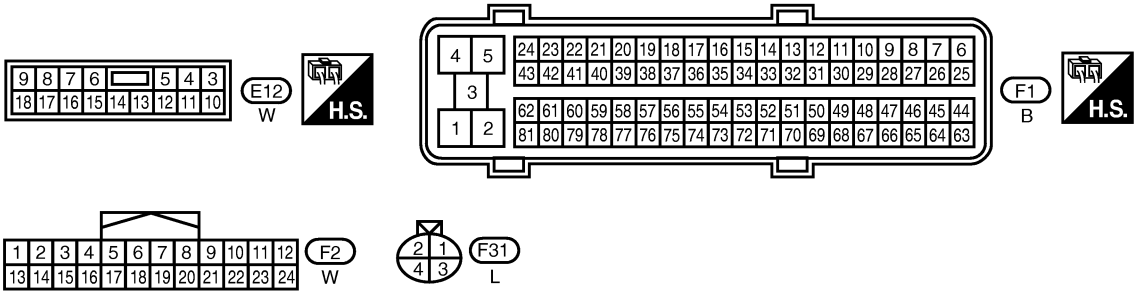
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
BANK 1

GBS000J9

EC-O2H2B1-01





MBWA1277E

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

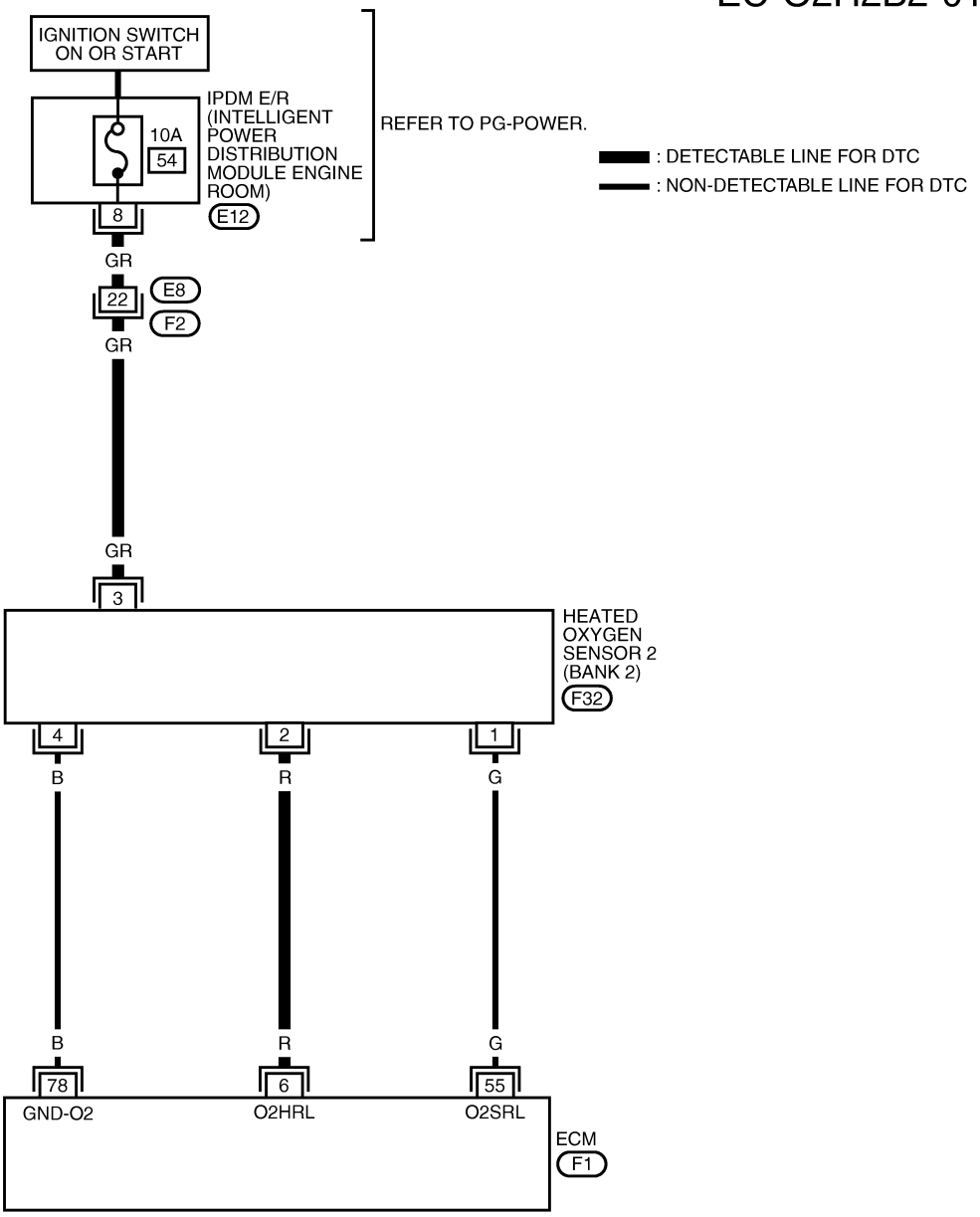
CAUTION:

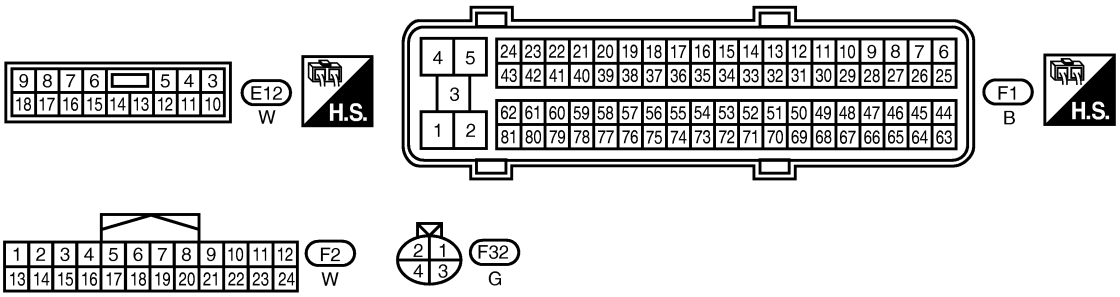
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-O2H2B2-01





MBWA1278E

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

CAUTION:

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

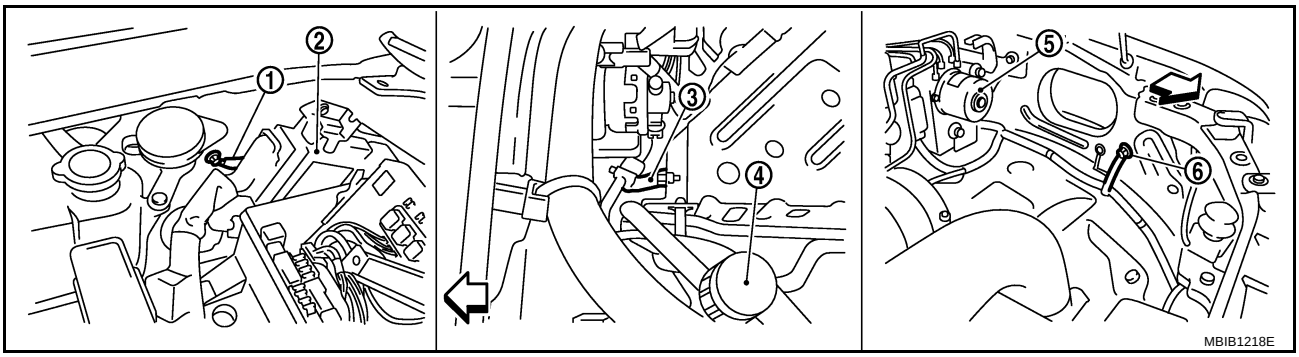
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000JA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

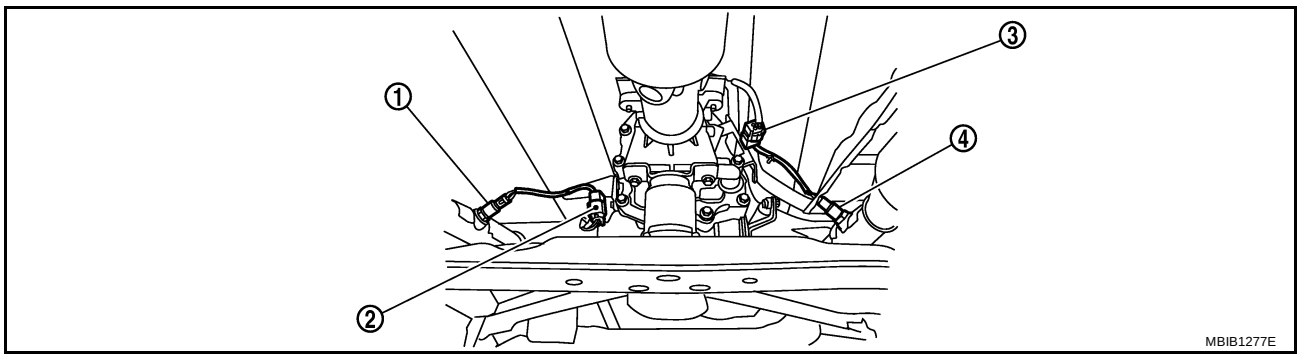
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. CHECK HO2S2 POWER SUPPLY CIRCUIT

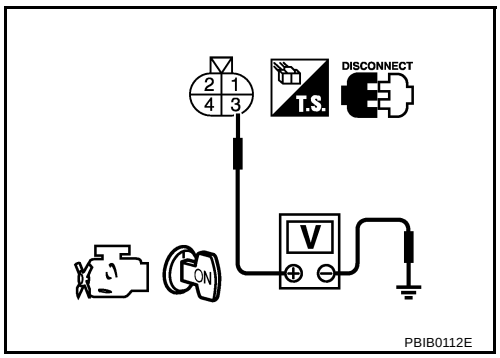
1. Disconnect heated oxygen sensor 2 harness connector.



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

2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	25	2	1
P0057, P0058	6	2	2

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-161, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000JB

HEATED OXYGEN SENSOR 2 HEATER

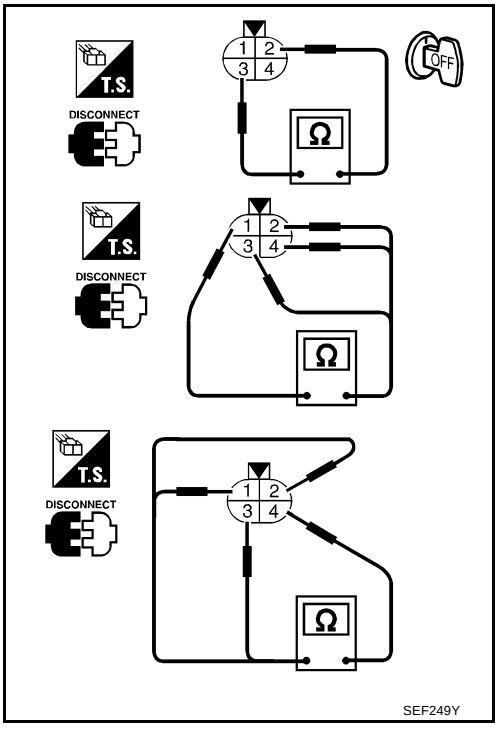
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	9.9 - 13.3 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, replace heated oxygen sensor 2.

CAUTION:

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



Removal and Installation

GBS000JC

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

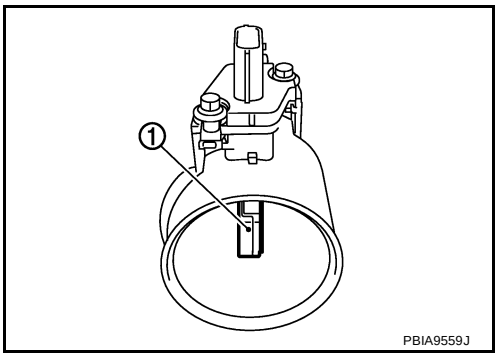
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

GBS000JD

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, electric current is supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

GBS000JE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	5 - 35%
		2,500 rpm	5 - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

GBS000JF

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

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

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

DTC Confirmation Procedure

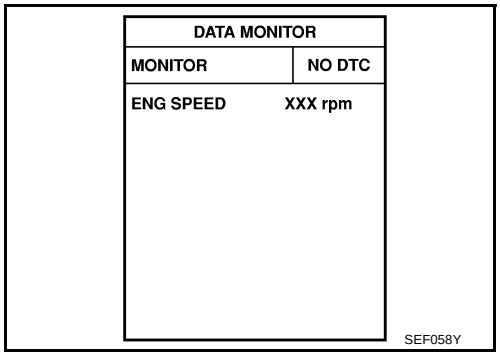
GBS000JG

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

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-166, "Diagnostic Procedure" .



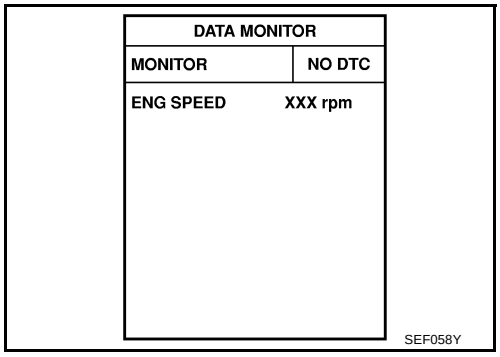
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-166, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-166, "Diagnostic Procedure" .

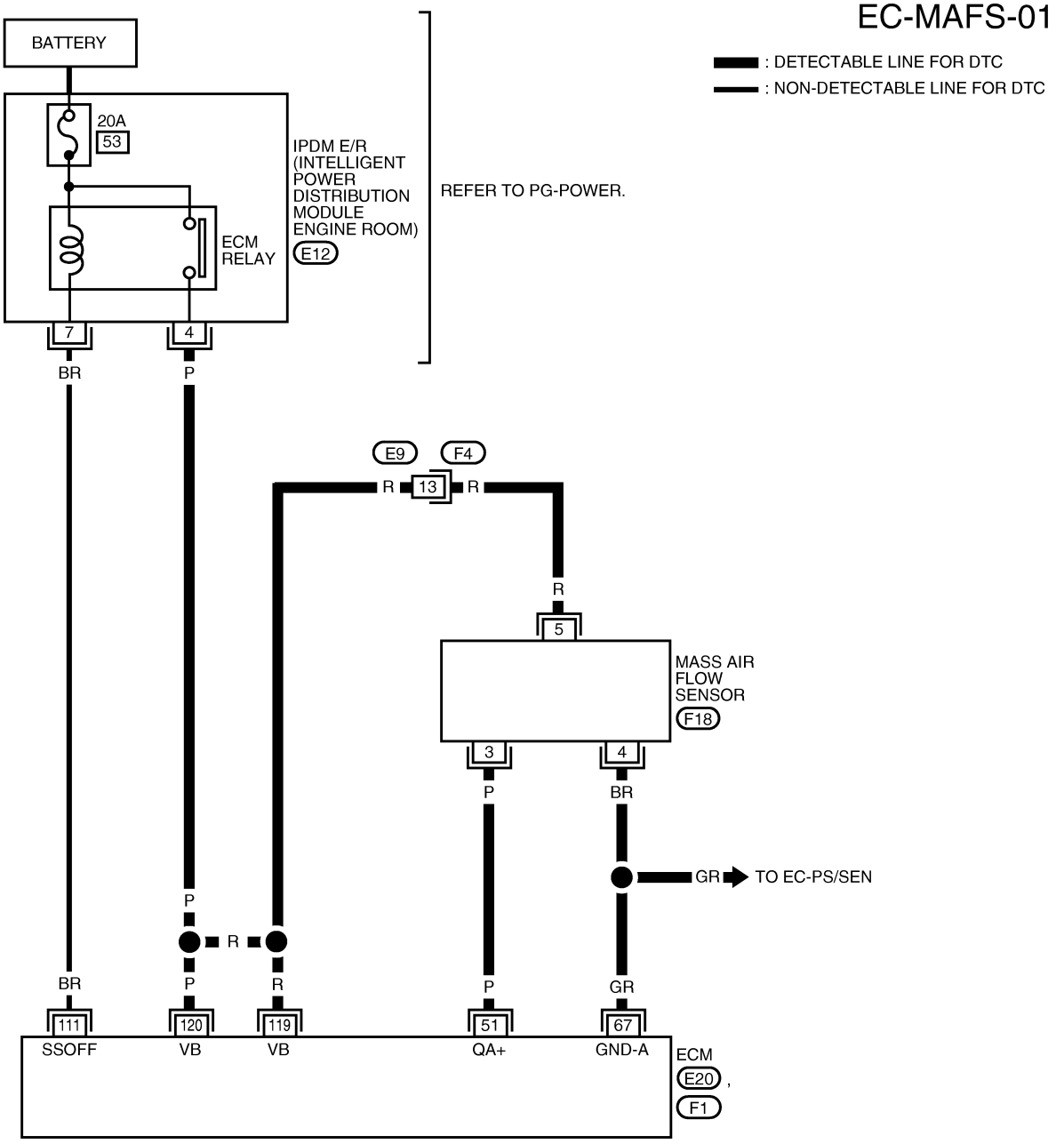


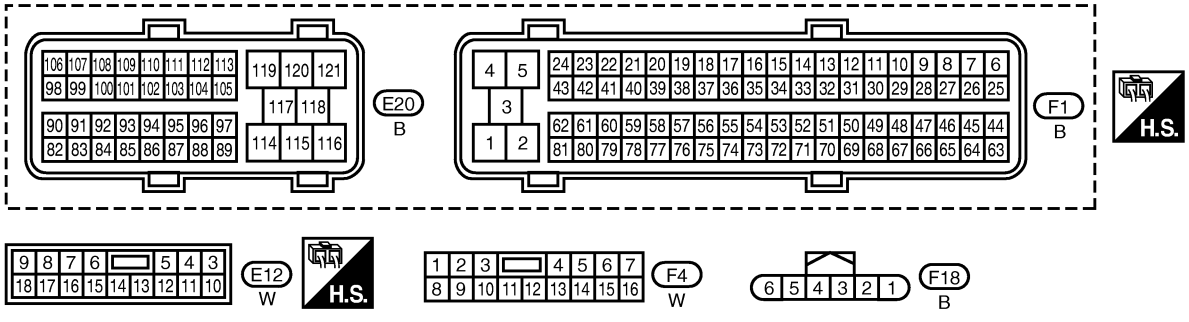
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

GBS000JH





MBWA1279E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	P	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000JI

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

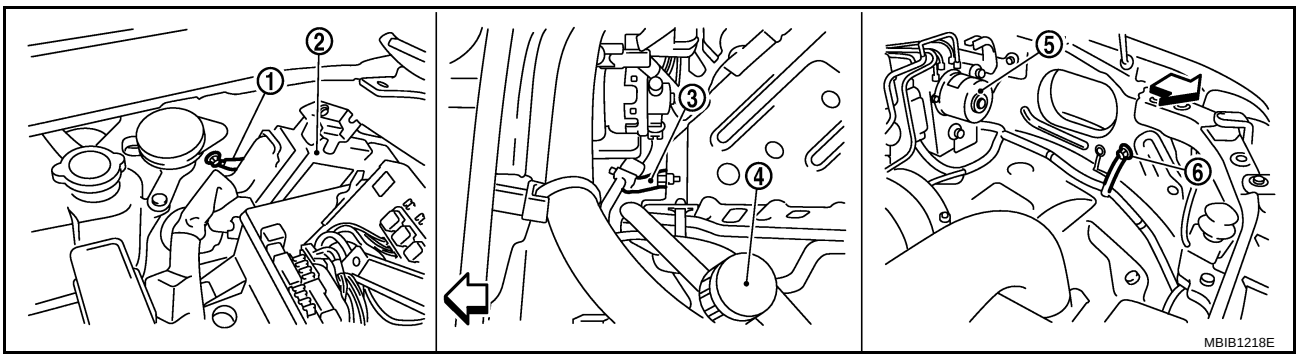
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

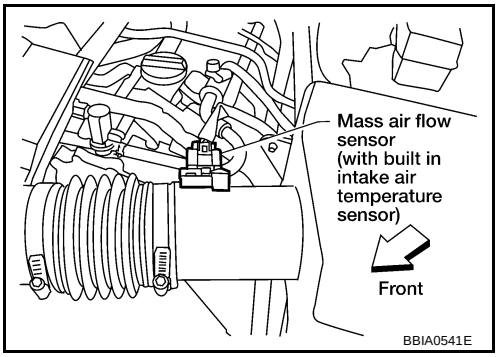
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

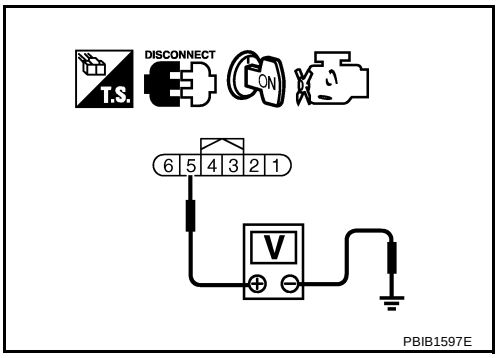
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

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

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 4 and ECM terminal 67.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 3 and ECM terminal 51.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-168, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

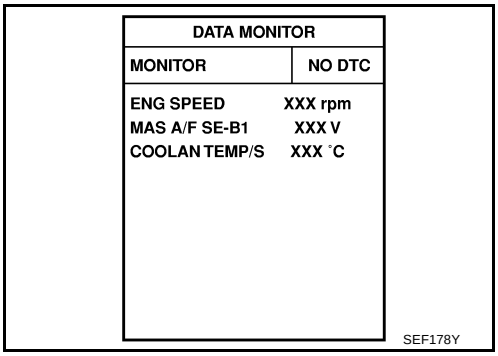
GBS000JJ

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.

4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

5. If the voltage is out of specification, proceed the following.

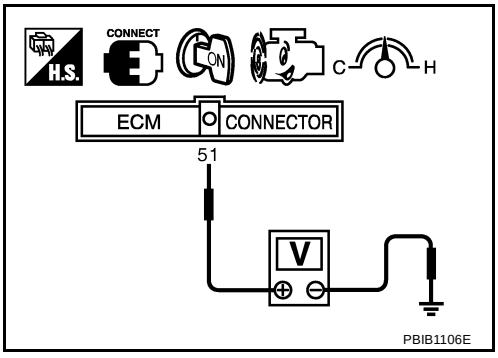
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

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



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

GBS000JK

MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

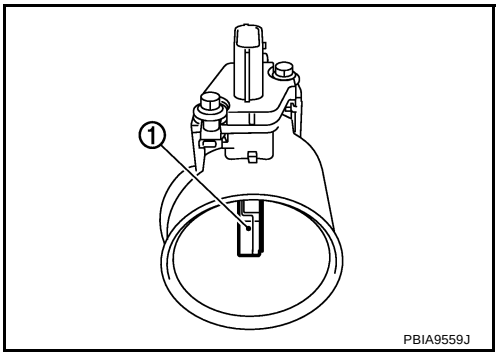
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

GBS000JL

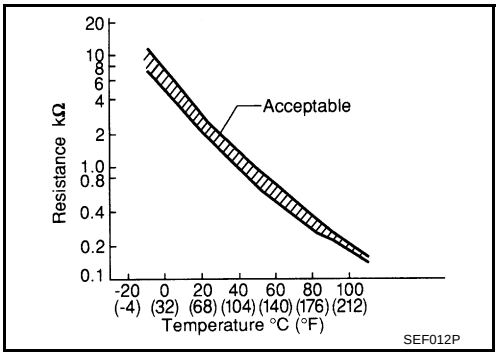
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

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



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

On Board Diagnosis Logic

GBS000JM

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

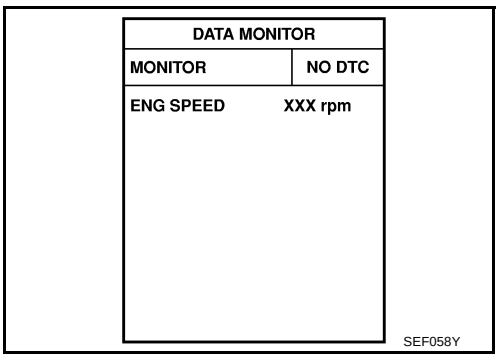
DTC Confirmation Procedure

GBS000JN

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-173, "Diagnostic Procedure"
.



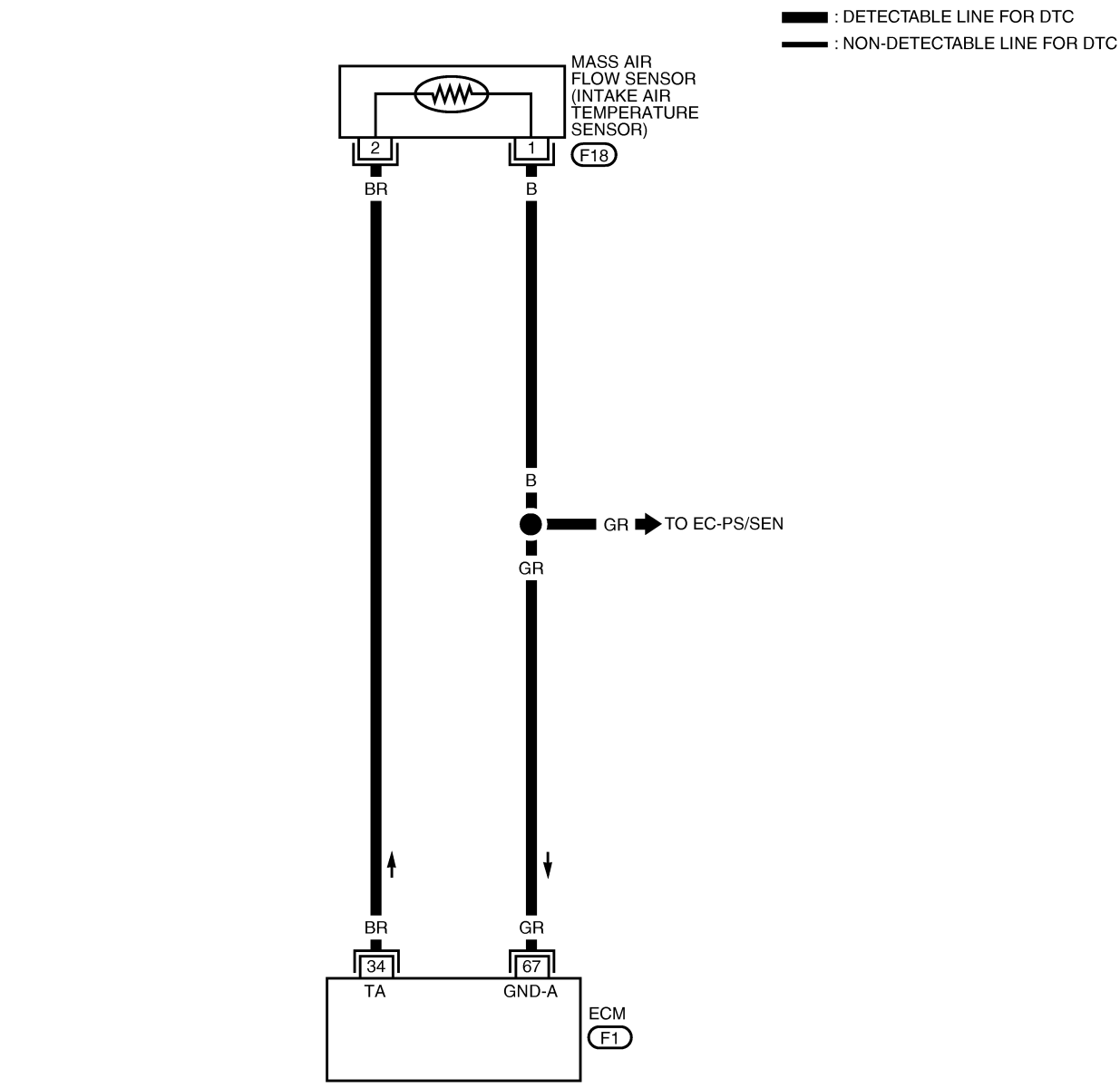
WITH GST

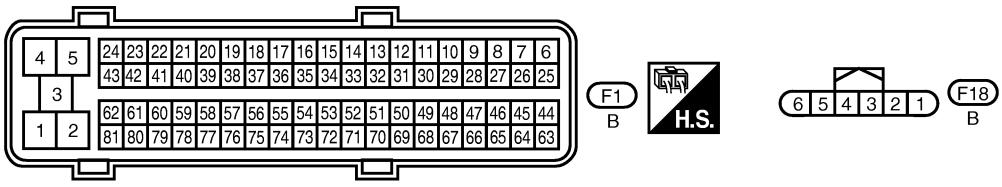
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000JO

EC-IATS-01





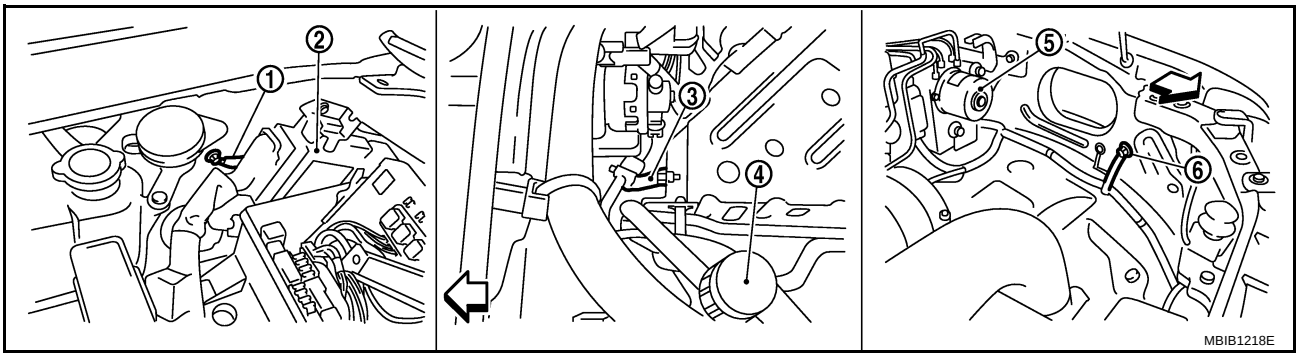
MBWA1280E

Diagnostic Procedure

GBS000JP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

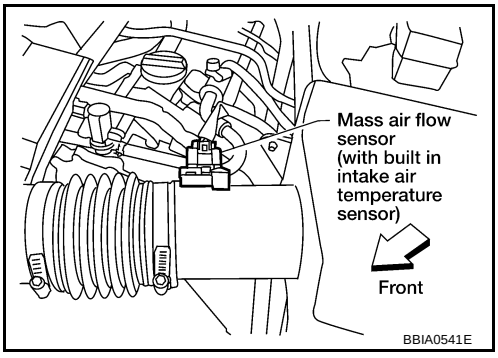
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

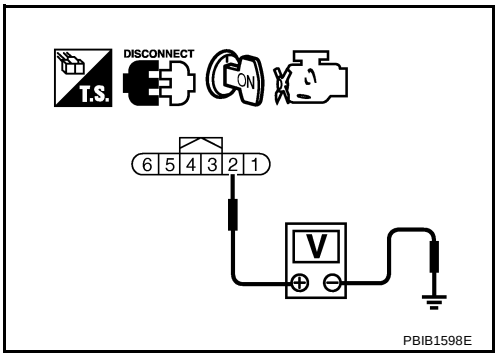
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminal 2 and ground.

Voltage: Approximately 5V



OK or NG

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

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-174, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

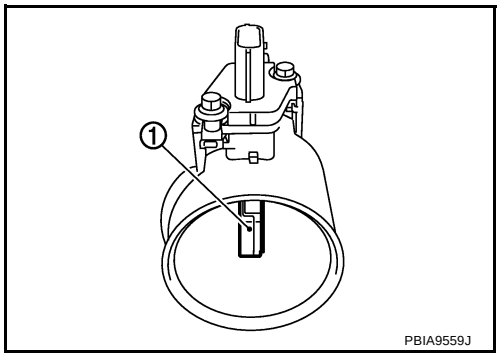
GBS000JQ

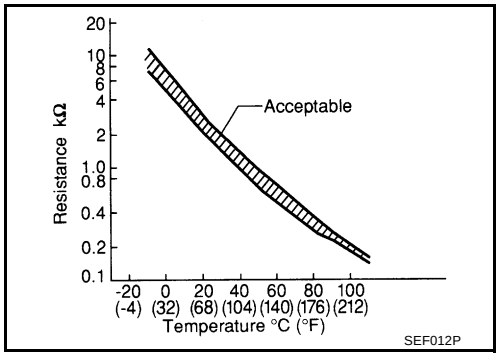
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 1 and 2 under the following conditions.

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

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





Removal and Installation

GBS000JR

MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

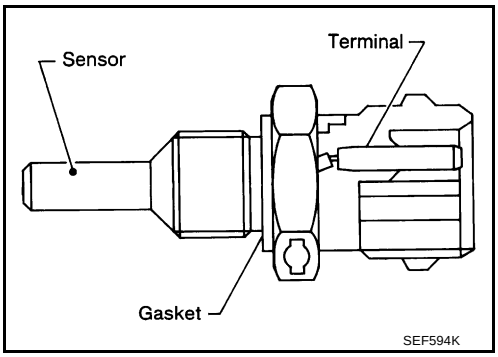
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

GBS000JS

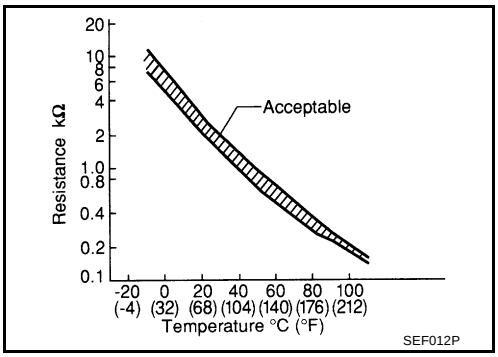
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



CAUTION:

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

On Board Diagnosis Logic

GBS000JT

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

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

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

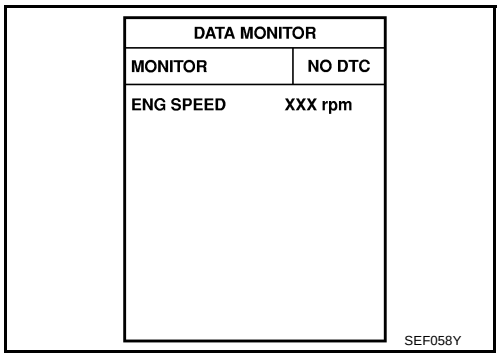
DTC Confirmation Procedure

GBS000JU

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-178, "Diagnostic Procedure" .



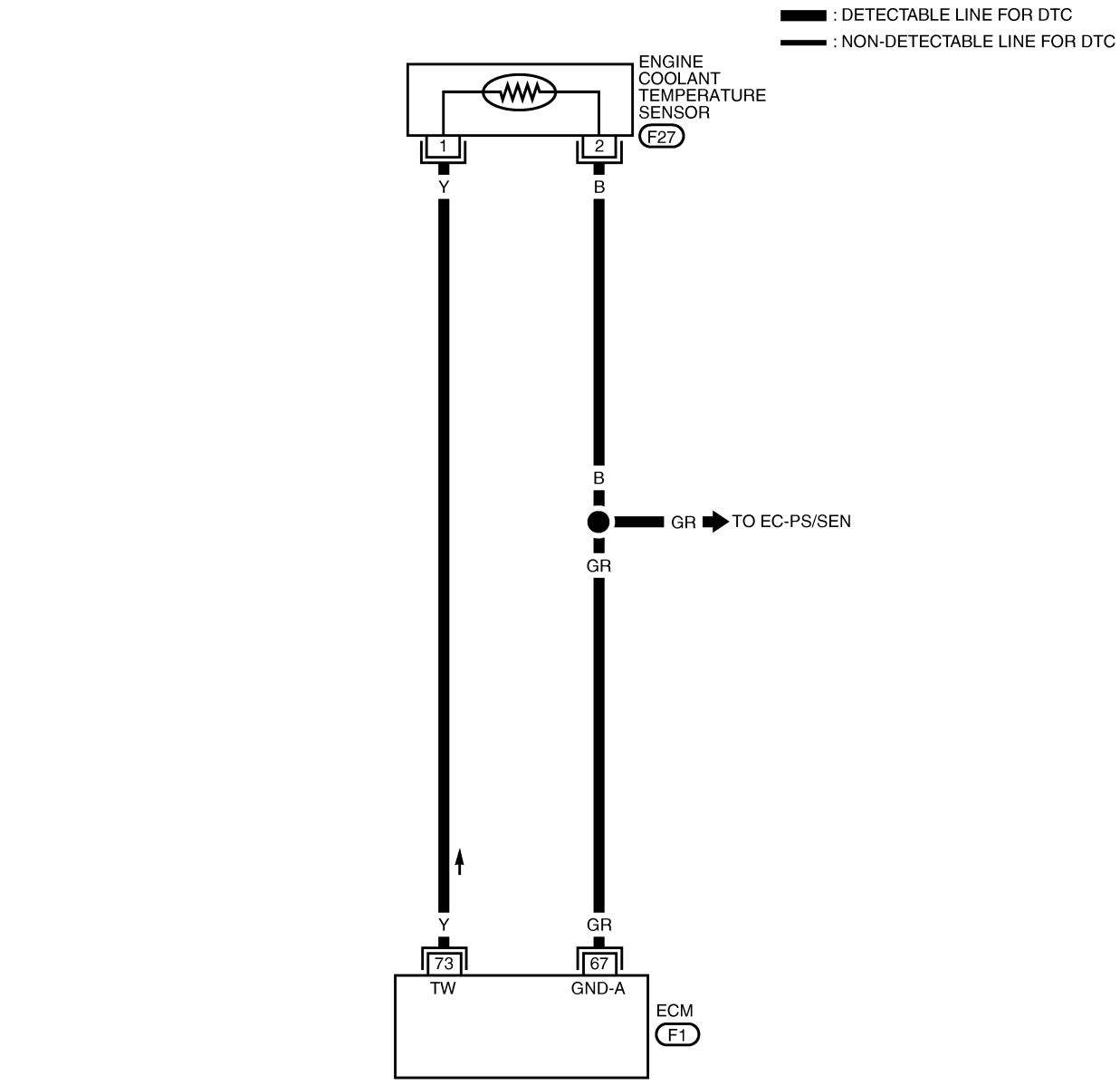
WITH GST

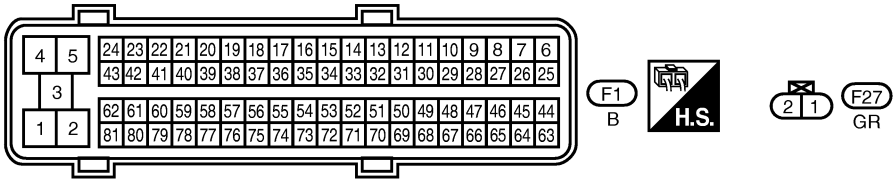
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000JV

EC-ECTS-01





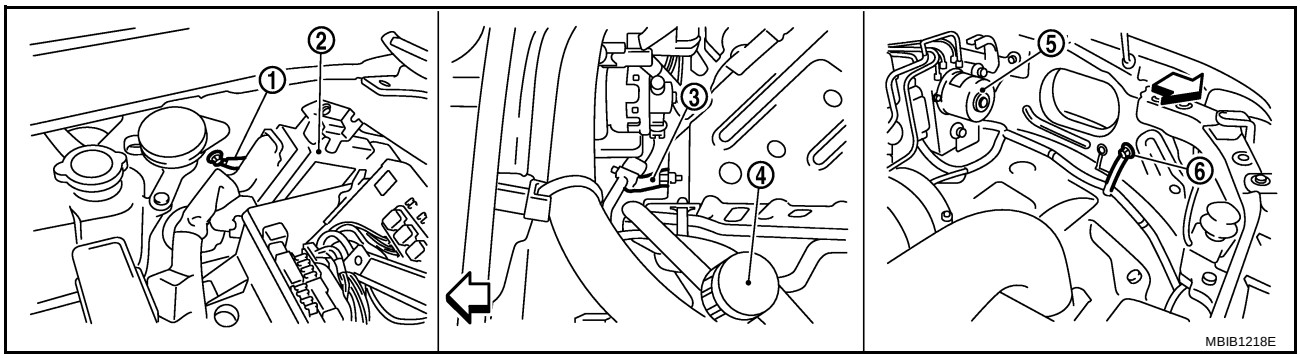
MBWA1281E

Diagnostic Procedure

GBS000JW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

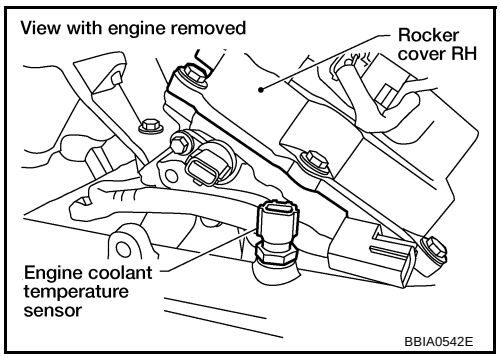
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

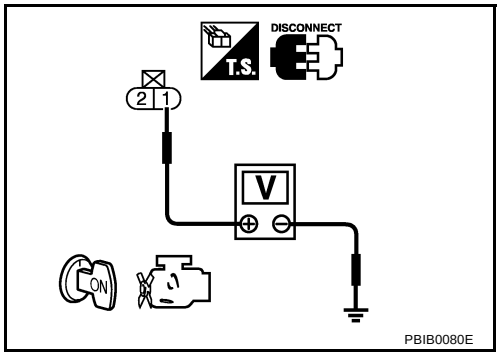
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-179, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

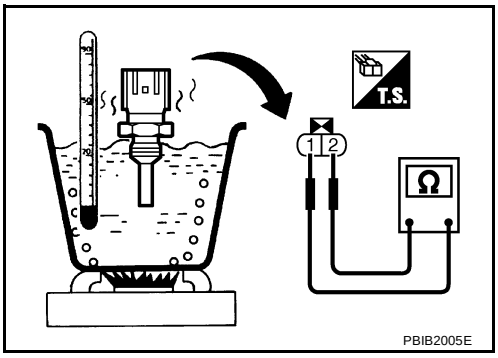
>> **INSPECTION END**

Component Inspection

GBS000JX

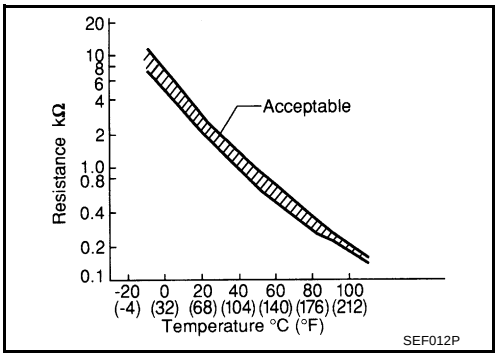
ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

GBS000JY

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-29, "WATER OUTLET AND WATER PIPING" .

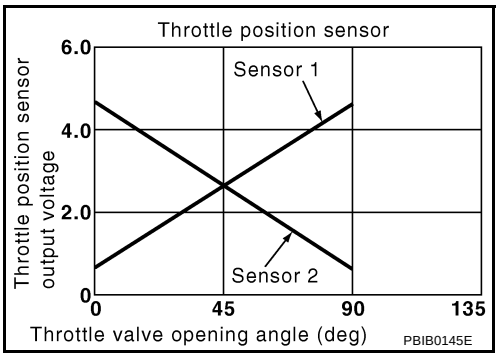
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

GBS000JZ

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



CONSULT-II Reference Value in Data Monitor Mode

GBS000K0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS000K1

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

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

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

DTC Confirmation Procedure

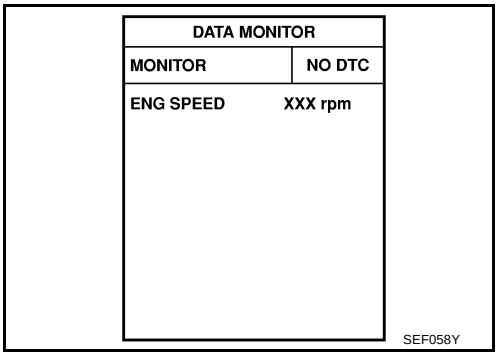
GBS000K2

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-184, "Diagnostic Procedure" .



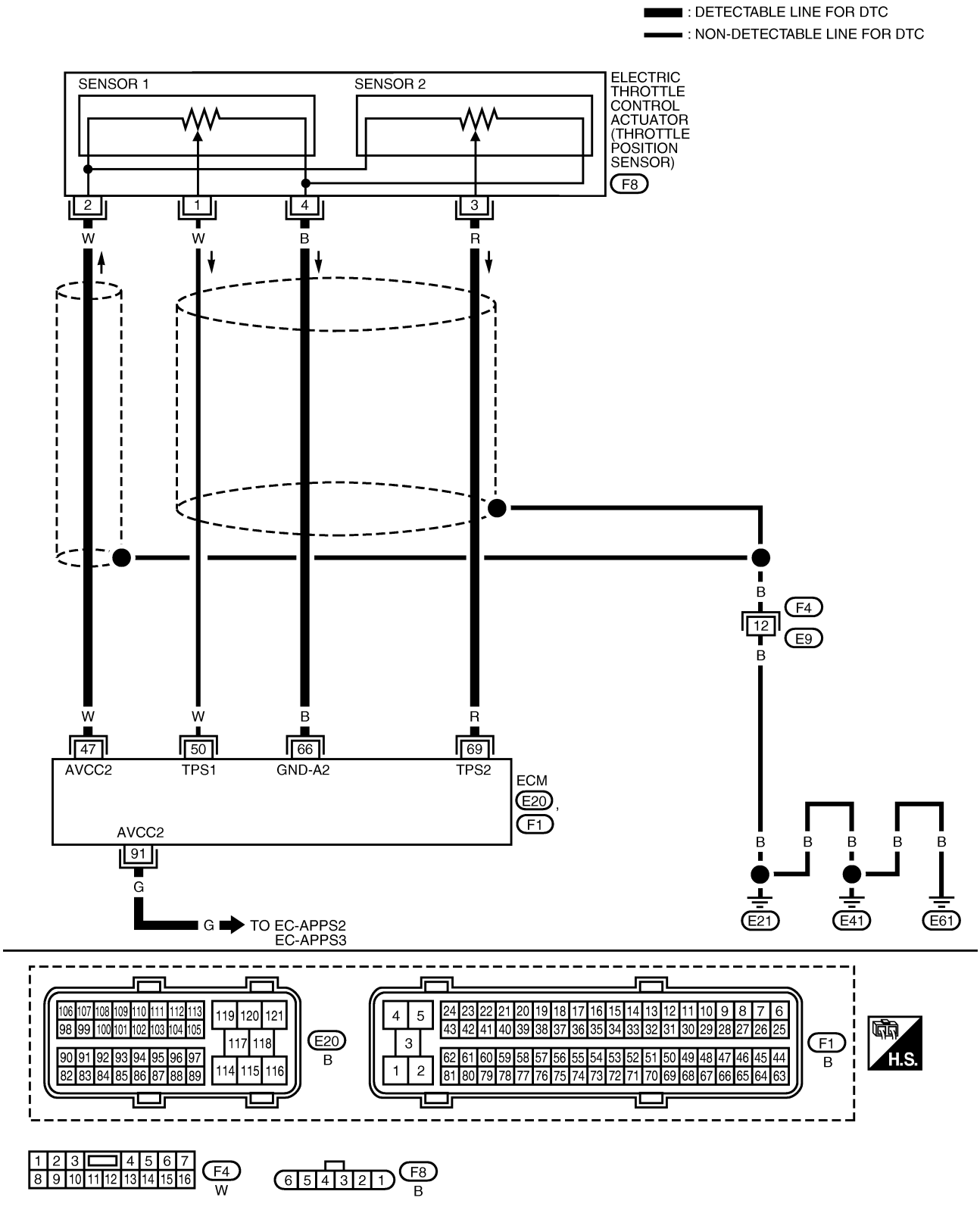
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000K3

EC-TPS2-01



MBWA1282E

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

CAUTION:

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

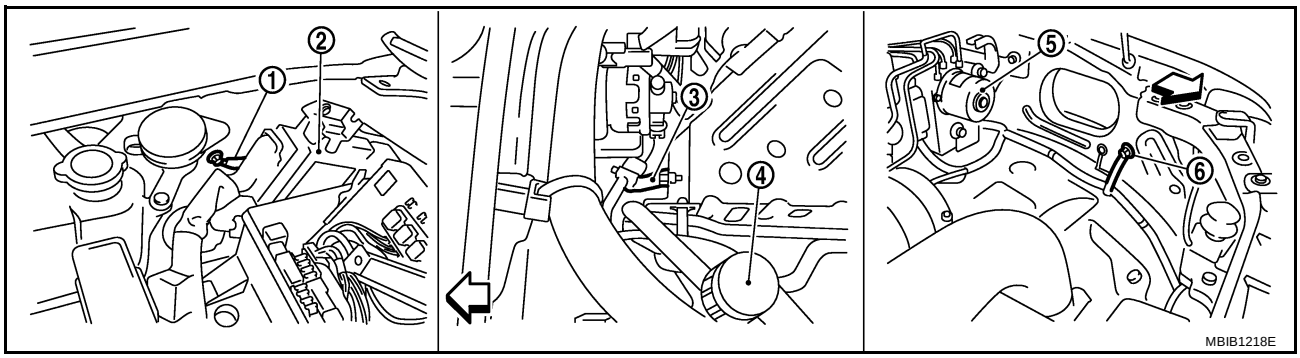
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More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

Diagnostic Procedure

GBS000K4

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

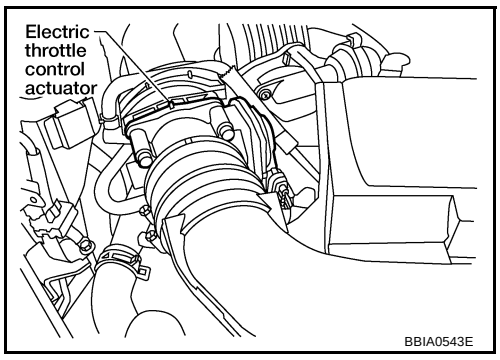
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

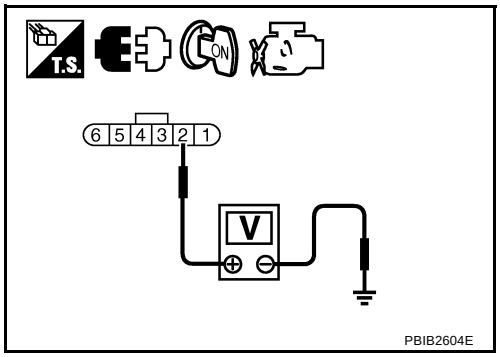
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

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



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

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

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-182
91	APP sensor terminal 1	EC-486

OK or NG

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

5. CHECK APP SENSOR

Refer to EC-490, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-186, "Component Inspection" .

OK or NG

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

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

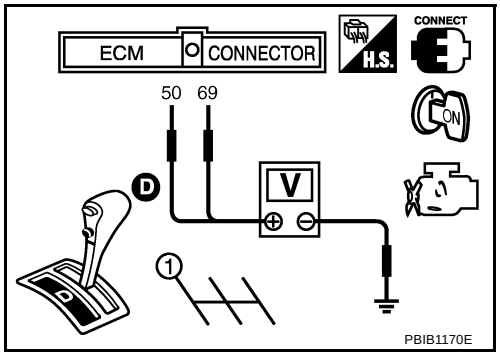
Component Inspection

GBS000K5

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

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



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-71, "Throttle Valve Closed Position Learning" .
8. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000K6

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

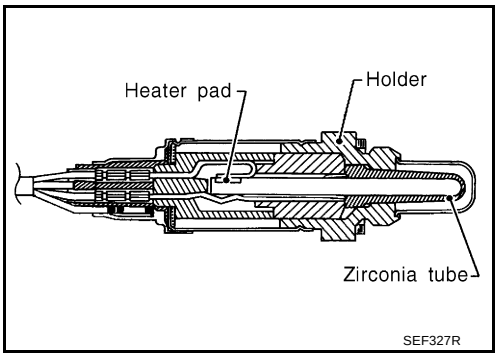
DTC P0138, P0158 HO2S2

PFP:226A0

Component Description

GBS000K7

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

GBS000K8

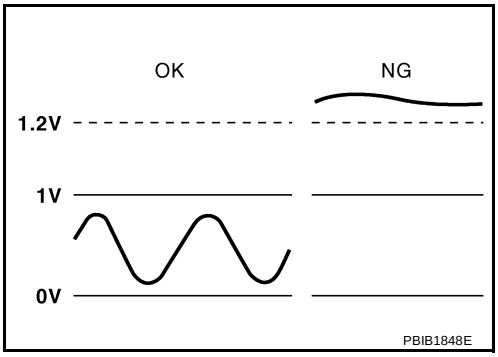
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ←→ RICH

On Board Diagnosis Logic

GBS000K9

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2
P0158 0158 (Bank 2)			

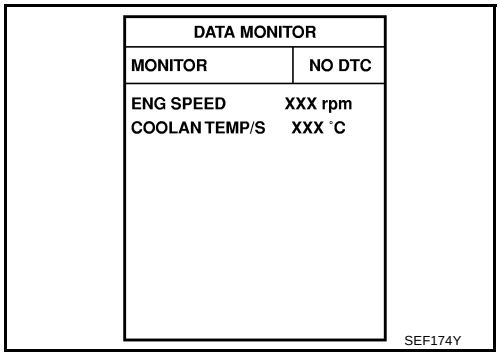
DTC Confirmation Procedure

GBS000KA

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

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-192, "Diagnostic Procedure" .



WITH GST

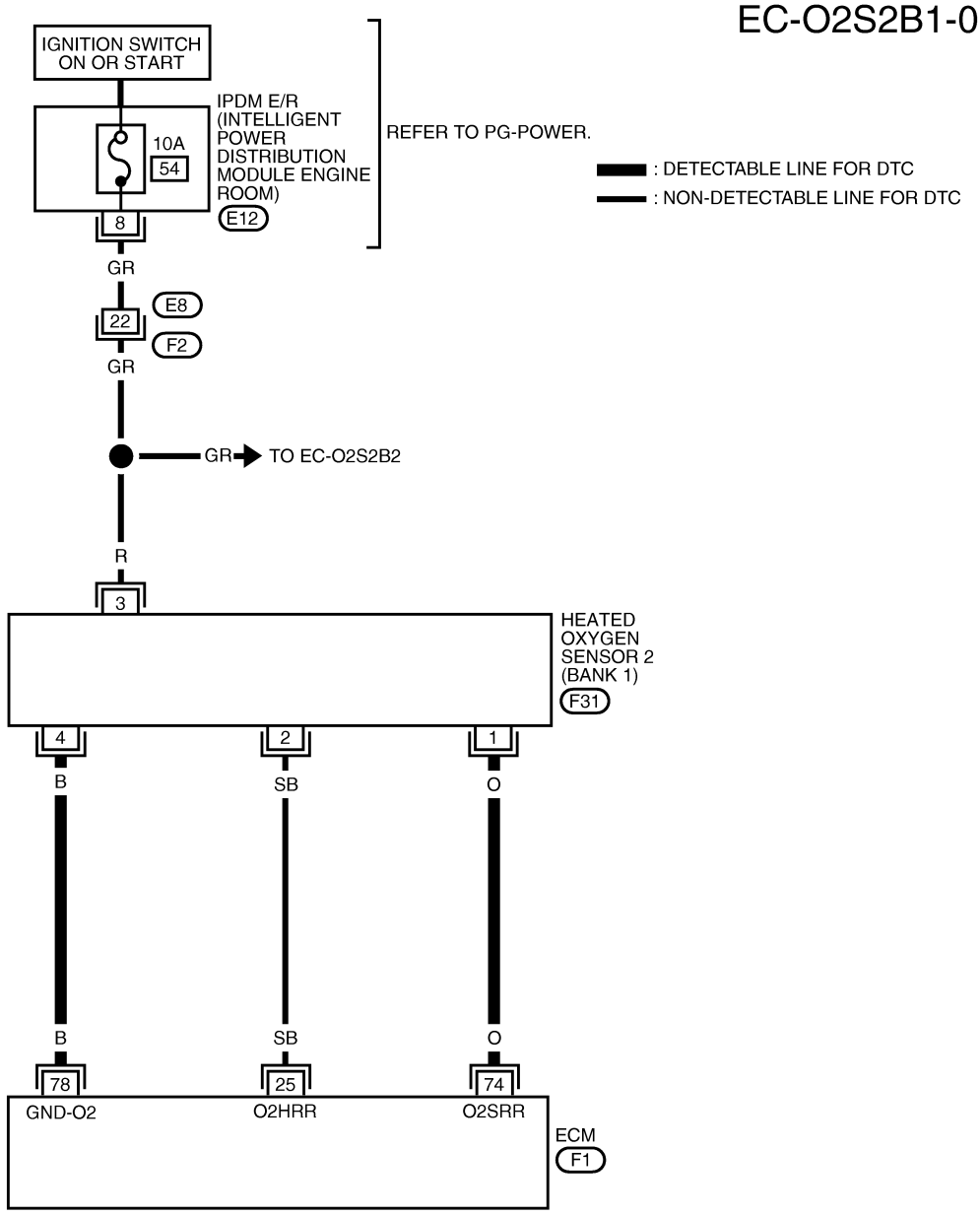
Follow the procedure “WITH CONSULT-II” above.

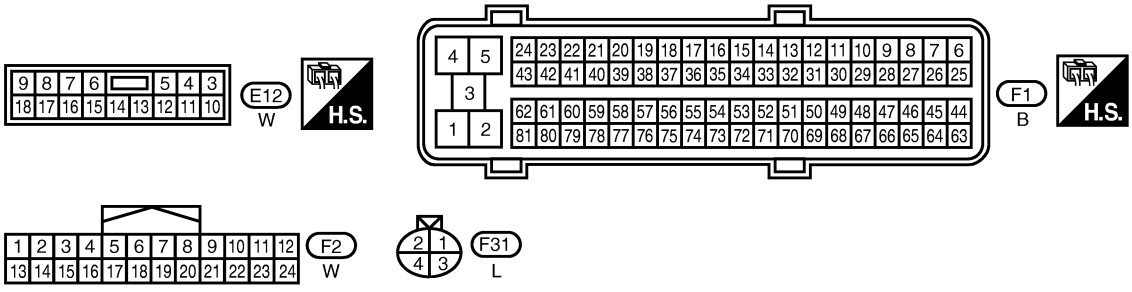
Wiring Diagram

BANK 1

GBS000KB

EC-O2S2B1-01





MBWA1283E

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

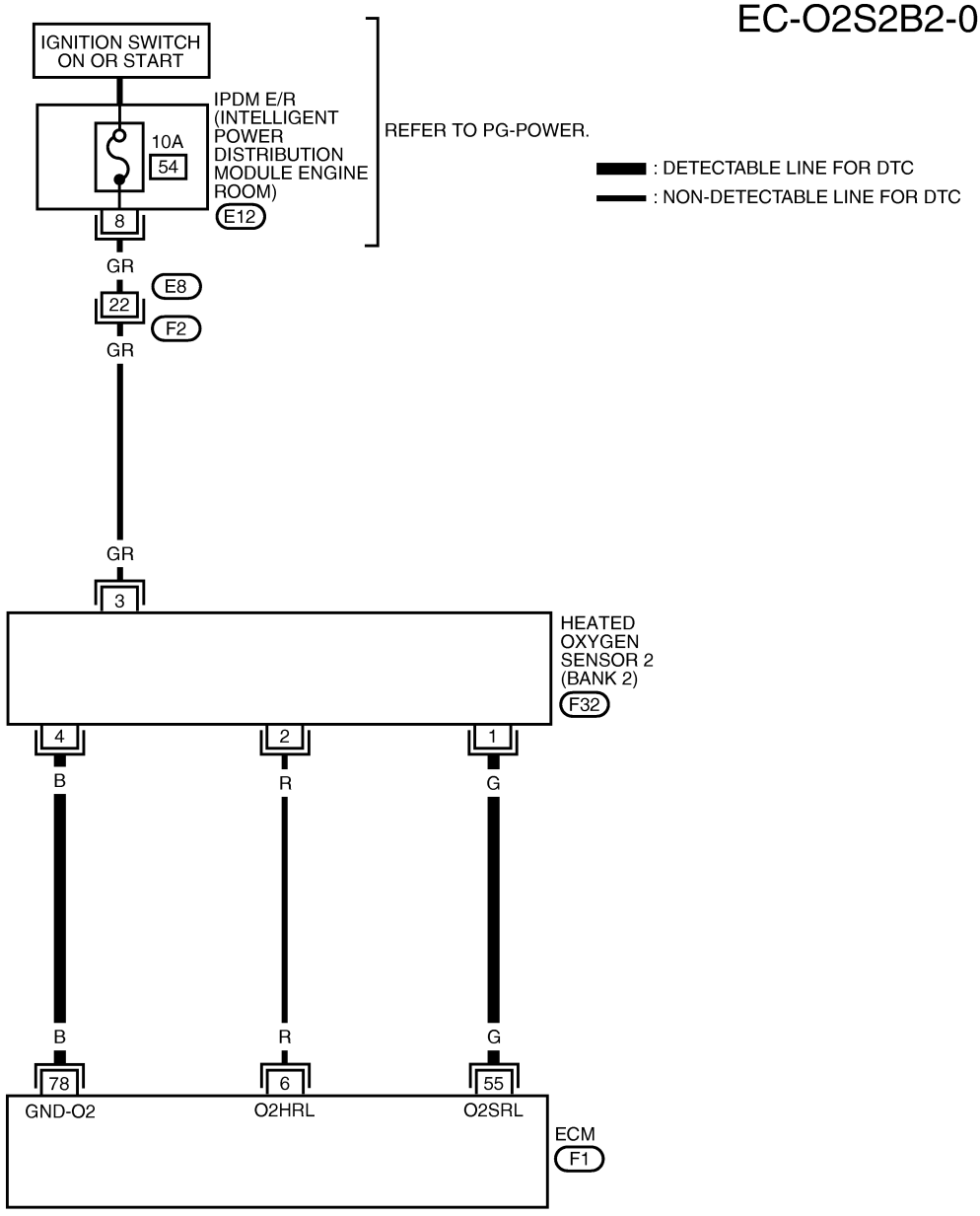
CAUTION:

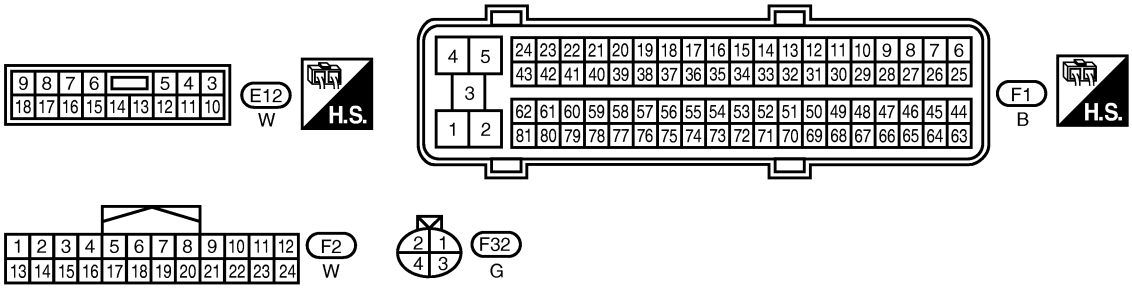
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





MBWA1284E

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

CAUTION:

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

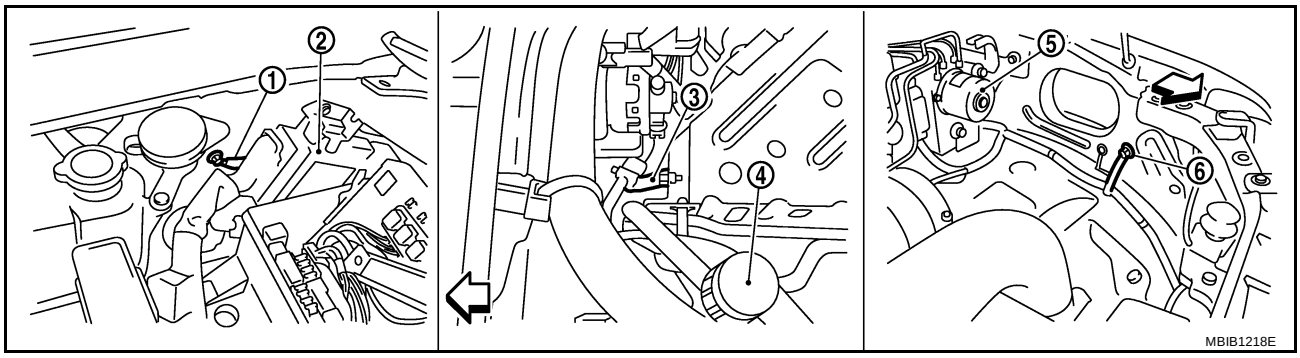
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000KC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

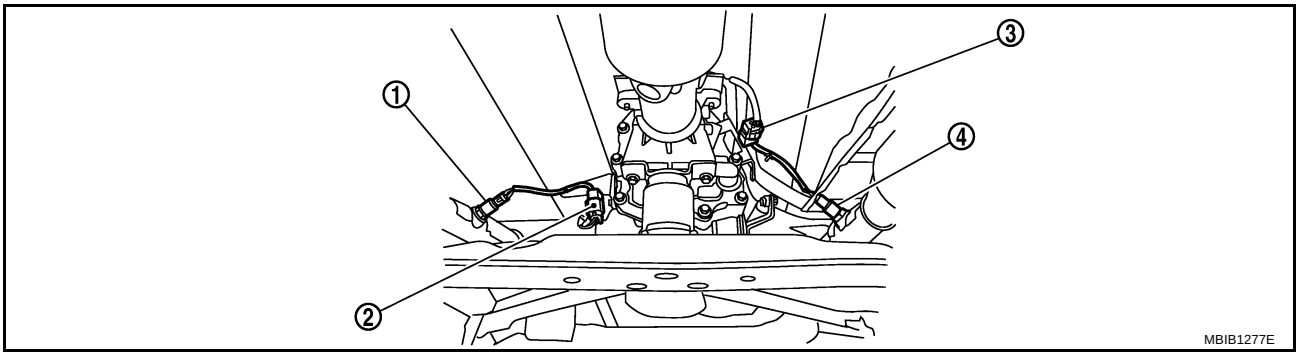
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.



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

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	1
P0158	55	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM	Sensor	
P0138	74	1	1
P0158	55	1	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-194, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

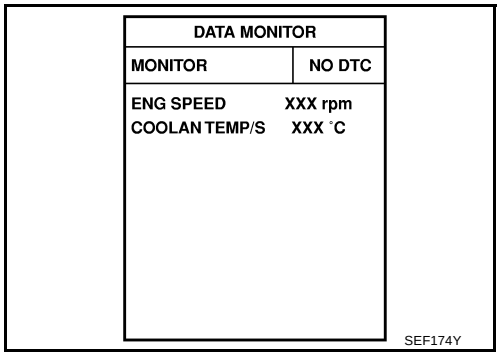
Component Inspection

GBS000KD

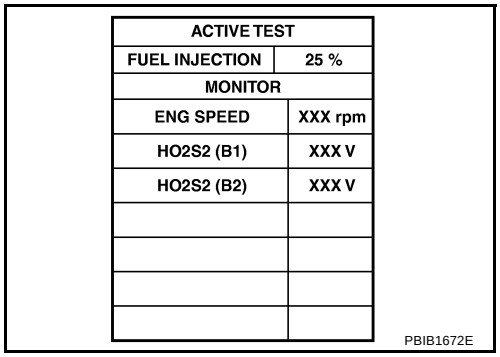
HEATED OXYGEN SENSOR 2

With CONSULT-II

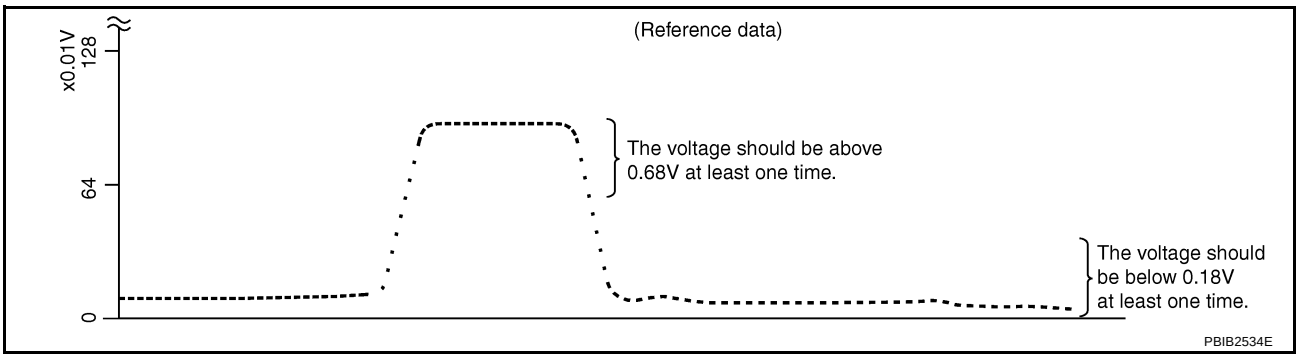
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.



6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.



7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



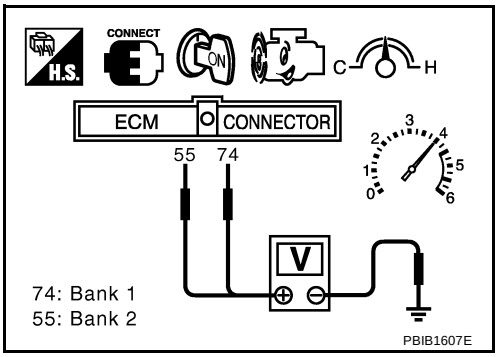
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

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

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.



8. If NG, replace heated oxygen sensor 2.

CAUTION:

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

Removal and Installation

GBS000KE

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

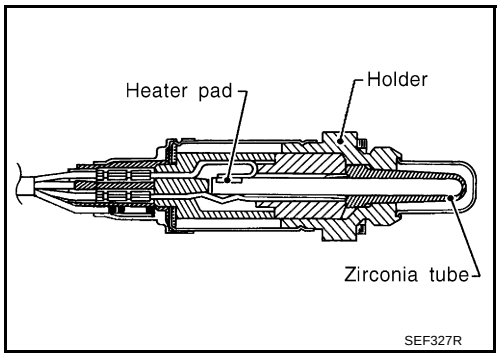
DTC P0139, P0159 HO2S2

PFP:226A0

Component Description

GBS000KF

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

GBS000KG

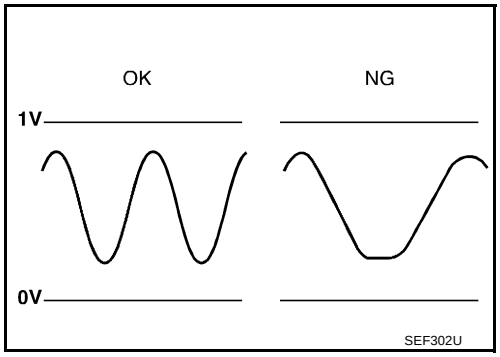
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ←→ RICH

On Board Diagnosis Logic

GBS000KH

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139 (Bank 1)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks
P0159 0159 (Bank 2)			

DTC Confirmation Procedure

GBS000KI

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 10 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.

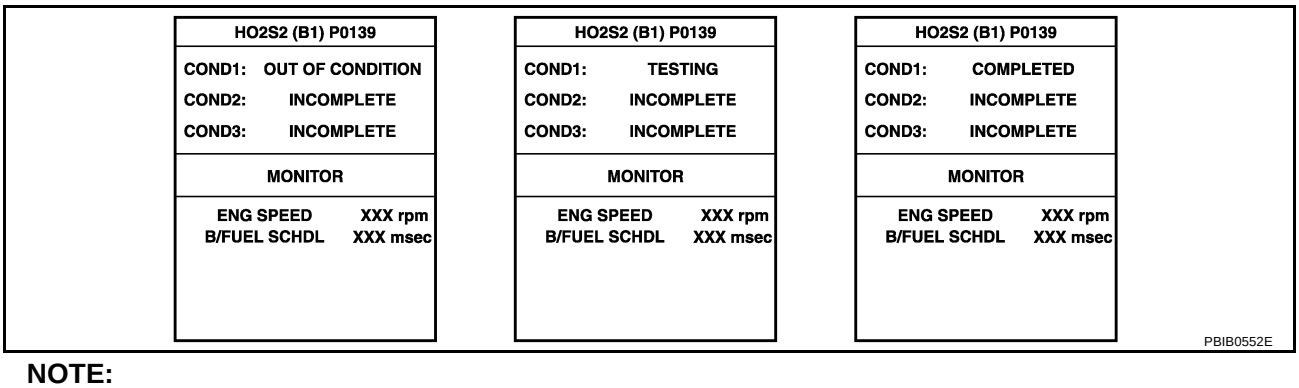
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F)

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three 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.
9. 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 "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105 °C
Shift lever	Suitable position



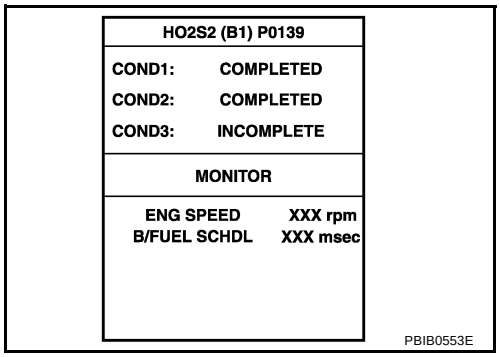
NOTE:

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

Procedure for COND2

1. While driving, release accelerator pedal completely with “OD” OFF (A/T models only) from the above condition [step 9] 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.



Procedure for COND3

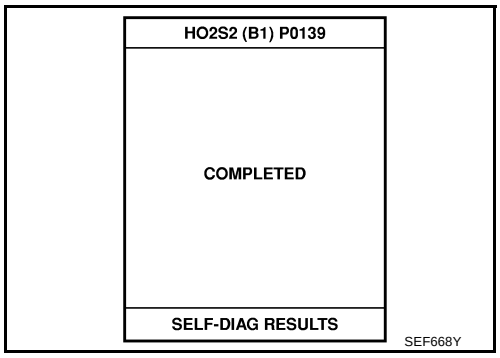
1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-202, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.

c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.

d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.



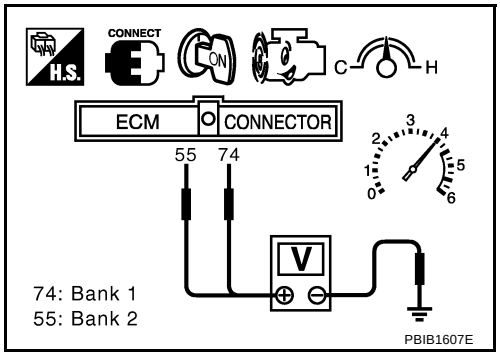
Overall Function Check

GBS000KJ

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-202, "Diagnostic Procedure" .

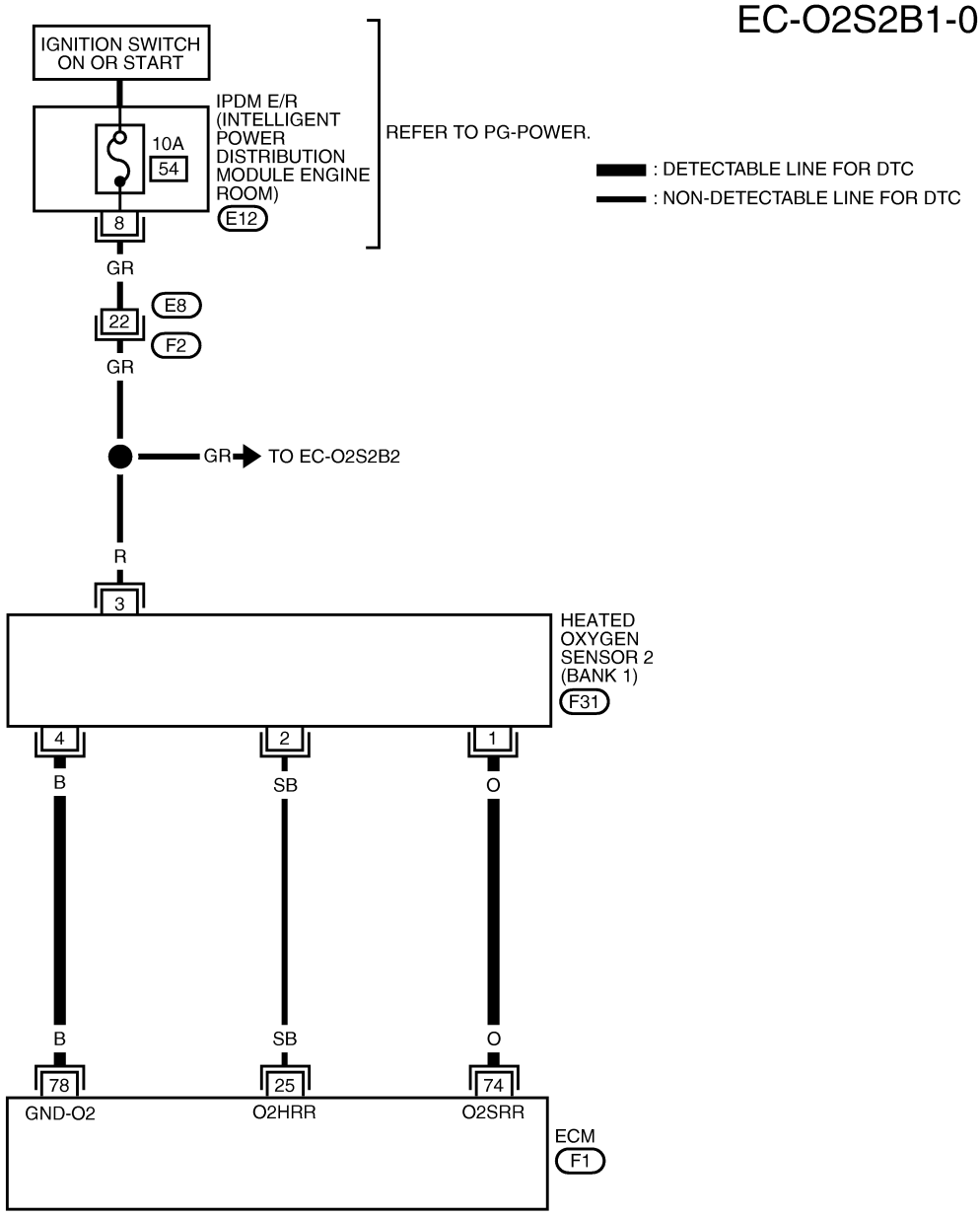


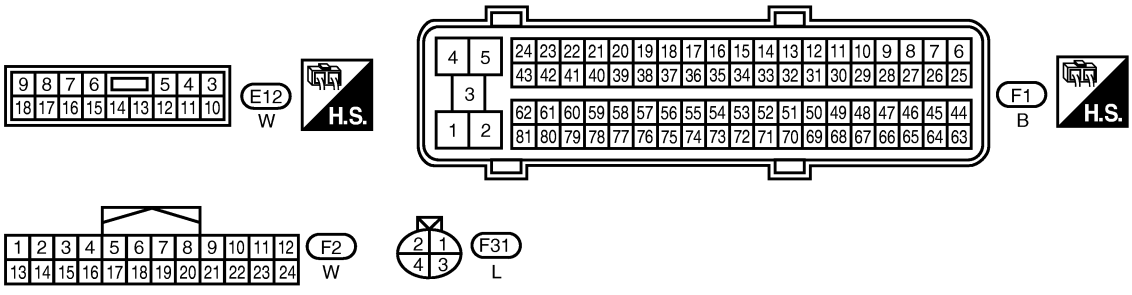
Wiring Diagram

BANK 1

GBS000KK

EC-O2S2B1-01





MBWA1283E

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

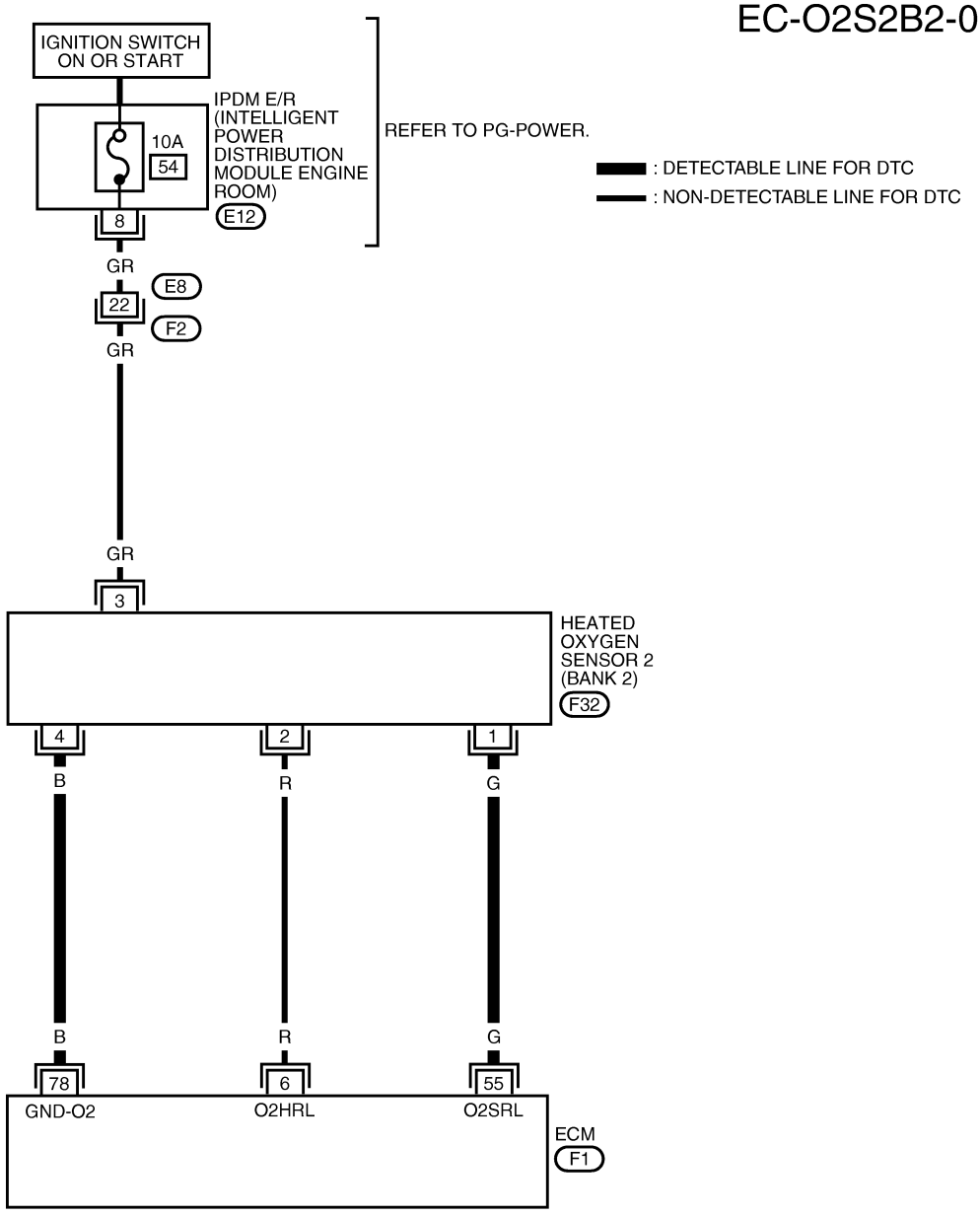
CAUTION:

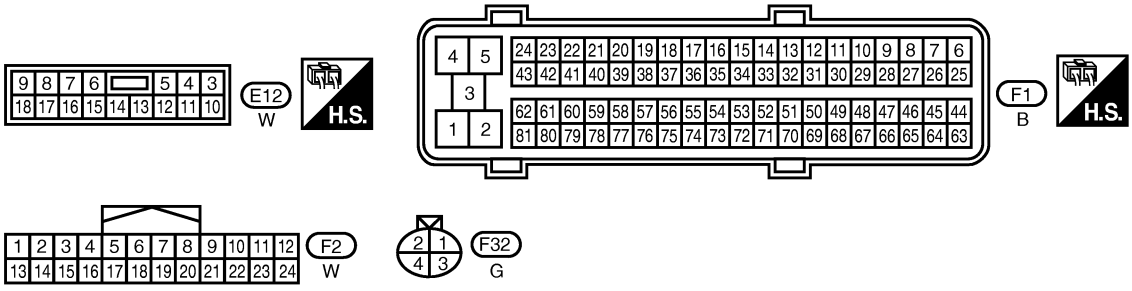
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





MBWA1284E

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

CAUTION:

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

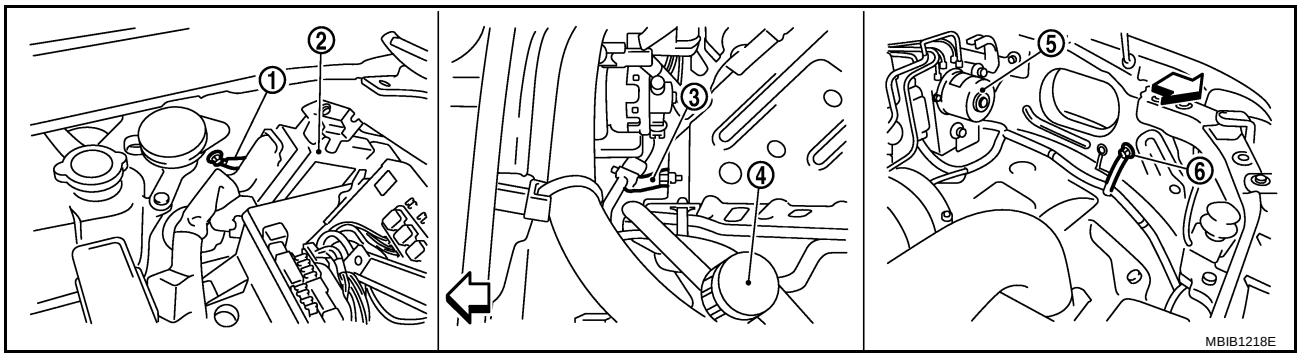
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000KL

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

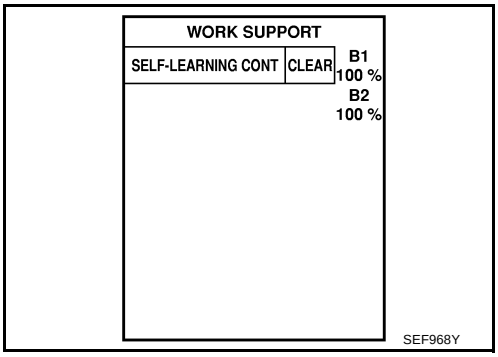
OK or NG

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

2. CLEAR THE SELF-LEARNING DATA

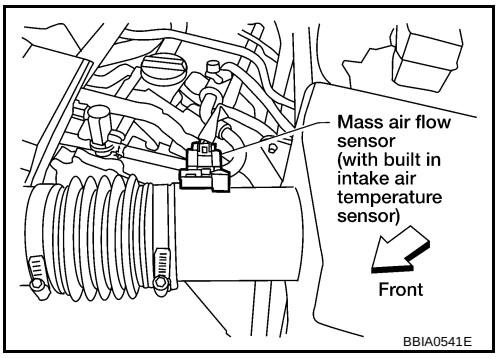
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

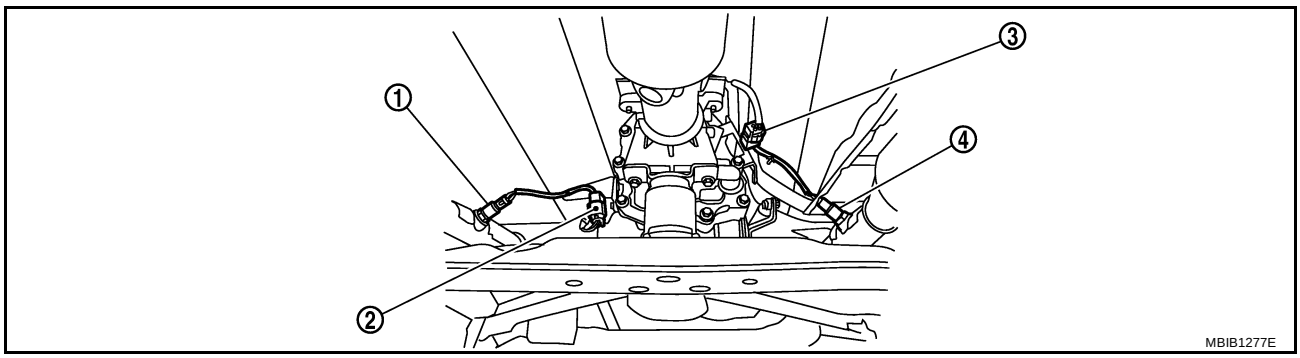


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-207 or EC-219 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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



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

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	74	1	1
P0159	55	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM	Sensor	
P0139	74	1	1
P0159	55	1	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-205, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

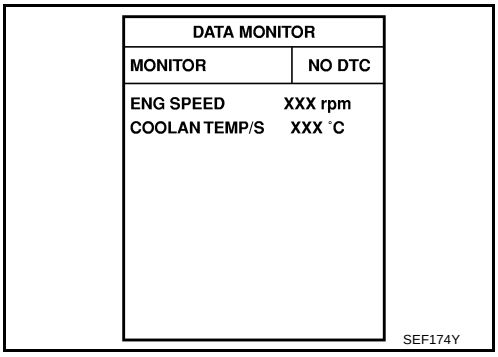
Component Inspection

GBS000KM

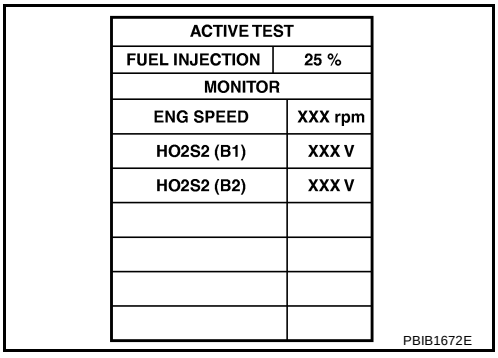
HEATED OXYGEN SENSOR 2

With CONSULT-II

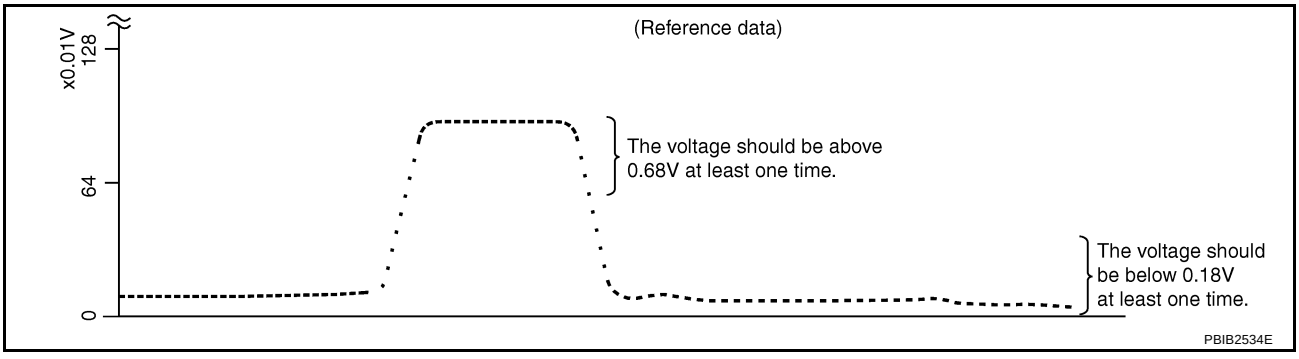
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.



6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.



7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

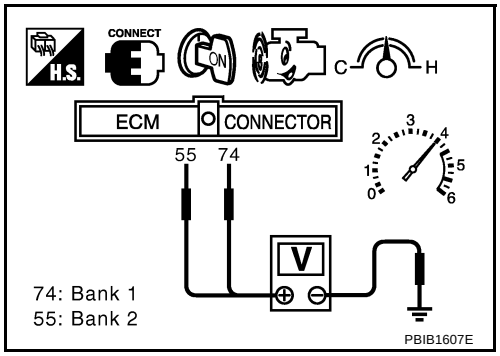
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

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

Removal and Installation

GBS000KN

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

GBS000KO

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171 (Bank 1) P0174 0174 (Bank 2)	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Air fuel ratio (A/F) sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

DTC Confirmation Procedure

GBS000KP

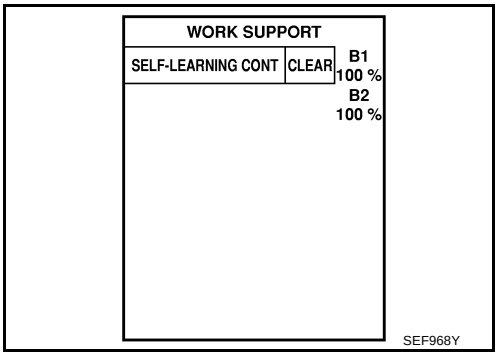
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-213, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



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

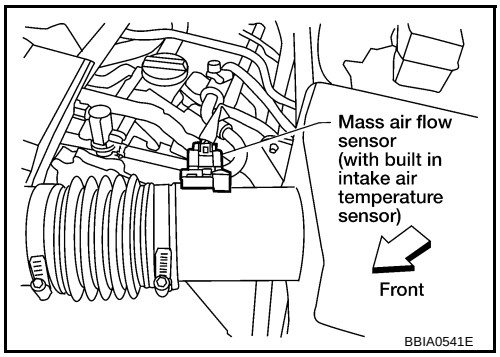
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)

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

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-213, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-213, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

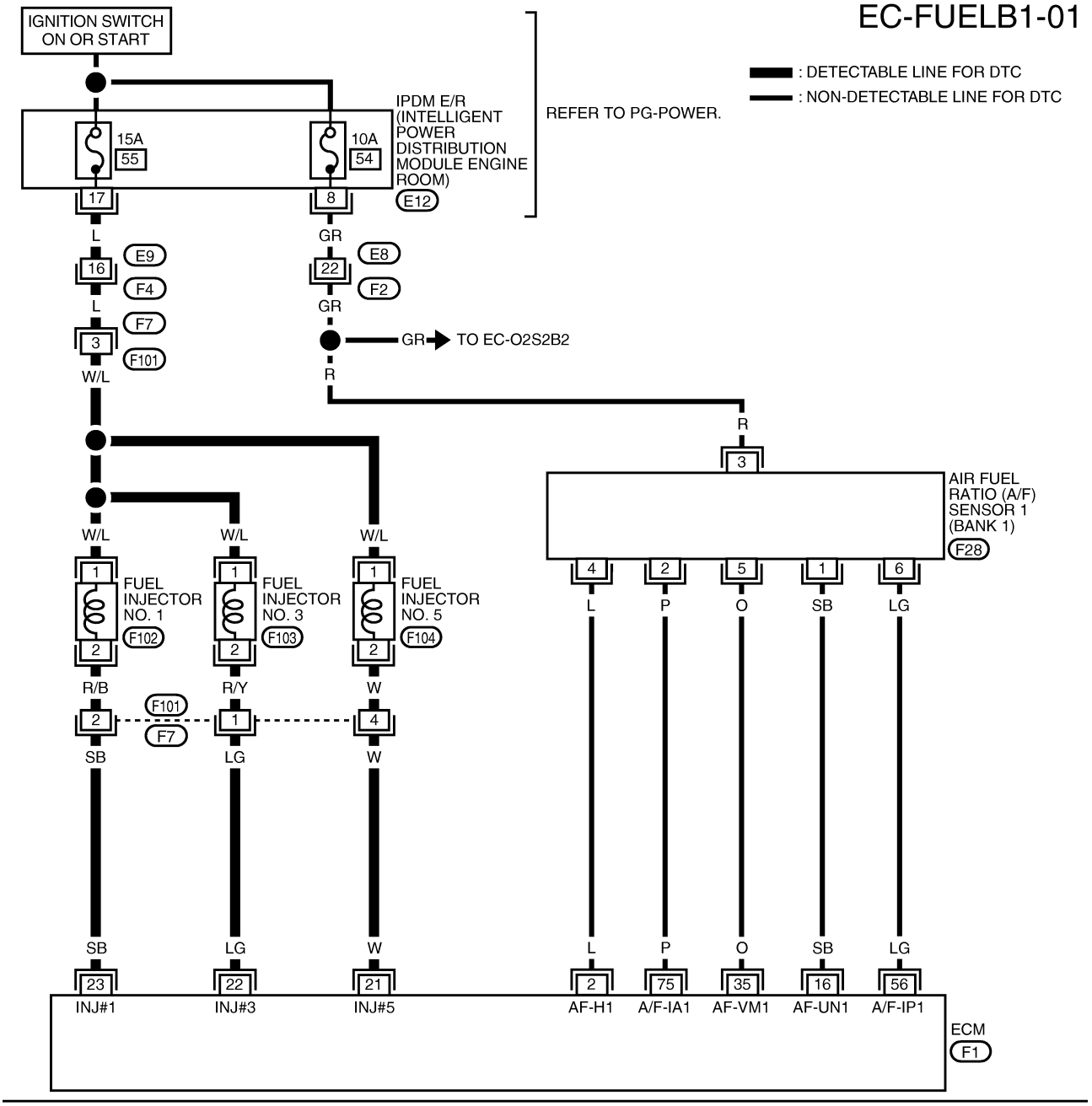
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

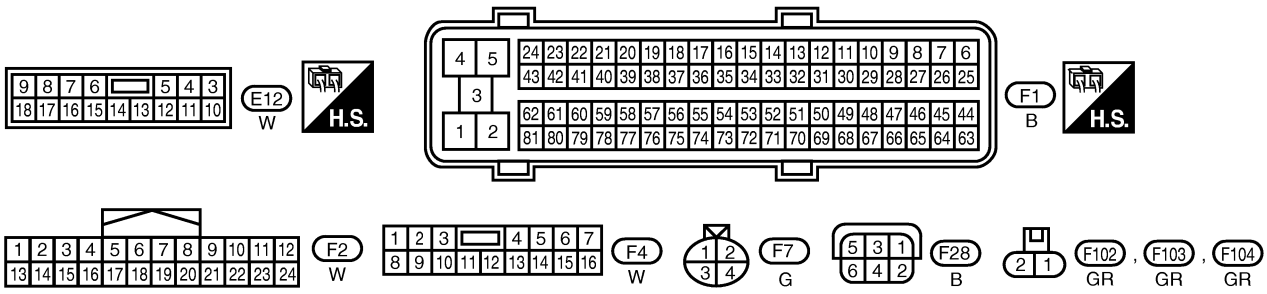
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to EC-213, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram
BANK 1

GBS000KQ



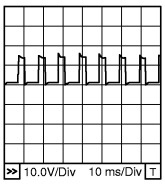
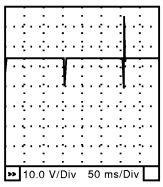
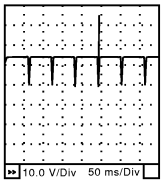


MBWA1285E

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

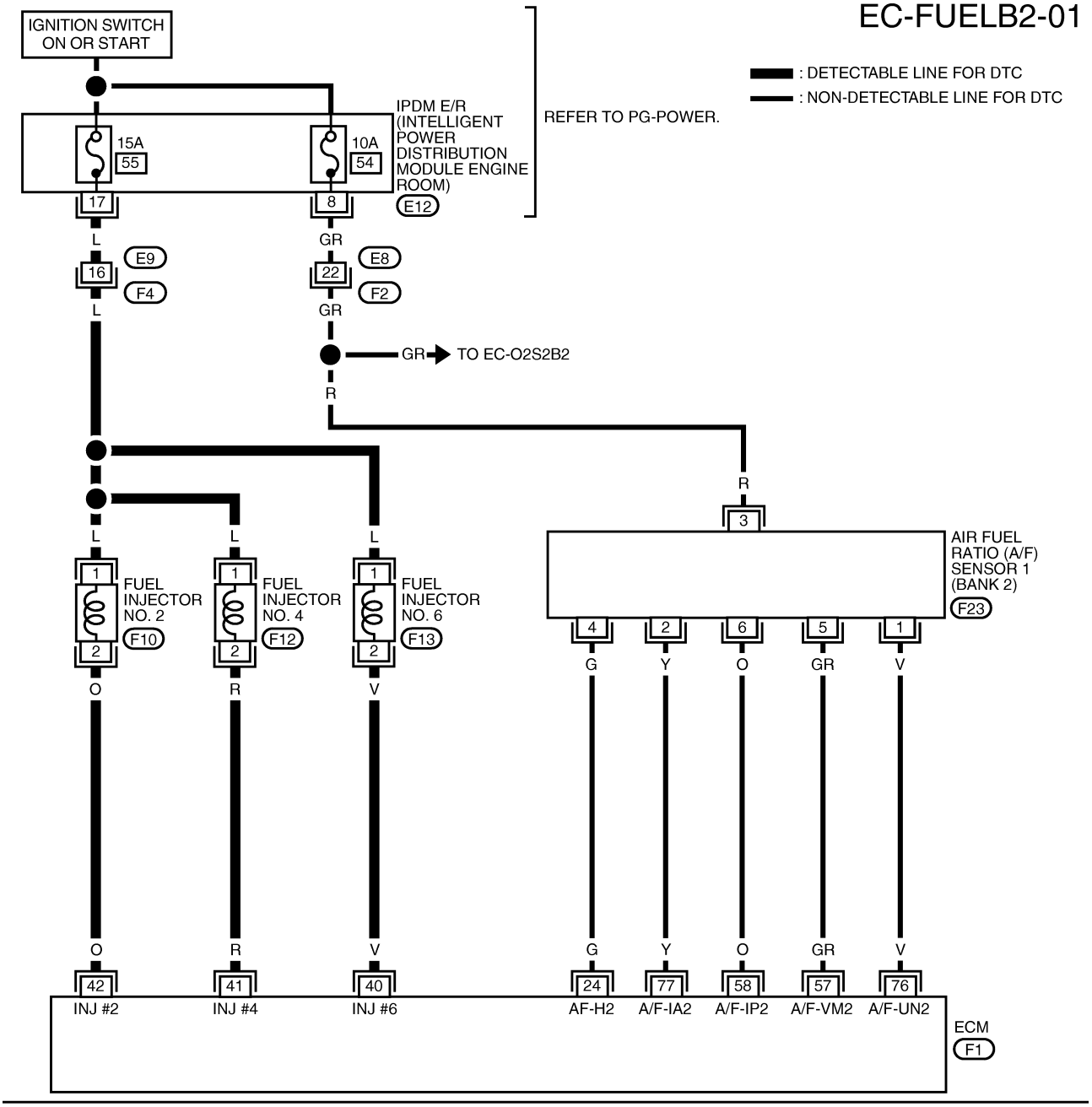
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

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

BANK 2

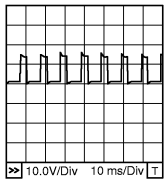
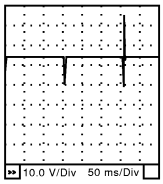
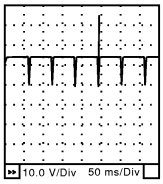


MBWA1286E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

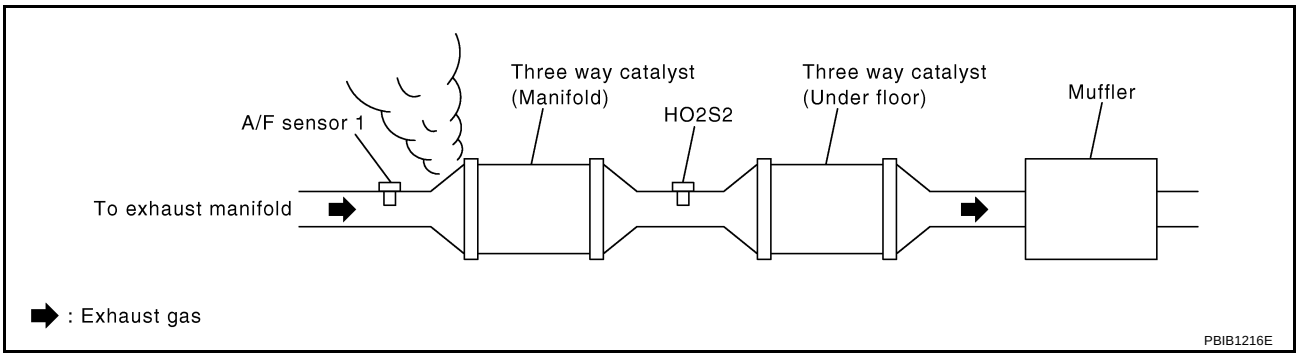
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000KR

1. CHECK EXHAUST GAS LEAK

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



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

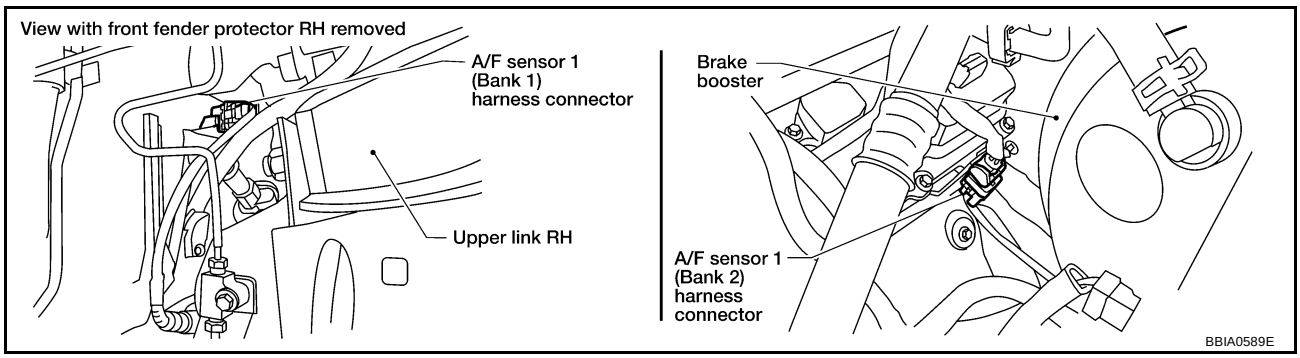
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-74, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-74, "FUEL PRESSURE CHECK" .

At idling: 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-537, "FUEL PUMP" .)
- Fuel pressure regulator (Refer to EC-74, "FUEL PRESSURE CHECK" .)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-163 .

7. CHECK MASS AIR FLOW SENSOR

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

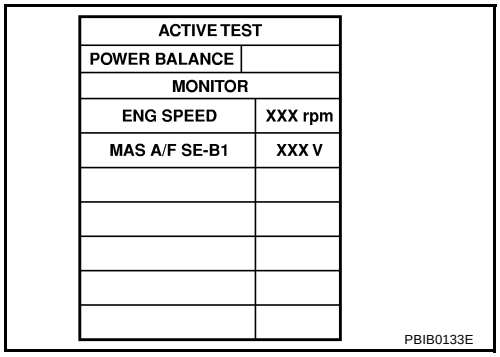
OK or NG

OK (P0171)>>GO TO 9.
OK (P0174)>>GO TO 11.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-163 .

8. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



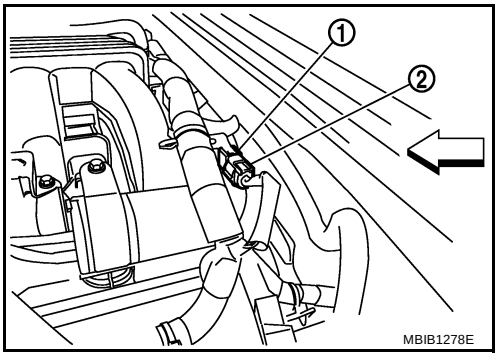
OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

9. CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-II

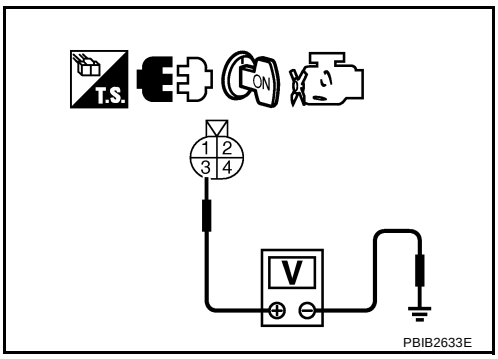
1. Stop engine.
2. Disconnect harness connector F101 (1), F7 (2).
   - ⇦: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
   Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

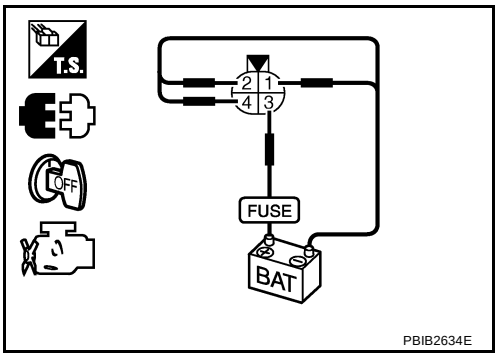
8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

10. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.



Cylinder	Harness connector F101 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4

Operating sound should exist.

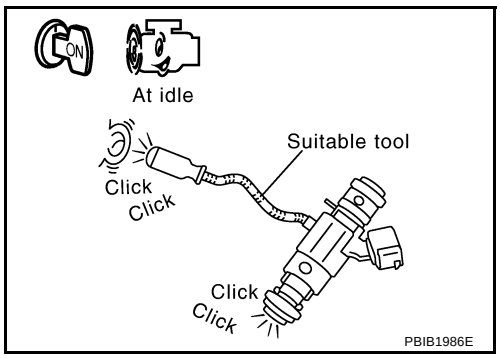
OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

11. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine.
2. Listen to fuel injectors No.2, No.4, No.6 operating sound.

Clicking noise should exist.



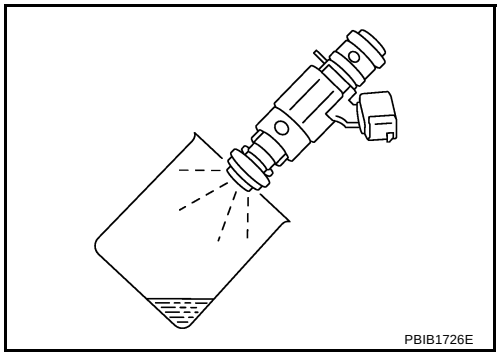
OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

12. CHECK FUEL INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. For DTC P0171, reconnect fuel injector harness connectors on bank 1.
   For DTC P0174, reconnect fuel injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each fuel injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.

Fuel should be sprayed evenly for each fuel injector.



OK or NG

OK >> GO TO 13.
NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

GBS000KS

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172 (Bank 1) P0175 0175 (Bank 2)	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Air fuel ratio (A/F) sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

DTC Confirmation Procedure

GBS000KT

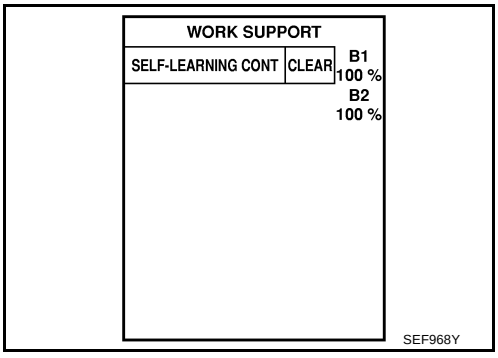
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-225, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



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

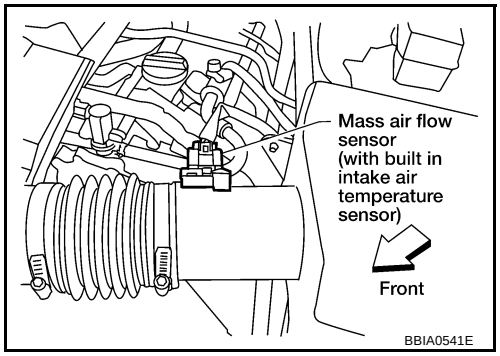
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

8. Crank engine while depressing accelerator pedal.
   If engine starts, go to EC-225, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service $03 with GST. Make sure DTC P0102 is detected.
6. Select Service $04 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select Service $07 with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-225, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

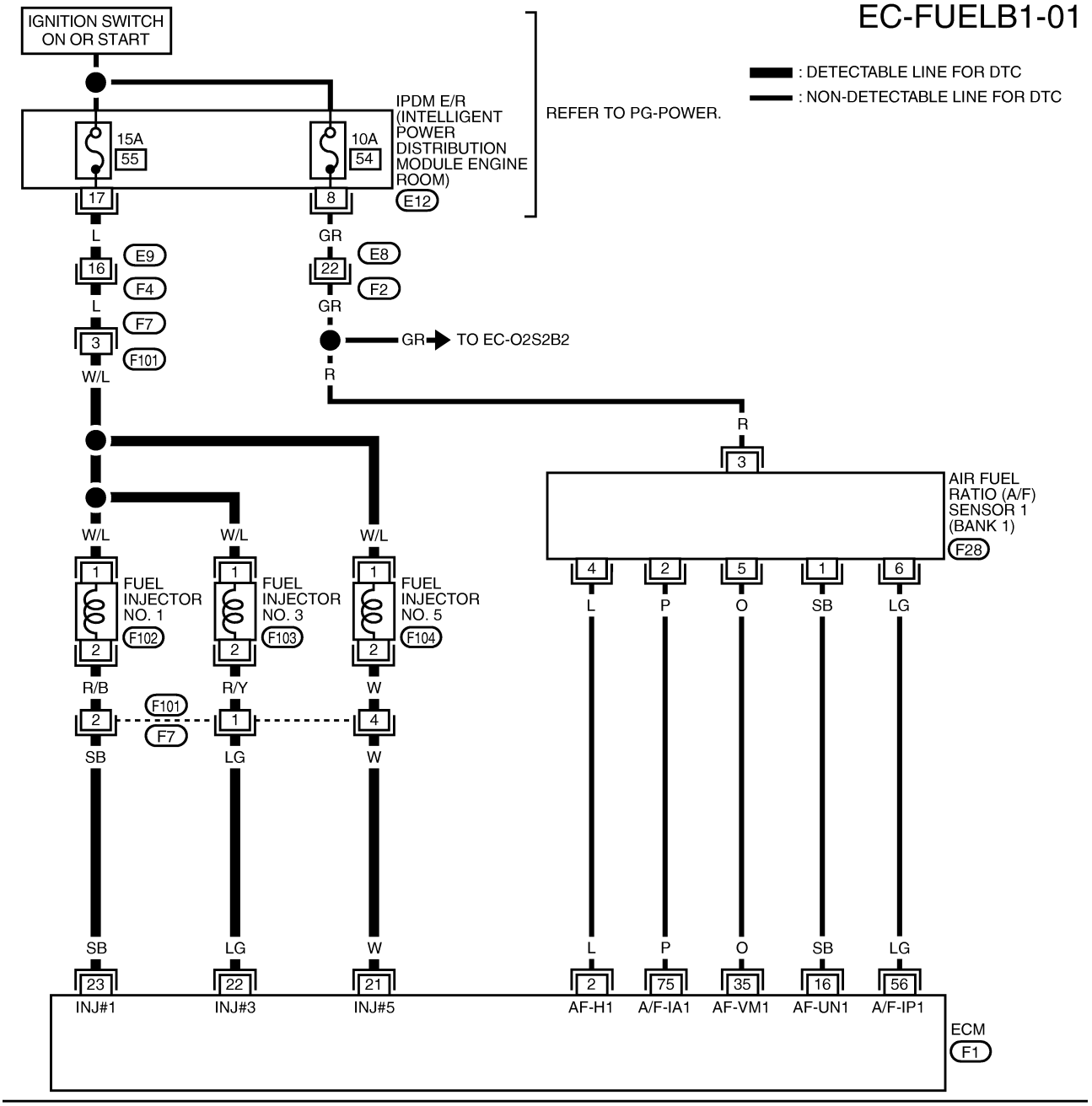
   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

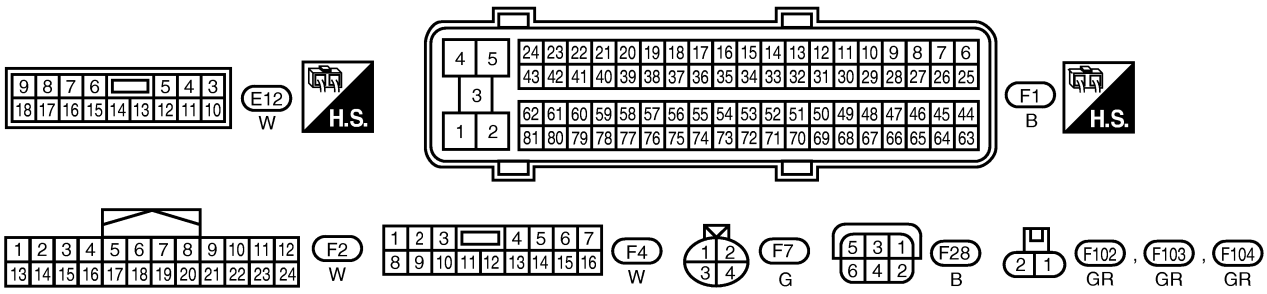
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-225, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram
BANK 1

GBS000KU



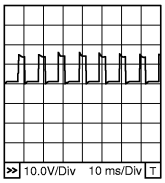
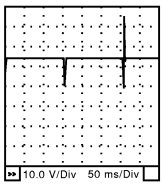
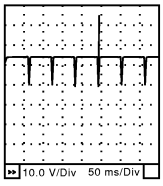


MBWA1285E

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

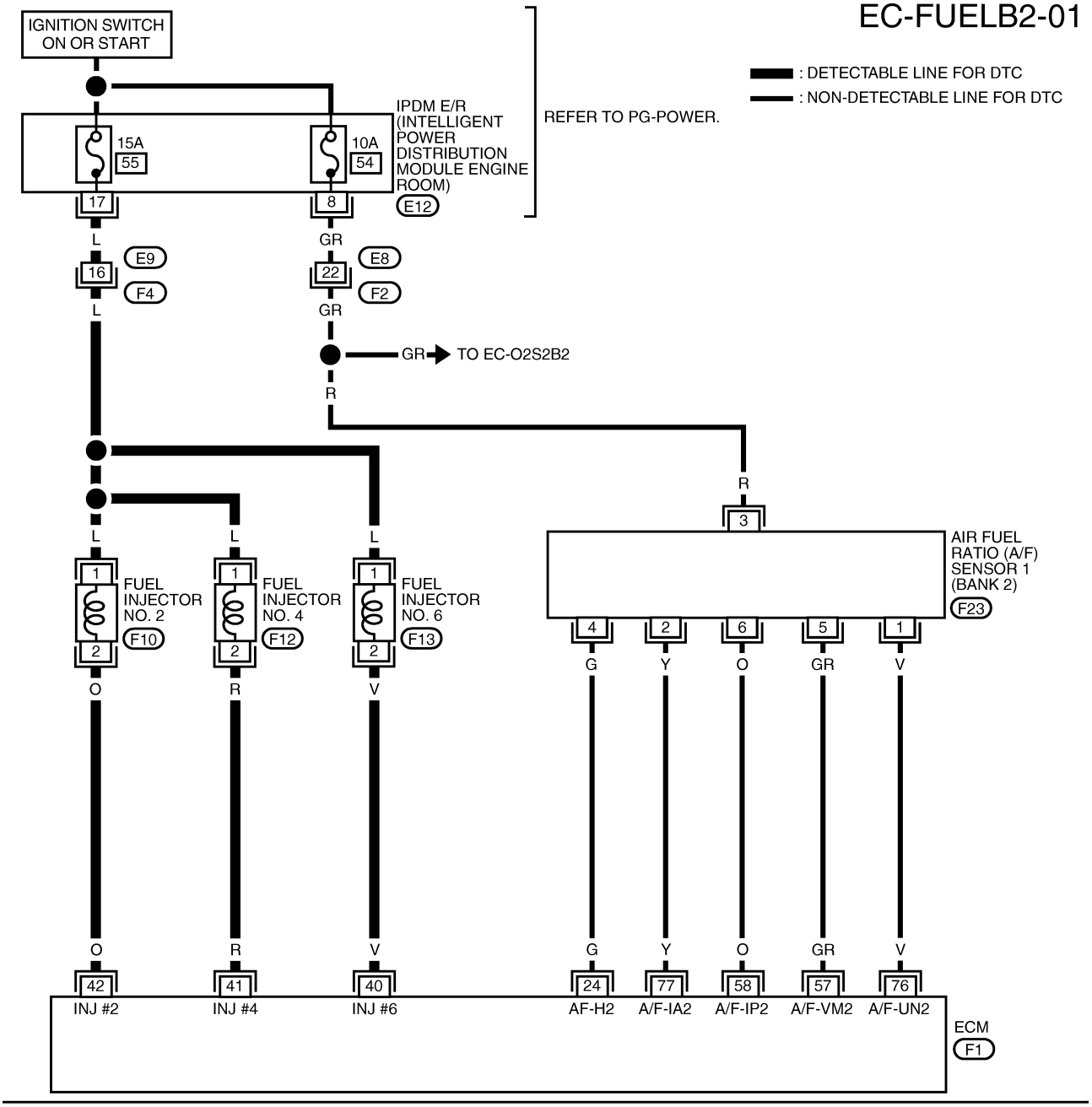
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

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

BANK 2

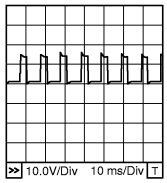
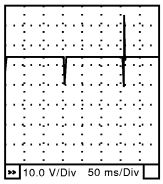
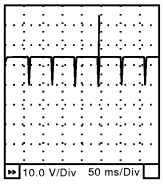


MBWA1286E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

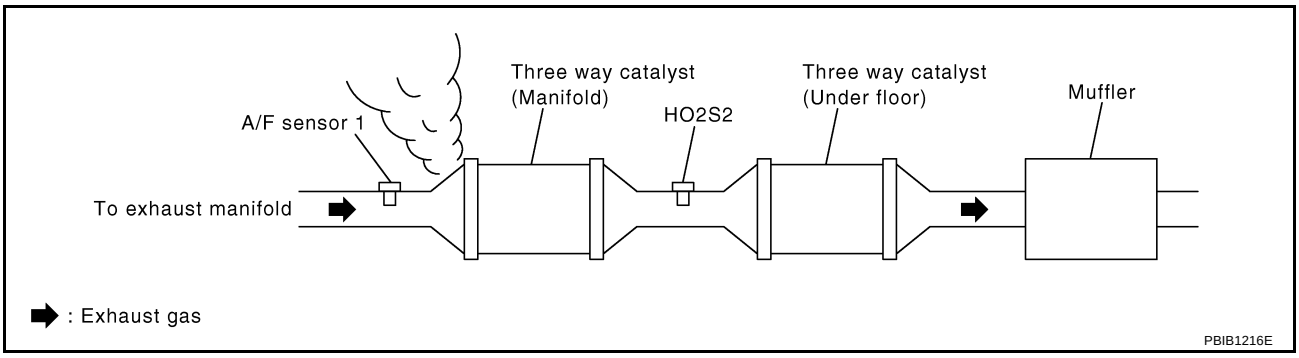
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000KV

1. CHECK EXHAUST GAS LEAK

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



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

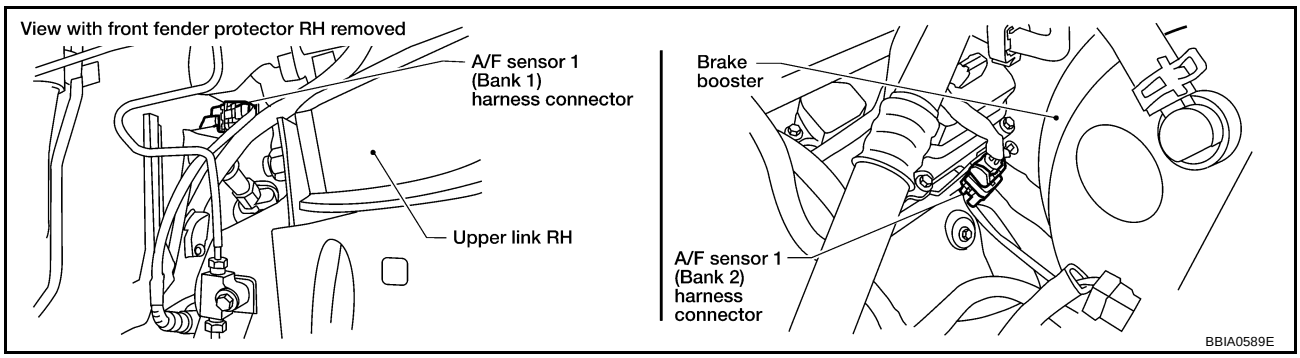
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-74, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-74, "FUEL PRESSURE CHECK" .

At idling: 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to, EC-537, "FUEL PUMP" .)
- Fuel pressure regulator (Refer to EC-74, "FUEL PRESSURE CHECK" .)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-163 .

7. CHECK MASS AIR FLOW SENSOR

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

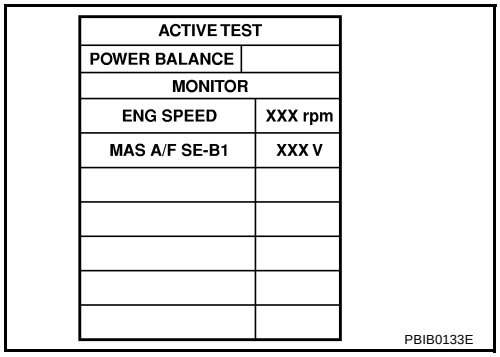
OK or NG

OK (P0172)>>GO TO 9.
OK (P0175)>>GO TO 11.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-163 .

8. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



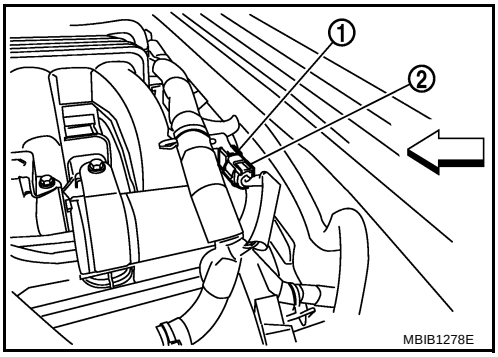
OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

9. CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-II

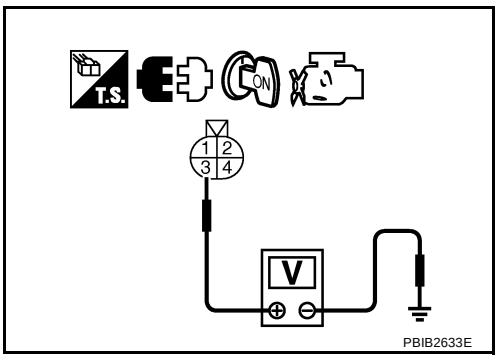
1. Stop engine.
2. Disconnect harness connector F101 (1), F7 (2).
   - ⇦: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
   Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

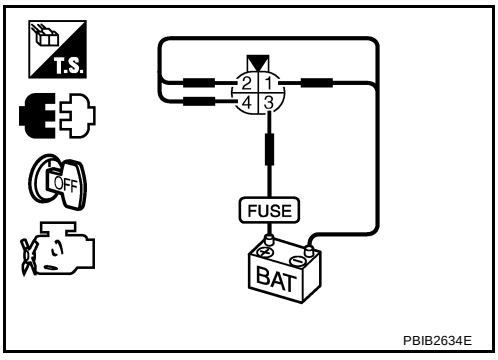
8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

10. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.



Cylinder	Harness connector F101 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4

Operating sound should exist.

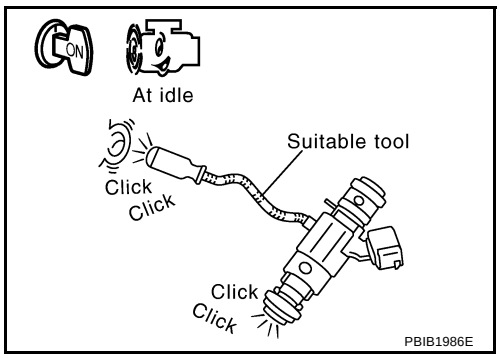
OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

11. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine.
2. Listen to fuel injectors No.2, No.4, No.6 operating sound.

Clicking noise should exist.



OK or NG

OK >> GO TO 12.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

12. CHECK FUEL INJECTOR

1. Remove fuel tube assembly. Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 13.
NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

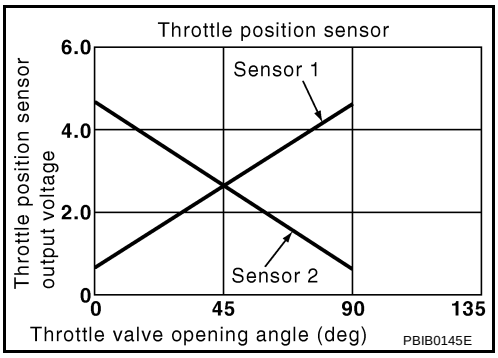
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

GBS000KW

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



CONSULT-II Reference Value in Data Monitor Mode

GBS000KX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS000KY

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor. (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

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

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

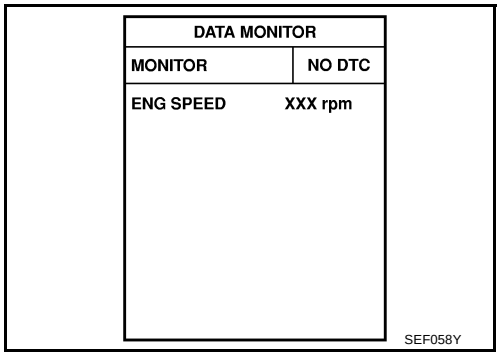
DTC Confirmation Procedure

GBS000KZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-235, "Diagnostic Procedure" .



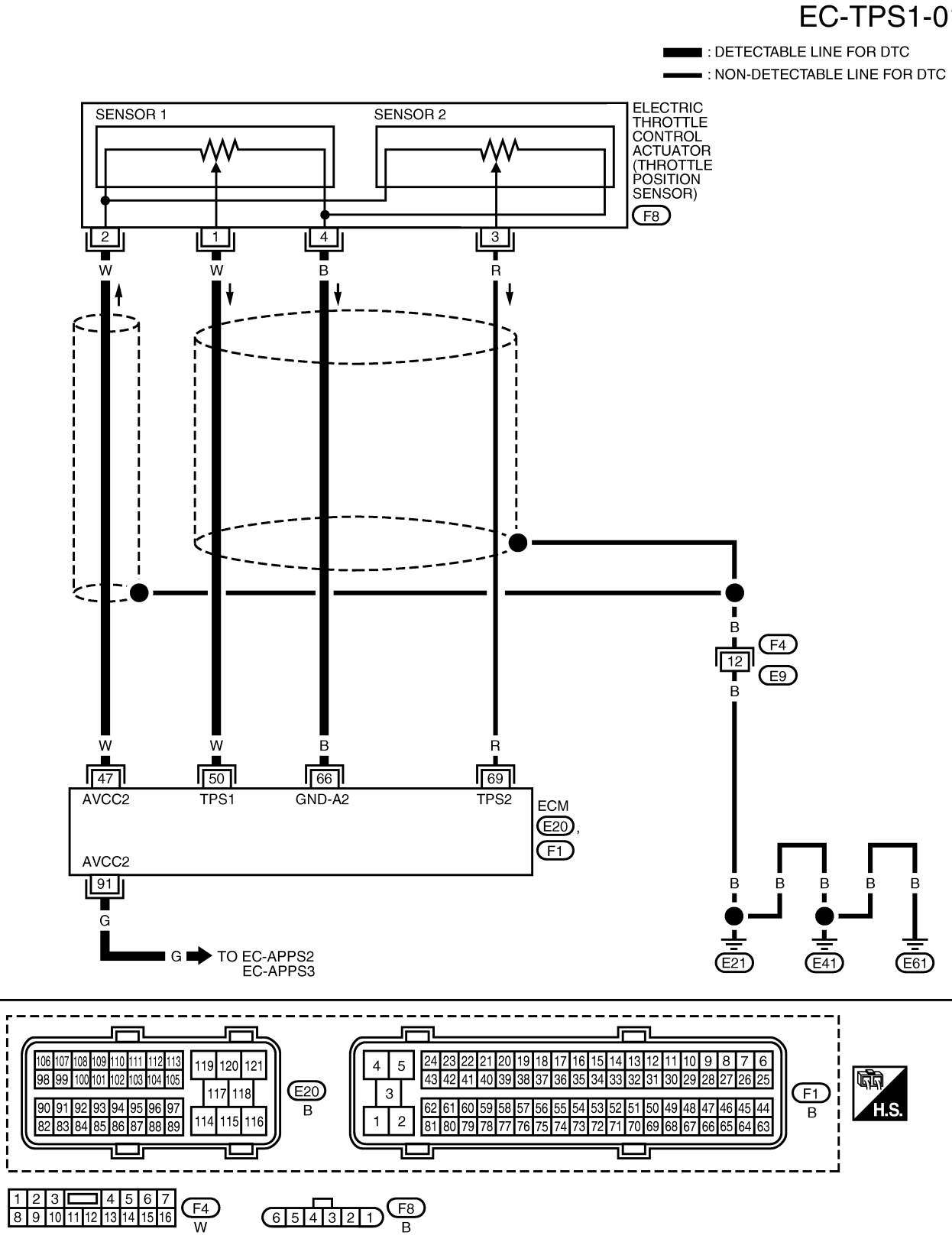
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000L0

EC-TPS1-01



MBWA1288E

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

CAUTION:

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

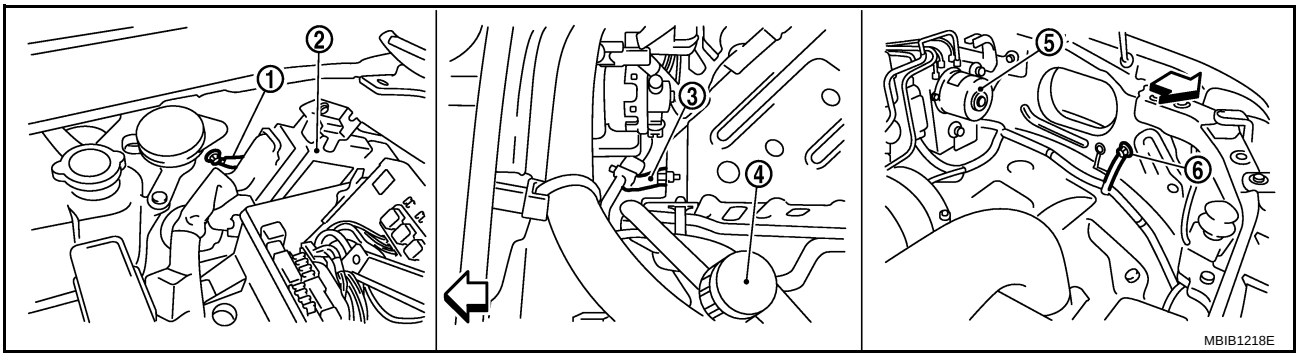
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More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

Diagnostic Procedure

GBS000L1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

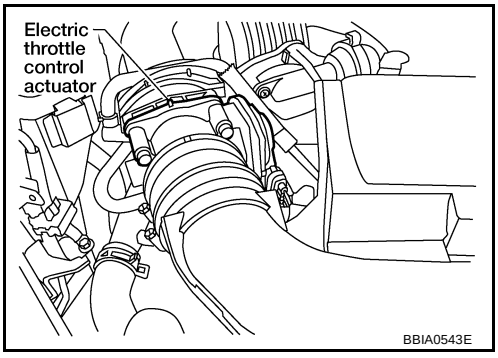
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

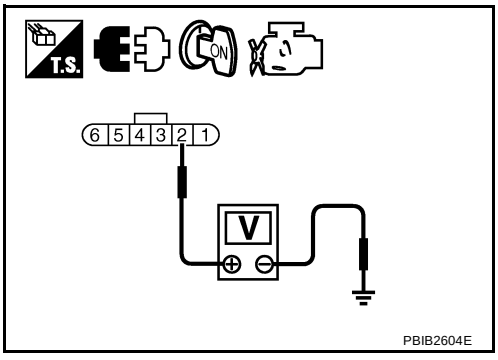
2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

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



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

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

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-233
91	APP sensor terminal 1	EC-486

OK or NG

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

5. CHECK APP SENSOR

Refer to EC-490, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-237, "Component Inspection" .

OK or NG

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

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

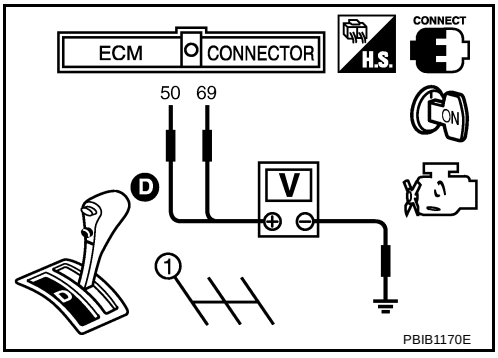
Component Inspection

GBS000L2

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

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



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-71, "Throttle Valve Closed Position Learning" .
8. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000L3

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

GBS000L4

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The fuel injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Signal plate ● Air fuel ratio (A/F) sensor 1 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305 0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306 0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	

DTC Confirmation Procedure

GBS000L5

CAUTION:

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

NOTE:

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

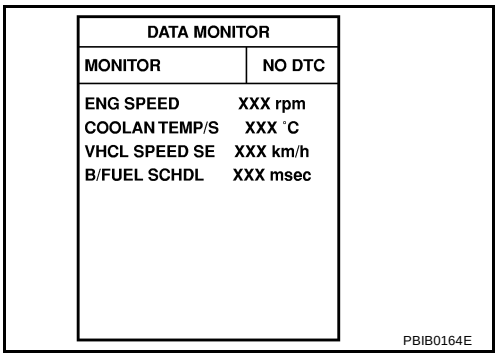
WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-239, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

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

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



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

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

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

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

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

GBS000L6

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

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

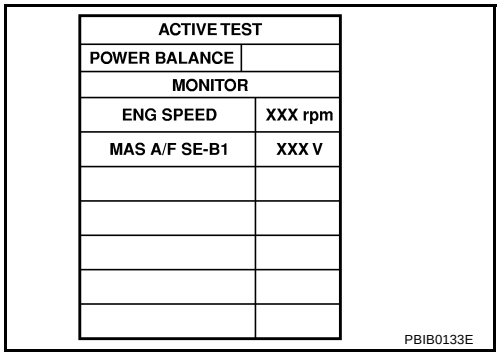
OK or NG

OK (With CONSULT-II)>>GO TO 3.
OK (Without CONSULT-II)>>GO TO 4.
NG >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?



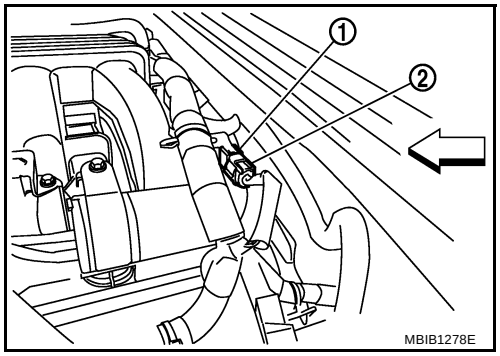
Yes or No

Yes >> GO TO 4.
No >> GO TO 10.

4. CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-II

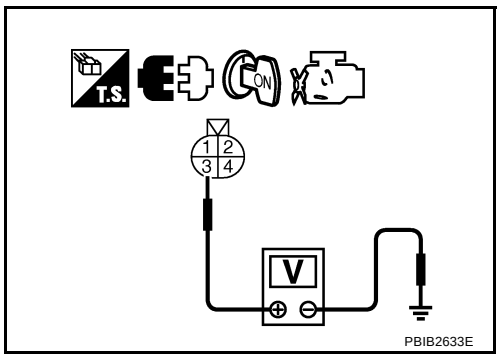
1. Turn ignition switch OFF.
2. Disconnect harness connector F101 (1), F7 (2).
   - ⇦: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
   Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

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

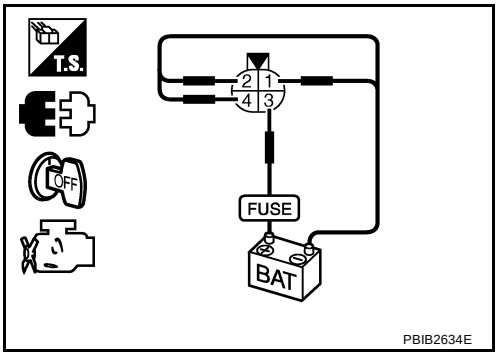
OK or NG

OK >> GO TO 5.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

5. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4



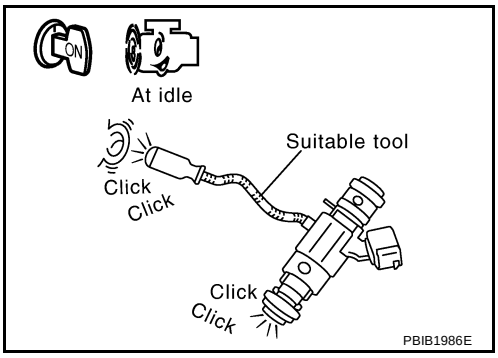
Operating sound should exist.

OK or NG

OK >> GO TO 6.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

6. CHECK FUNCTION OF FUEL INJECTOR-III

1. Reconnect all harness connector disconnected.
2. Start engine.
3. Listen to fuel injectors No. 2, No. 4, No.6 operating sound.



Clicking noise should exist.

OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-530 .

7. CHECK FUNCTION OF IGNITION COIL-I

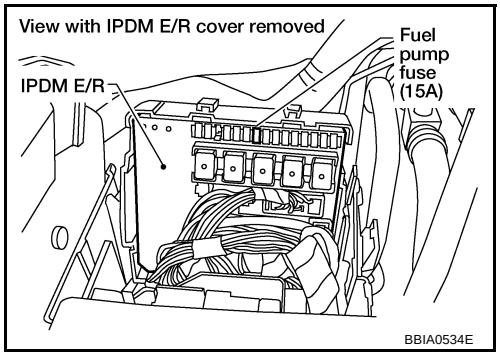
CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

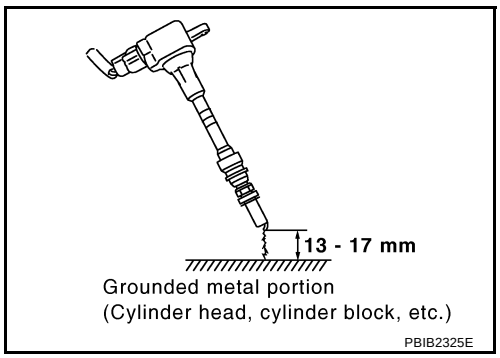
1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   NOTE:

   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.



8. Crank engine for five seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 11.
NG >> GO TO 8.

8. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

OK >> GO TO 9.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-543, "IGNITION SIGNAL" .

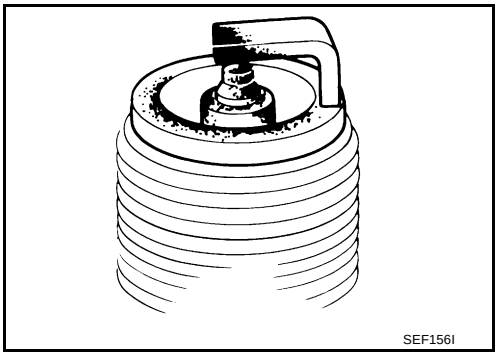
9. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-23, "Changing Spark Plugs (Platinum-Tipped Type)" .

NG >> 1. Repair or clean spark plug.
2. GO TO 10.



10. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**

NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-23, "Changing Spark Plugs (Platinum-Tipped Type)" .

11. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-91, "CHECKING COMPRESSION PRESSURE" .

OK or NG

OK >> GO TO 12.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

12. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-74, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-74, "FUEL PRESSURE CHECK" .

At idle: Approx. 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 14.

NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-537, "FUEL PUMP" .)
- Fuel pressure regulator (Refer to EC-74, "FUEL PRESSURE CHECK" .)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

14. CHECK IGNITION TIMING

Check the following items. Refer to EC-65, "Basic Inspection" .

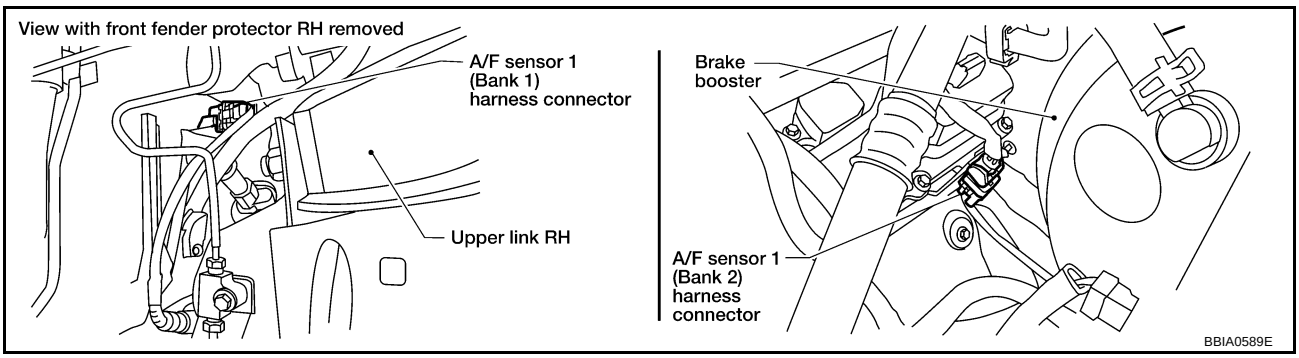
Items	Specifications
Target idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 15.
NG >> Follow the EC-65, "Basic Inspection" .

15. CHECK A/F SENSOR 1 INPUT SIGNAL

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.

16. CHECK A/F SENSOR 1 HEATER

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

18. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in Service $01 with GST.

2.0 - 6.0 g·m/sec: at idling

7.0 - 20.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 19.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-163 .

19. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-85, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 20.

NG >> Repair or replace.

20. 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-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 21.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0327, P0328, P0332, P0333 KS

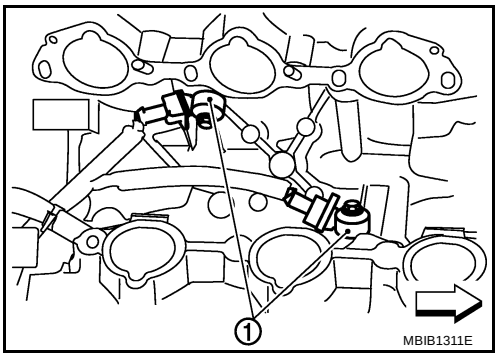
PFP:22060

Component Description

GBS000L7

The knock sensor (1) 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.

- ⇦: Vehicle front



On Board Diagnosis Logic

GBS000L8

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (bank 1) P0332 0332 (bank 2)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328 (bank 1) P0333 0333 (bank 2)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

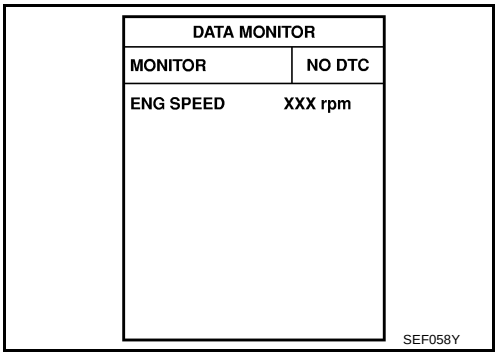
GBS000L9

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-249, "Diagnostic Procedure"
.



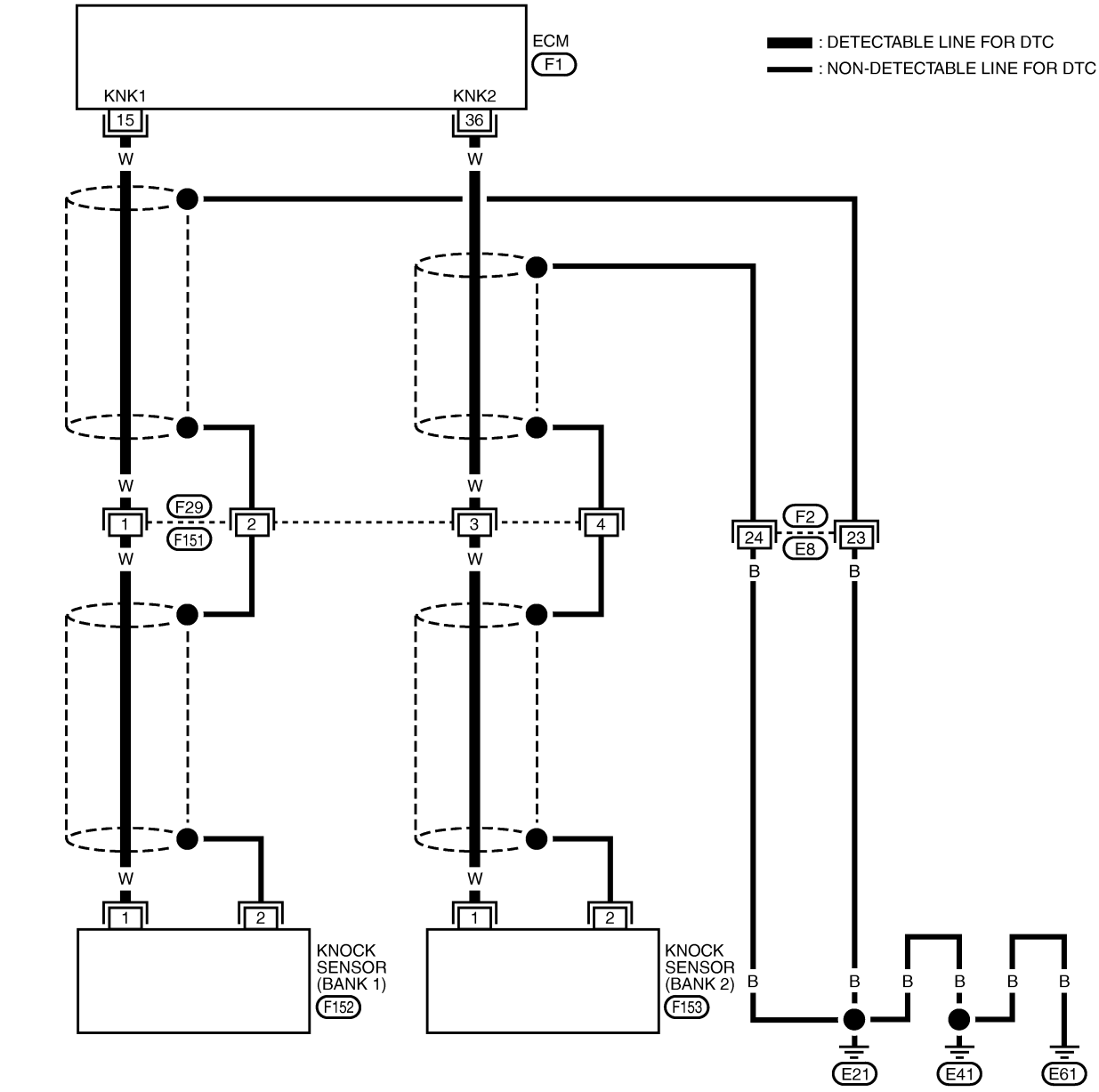
WITH GST

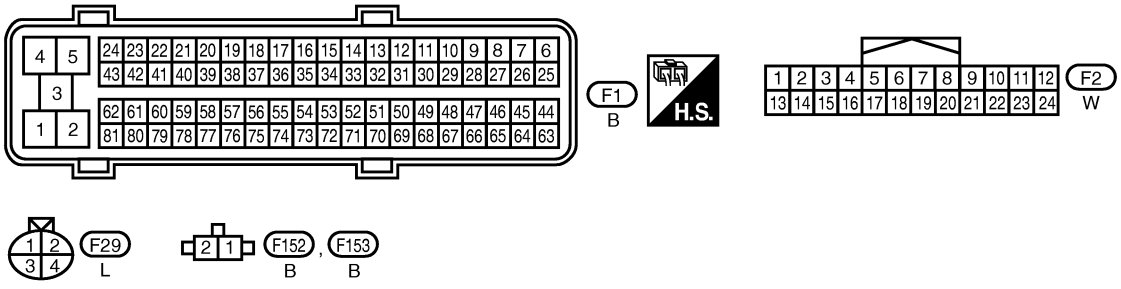
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000LA

EC-KS-01





MBWA1289E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W W	Knock sensor (Bank 1) Knock sensor (Bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

GBS000LB

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

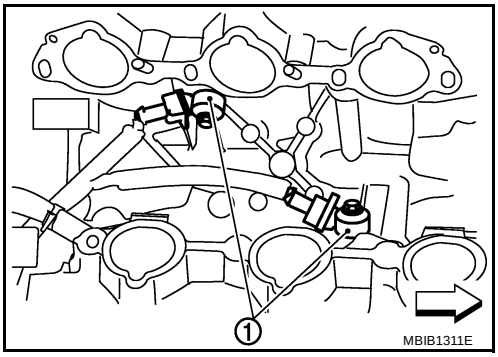
1. Disconnect knock sensor (1) harness connector.

– ⇦: Vehicle front

2. Check harness continuity between ECM terminal 15 and knock sensor (bank1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness for open or short between ECM and knock sensor

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

4. CHECK KNOCK SENSOR

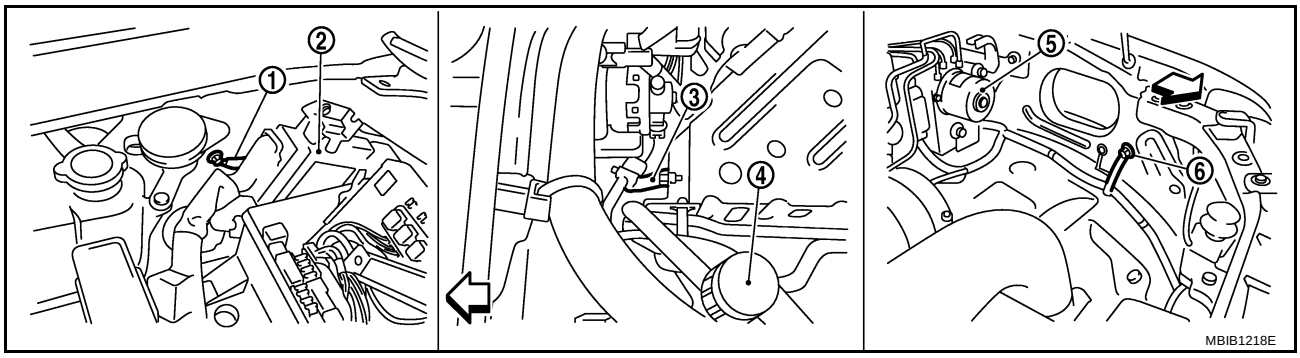
Refer to EC-251, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

5. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check for short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness connectors F2, E8
- Harness for open or short between knock sensor and ground

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

8. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000LC

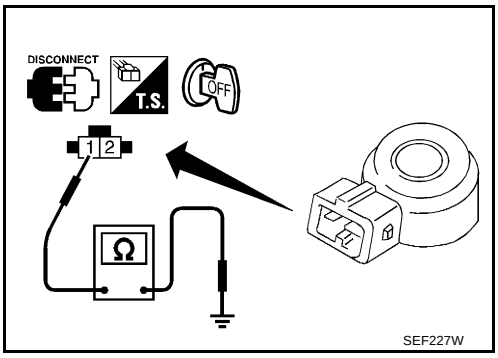
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

GBS000LD

KNOCK SENSOR

Refer to EM-107, "CYLINDER BLOCK" .

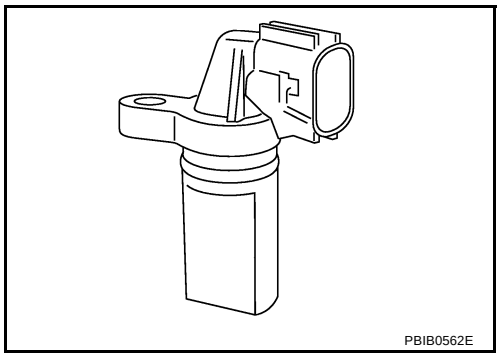
DTC P0335 CKP SENSOR (POS)

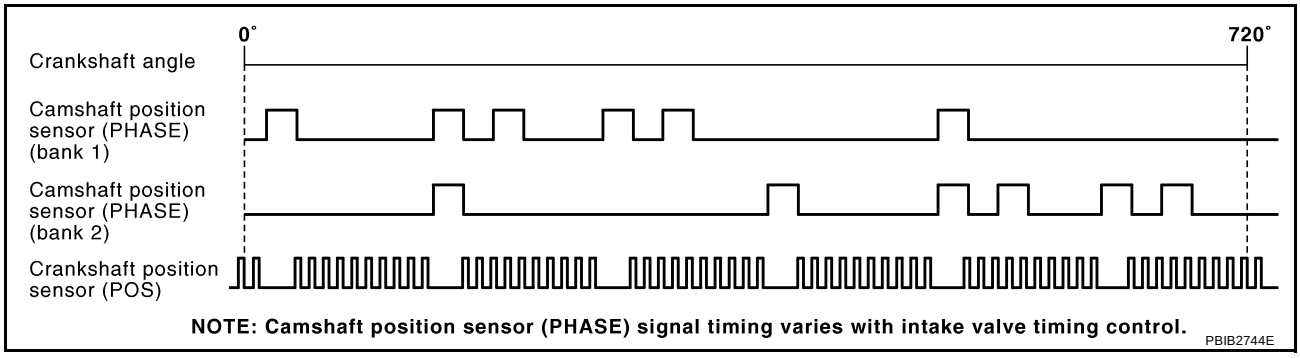
PFP:23731

Component Description

GBS000LE

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIB0562E



CONSULT-II Reference Value in Data Monitor Mode

GBS000LF

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

GBS000LG

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (POS) ● Signal plate

DTC Confirmation Procedure

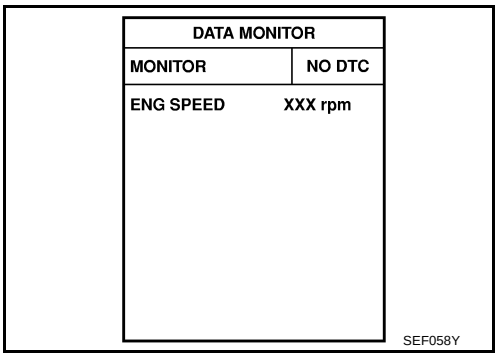
GBS000LH

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

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

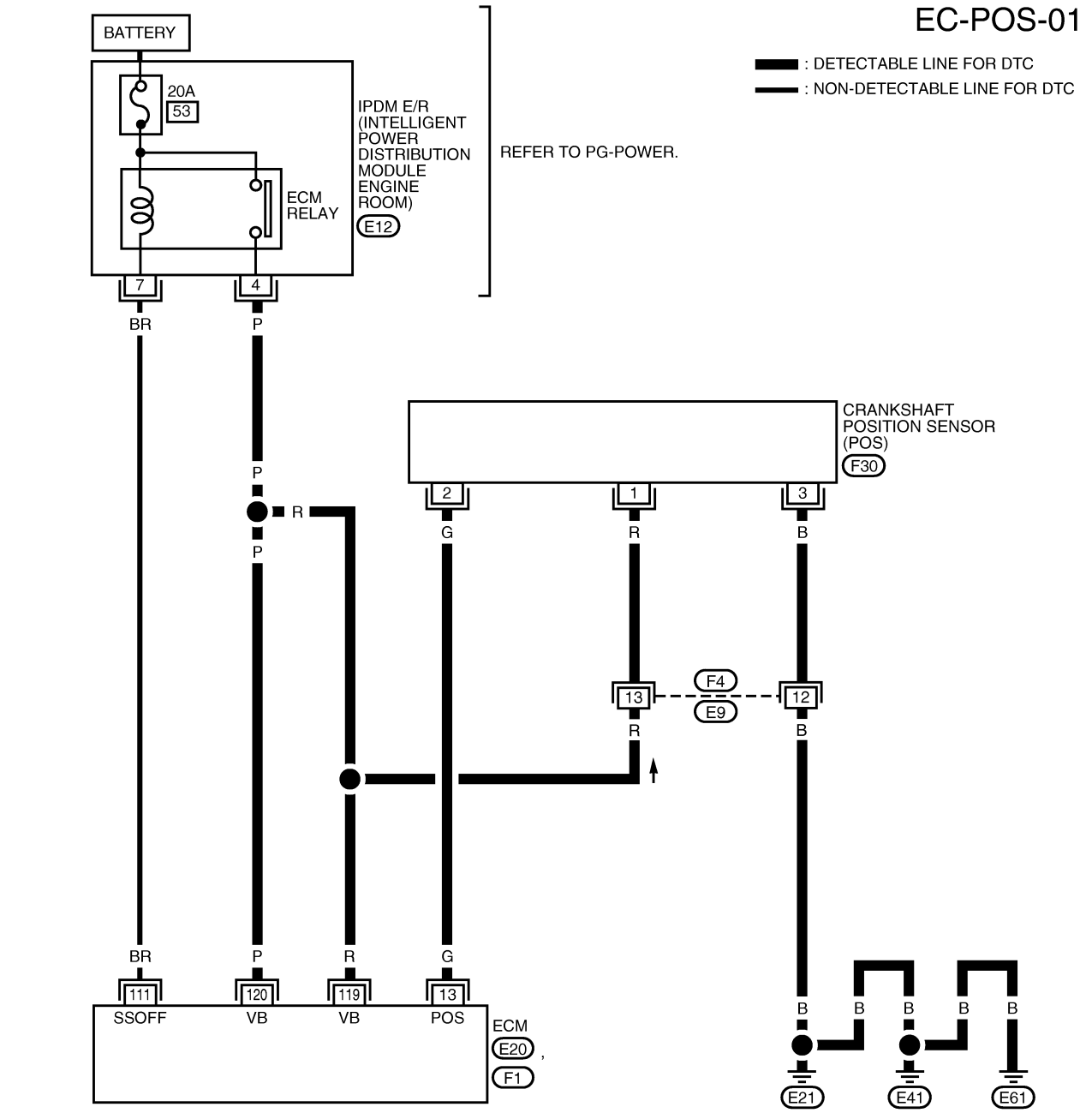


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000LI

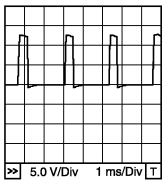
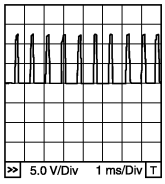


MBWA1290E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	G	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] ● Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

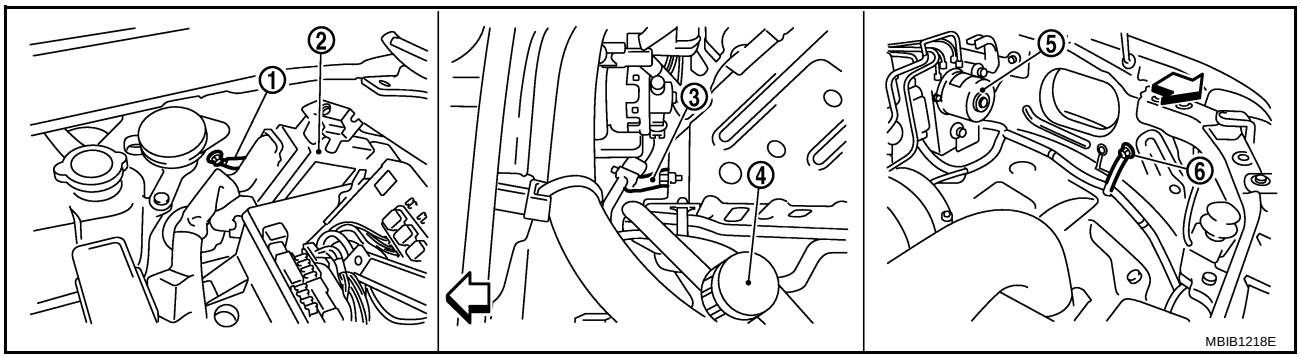
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000LJ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

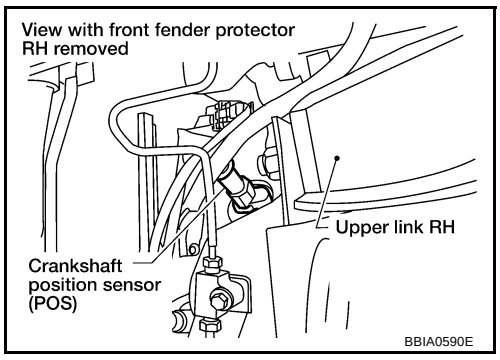
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

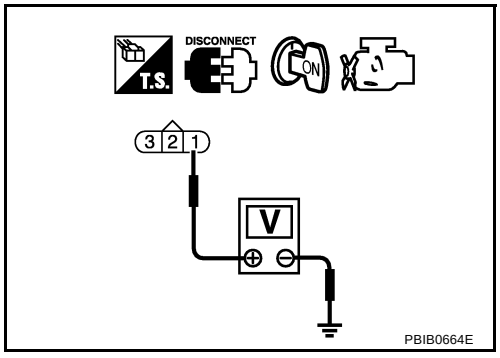
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ground

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

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-258, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

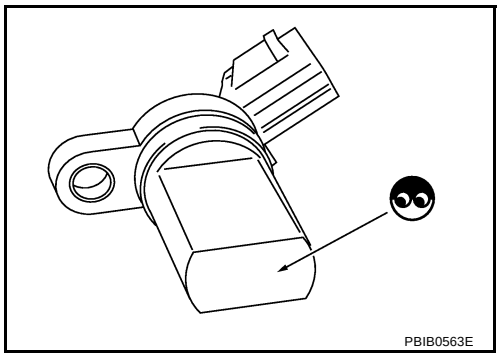
>> **INSPECTION END**

Component Inspection

GBS000LK

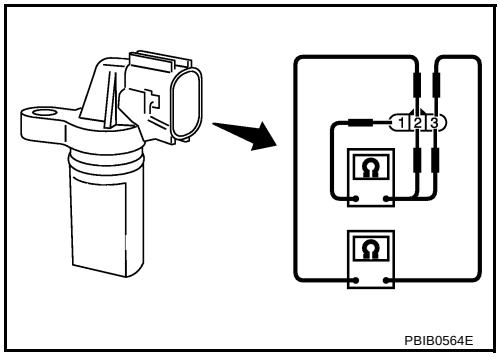
CRANKSHAFT POSITION SENSOR (POS)

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


PBIB0563E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



PBIB0564E

Removal and Installation

GBS000LL

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-28, "OIL PAN AND OIL STRAINER" .

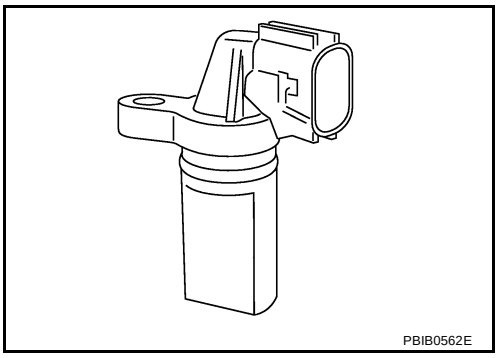
DTC P0340, P0345 CMP SENSOR (PHASE)

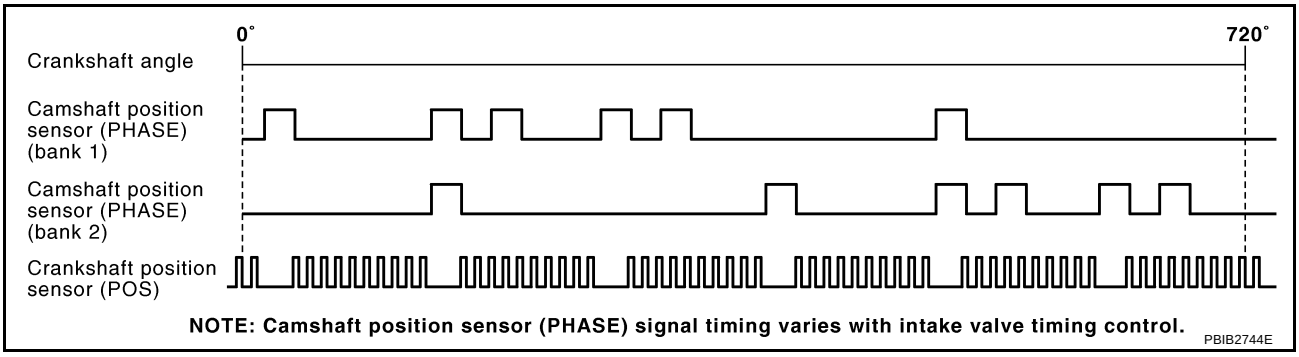
PFP:23731

Component Description

GBS000LM

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.


PBIB0562E



NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2744E

CONSULT-II Reference Value in Data Monitor Mode

GBS000LN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

GBS000LO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1) P0345 0345 (Bank 2)	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not sent to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-30 .) ● Starting system circuit (Refer to SC-30 .) ● Dead (Weak) battery

DTC Confirmation Procedure

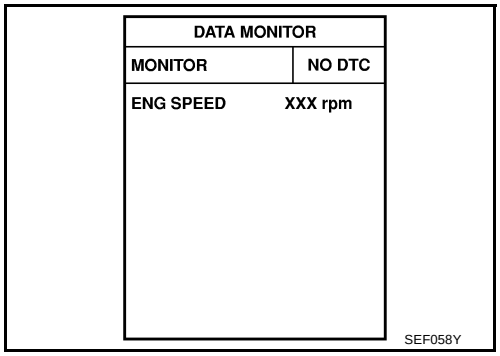
GBS000LP

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-264, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-264, "Diagnostic Procedure".

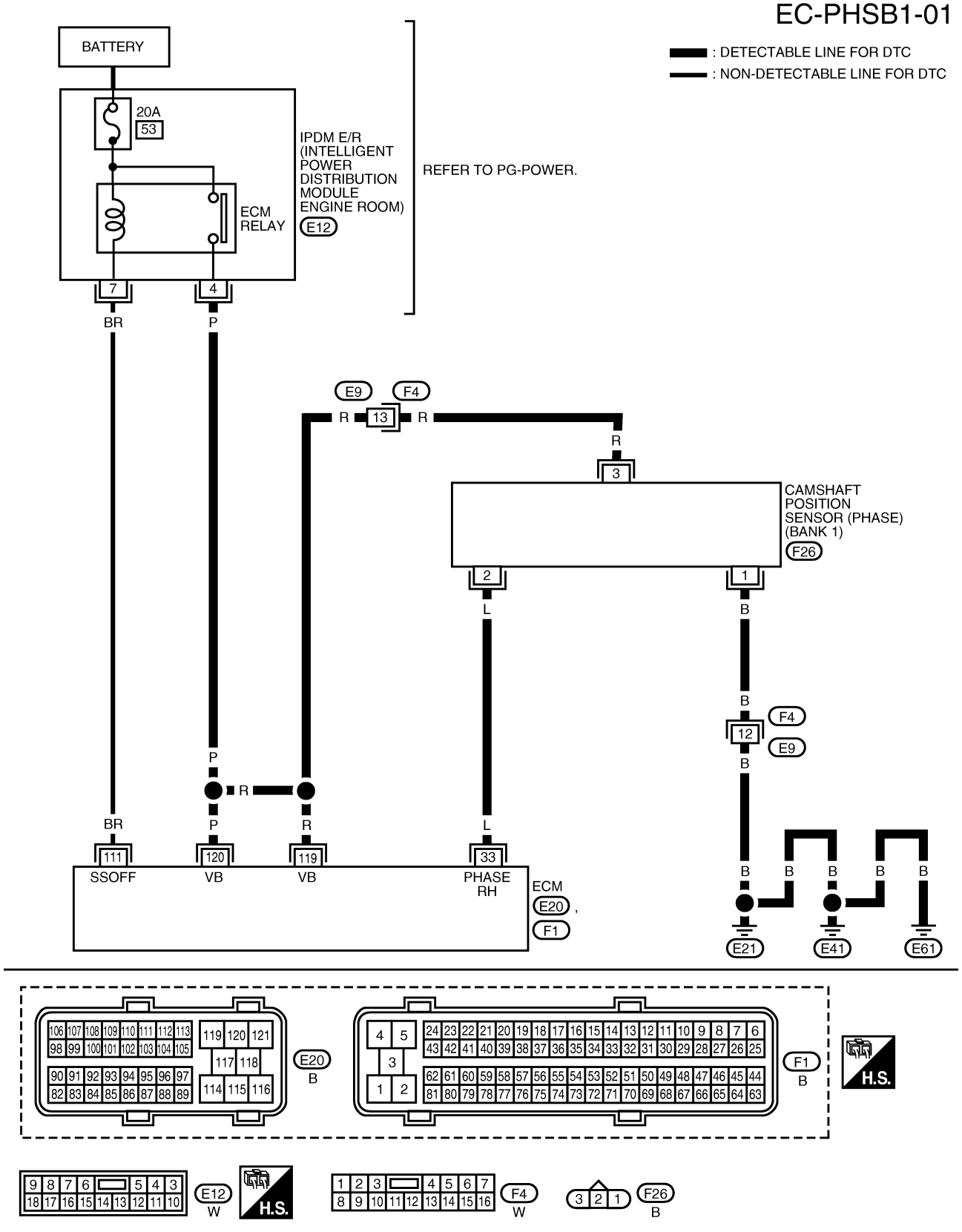


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
BANK 1

GBS000LQ

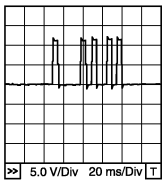
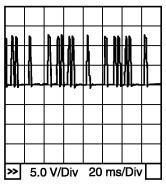


MBWA1291E

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

CAUTION:

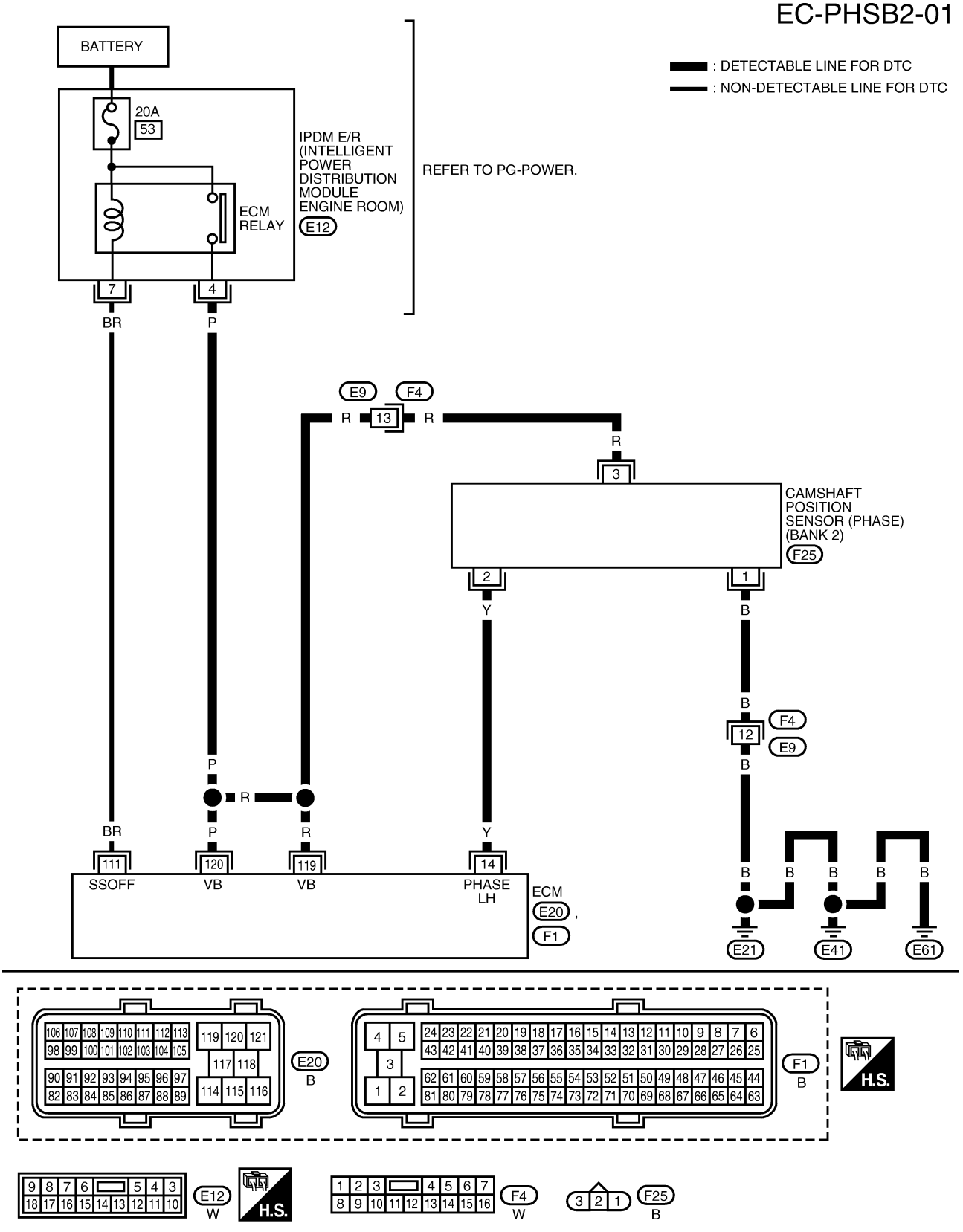
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

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

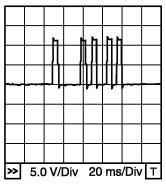
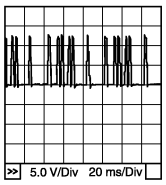
BANK 2

EC-PHSB2-01



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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

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

Diagnostic Procedure

GBS000LR

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

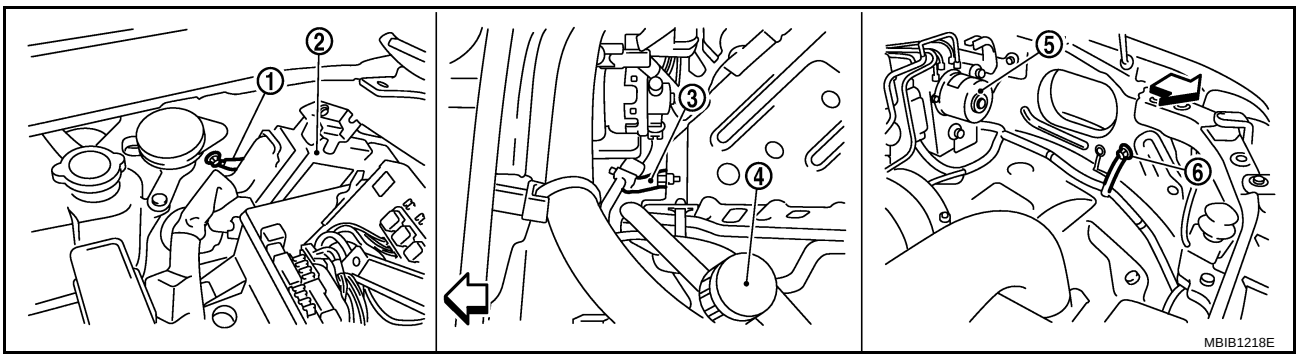
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-30, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

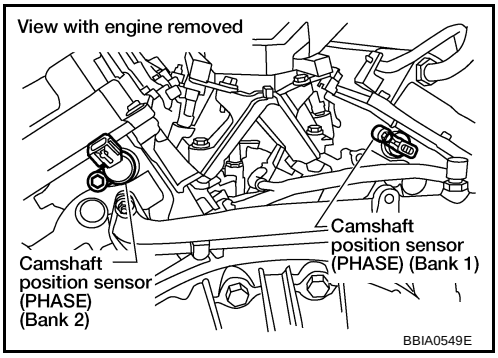
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

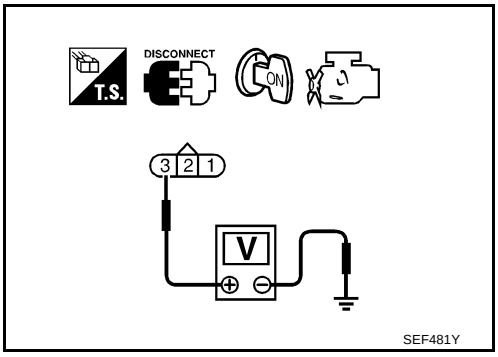
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

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

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between CMP sensor (PHASE) and ground

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

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (bank 1) or 14 (bank 2) and CMP sensor (PHASE) terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-267, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

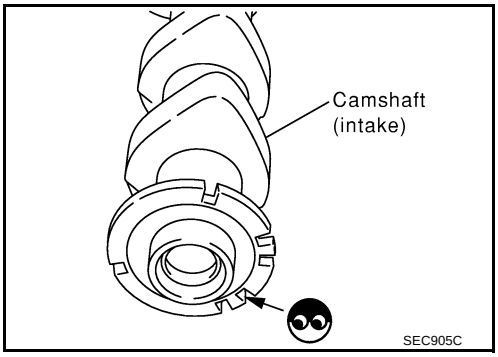
9. CHECK CAMSHAFT (INTAKE)

Check the following.

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

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

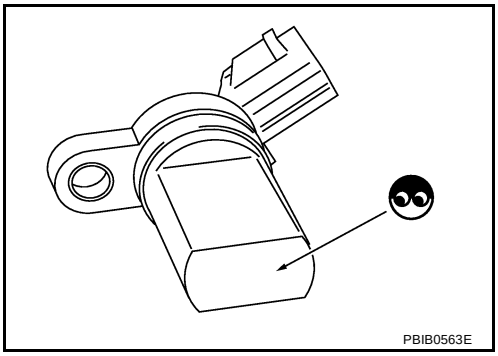
>> **INSPECTION END**

Component Inspection

GBS000LS

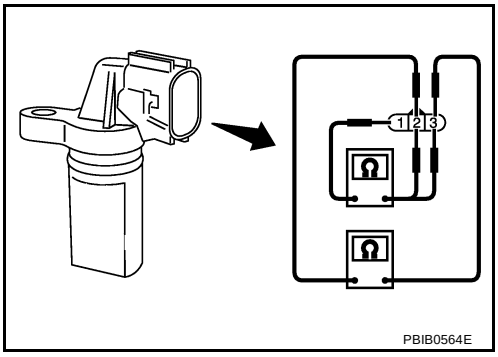
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

GBS000LT

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-73, "CAMSHAFT" .

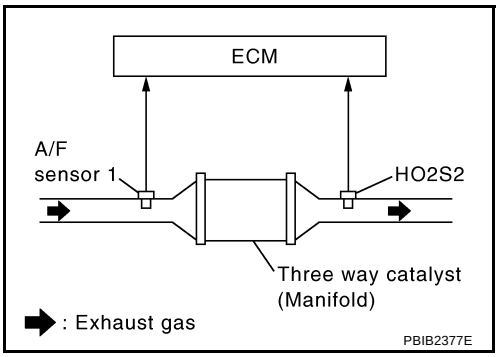
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

GBS000LU

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420 (Bank 1)	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing
P0430 0430 (Bank 2)			

DTC Confirmation Procedure

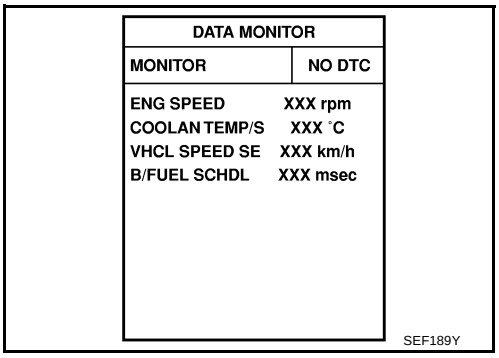
GBS000LV

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

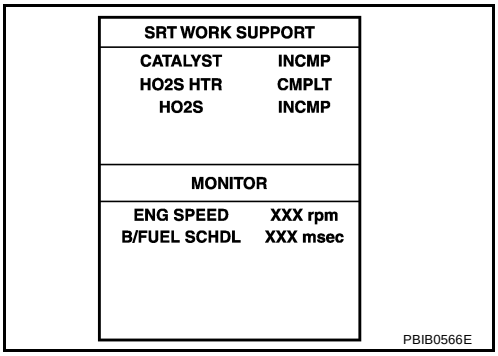
WITH CONSULT-II

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

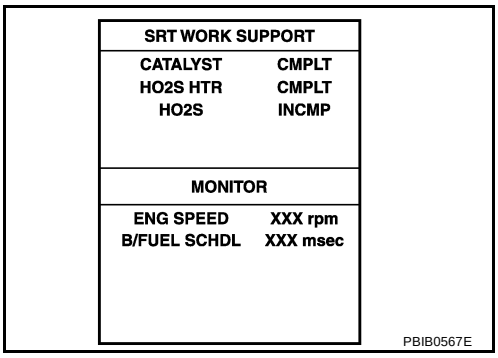
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.



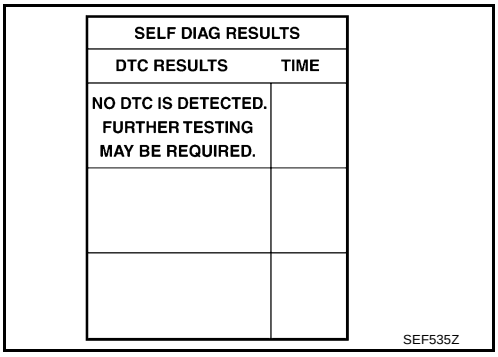
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “CMPLT”, go to step 12.
10. Wait 5 seconds at idle.



11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.



12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-270, "Diagnostic Procedure" .



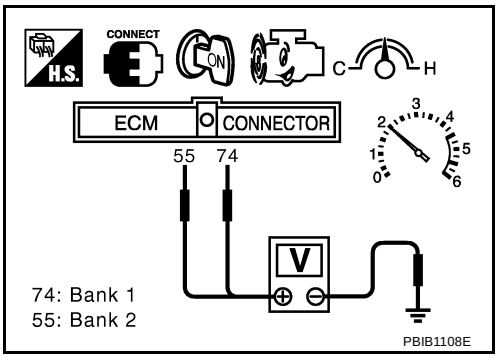
Overall Function Check

GBS000LW

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

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 74 [HO2S2 (bank 1) signal], 55 [HO2S2 (bank 2) signal] and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-270, "Diagnostic Procedure" .
   - 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Diagnostic Procedure

GBS000LX

1. CHECK EXHAUST SYSTEM

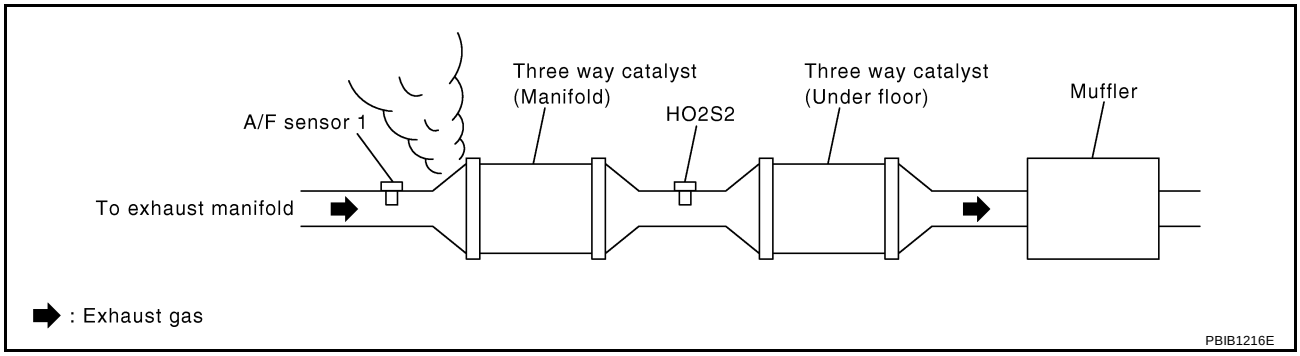
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

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



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-65, "Basic Inspection" .

Items	Specifications
Target idle speed	A/T: 625 ± 50 rpm (in P or N position) M/T: 625 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (in Neutral position)

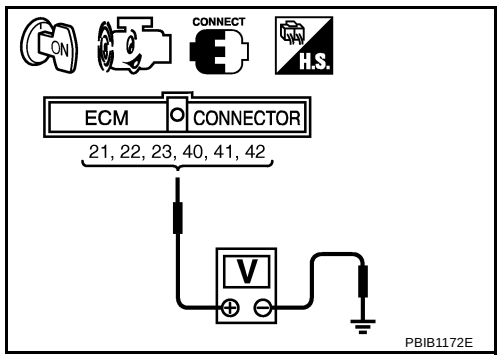
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-65, "Basic Inspection" .

5. CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42 and ground with CONSULT-II or tester.
   Refer to Wiring Diagram for fuel injectors, EC-531 .

   Voltage: Battery voltage



OK or NG

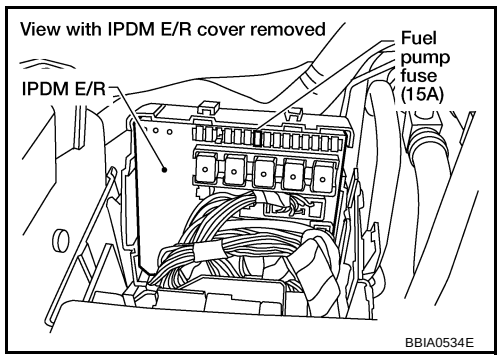
OK >> GO TO 6.
NG >> Perform EC-532, "Diagnostic Procedure" .

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

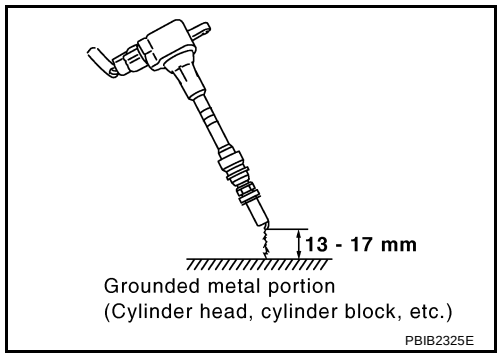
1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.



3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for five seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

    Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

NOTE:
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

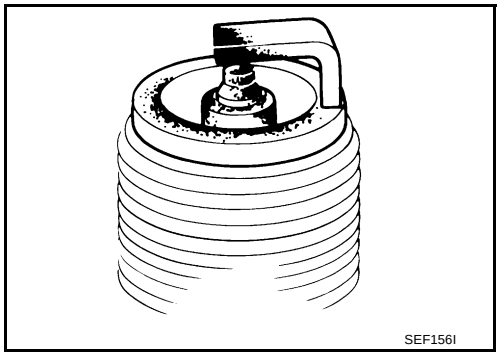
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-543, "IGNITION SIGNAL" .

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-23, "Changing Spark Plugs (Platinum-Tipped Type)" .
NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-23, "Changing Spark Plugs (Platinum-Tipped Type)" .

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel tube assembly.
   Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Reconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 11.
NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (manifold).

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

GBS000LY

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor	Vehicle speed*2		

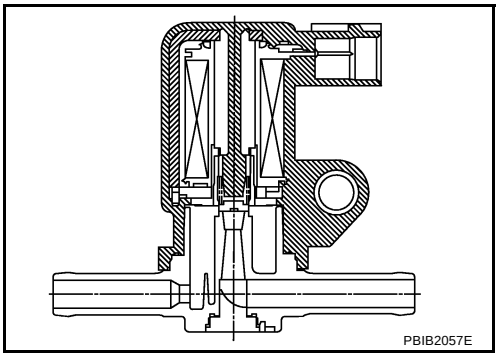
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

GBS000LZ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—

On Board Diagnosis Logic

GBS000M0

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

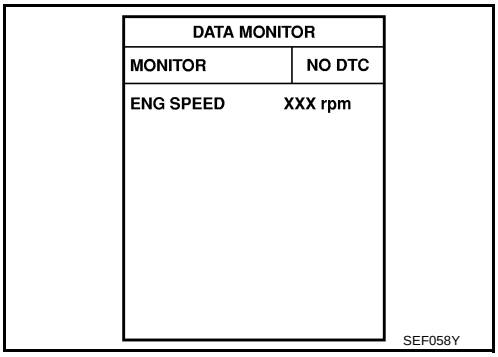
GBS000M1

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

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-278, "Diagnostic Procedure"
.

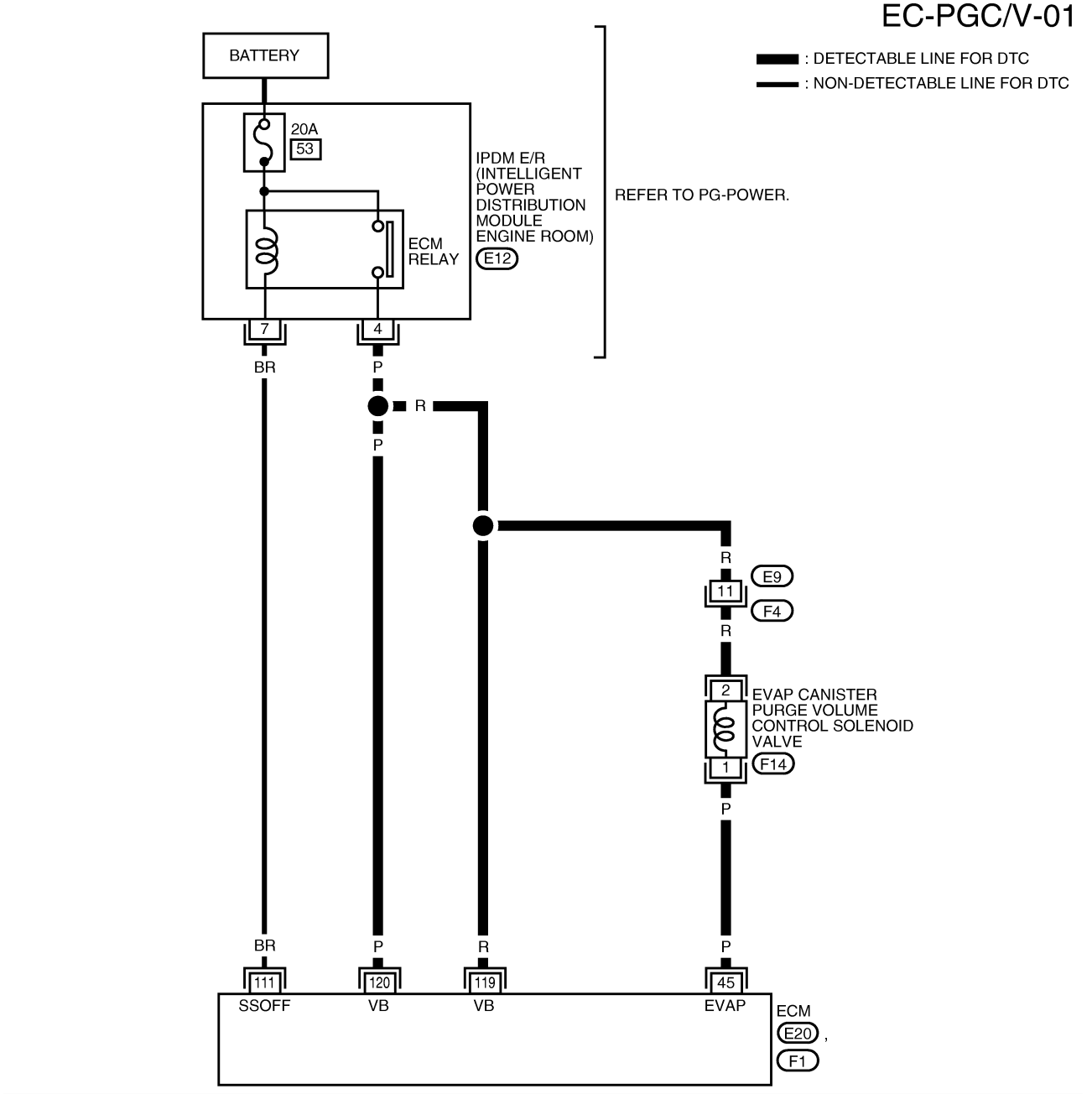


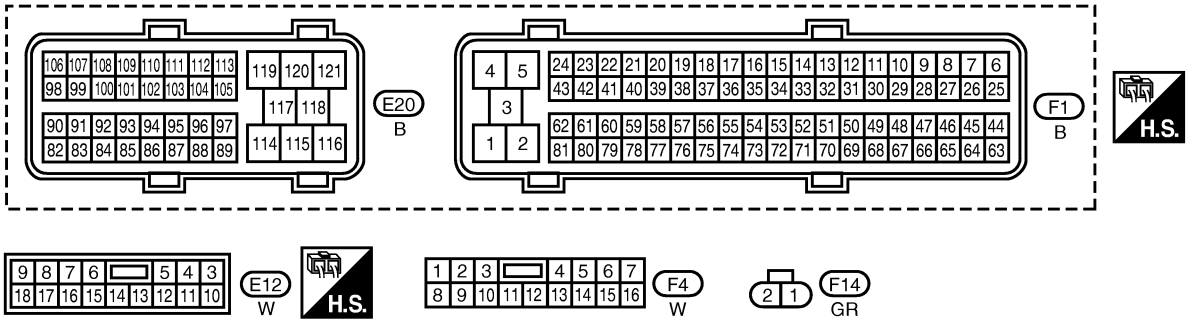
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000M2



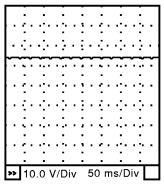
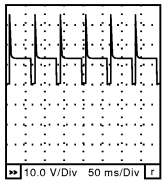


MBWA1293E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

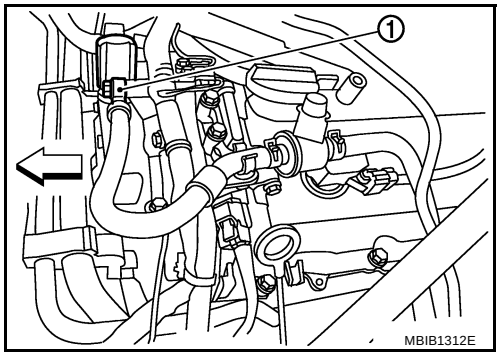
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000M3

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

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
   - ⇦: Vehicle front
3. Turn ignition switch ON.

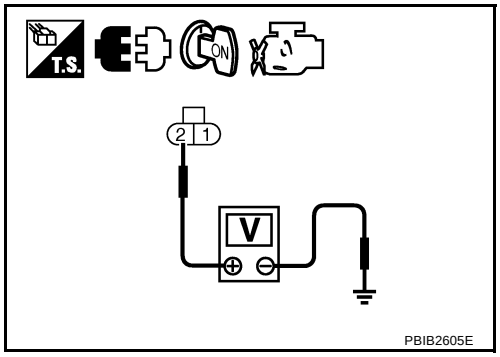


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

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

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %

PBIB1678E

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-279, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

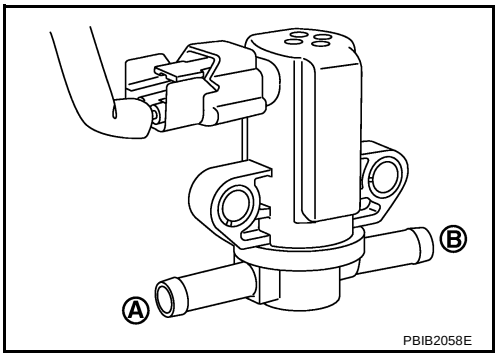
GBS000M4

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No

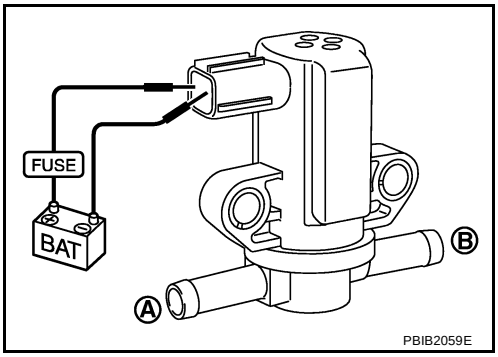


PBIB2058E

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Yes
No supply	No



PBIB2059E

Removal and Installation

GBS000M5

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P0500 VSS

PFP:32702

Description

GBS000M6

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

On Board Diagnosis Logic

GBS000M7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The vehicle speed signal circuit is open or shorted) ● Wheel sensor ● Combination meter ● ABS actuator and electric unit (control unit)

DTC Confirmation Procedure

GBS000M8

CAUTION:
Always drive vehicle at a safe speed.

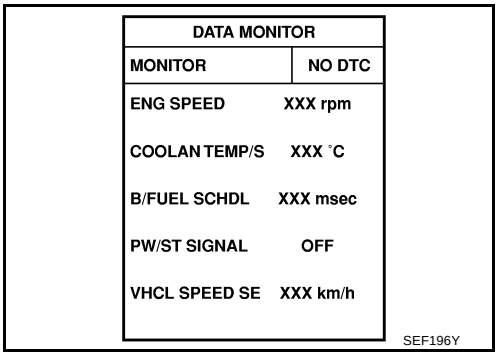
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-282, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,700 - 6,000 rpm (A/T) 1,600 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.3 - 31.8 msec (A/T) 6.5 - 31.8 msec (M/T)
Selector lever	Except P or N position (A/T) Except Neutral position (M/T)
PW/ST SIGNAL	OFF



6. If 1st trip DTC is detected, go to EC-282, "Diagnostic Procedure" .

Overall Function Check

GBS000M9

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

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-282, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000MA

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

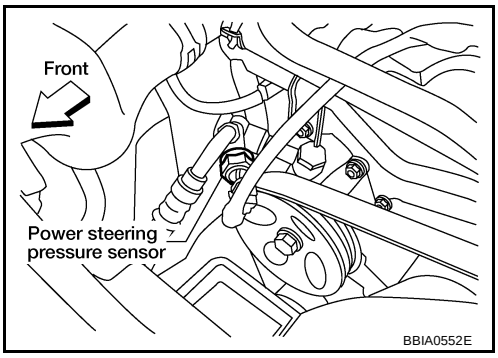
DTC P0550 PSP SENSOR

PFP:49763

Component Description

GBS000MB

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

GBS000MC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned.	OFF
		Steering wheel: Being turned.	ON

On Board Diagnosis Logic

GBS000MD

The MIL will not light up for this diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-365, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Power steering pressure sensor

DTC Confirmation Procedure

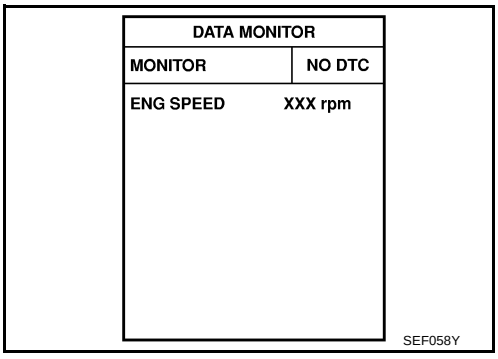
GBS000ME

NOTE:

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-285, "Diagnostic Procedure" .



WITH GST

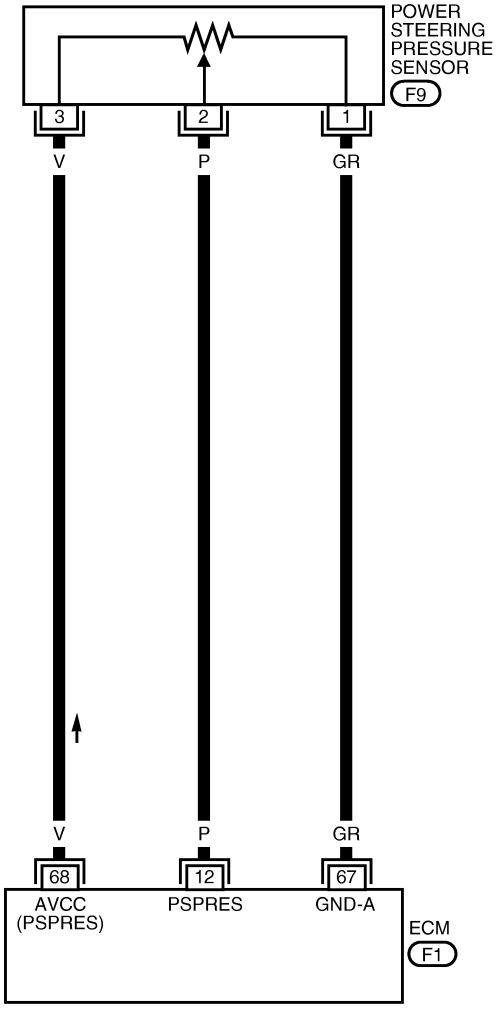
Follow the procedure “WITH CONSULT-II” above.

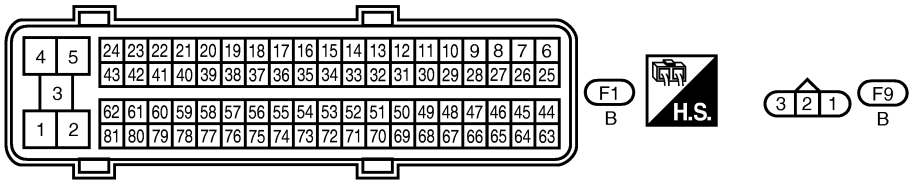
Wiring Diagram

GBS000MF

EC-PS/SEN-01

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





MBWA1296E

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

CAUTION:

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

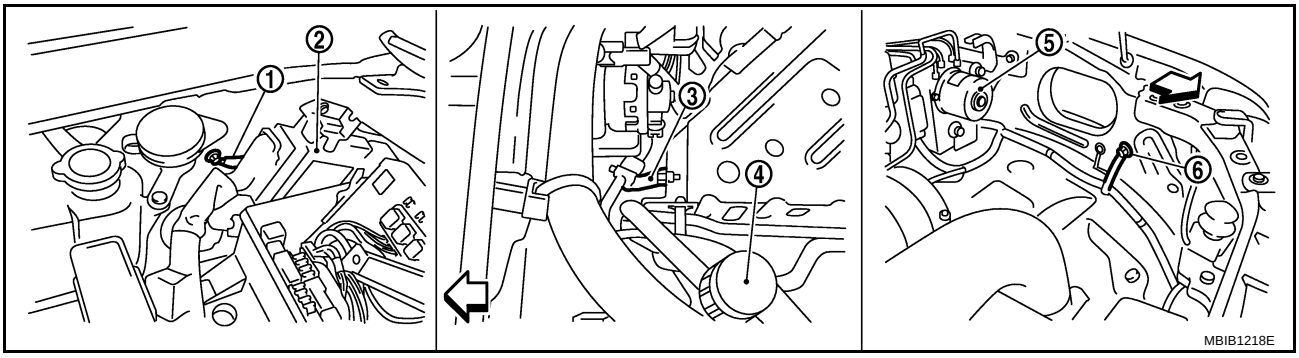
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] ● Steering wheel: Not being turned	0.4 - 0.8V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

GBS000MG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

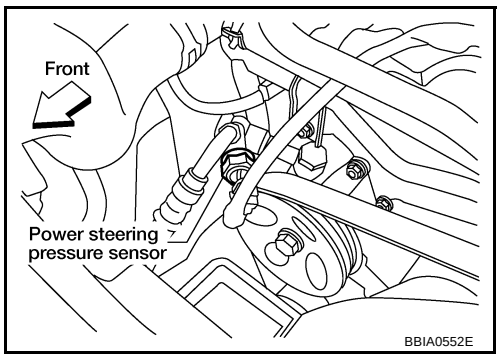
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

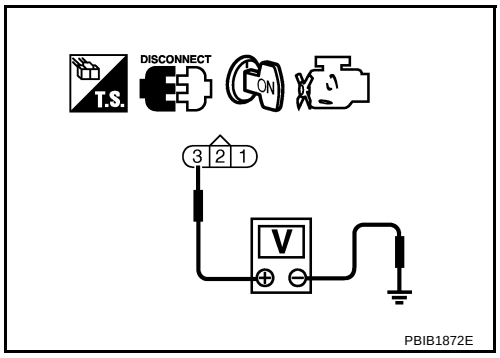
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-287, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

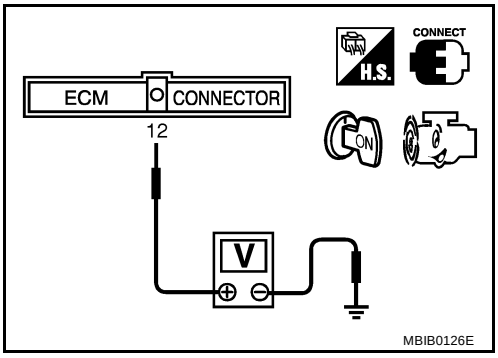
Component Inspection

GBS000MH

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned.	0.5 - 4.5V
Steering wheel: Not being turned.	0.4 - 0.8V



Removal and Installation

GBS000MI

POWER STEERING PRESSURE SENSOR

Refer to PS-33, "HYDRAULIC LINE" .

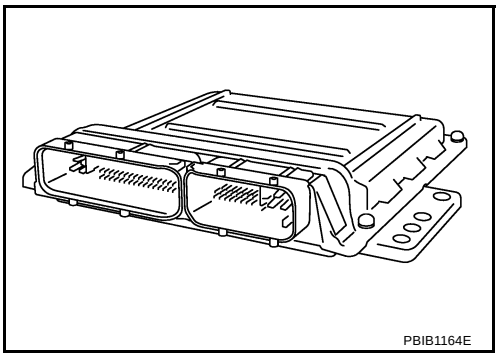
DTC P0605 ECM

PFP:23710

Component Description

GBS000MJ

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

GBS000MK

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

GBS000ML

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

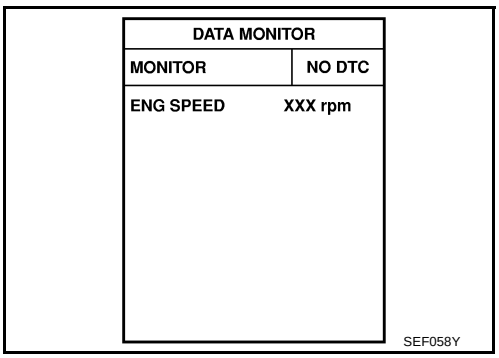
NOTE:

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

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-289, "Diagnostic Procedure"
   .



SEF058Y

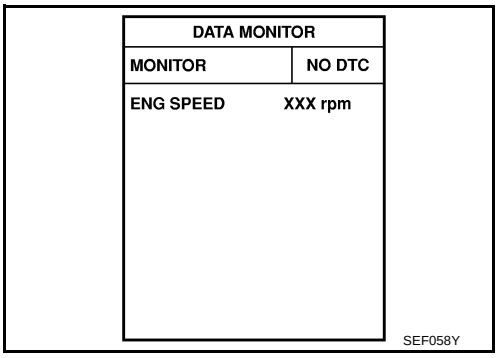
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. If 1st trip DTC is detected, go to EC-289, "Diagnostic Procedure" .



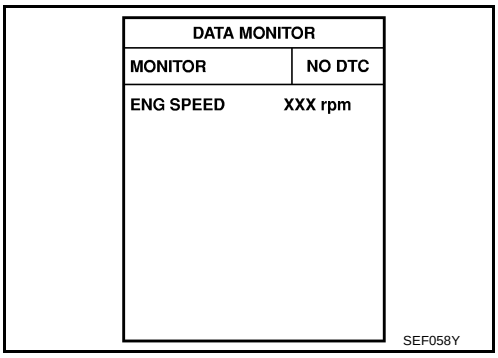
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-289, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

GBS000MM

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-288, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC Confirmation Procedure.**
   See EC-288, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

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

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-71, "Accelerator Pedal Released Position Learning" .
4. Perform EC-71, "Throttle Valve Closed Position Learning" .
5. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

PFP:22693

Description

GBS000MN

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the air fuel ratio (A/F) sensor 1 heater corresponding to the engine operating condition to keep the temperature of air fuel ratio (A/F) sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

GBS000MO

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	● Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

GBS000MP

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1) P1051 1051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 heater
P1032 1032 (Bank 1) P1052 1052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is shorted.) ● Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

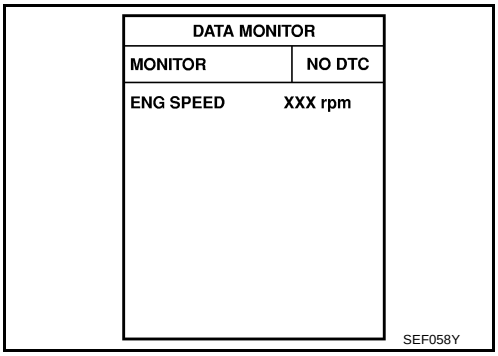
GBS000MQ

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

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

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and let it idle for at least 10 seconds.
3. If 1st trip DTC is detected, go to EC-296, "Diagnostic Procedure" .



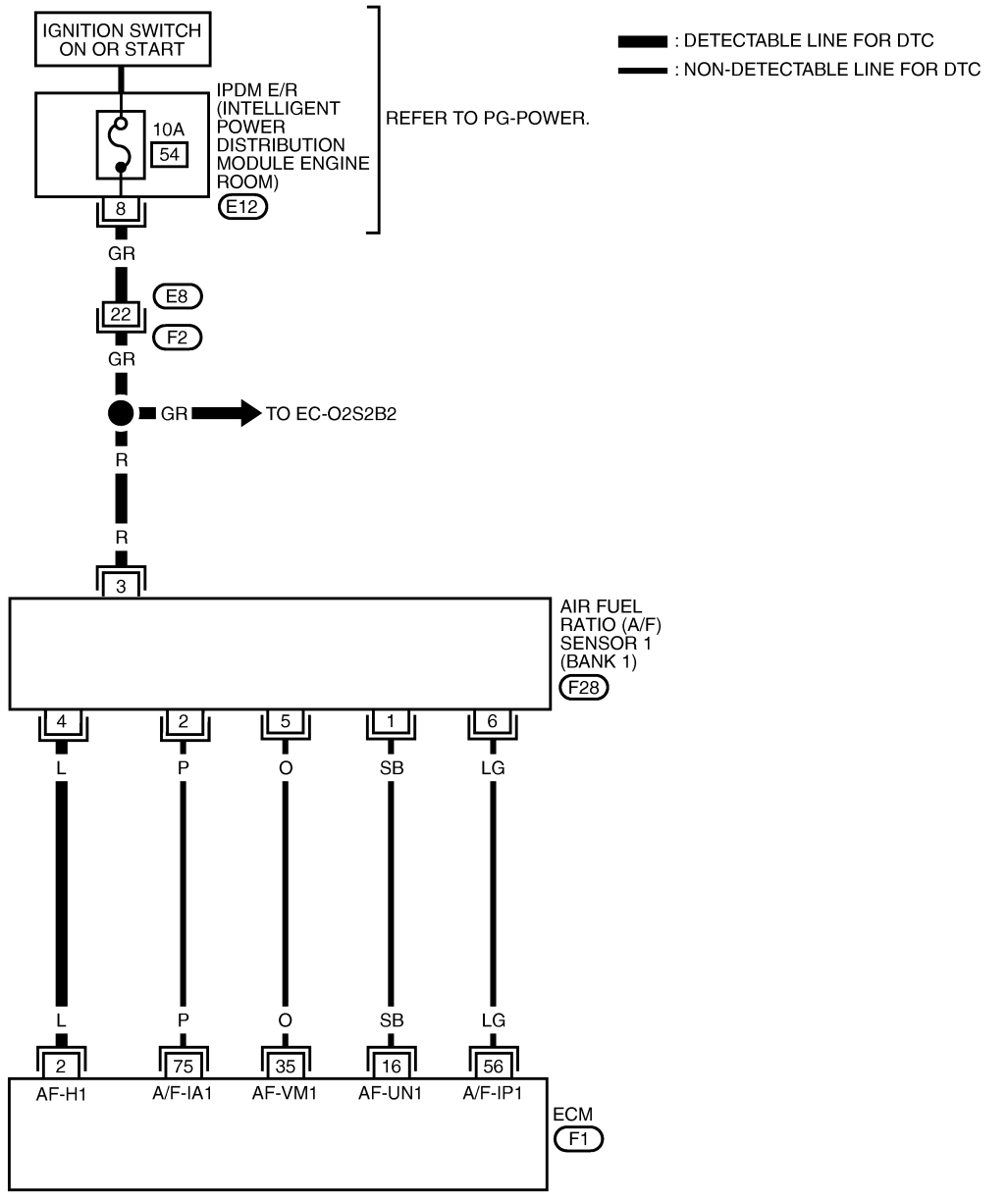
WITH GST

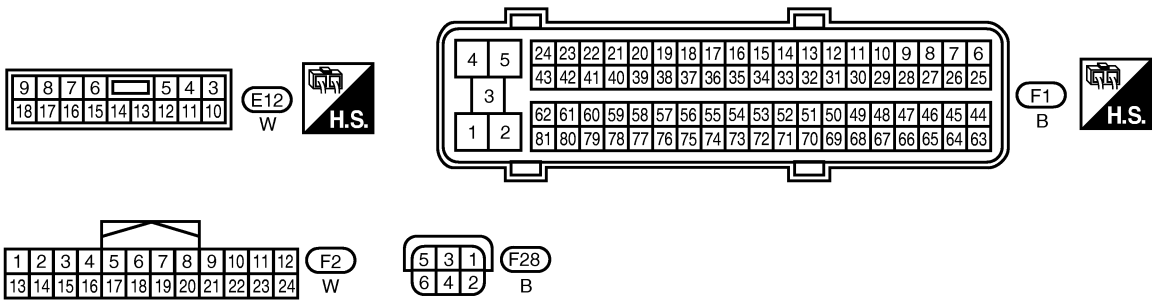
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
BANK 1

GBS000MR

EC-AF1HB1-01



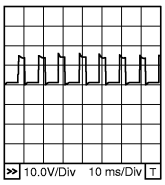


MBWA1297E

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

CAUTION:

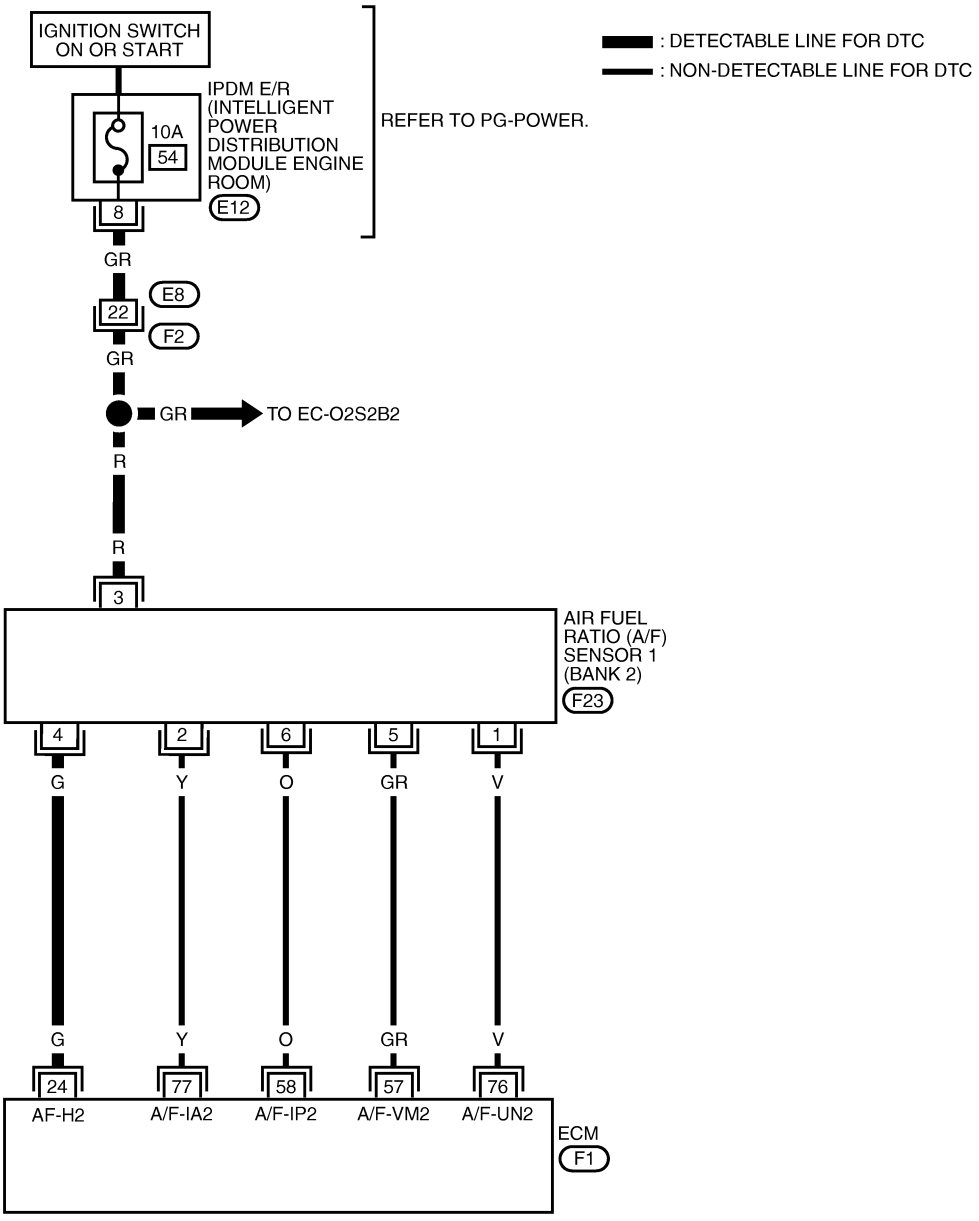
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

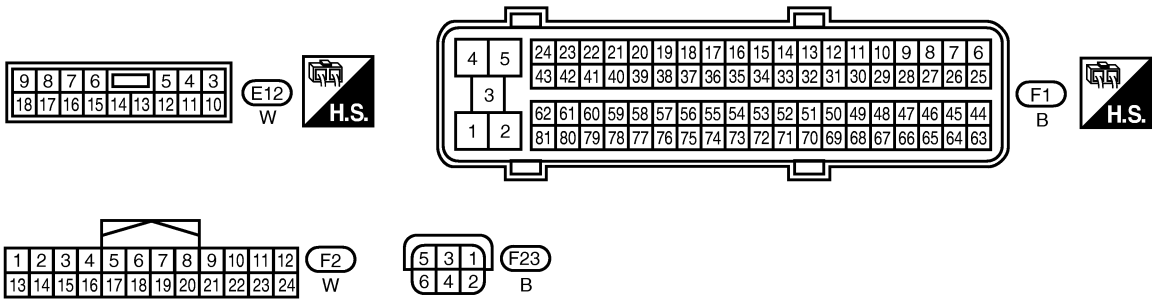
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1HB2-01



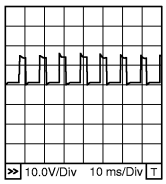


MBWA1298E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

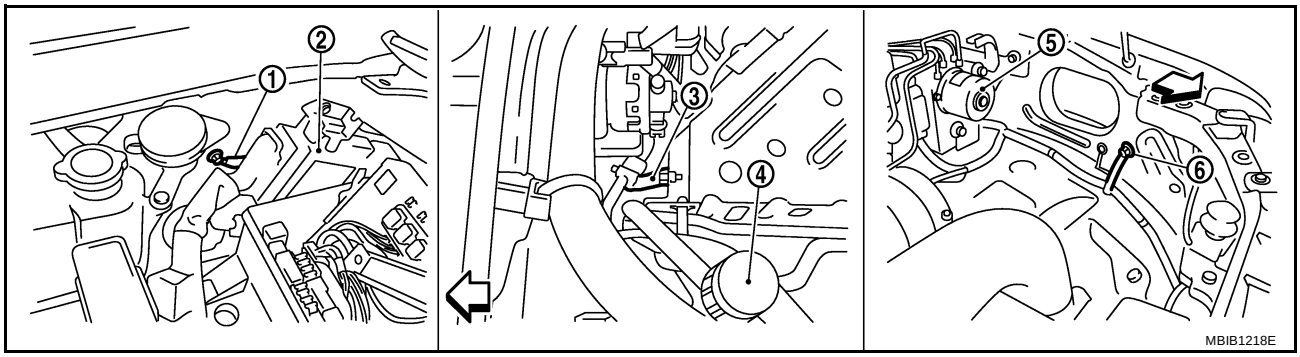
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000MS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

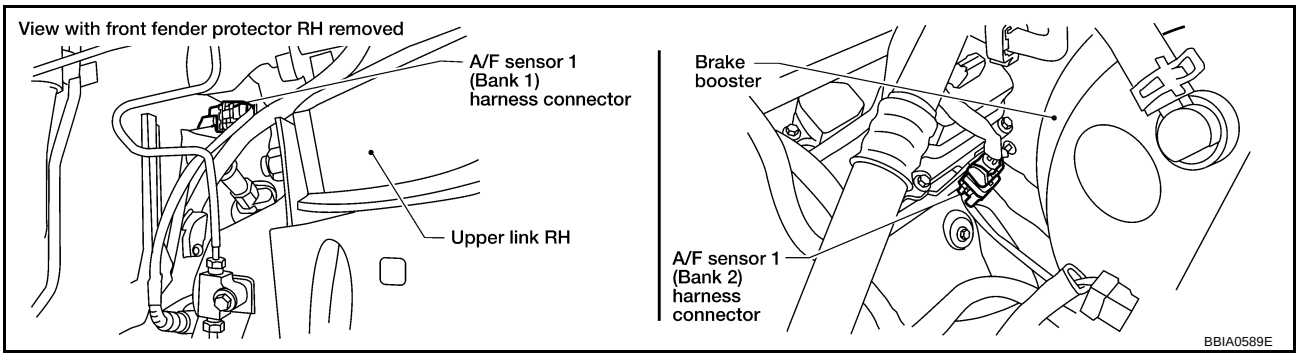
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or Replace ground connections.

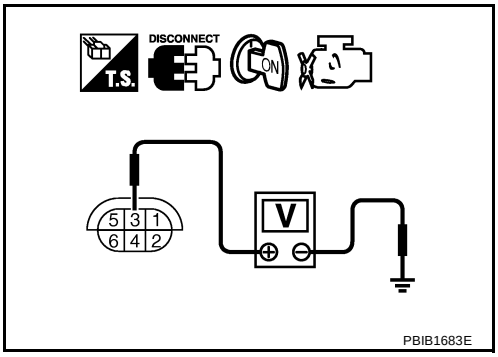
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to EC-298, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Component Inspection

GBS000MT

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω [at 25°C (77°F)]

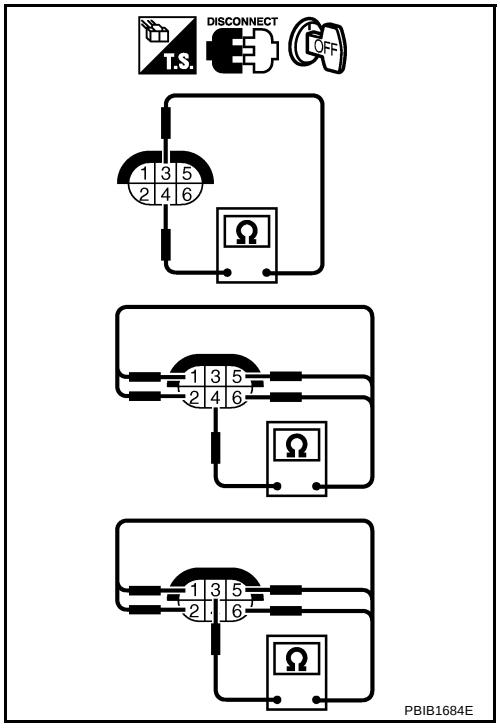
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**



Removal and Installation

GBS000MU

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

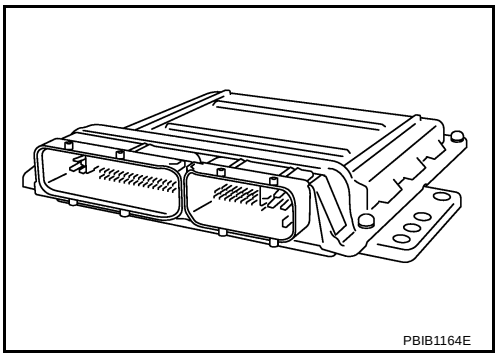
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

GBS000MV

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

GBS000MW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

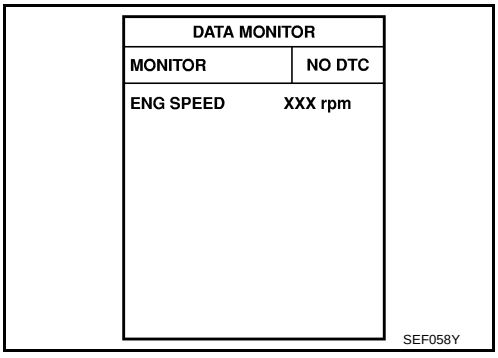
DTC Confirmation Procedure

GBS000MX

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

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-301, "Diagnostic Procedure".



SEF058Y

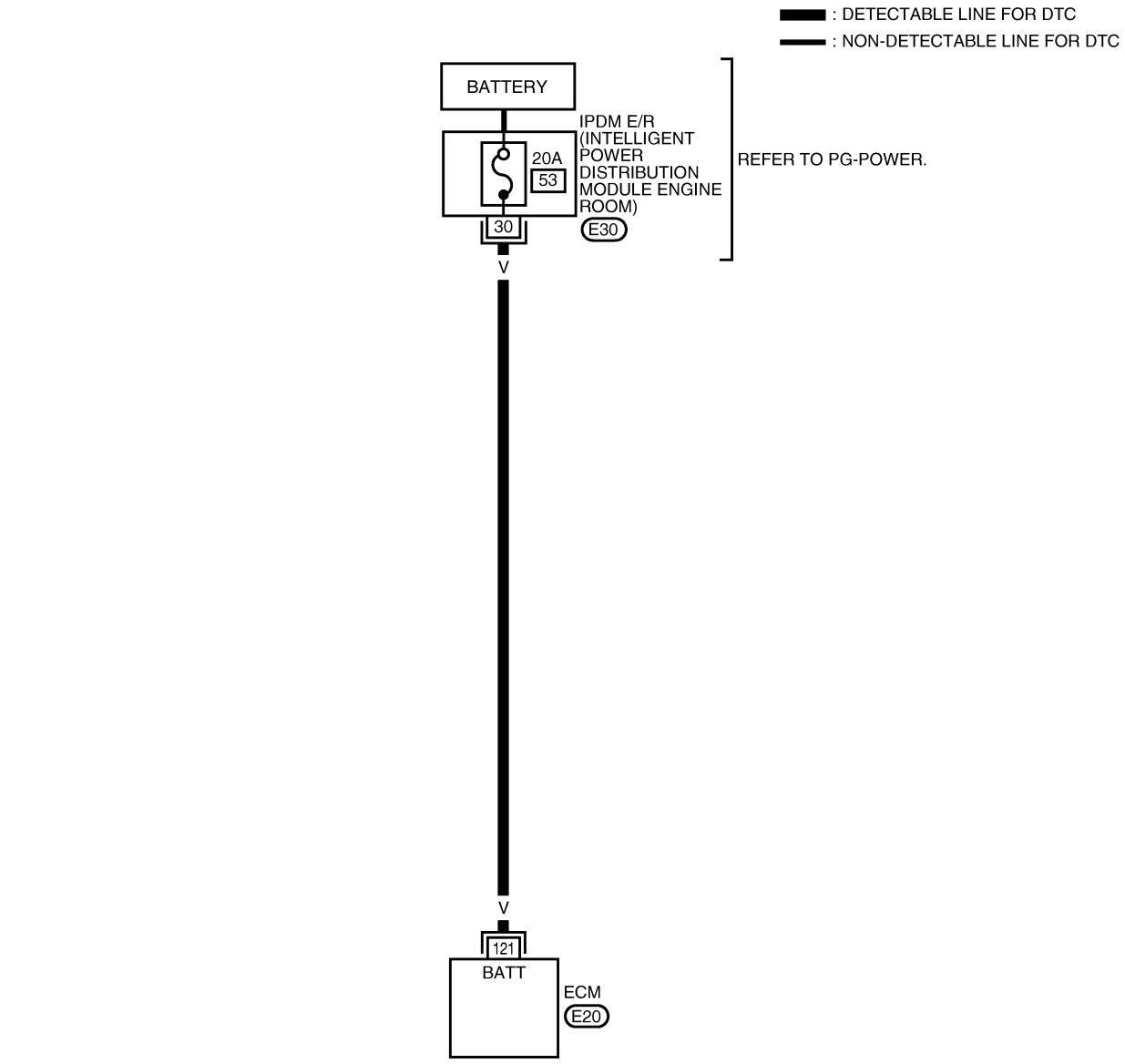
WITH GST

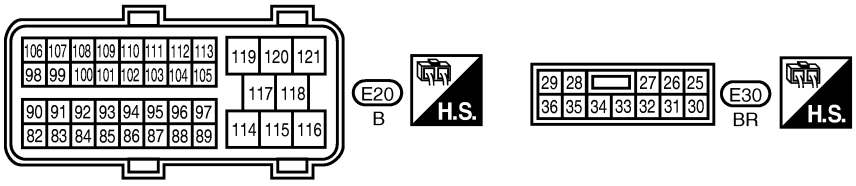
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000MY

EC-ECM/PW-01





MBWA1299E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	V	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

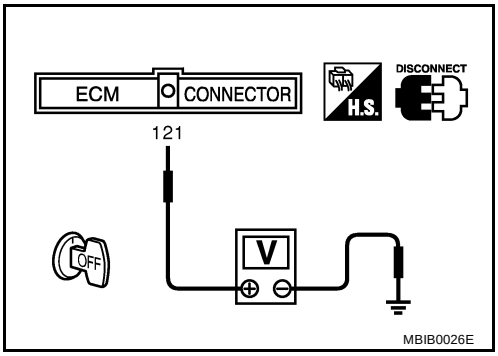
Diagnostic Procedure

GBS000MZ

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- IPDM E/R harness connector E30
- Harness for open or short between ECM and battery

>> Repair open circuit in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-299, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC Confirmation Procedure.**
   See EC-299, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-71, "Accelerator Pedal Released Position Learning" .
4. Perform EC-71, "Throttle Valve Closed Position Learning" .
5. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

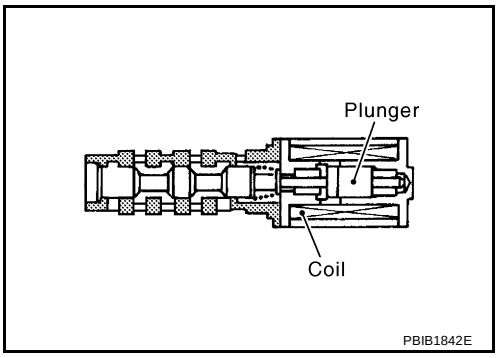
DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

GBS000N0

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

GBS000N1

Specification data are reference values.

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

On Board Diagnosis Logic

GBS000N2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111 (Bank 1) P1136 1136 (Bank 2)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

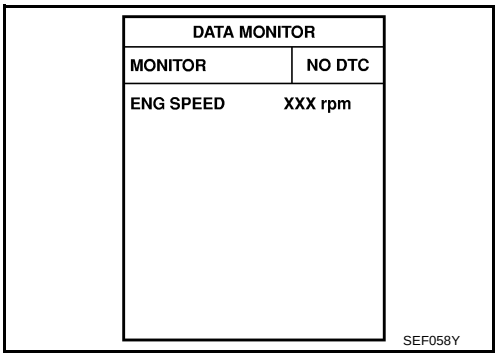
DTC Confirmation Procedure

GBS000N3

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-308, "Diagnostic Procedure"
.

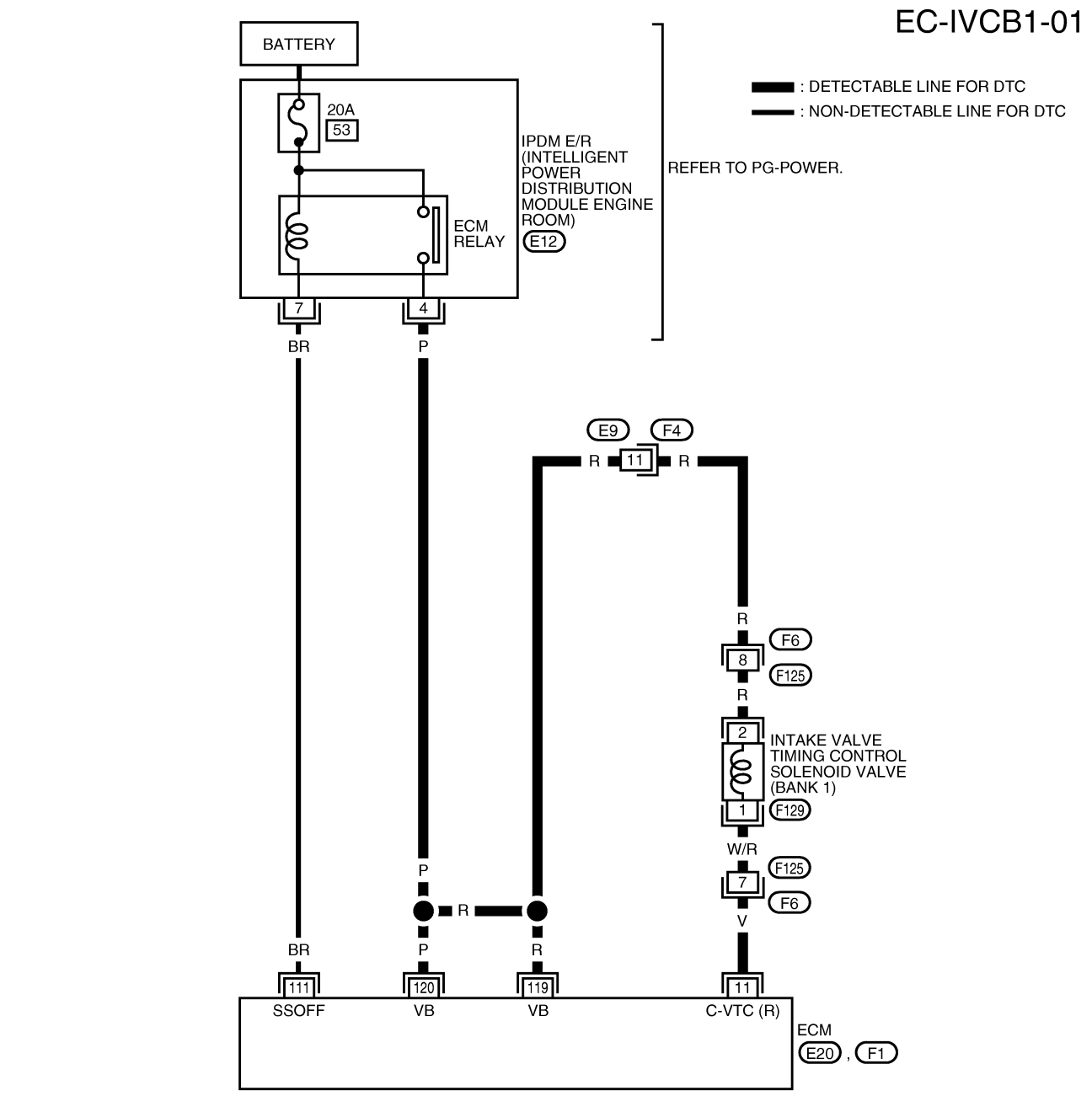


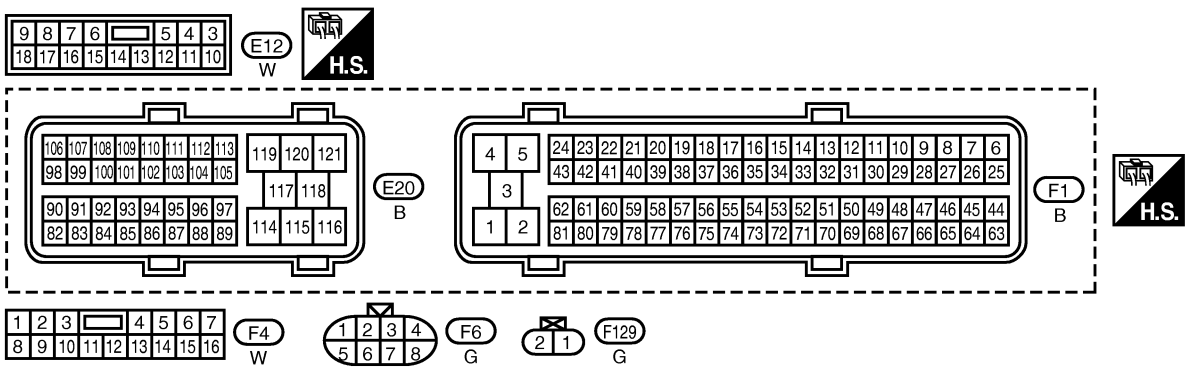
WITH GST

Following the procedure “WITH CONSULT-II” above.

Wiring Diagram
GBS000N4

BANK 1

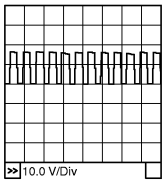




MBWA1300E

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

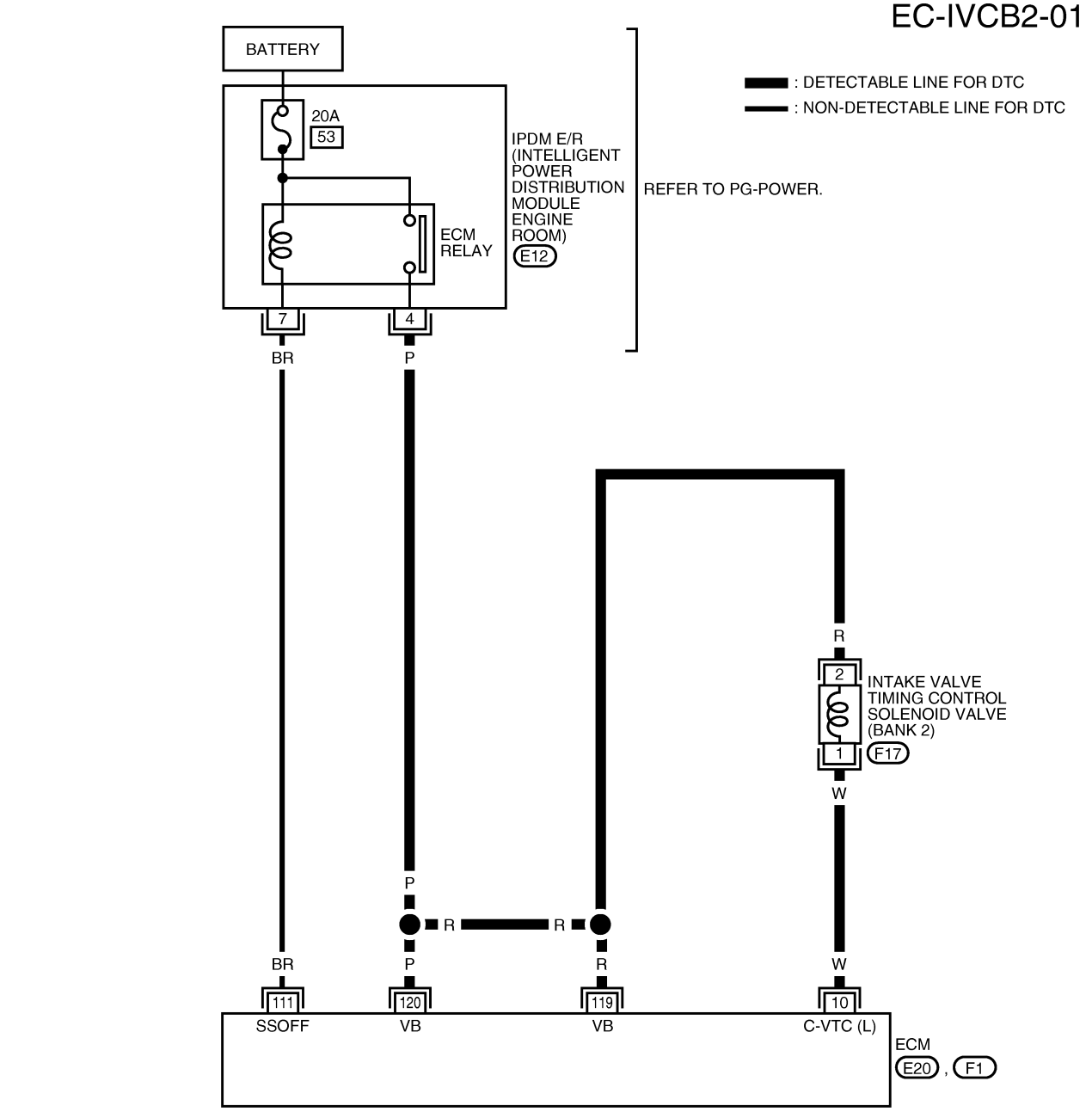
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

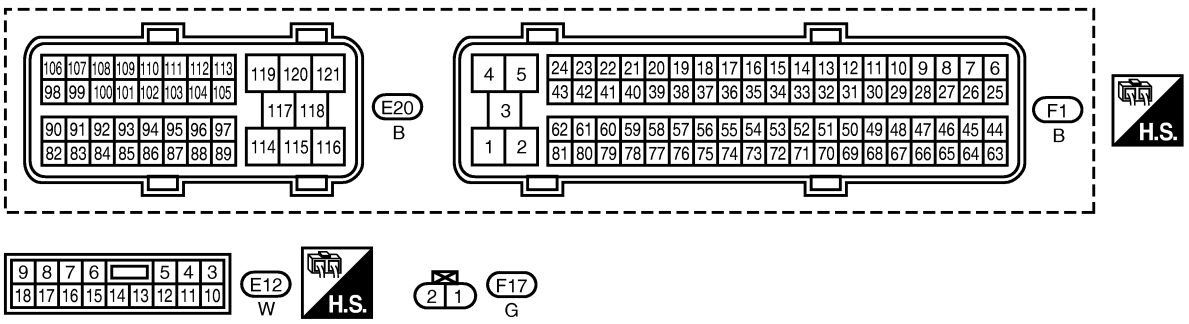
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

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

BANK 2

EC-IVCB2-01

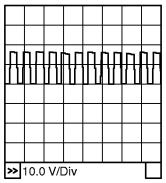




MBWA1301E

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

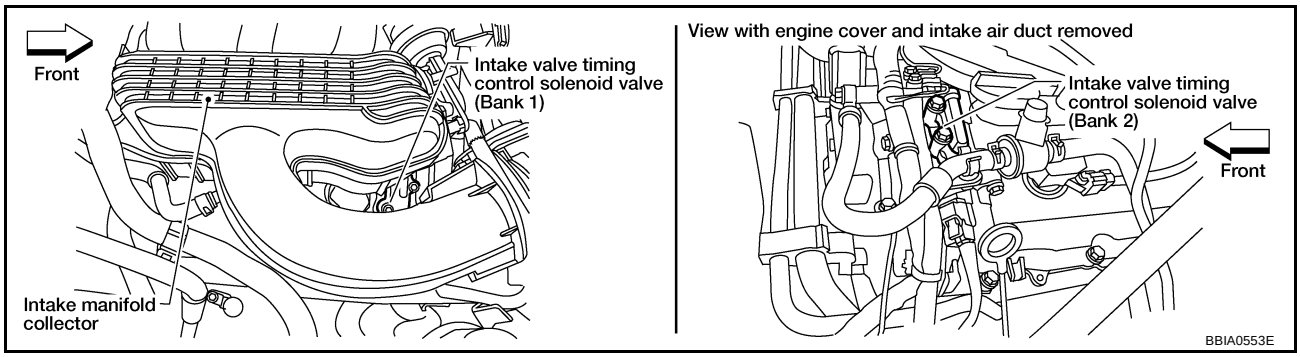
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000N5

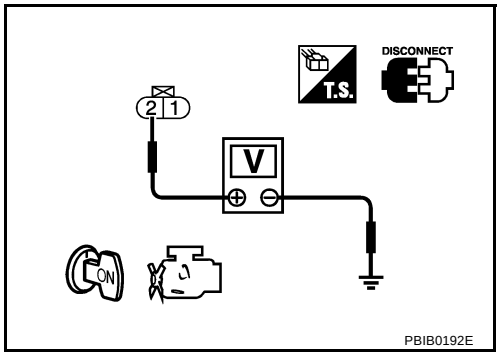
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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



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

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4 (bank 1)
- Harness connectors F6, F125 (bank 1)
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R
- Harness for open or short between intake valve timing control solenoid valve and ECM

>> Repair harness or connectors.

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

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

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6 (bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

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

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-309, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace intake valve timing control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

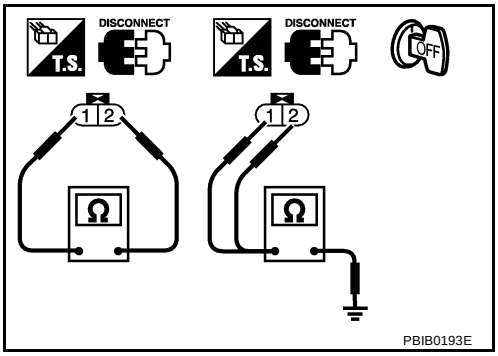
GBS000N6

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

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

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

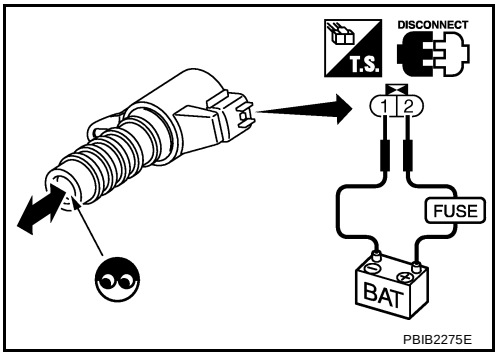
If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.



3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

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

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

GBS000N7

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-53, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

GBS000N8

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

GBS000N9

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

GBS000NA

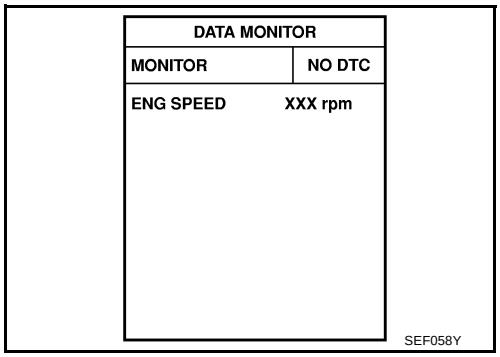
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P position (A/T) or neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
8. Shift selector lever to P position (A/T) or neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10. If DTC is detected, go to EC-311, "Diagnostic Procedure" .



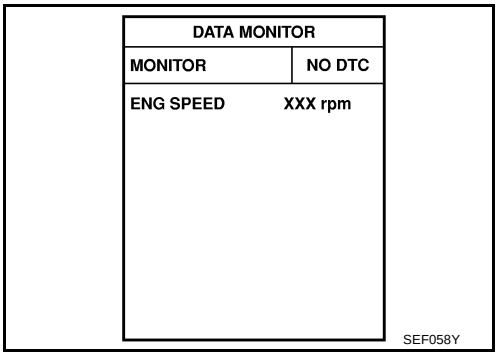
With GST

Follow the procedure “WITH CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P or N position (A/T) or neutral position (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-311, "Diagnostic Procedure" .



With GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

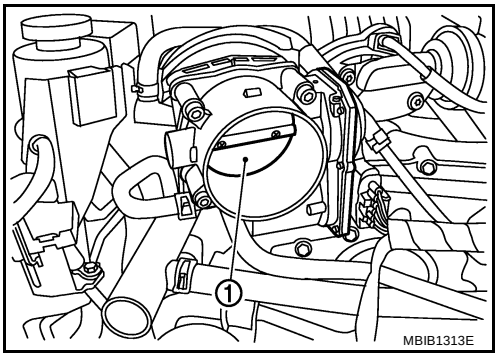
GBS000NB

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

GBS000NC

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-310 or EC-318 .
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

GBS000ND

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator

FAIL-SAFE MODE

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

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

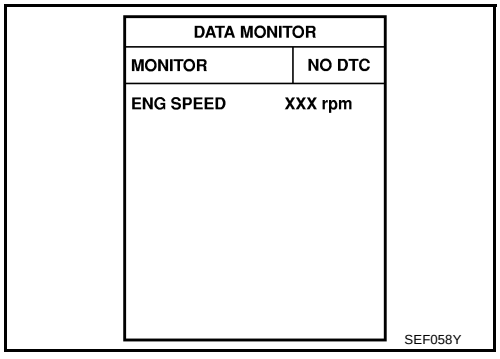
DTC Confirmation Procedure

GBS000NE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when the engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-314, "Diagnostic Procedure" .

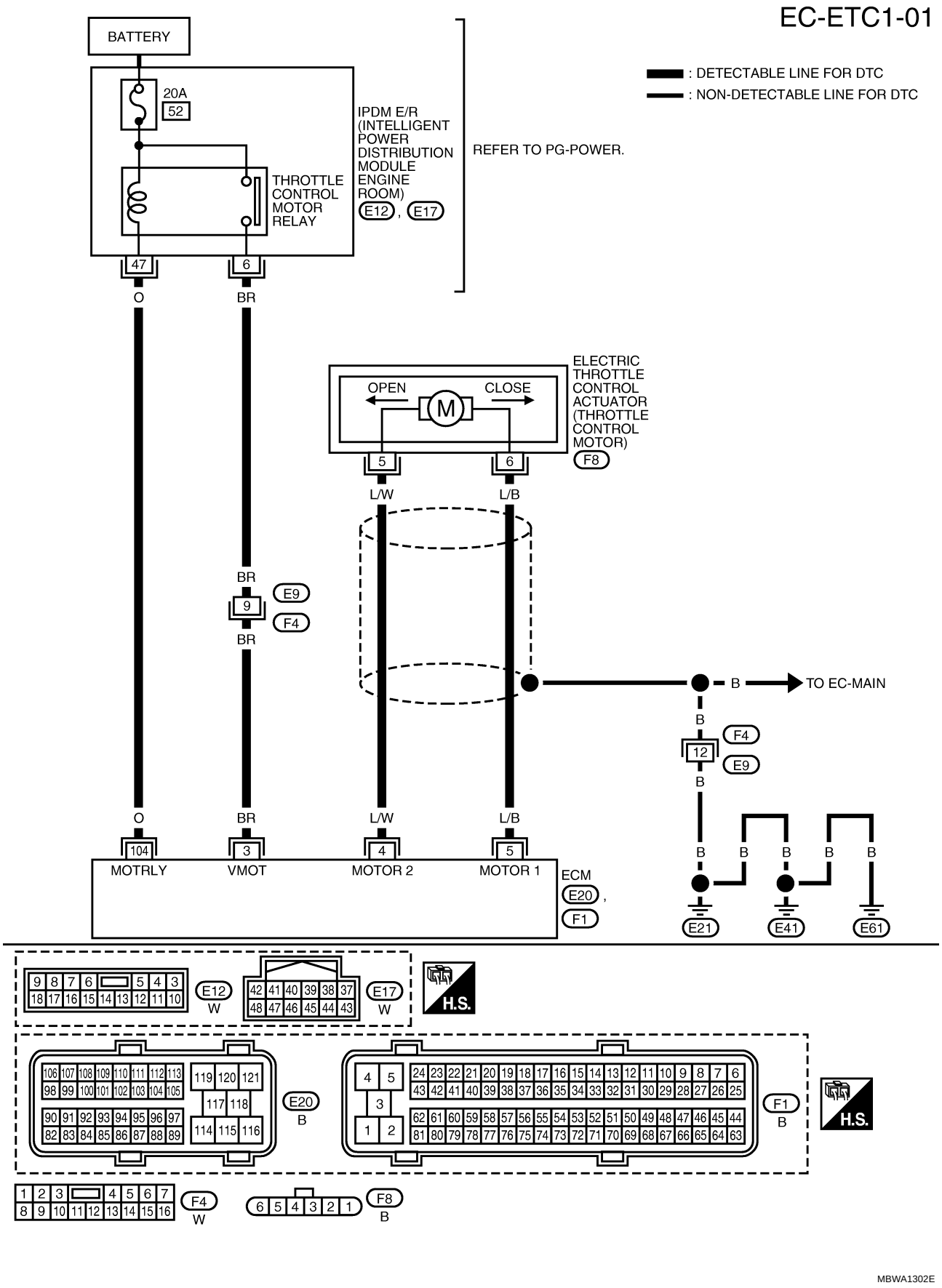


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

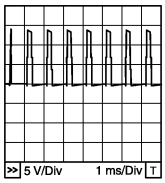
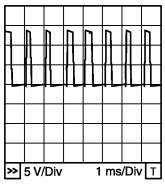
GBS000NF



MBWA1302E

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

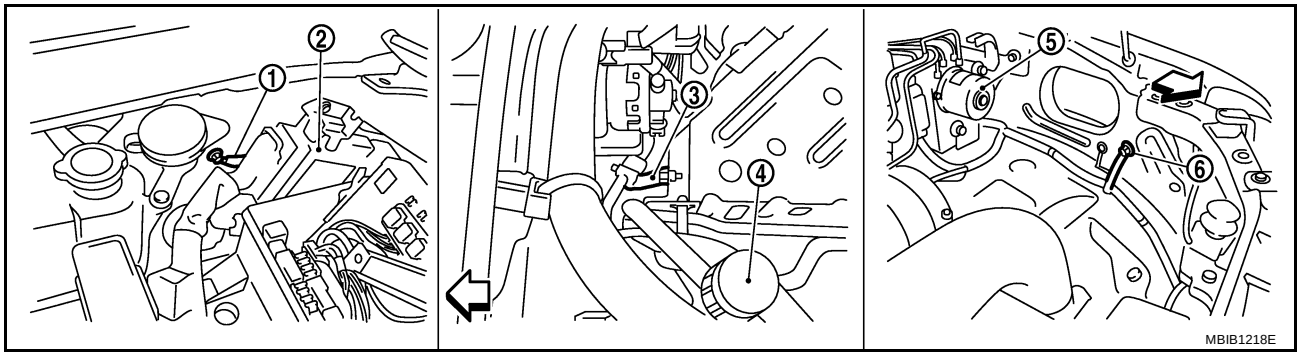
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000NG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C hi-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

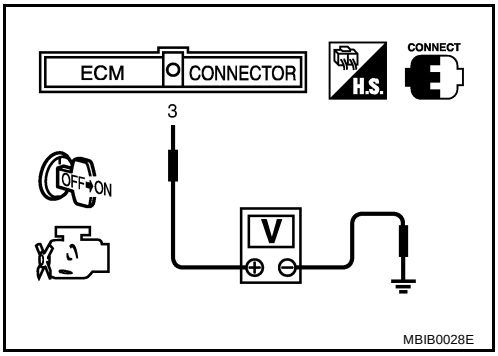
OK or NG

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

2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



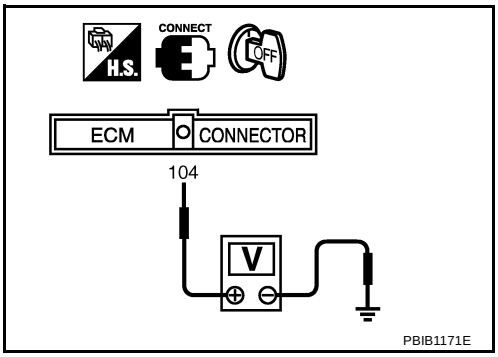
OK or NG

OK >> GO TO 9.
NG >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

OK >> GO TO 8.
NG >> Replace 20A fuse.

6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

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

8. CHECK INTERMITTENT INCIDENT

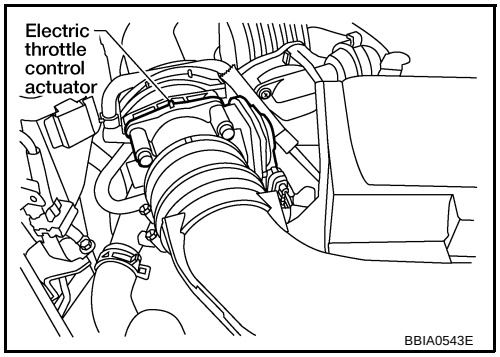
Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

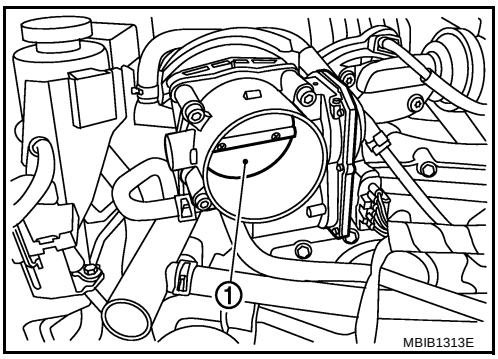
5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.



OK or NG

OK >> GO TO 11.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-317, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

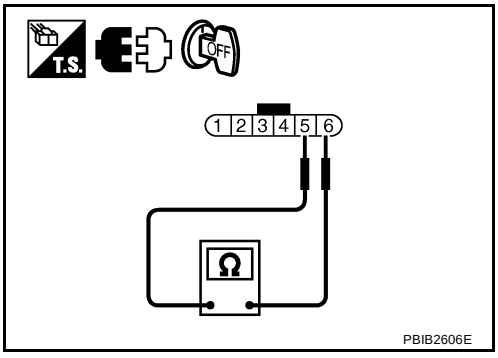
>> **INSPECTION END**

Component Inspection

GBS000NH

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.



Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-71, "Throttle Valve Closed Position Learning" .
5. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000NI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

GBS000NJ

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

GBS000NK

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

GBS000NL

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

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

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

GBS000NM

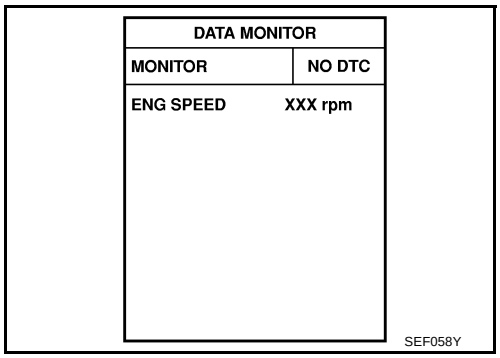
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-321, "Diagnostic Procedure" .



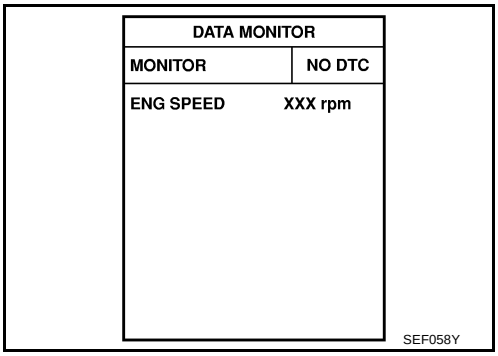
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR””mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-321, "Diagnostic Procedure" .

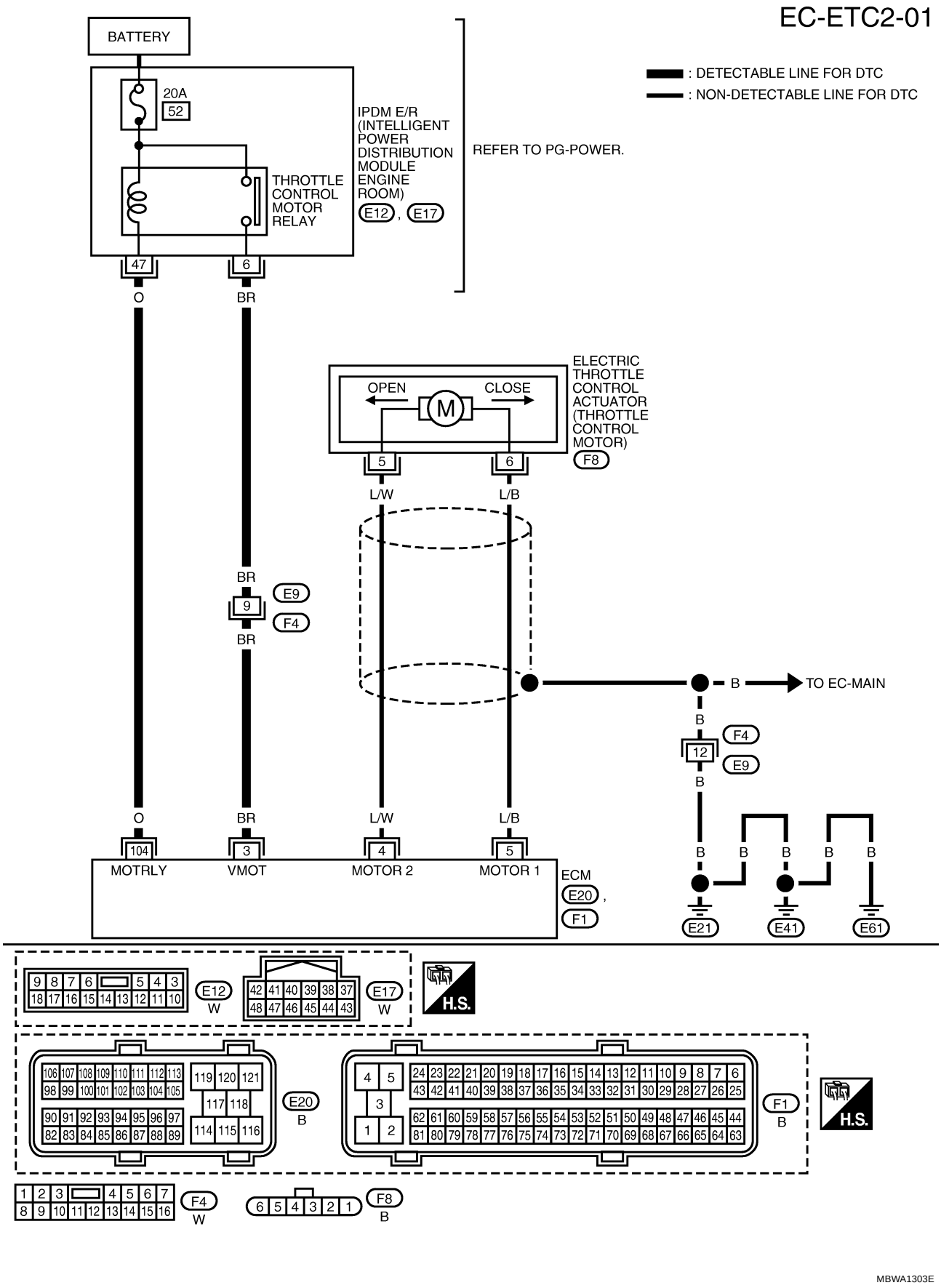


With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

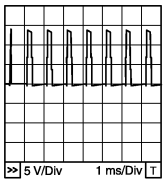
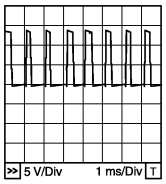
GBS000NN



MBWA1303E

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

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

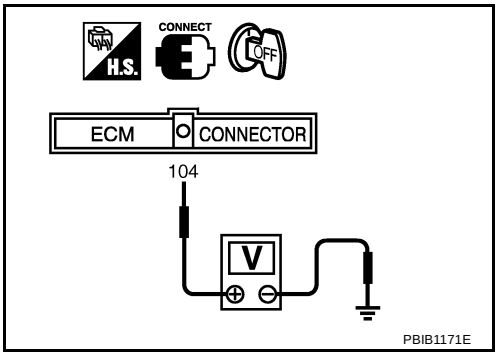
Diagnostic Procedure

GBS000NO

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage



PBIB1171E

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

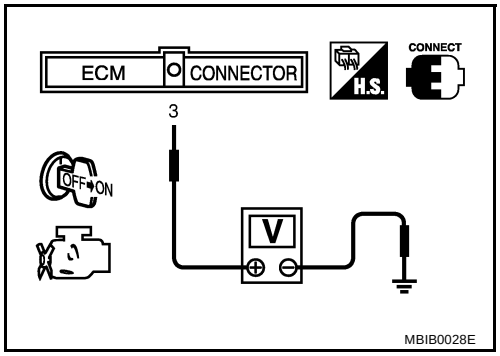
OK or NG

OK >> GO TO 7.
NG >> Replace 20A fuse.

4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

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

7. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .

NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

GBS000NP

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

On Board Diagnosis Logic

GBS000NQ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

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

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

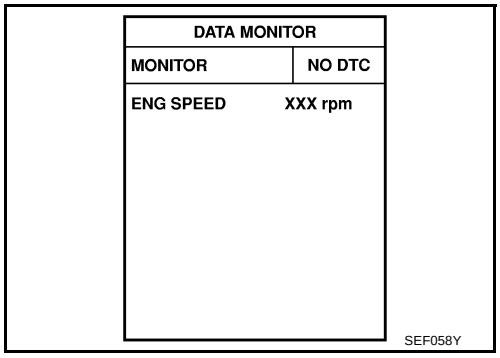
DTC Confirmation Procedure

GBS000NR

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

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-326, "Diagnostic Procedure" .

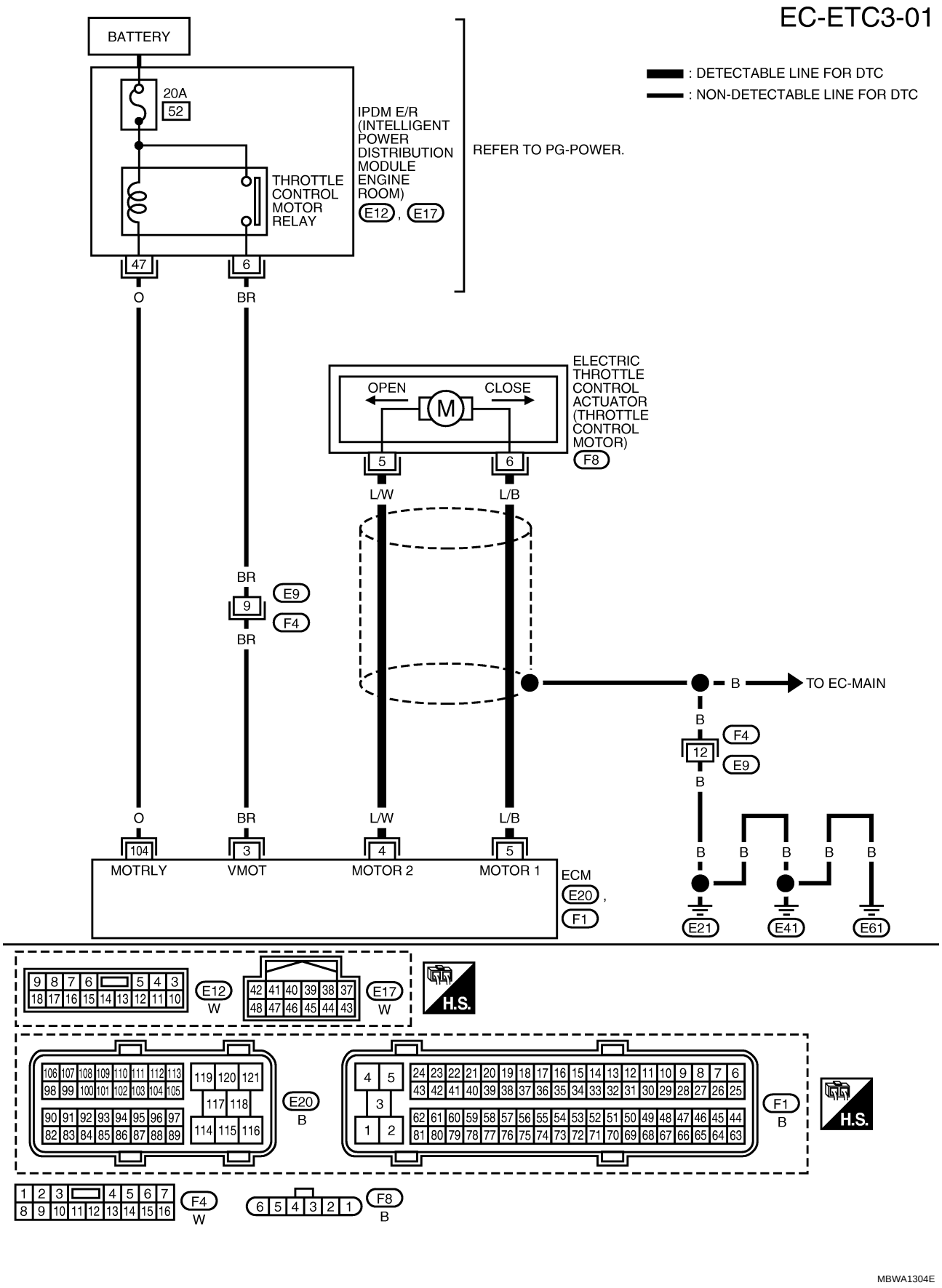


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

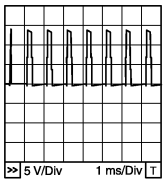
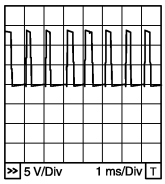
GBS000NS



MBWA1304E

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

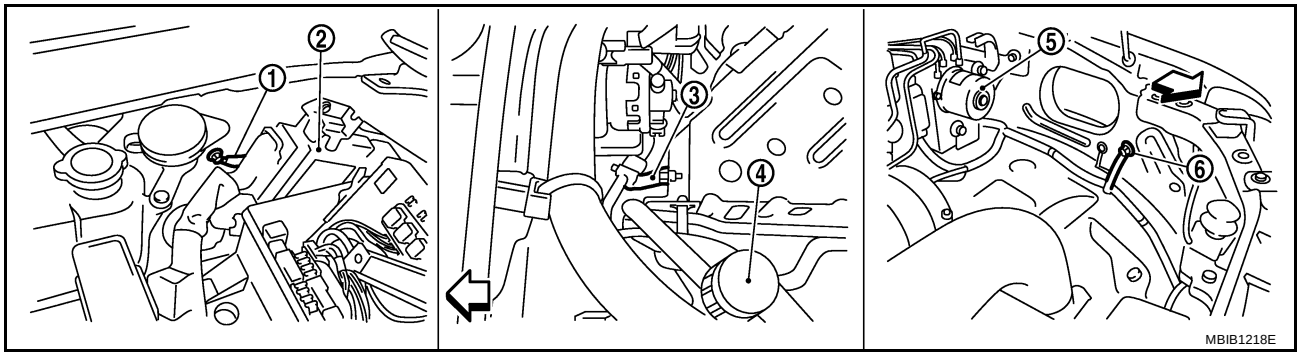
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000NT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

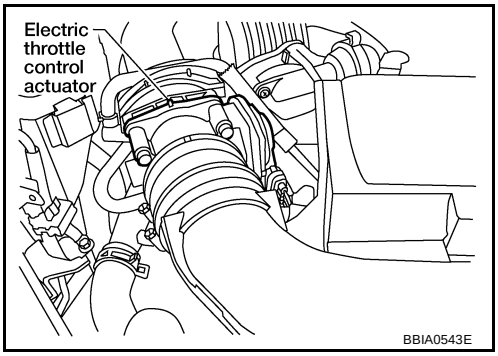
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C hi-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

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

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-327, "Component Inspection" .

OK or NG

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

4. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

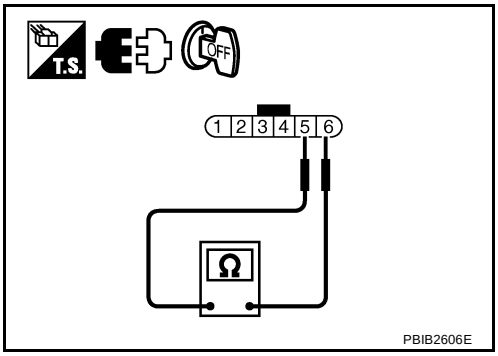
Component Inspection

GBS000NU

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-71, "Throttle Valve Closed Position Learning" .
5. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000NV

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

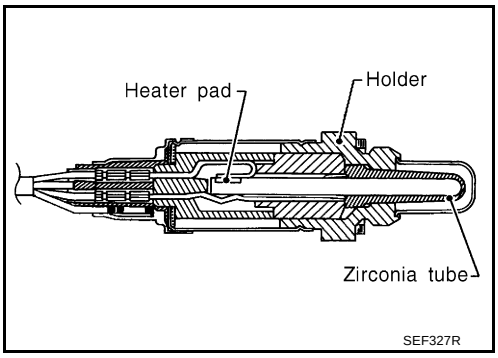
DTC P1146, P1166 HO2S2

PFP:226A0

Component Description

GBS000NW

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

GBS000NX

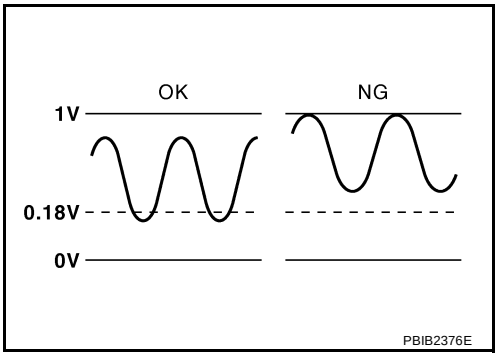
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ←→ RICH

On Board Diagnosis Logic

GBS000NY

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146 (Bank 1)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector
P1166 1166 (Bank 2)			

DTC Confirmation Procedure

GBS000NZ

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 10 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in Procedure for COND1.

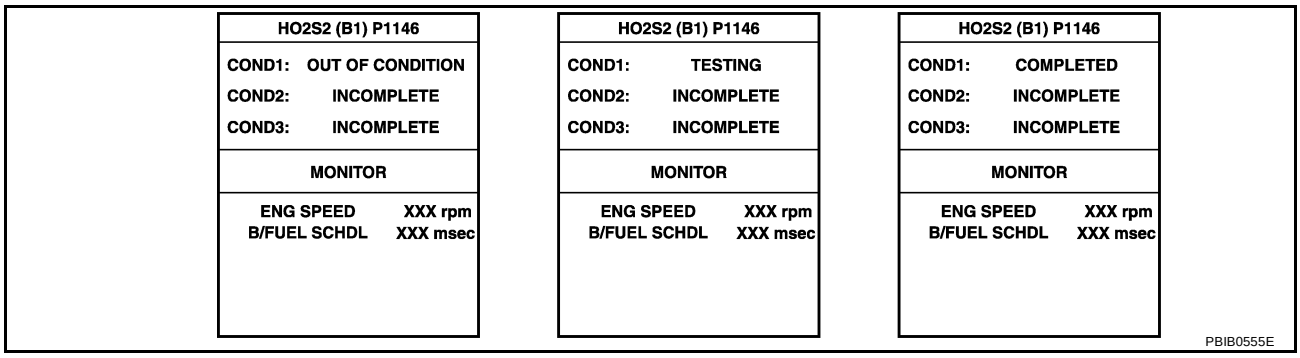
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "HO2S2 (B1) P1146" or "HO2S2 (B2) P1166" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three 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.
9. 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 "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position



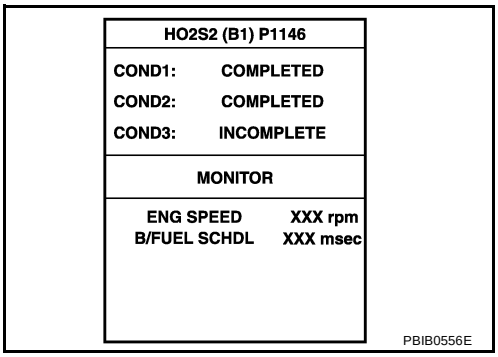
NOTE:

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

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T models only) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

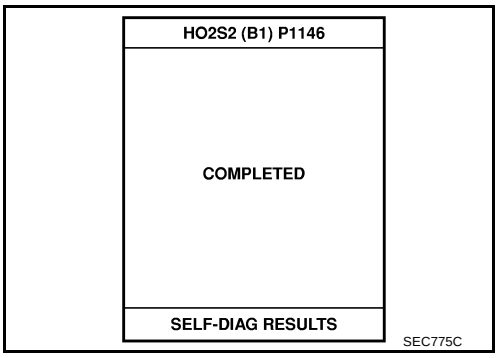
   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.



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 EC-335, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.



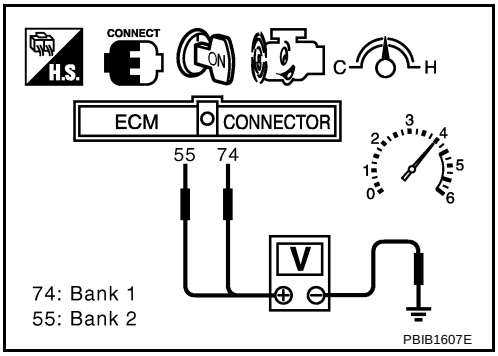
Overall Function Check

GBS000O0

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

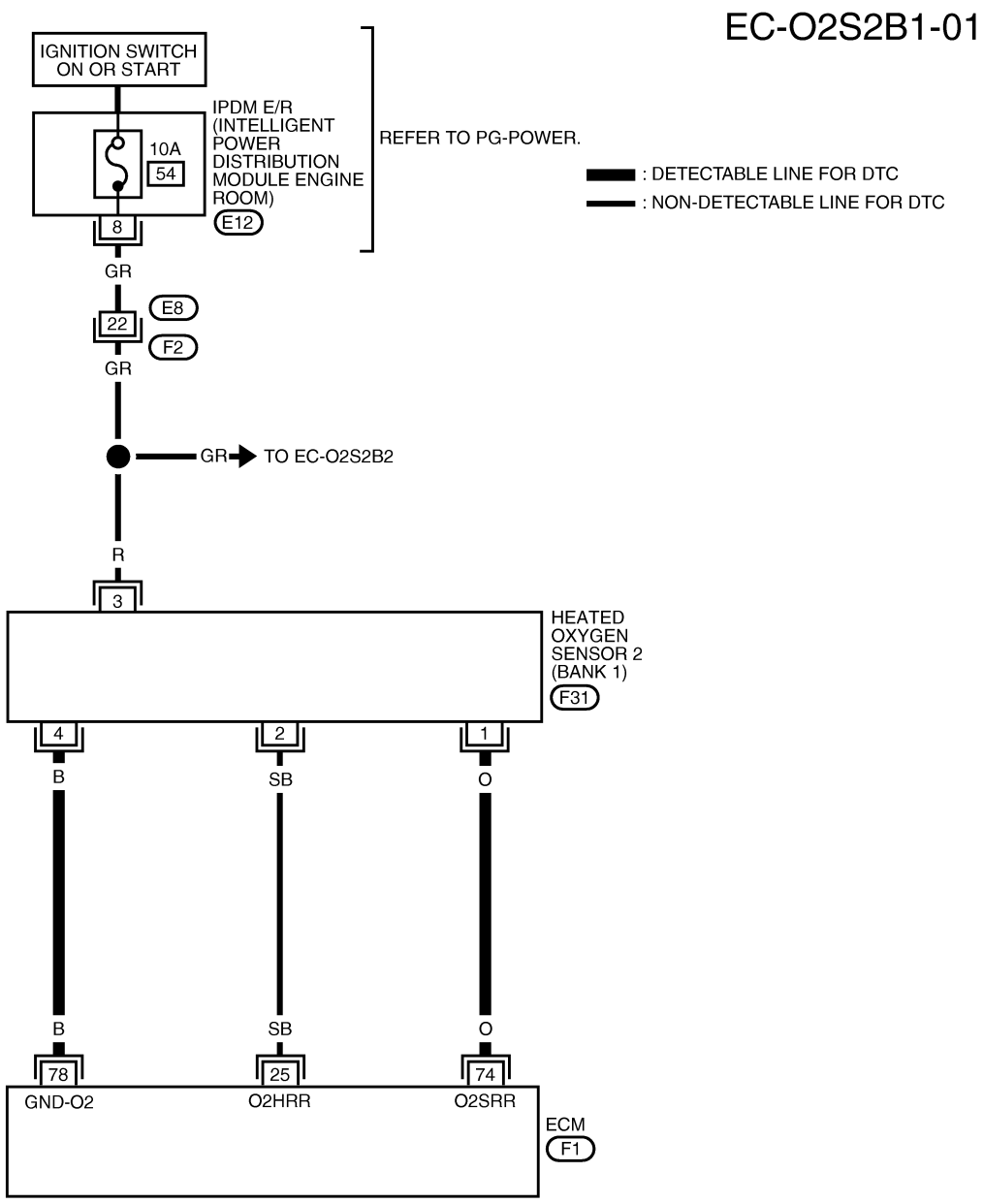
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.18V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, go to EC-335, "Diagnostic Procedure" .

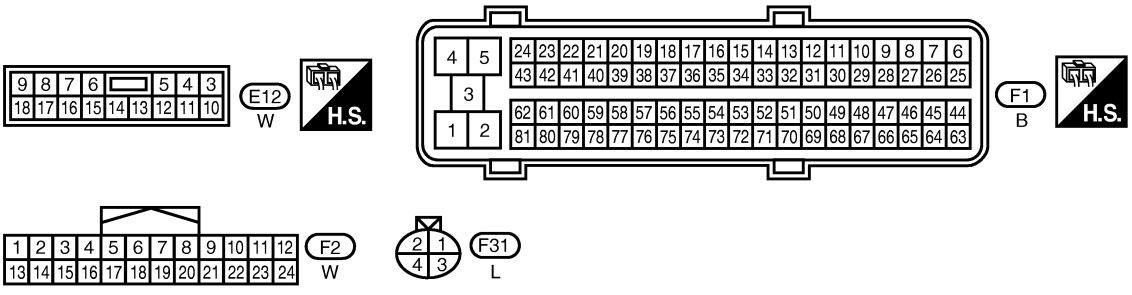


Wiring Diagram

GBS000O1

BANK 1





MBWA1283E

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

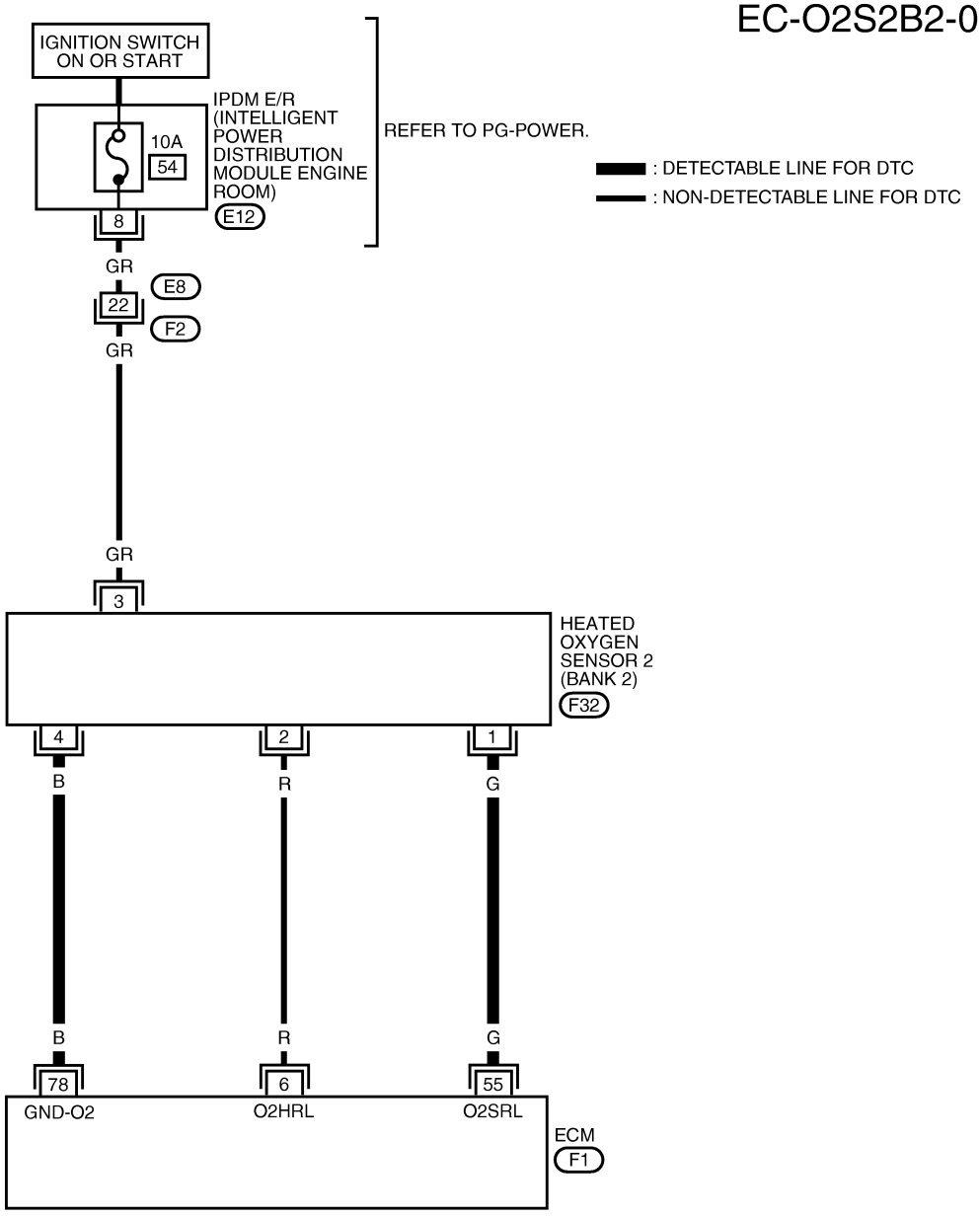
CAUTION:

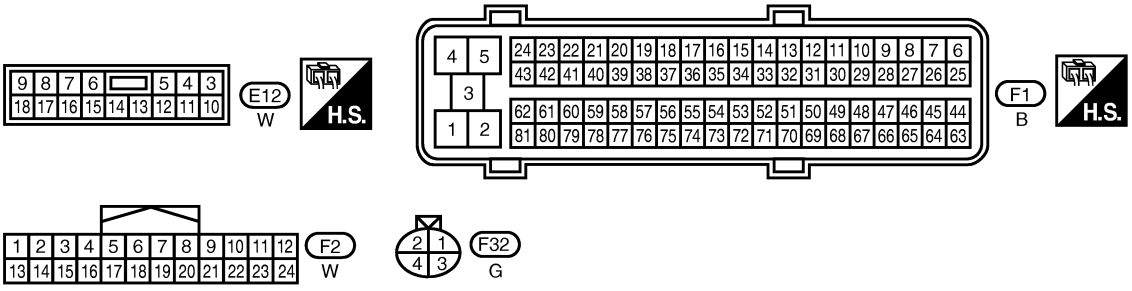
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





MBWA1284E

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

CAUTION:

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

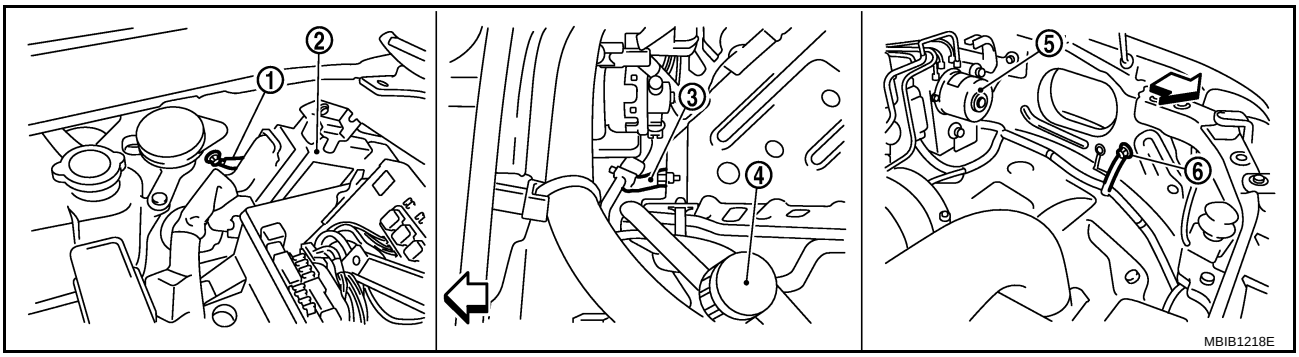
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000O2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

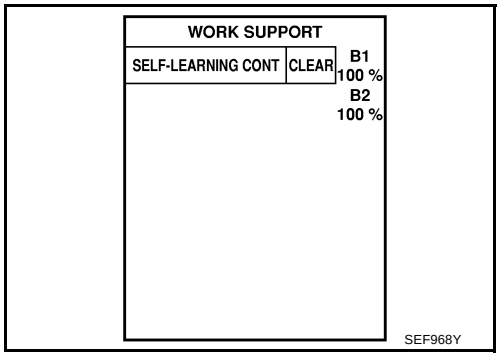
OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

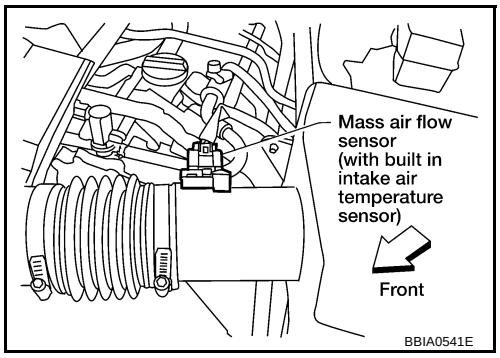
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

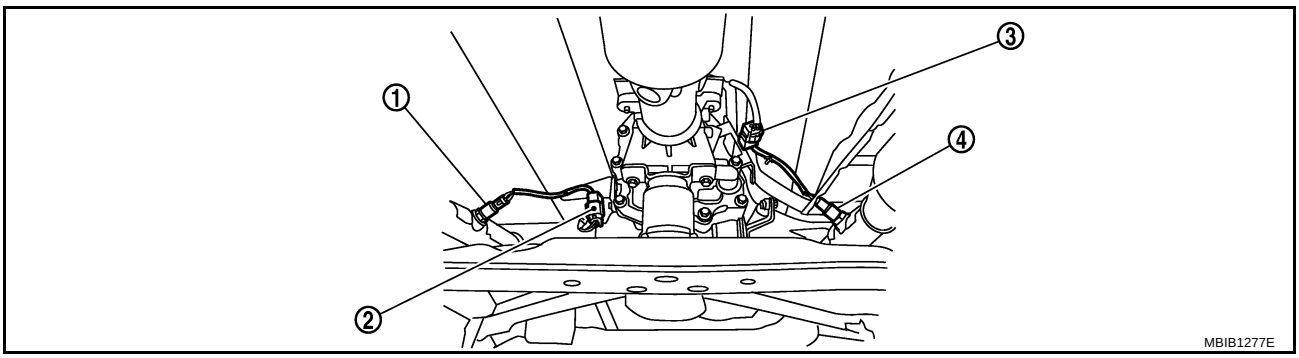


Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-219 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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



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

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	1
P1166	55	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM	Sensor	
P1146	74	1	1
P1166	55	1	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-338, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000O3

HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

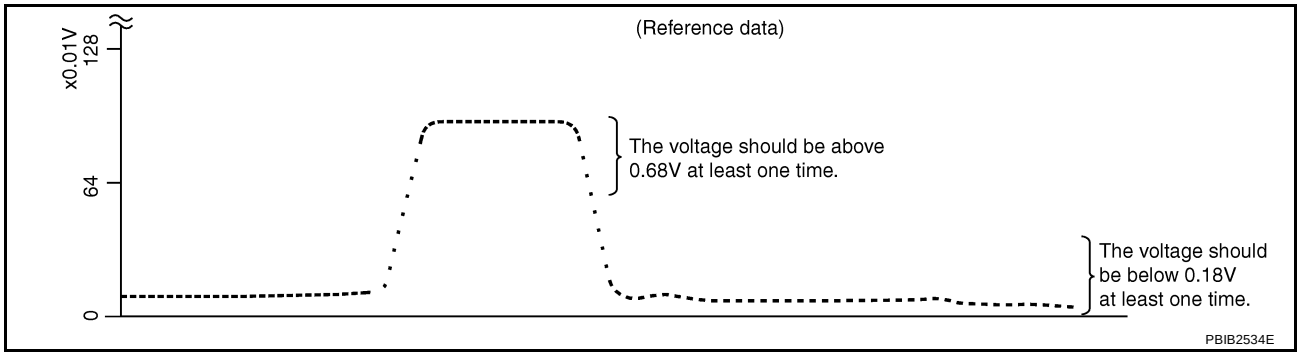
SEF174Y

6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V
HO2S2 (B2)	XXX V

PBIB1672E

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

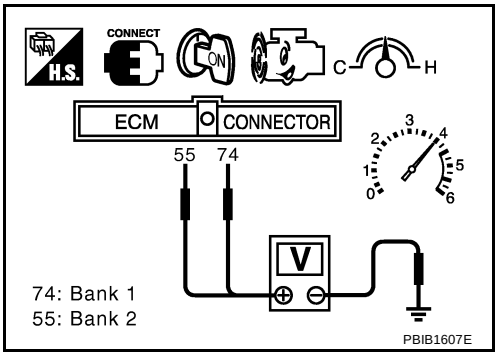
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

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

Removal and Installation

GBS000O4

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

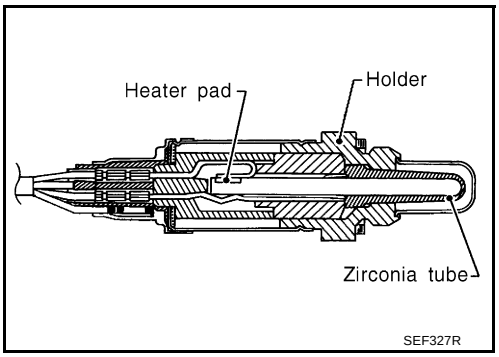
DTC P1147, P1167 HO2S2

PFP:226A0

Component Description

GBS000O5

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

GBS000O6

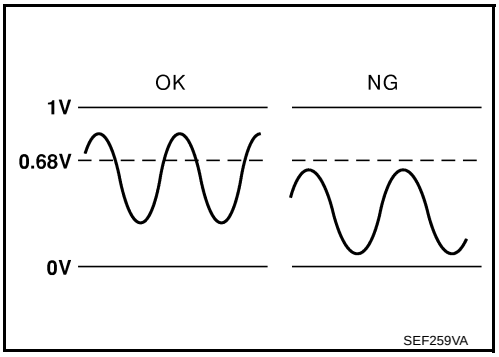
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ←→ RICH

On Board Diagnosis Logic

GBS000O7

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147 (Bank 1)	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks
P1167 1167 (Bank 2)			

DTC Confirmation Procedure

GBS000O8

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 10 seconds before conducting the next test.

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in Procedure for COND1.

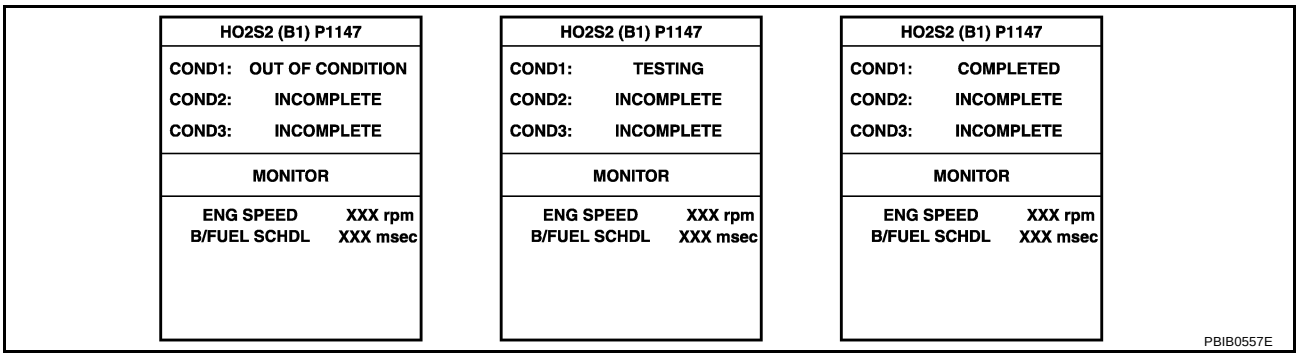
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "HO2S2 (B1) P1147" or "HO2S2 (B2) P1167" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three 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.
9. 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 "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position

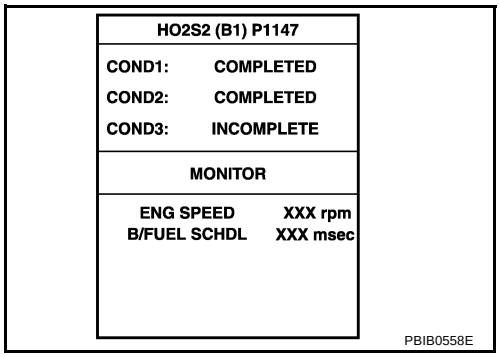


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.**

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T models only) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

   NOTE:
   If “COMPLETE” 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.



Procedure for COND3

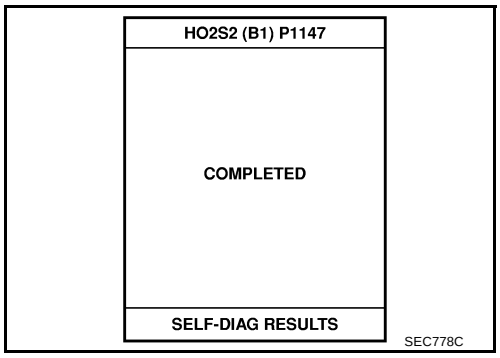
1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-346, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II

c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.

d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3 in Procedure for COND 1.



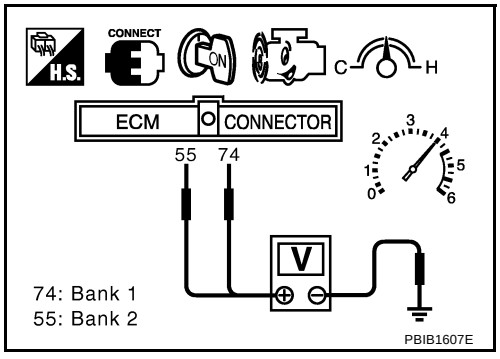
Overall Function Check

GBS000O9

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

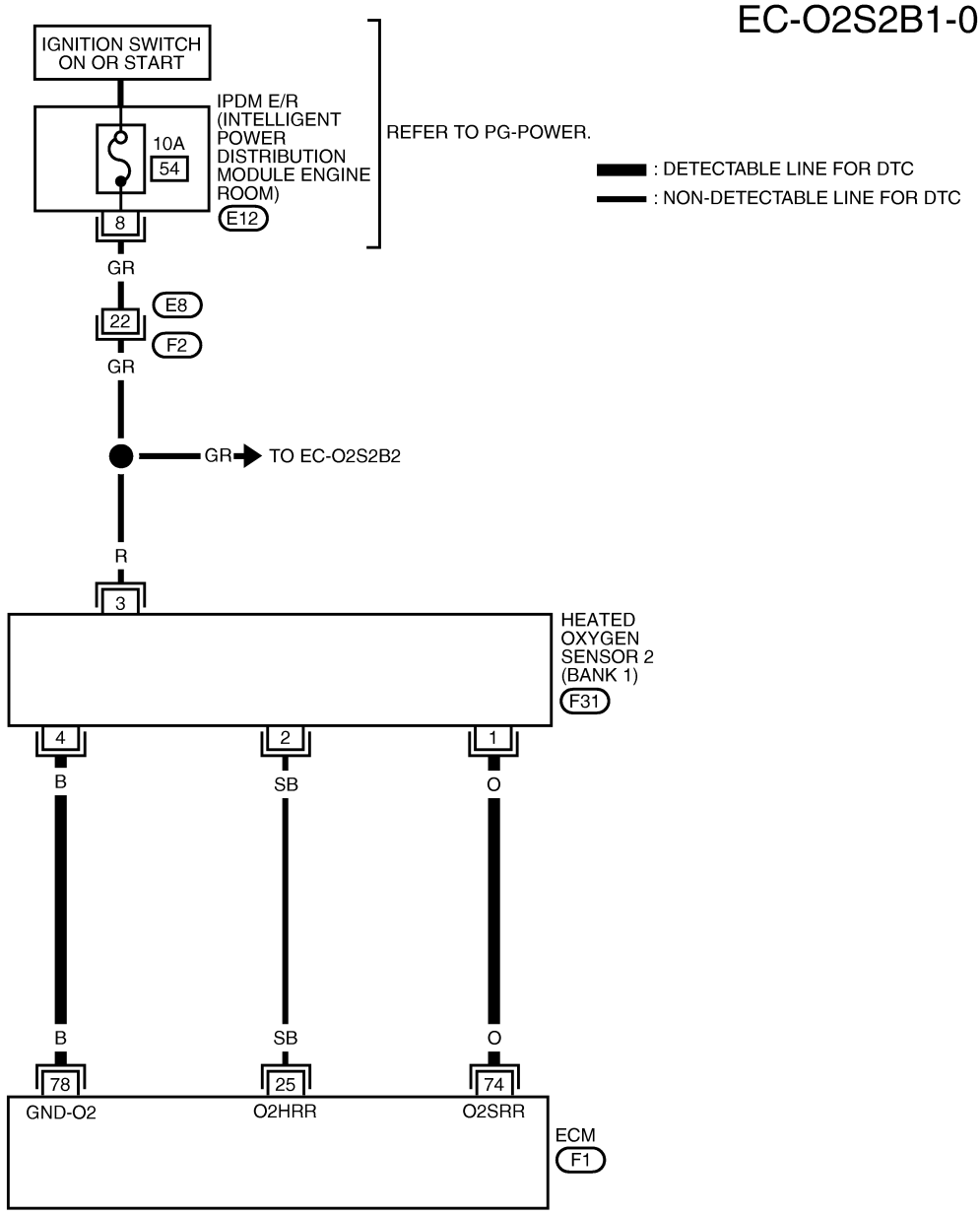
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-346, "Diagnostic Procedure" .

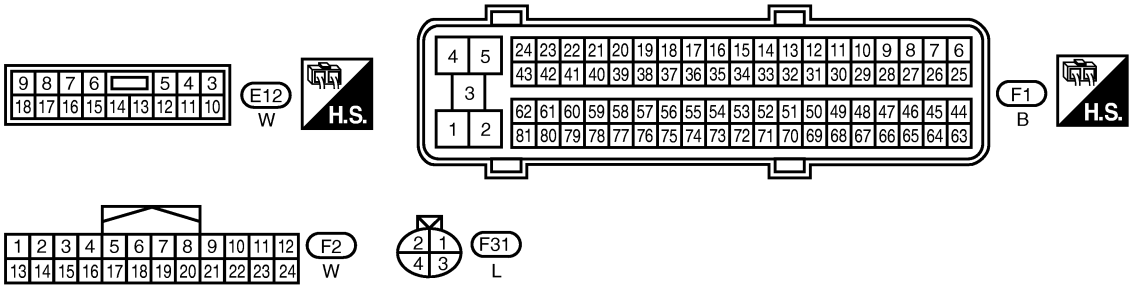


Wiring Diagram
BANK 1

GBS000OA

EC-O2S2B1-01





MBWA1283E

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

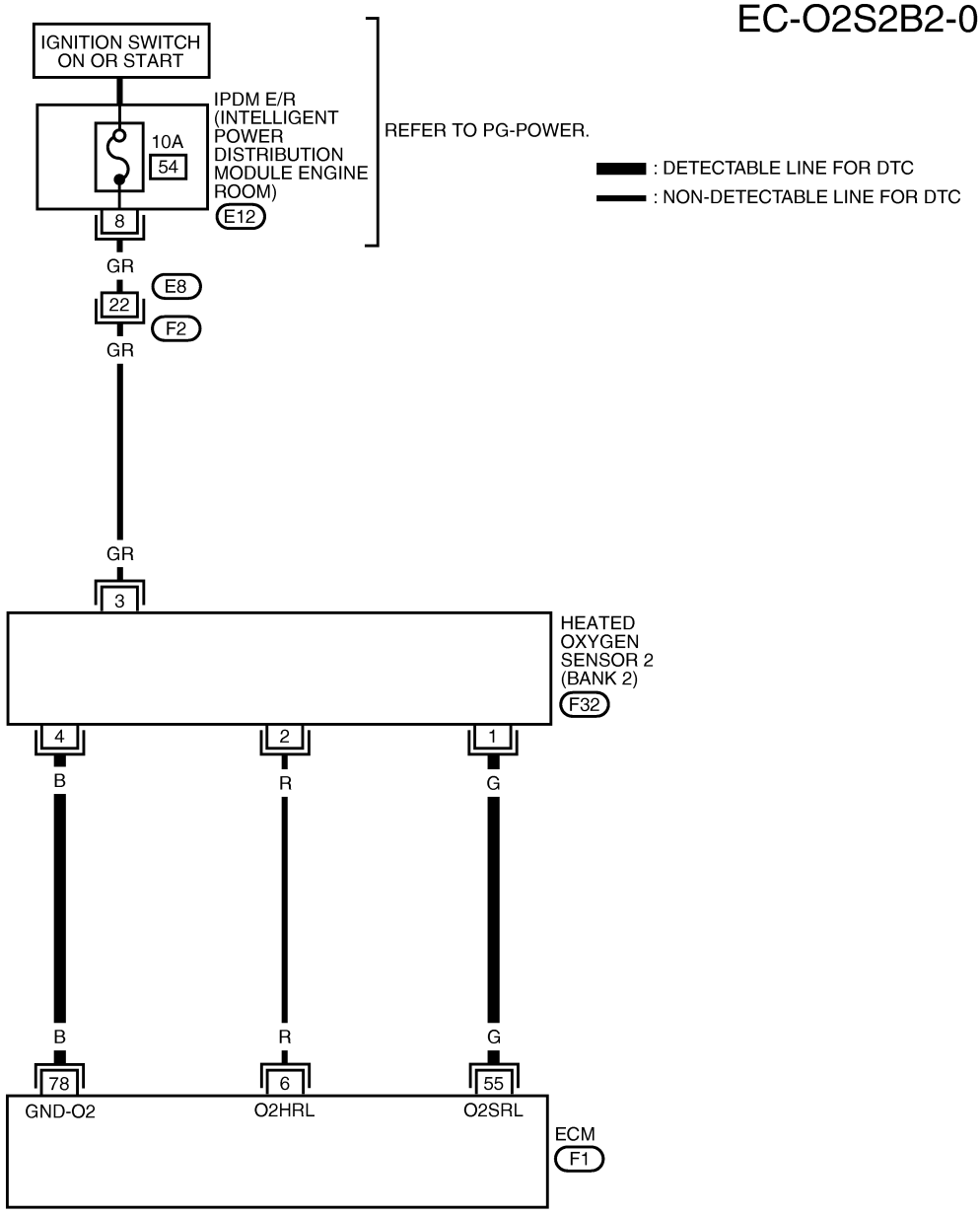
CAUTION:

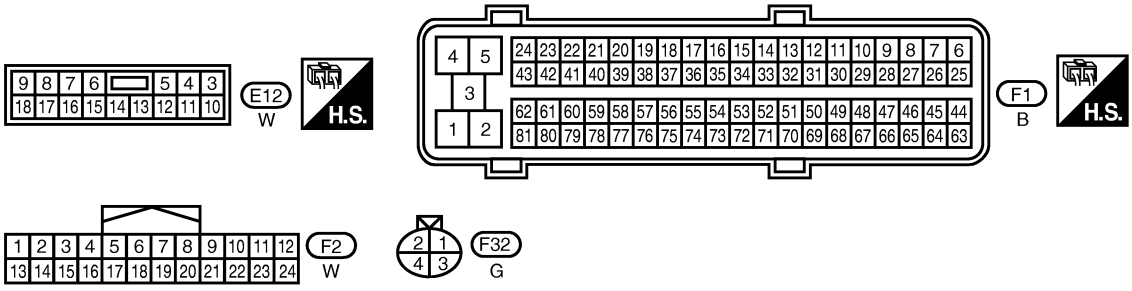
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





MBWA1284E

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

CAUTION:

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

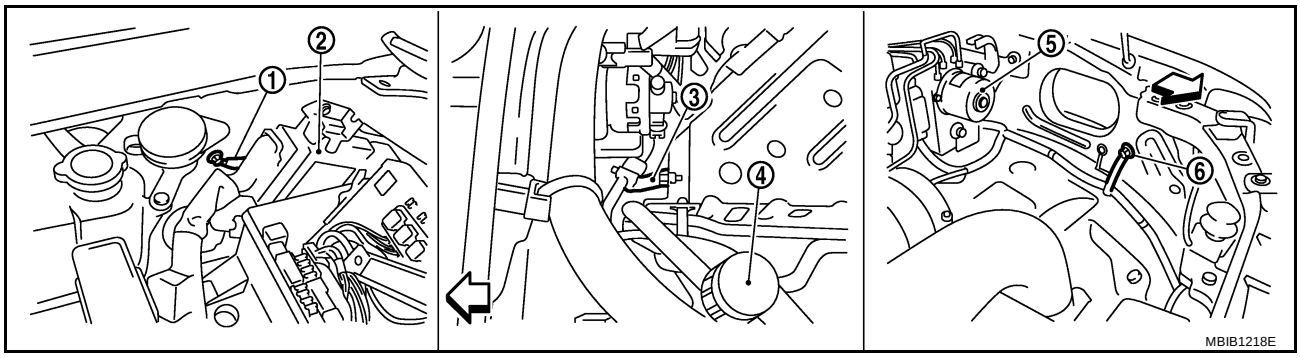
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: after warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000OB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

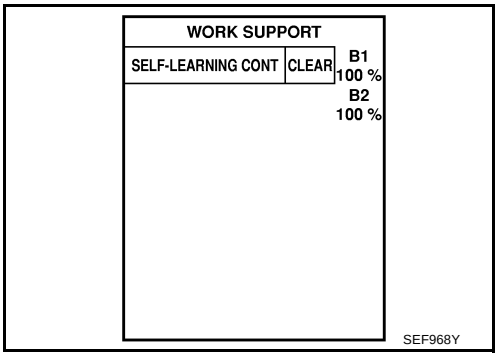
OK or NG

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

2. CLEAR THE SELF-LEARNING DATA

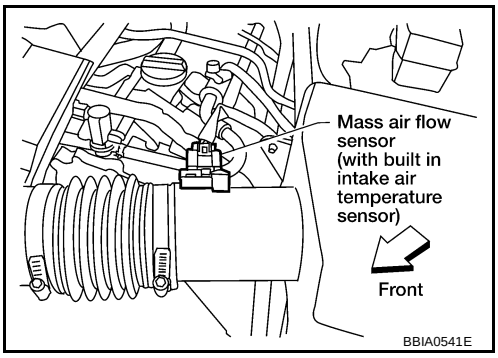
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

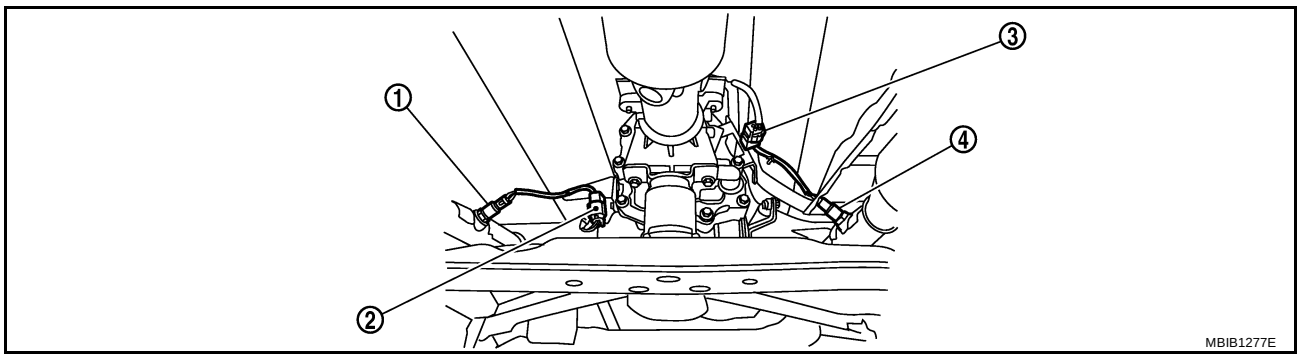


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171or P0174. Refer to EC-207 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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



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

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	74	1	1
P1167	55	1	2

Continuity should exist.

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

DTC	Terminals		Bank
	ECM	Sensor	
P1147	74	1	1
P1167	55	1	2

Continuity should not exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-349, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

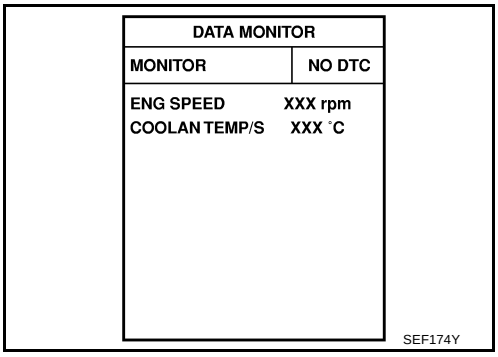
Component Inspection

GBS000OC

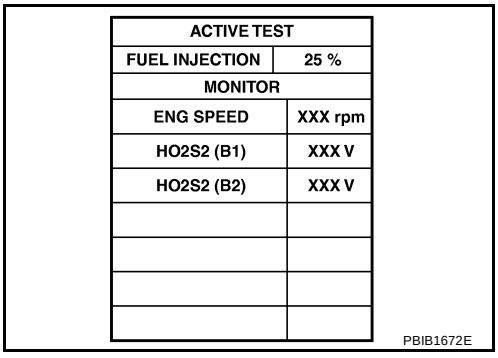
HEATED OXYGEN SENSOR 2

With CONSULT-II

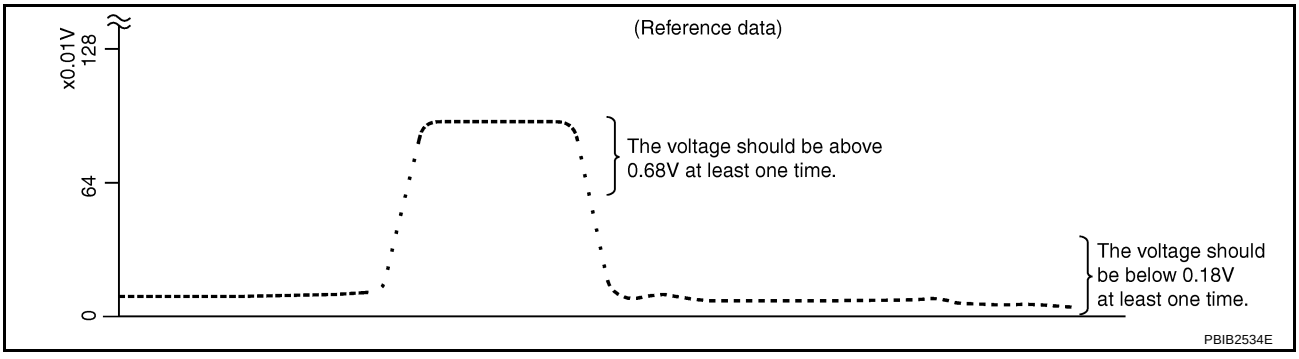
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.



6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.



7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

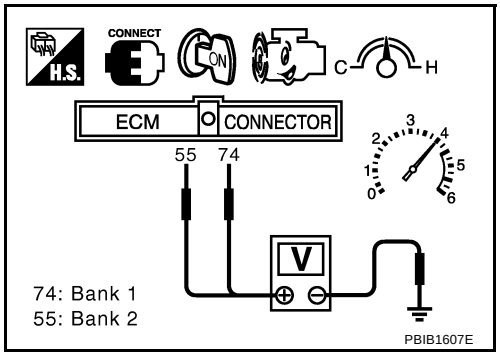
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

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

Removal and Installation

GBS000OD

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

Description

GBS000OM

SYSTEM DESCRIPTION

NOTE:
If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

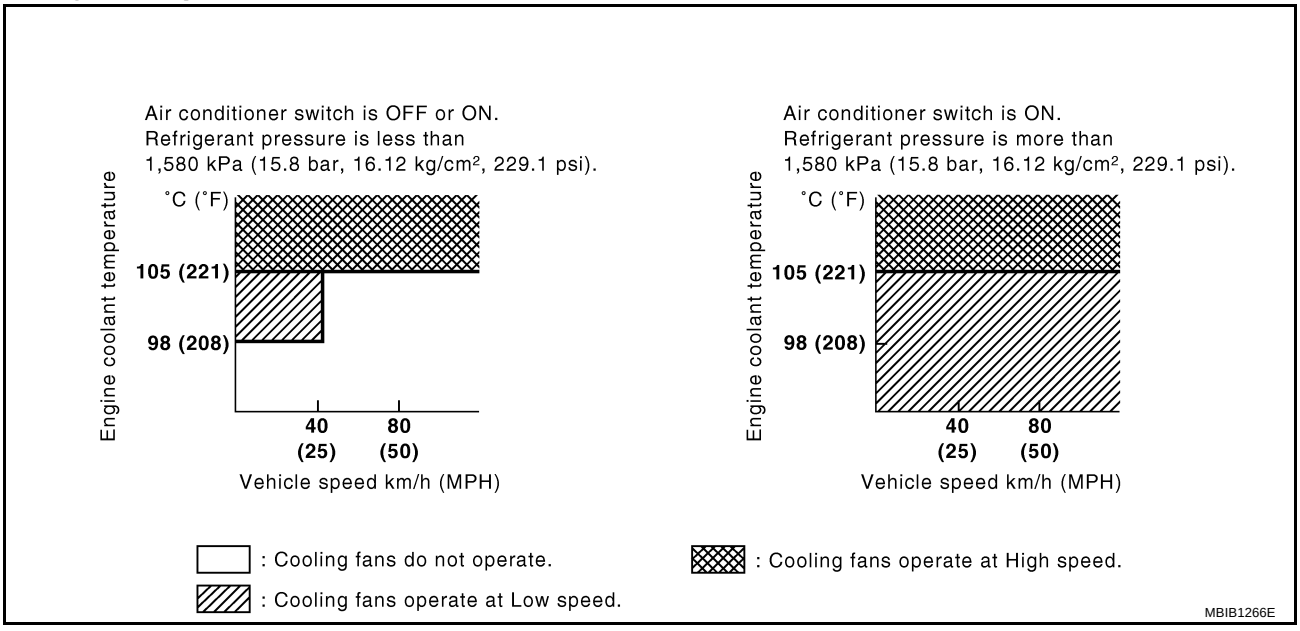
Cooling Fan Control

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage*1		
Wheel sensor	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low (LOW)	1	3
High (HI)	2	3

CONSULT-II Reference Value in Data Monitor Mode

GBS000ON

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

On Board Diagnosis Logic

GBS000OO

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant level was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● IPDM E/R ● Cooling fan ● Cooling fan (Crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Reservoir tank ● Reservoir tank cap ● Water pump ● Thermostat For more information, refer to EC-359, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-17, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-20, "Changing 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-15, "Engine Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

GBS000OP

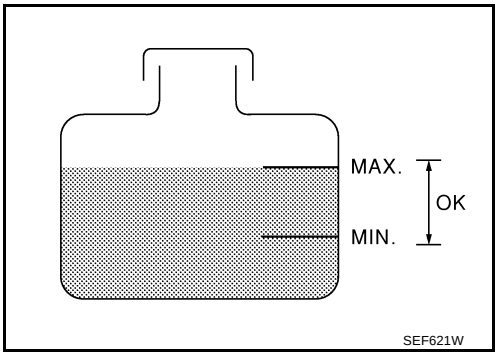
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:
Never remove a radiator cap and/or a reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.

   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-357, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-357, "Diagnostic Procedure" .
3. Turn ignition switch ON.



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-357, "Diagnostic Procedure" .

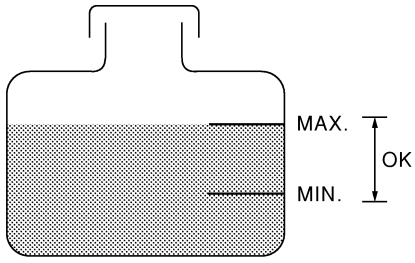
ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

WITH GST

1. Check the coolant level in the reservoir tank and radiator.

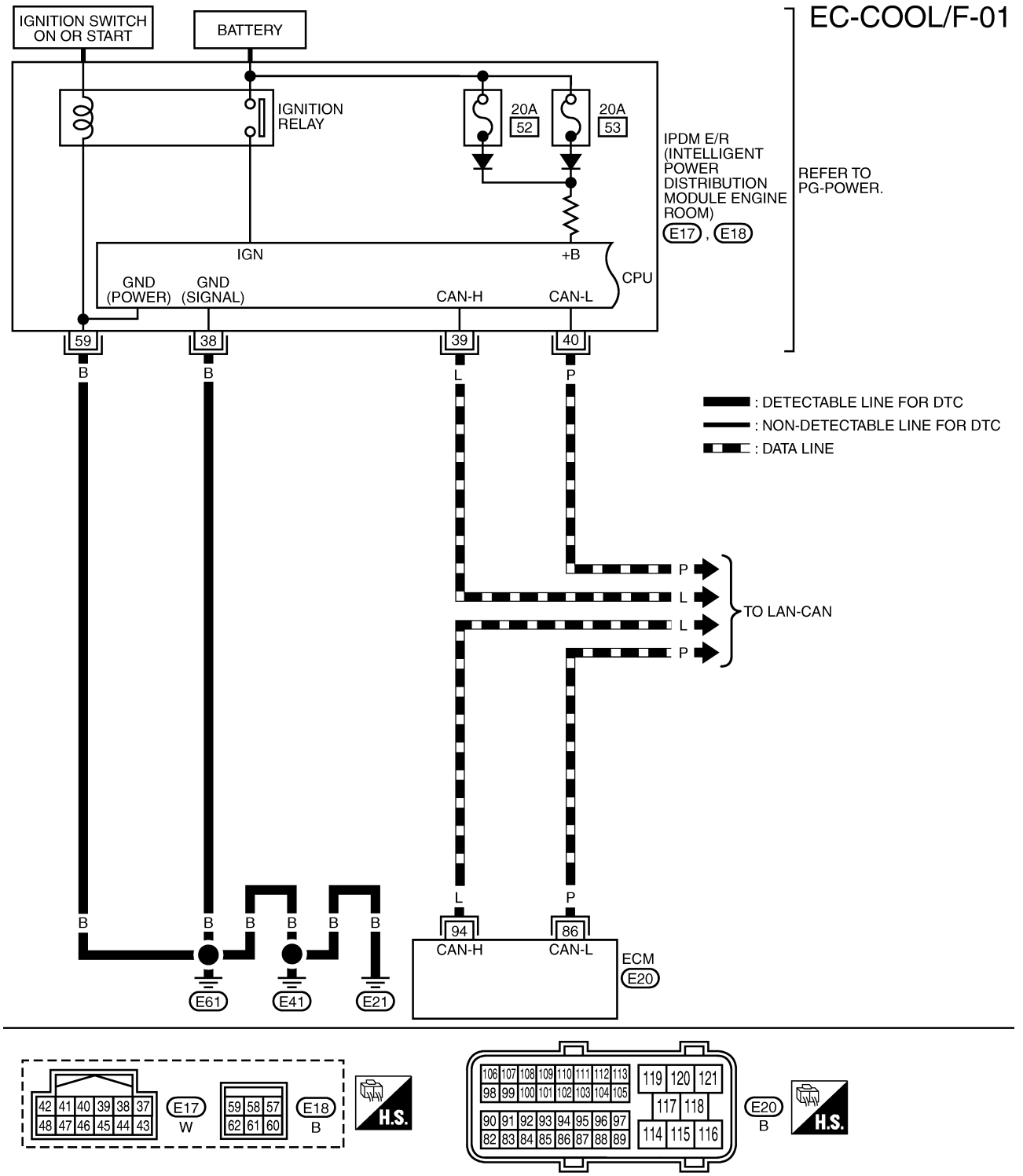
   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-357, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-357, "Diagnostic Procedure" .
3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-19, "Auto Active Test" .
4. If NG, go to EC-357, "Diagnostic Procedure" .



SEF621W

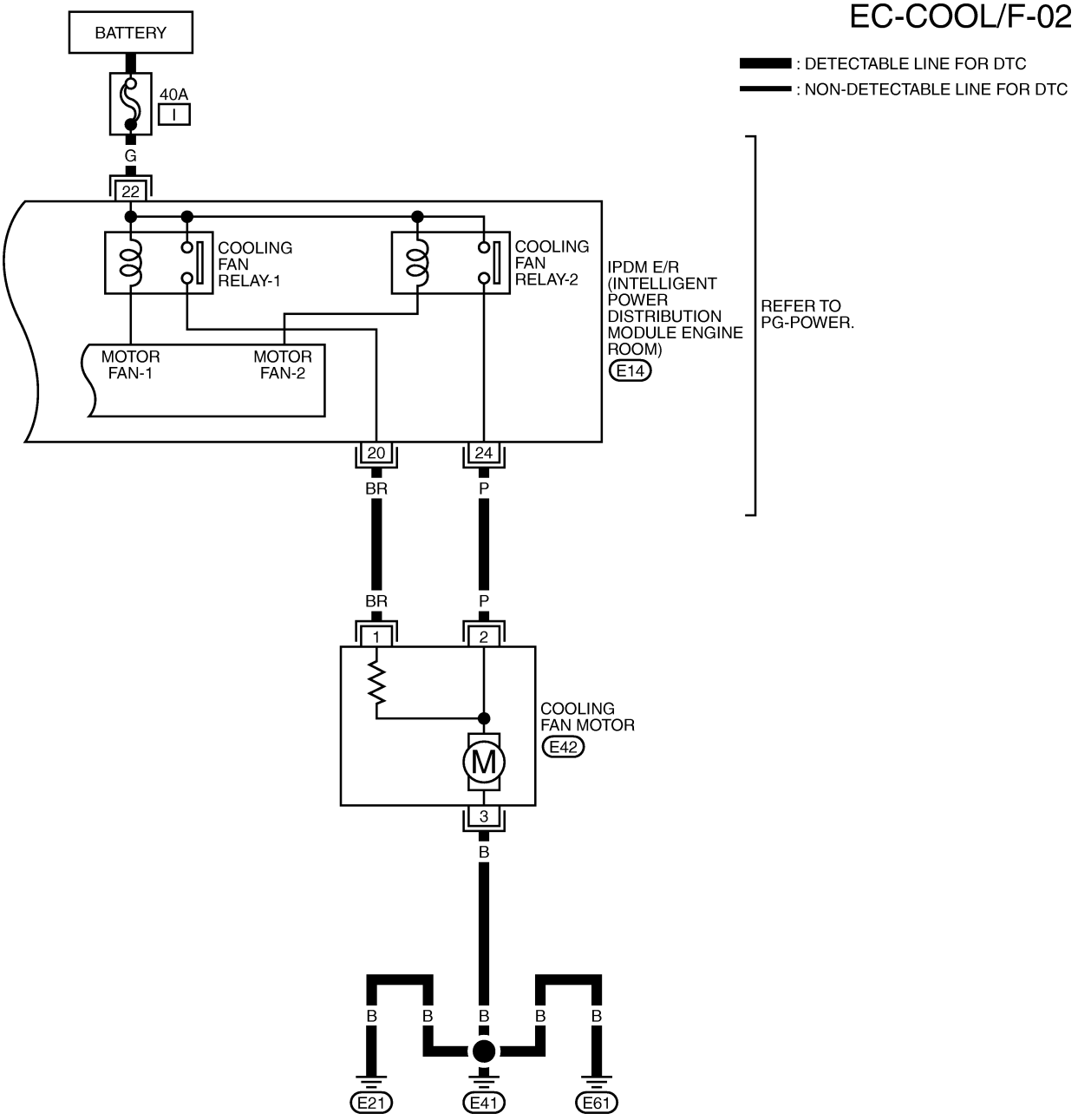
Wiring Diagram

GBS000OQ



MBWA1305E

EC-COOL/F-02



MBWA1384E

Diagnostic Procedure

GBS000OR

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

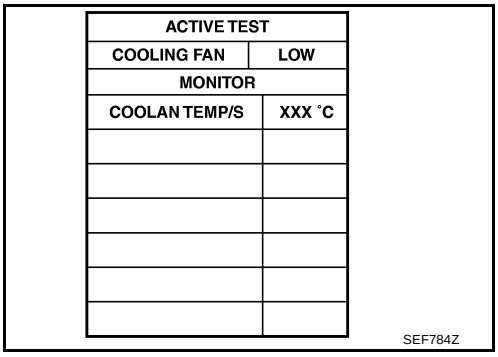
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Check cooling fan (crankshaft driven). Refer to CO-21, "Removal and Installation (Crankshaft Driven Type)" .

2. CHECK COOLING FAN OPERATION

With CONSULT-II

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that cooling fan operate at each speed (LOW/HI).



OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-358, "PROCEDURE A" .)

3. CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PG-19, "Auto Active Test" .
2. Make sure that cooling fan operate at each speed (Low/High).

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-358, "PROCEDURE A" .)

4. CHECK COOLING SYSTEM FOR LEAK

Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

5. CHECK RESERVOIR TANK CAP

Refer to CO-15, "Checking Reservoir Tank Cap" .

OK or NG

OK >> GO TO 6.
NG >> Replace reservoir tank cap.

6. CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to CO-27, "WATER INLET AND THERMOSTAT ASSEMBLY" .
- Engine coolant temperature sensor. Refer to EC-179, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-359, "Main 12 Causes of Overheating" .

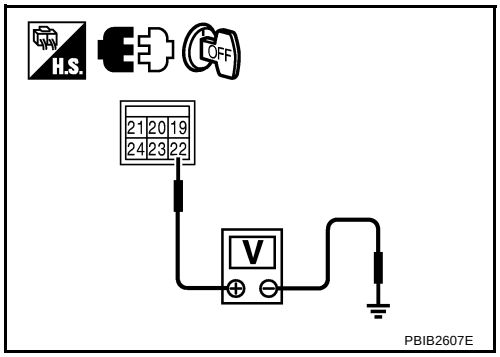
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLILNG FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E14.
3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- 40A fusible link
- Harness for open or short between IPDM E/R and battery

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

3. CHECK IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors E17, E18.
2. Check harness continuity between IPDM E/R terminal 38, 59 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

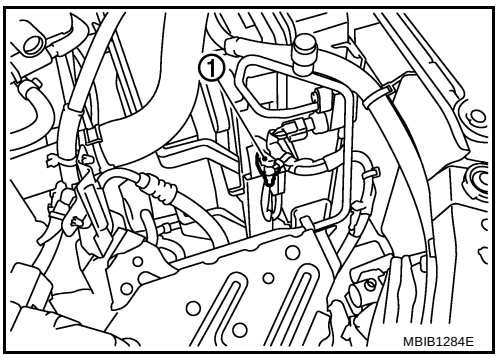
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector (1).
2. Check harness continuity between the following;
   cooling fan motor terminal 1 and IPDM E/R terminal 20,
   cooling fan motor terminal 2 and IPDM E/R terminal 24.
   Refer to Wiring Diagram.

Continuity should exist.



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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COOLING FAN MOTER GROUND CIRCUIT FOR OPEN OR SHORT

1. Check harness continuity between cooling fan motor terminal 3 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK COOLING FAN MOTOR

Refer to EC-360, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motors.

7. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connector.

Main 12 Causes of Overheating

GBS000OS

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	MA-15
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-17
	4	● Reservoir tank cap	● Pressure tester	59 - 117.8 kPa (0.59 - 1.18 bar, 0.6 - 1.2 kg/cm^2 , 9 - 17 psi) (Limit)	CO-15
ON*2	5	● Coolant leaks	● Visual	No leaks	CO-10

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	CO-27
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-351).
ON*2	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	See CO-21 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	MA-17
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	MA-17
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-93
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	EM-107

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-6, "OVERHEATING CAUSE ANALYSIS" .

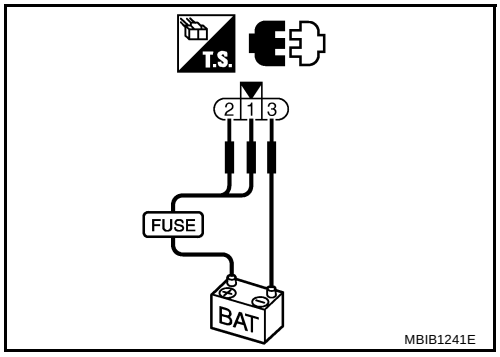
Component Inspection

GBS000OT

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low	1	3
High	2	3



Cooling fan motor should operate.
If NG, replace cooling fan motor.

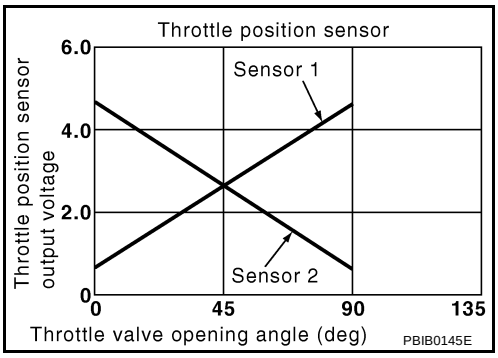
DTC P1225 TP SENSOR

PFP:16119

Component Description

GBS000OU

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



On Board Diagnosis Logic

GBS000OV

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

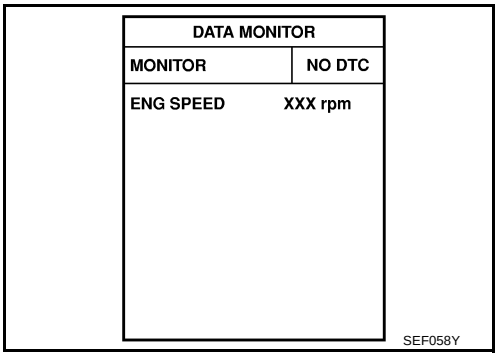
DTC Confirmation Procedure

GBS000OW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-362, "Diagnostic Procedure" .



WITH GST

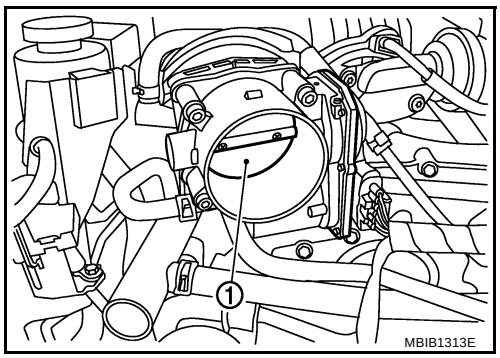
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

GBS000OX

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

GBS000OY

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

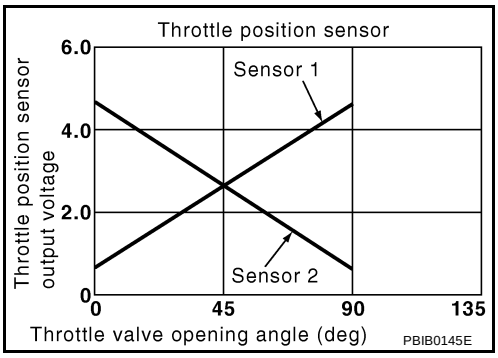
DTC P1226 TP SENSOR

PFP:16119

Component Description

GBS000OZ

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



On Board Diagnosis Logic

GBS000P0

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

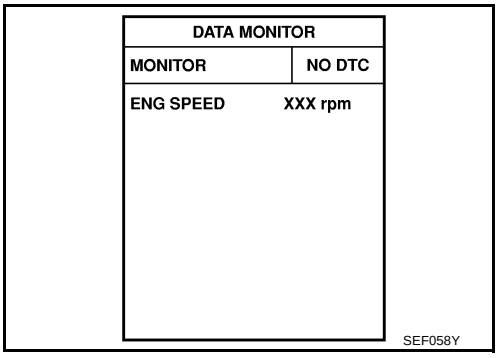
DTC Confirmation Procedure

GBS000P1

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-364, "Diagnostic Procedure"
.



WITH GST

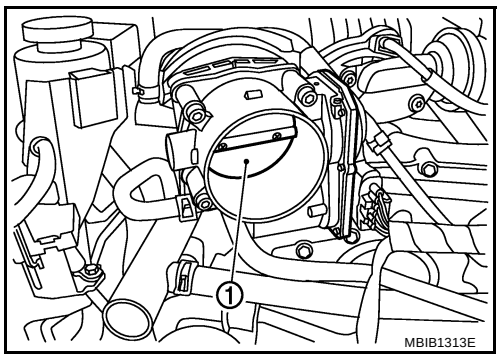
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

GBS000P2

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

GBS000P3

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

GBS000P4

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1) ● EVAP control system pressure sensor ● Power steering pressure sensor ● Refrigerant pressure sensor

FAIL-SAFE MODE

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

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

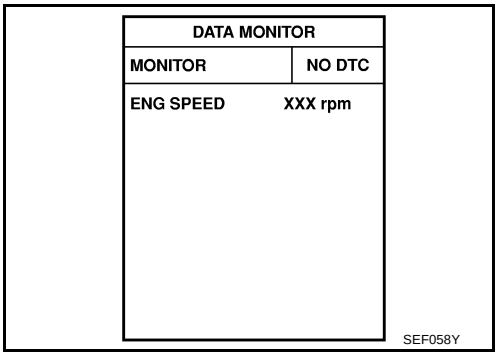
GBS000P5

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-369, "Diagnostic Procedure" .



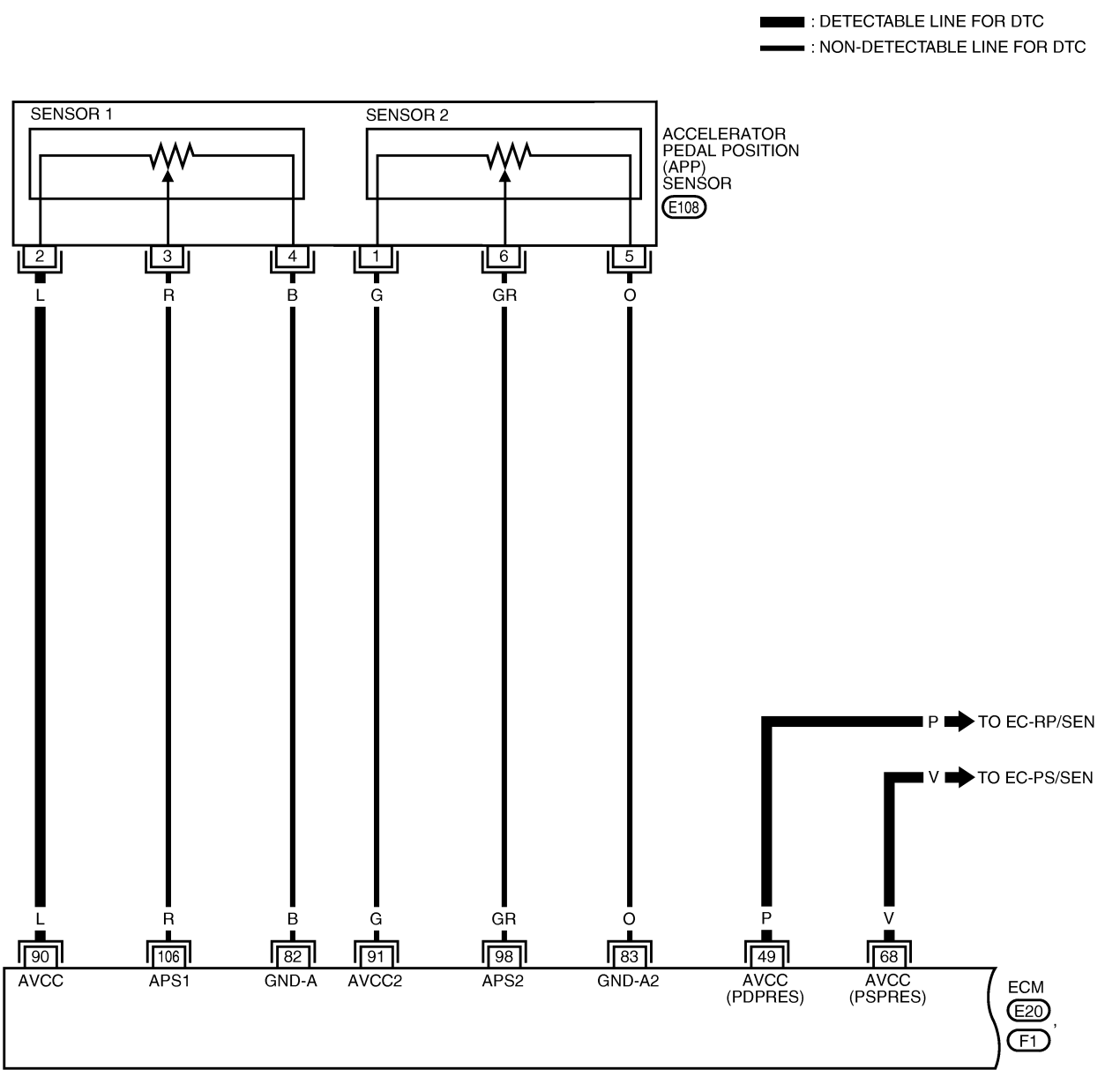
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000P6

EC-SEN/PW-01



MBWA1307E

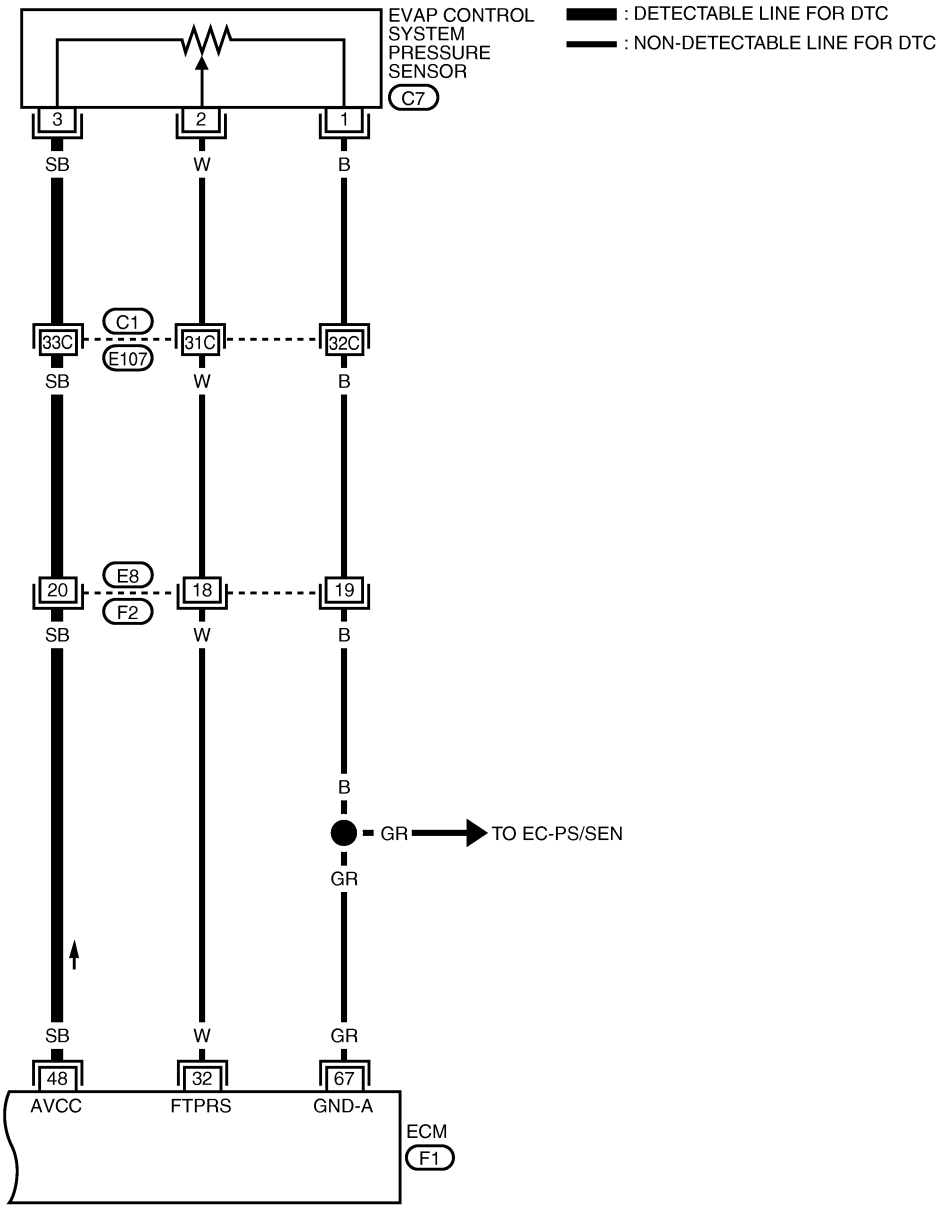
Specification data are reference values and are measured between each terminal and ground.

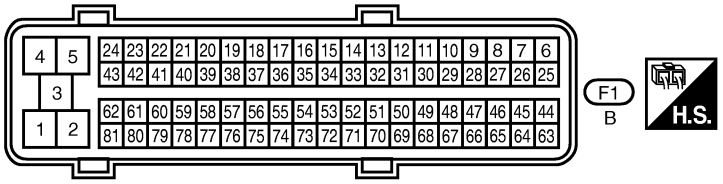
CAUTION:

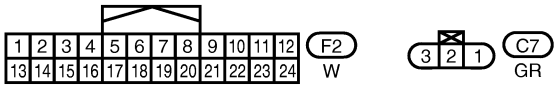
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

EC-SEN/PW-02







REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1295E

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 ECMs transistor. Use a ground other than ECM terminals, such as the ground.

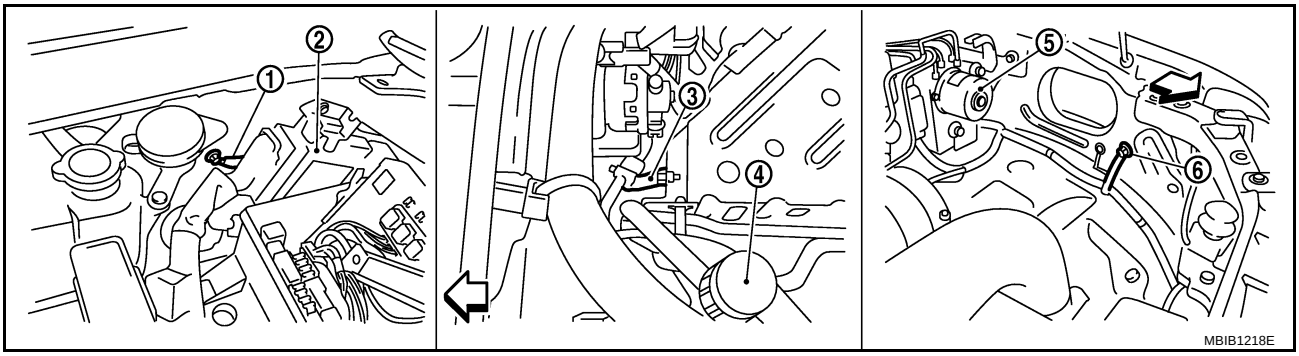
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	W	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000P7

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground three screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

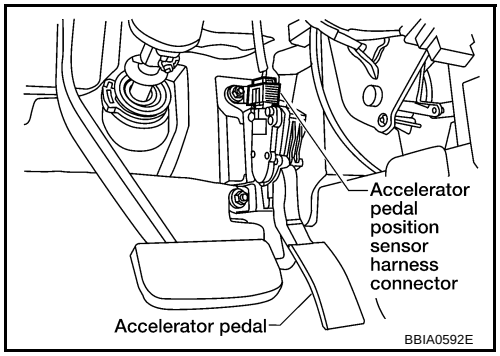
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

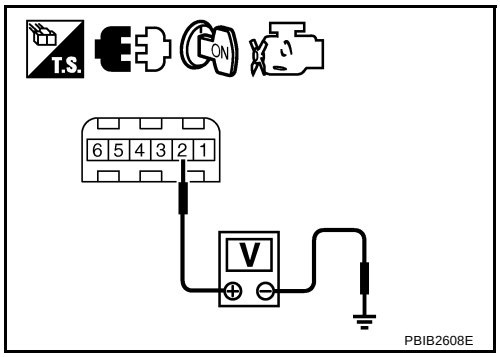
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-366
48	EVAP control system pressure sensor terminal 3	EC-366
49	Refrigerant pressure sensor terminal 3	EC-557
68	PSP sensor terminal 3	EC-284

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

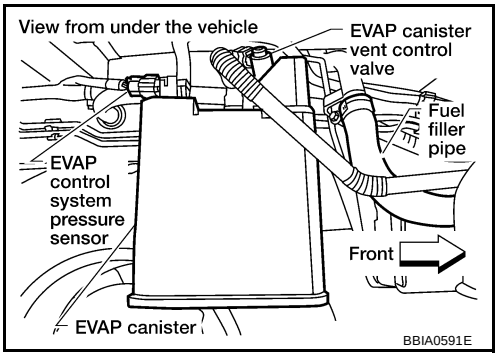
- Refrigerant pressure sensor (Refer to MTC-77, "COMPONENT INSPECTION" .)
- Power steering pressure sensor (Refer to EC-287, "Component Inspection" .)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

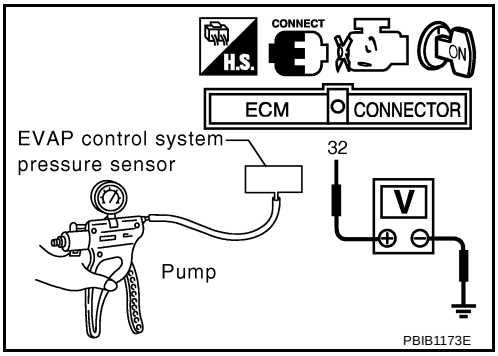
5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**



2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mbar, mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-267, -200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-933 mbar, -700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (1013 mbar, 760 mmHg, 29.92 inHg).**

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

6. CHECK APP SENSOR

Refer to EC-483, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1271, P1281 A/F SENSOR 1

PFP:22693

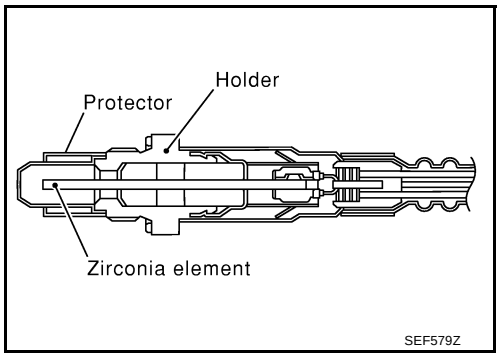
Component Description

GBS000P8

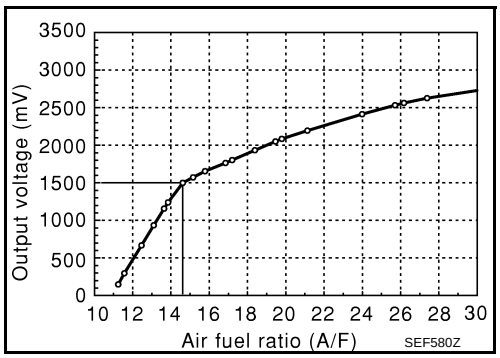
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000P9

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000PA

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 0V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1
P1281 1281 (Bank 2)			

DTC Confirmation Procedure

GBS000PB

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

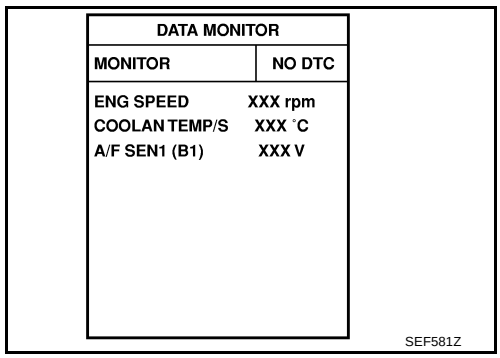
TESTING CONDITION:

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

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 0V, go to EC-377, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



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

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-377, "Diagnostic Procedure" .

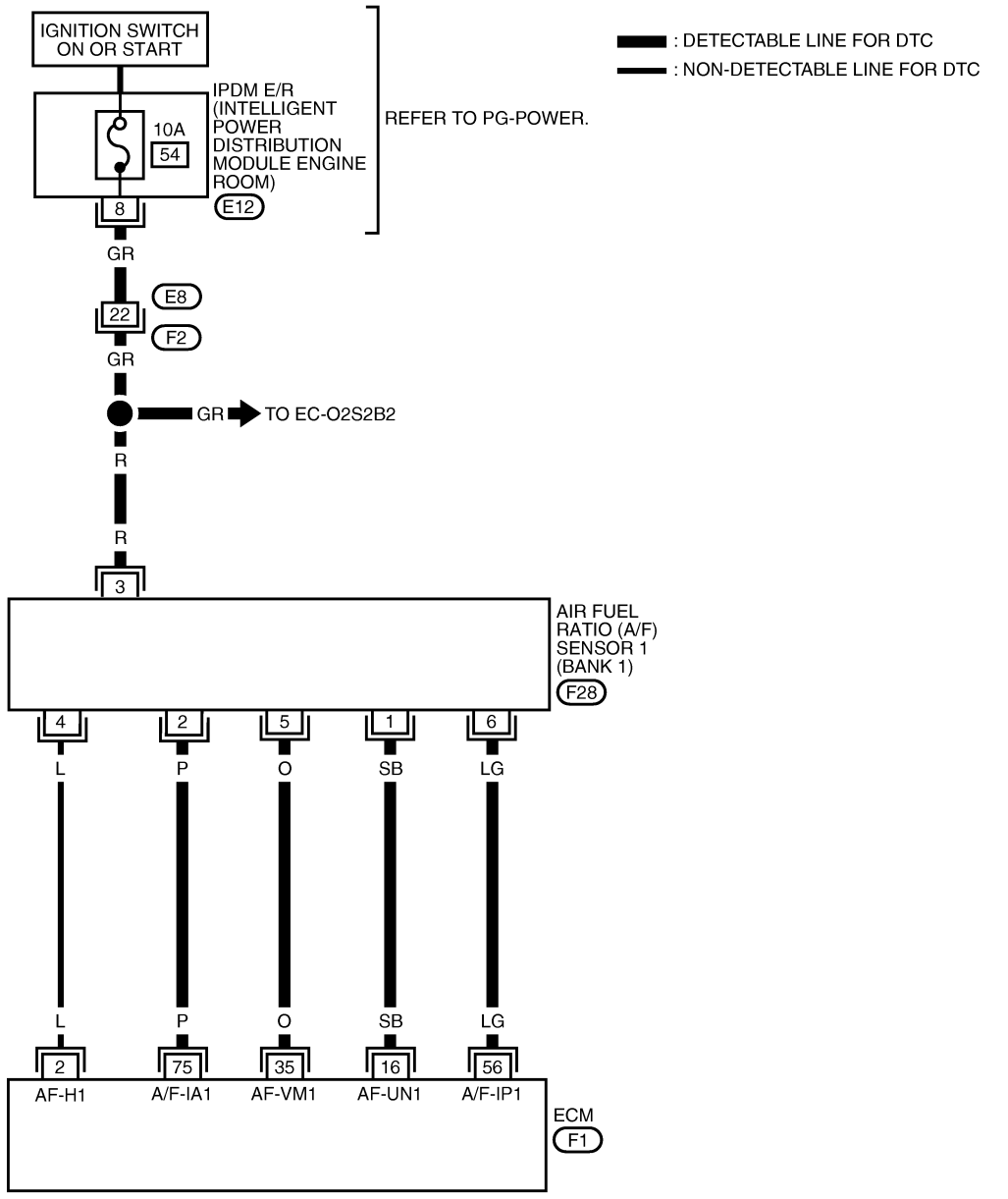
WITH GST

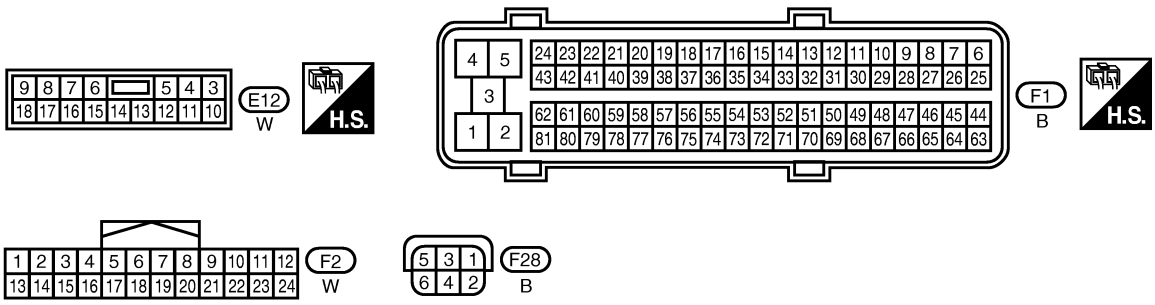
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
BANK 1

GBS000PC

EC-AF1B1-01



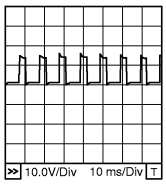


MBWA1336E

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

CAUTION:

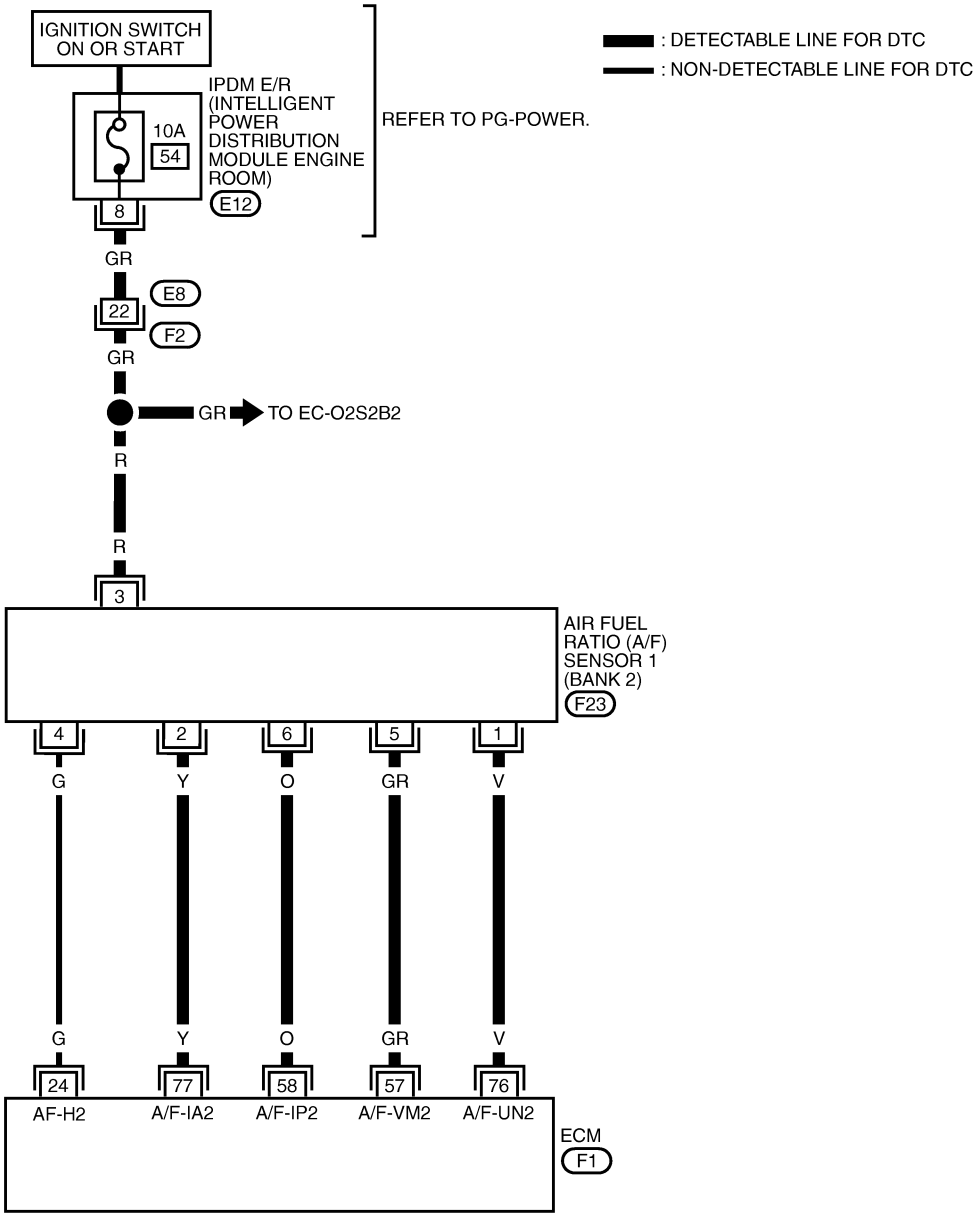
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

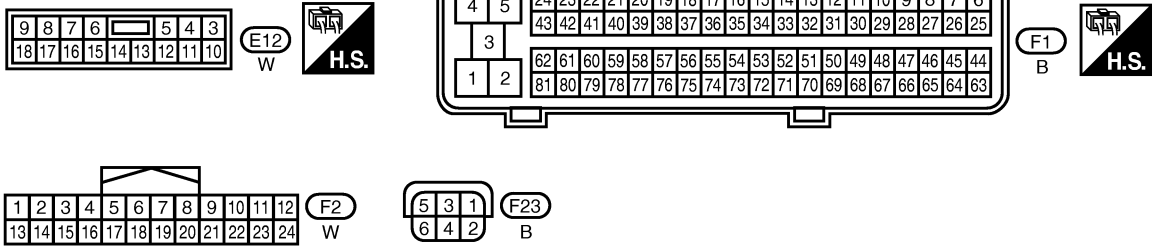
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



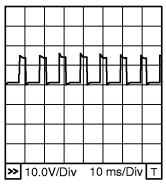


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

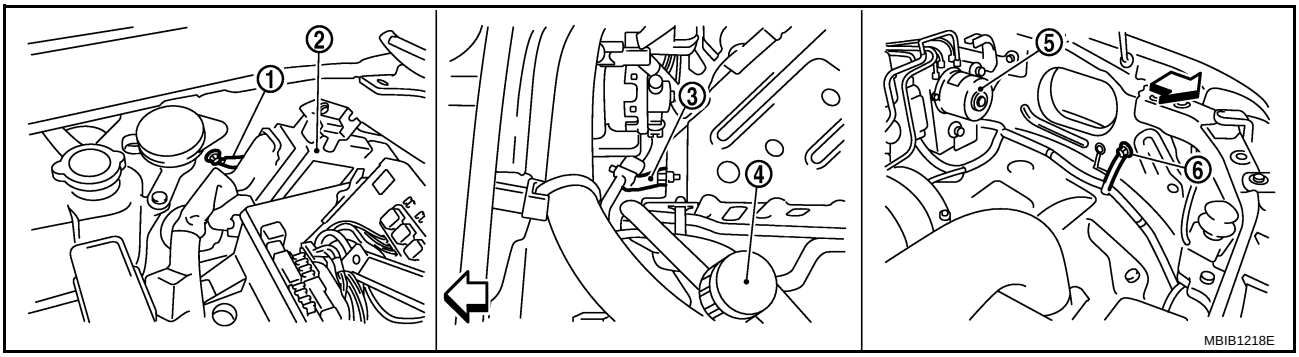
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000PD

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

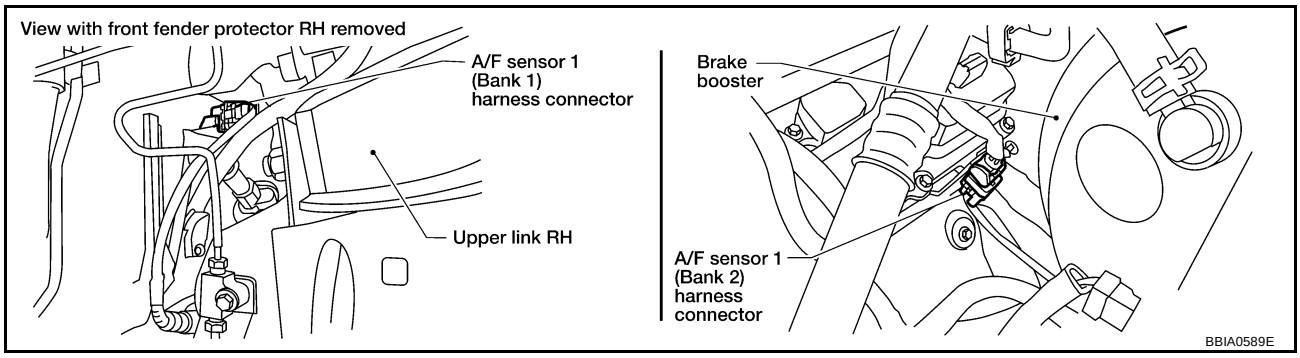
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

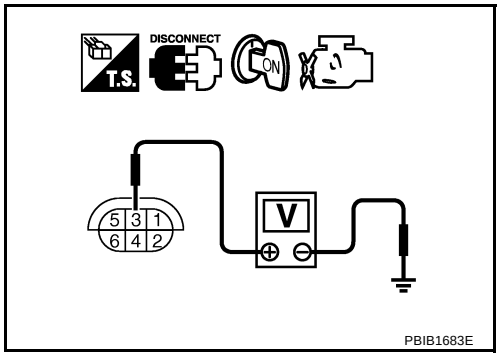
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000PE

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1272, P1282 A/F SENSOR 1

PFP:22693

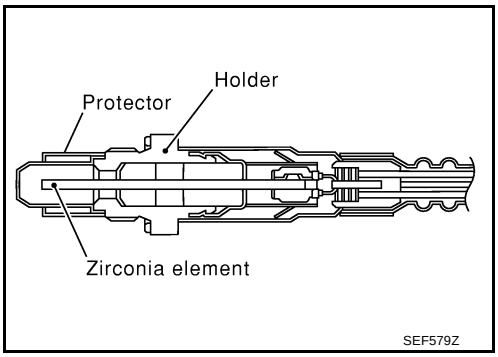
Component Description

GBS000PF

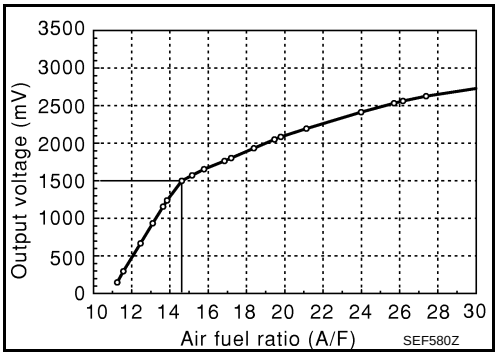
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000PG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000PH

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272 (Bank 1) P1282 1282 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 5V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

GBS000PI

CAUTION:
Always drive vehicle at a safe speed.

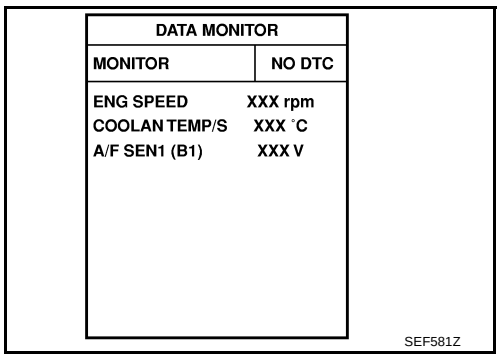
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 5V, go to EC-386, "Diagnostic Procedure" .
   If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



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

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-386, "Diagnostic Procedure" .

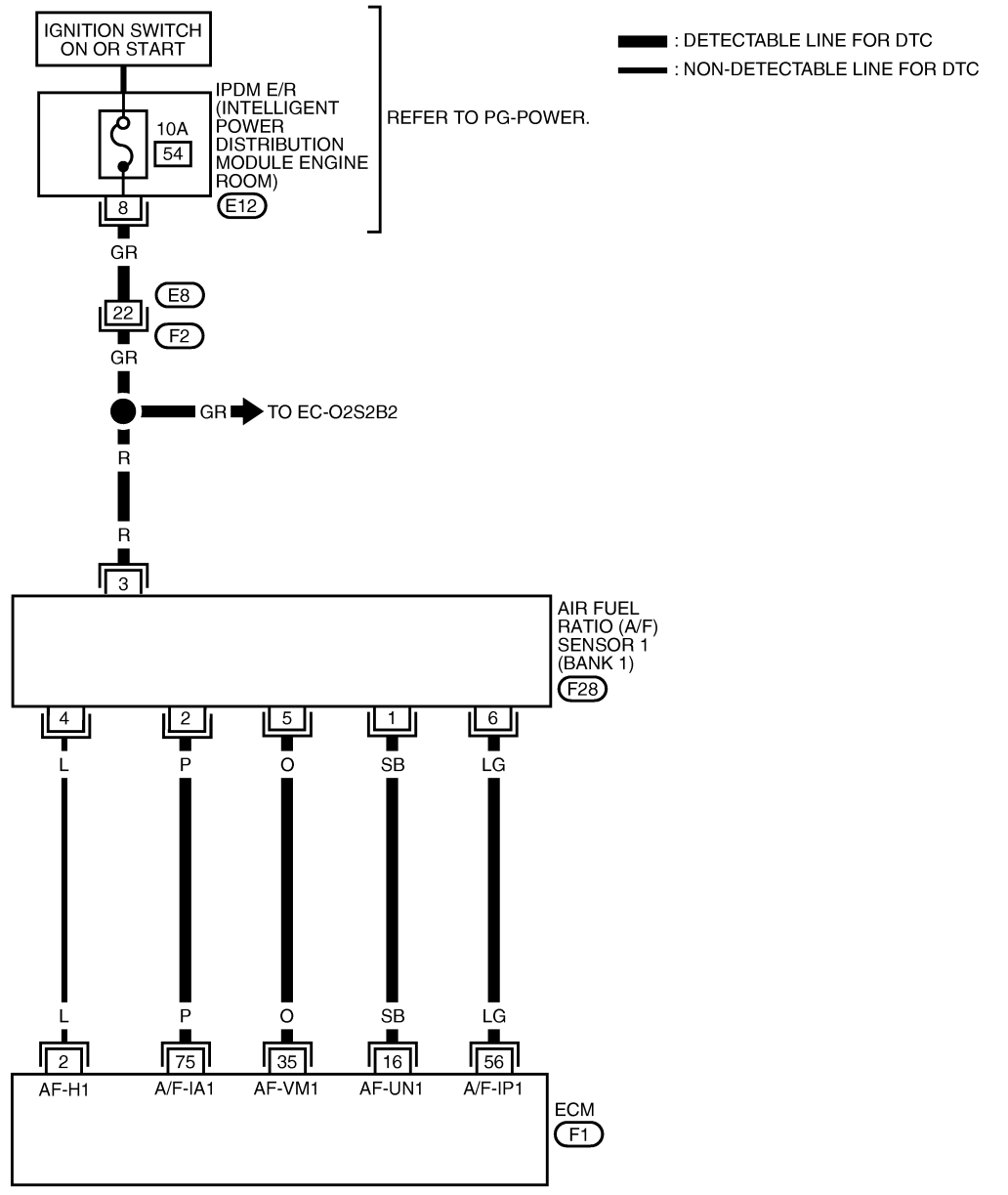
WITH GST

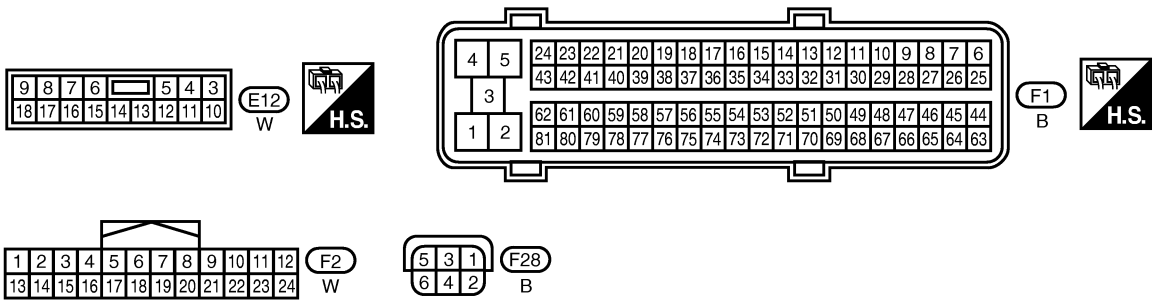
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
BANK 1

GBS000PJ

EC-AF1B1-01



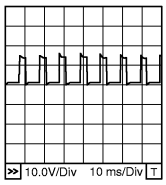


MBWA1336E

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

CAUTION:

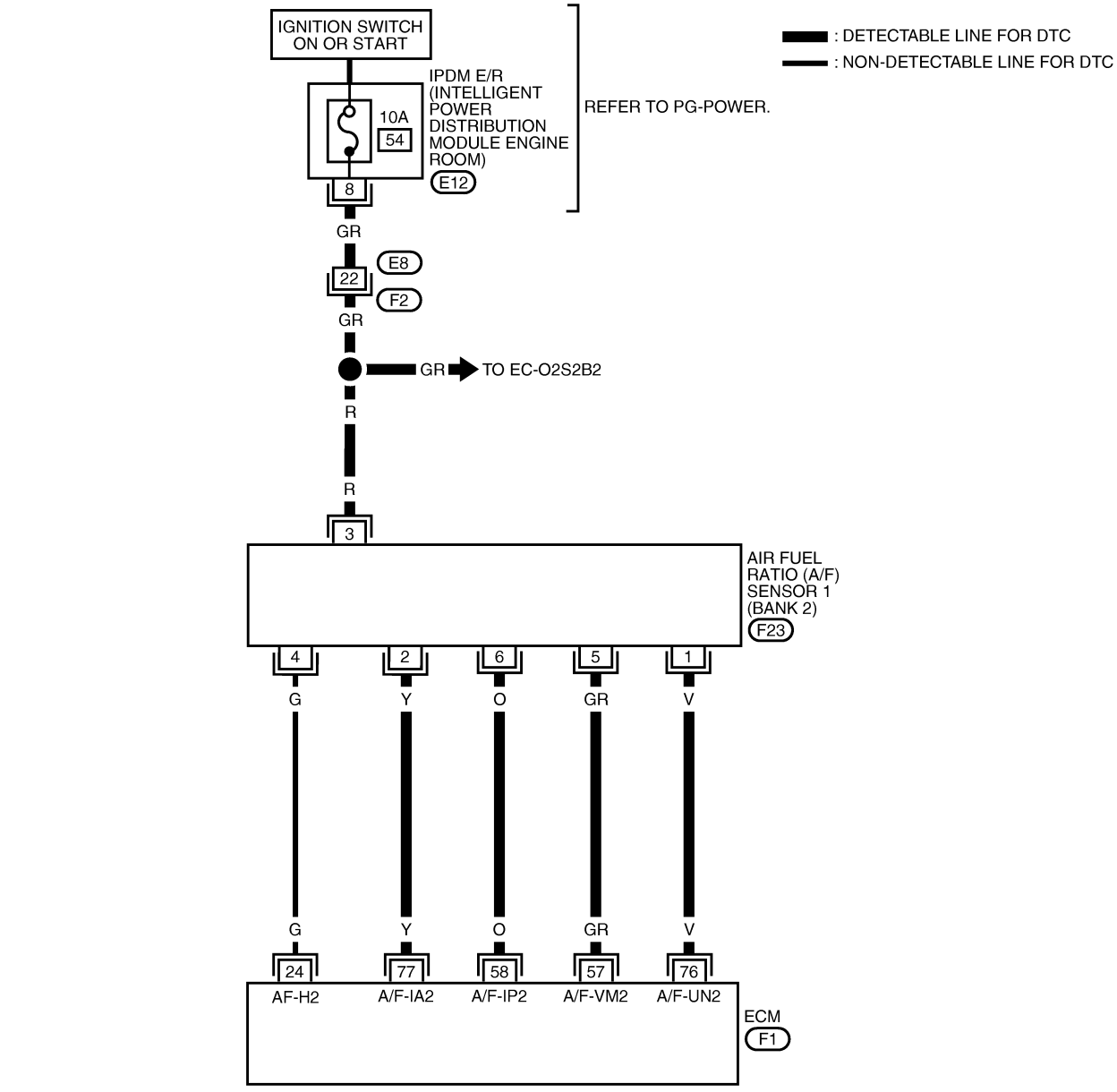
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

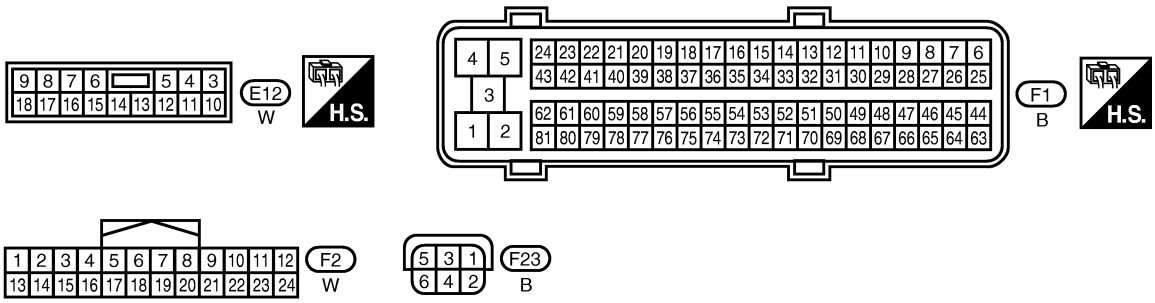
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



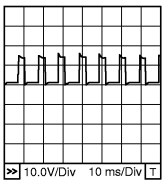


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

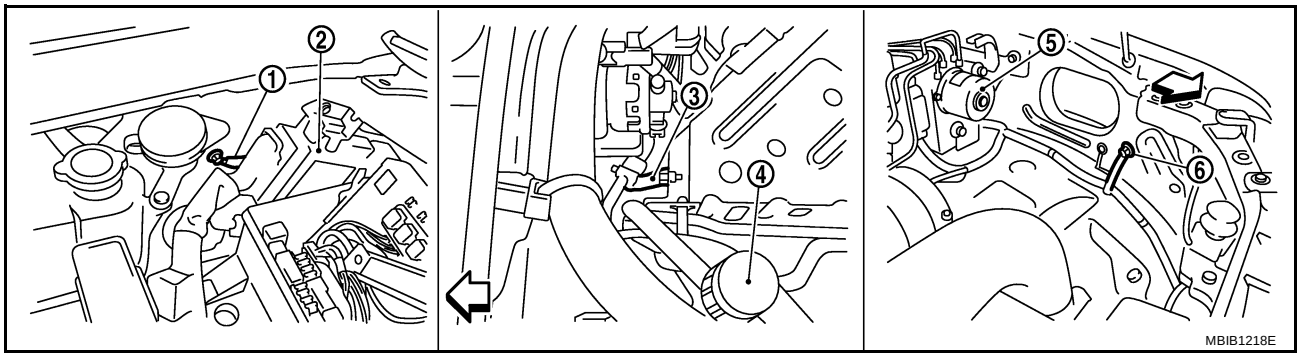
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000PK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws.Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

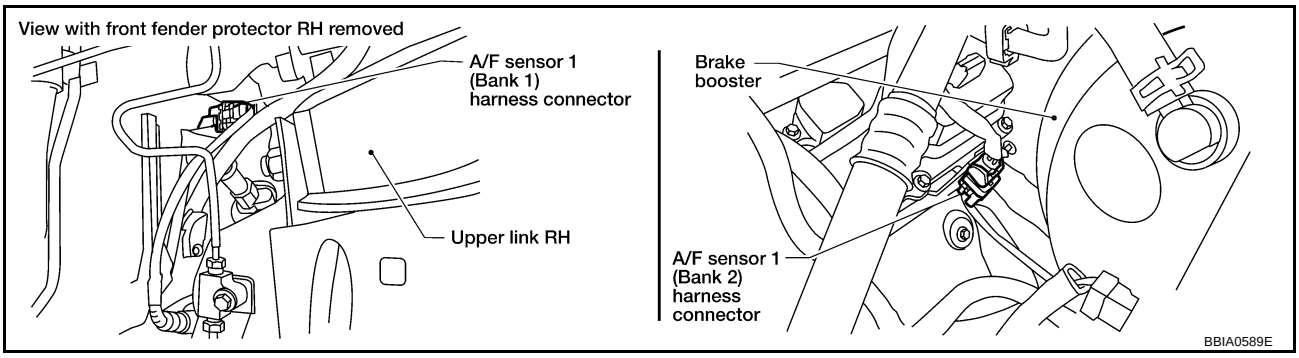
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

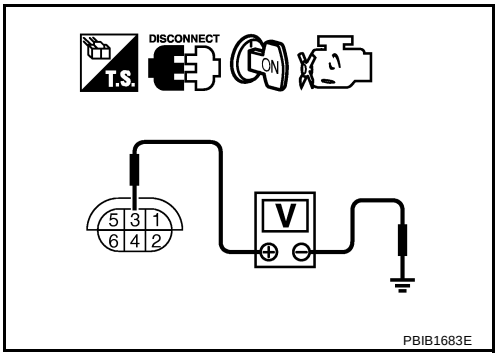
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000PL

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1273, P1283 A/F SENSOR 1

PFP:22693

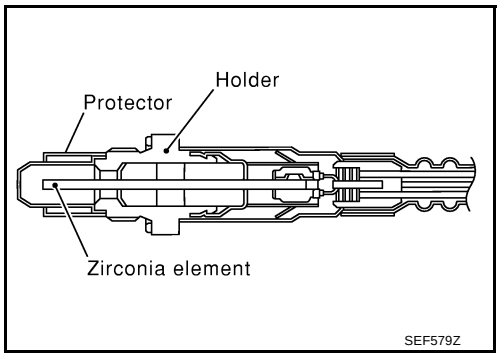
Component Description

GBS000PM

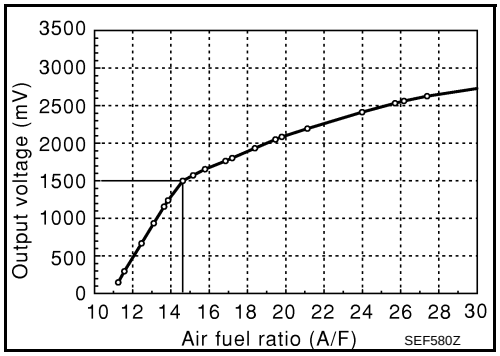
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000PN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000PO

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1273 1273 (Bank 1)	Air fuel ratio (A/F) sensor 1 lean shift monitoring	● The output voltage computed by ECM from the air fuel ratio (A/F) sensor 1 signal is shifted to the lean side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks
P1283 1283 (Bank 2)			

DTC Confirmation Procedure

GBS000PP

NOTE:

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

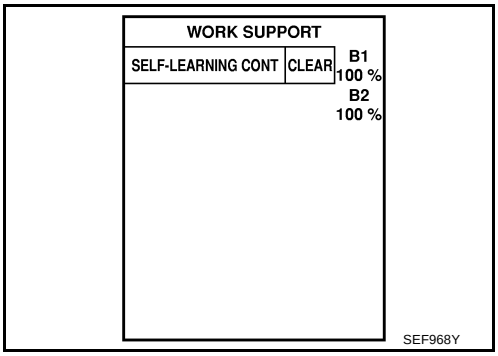
TESTING CONDITION:

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

WITH CONSULT-II

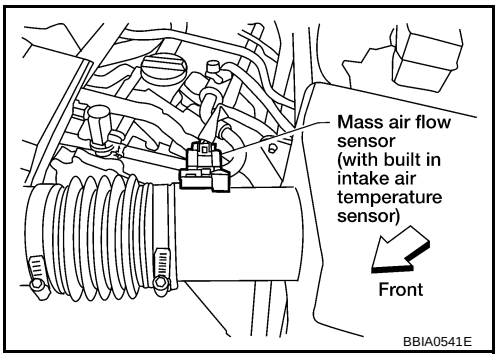
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.

4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-395, "Diagnostic Procedure" .



WITH GST

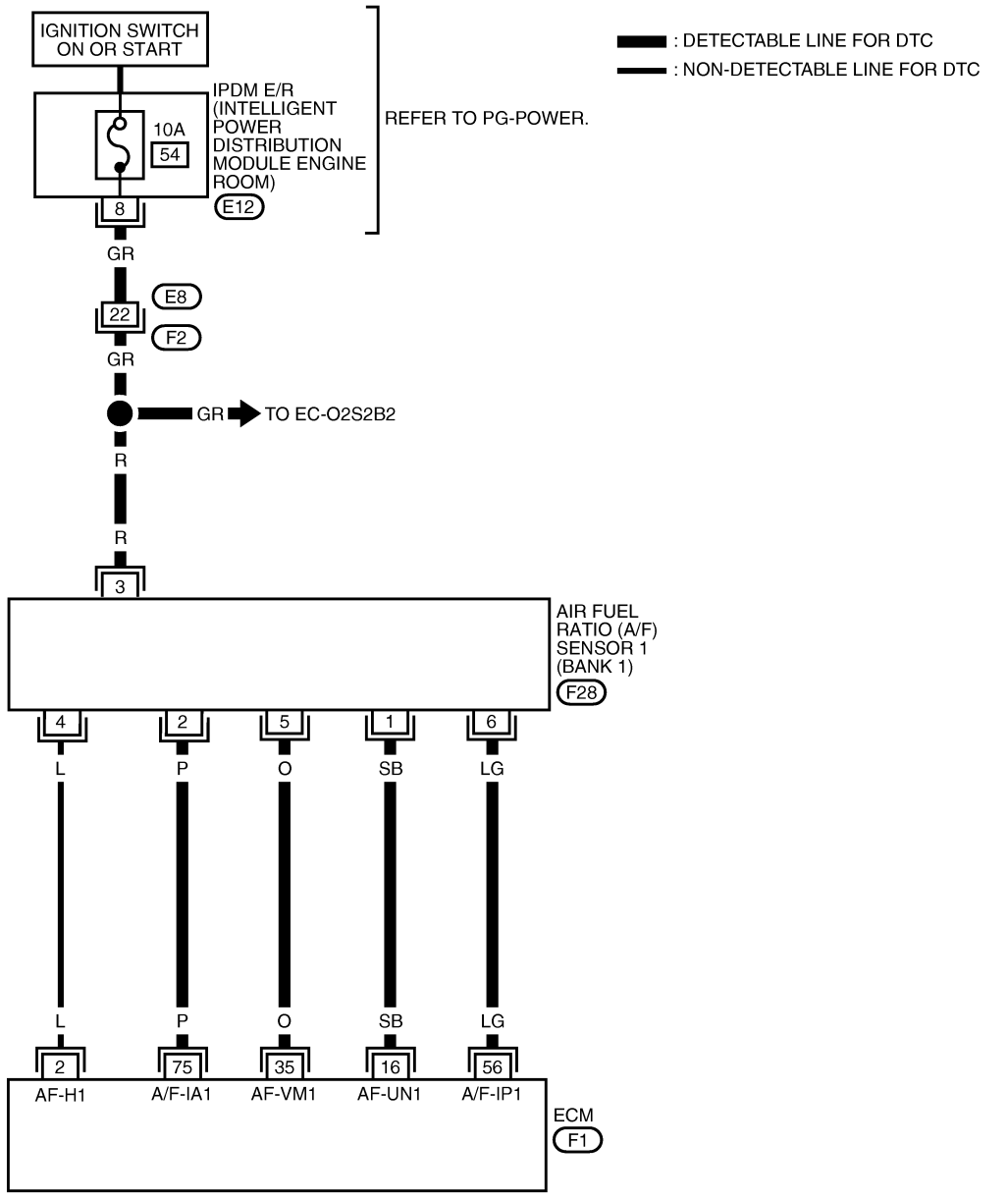
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-395, "Diagnostic Procedure" .

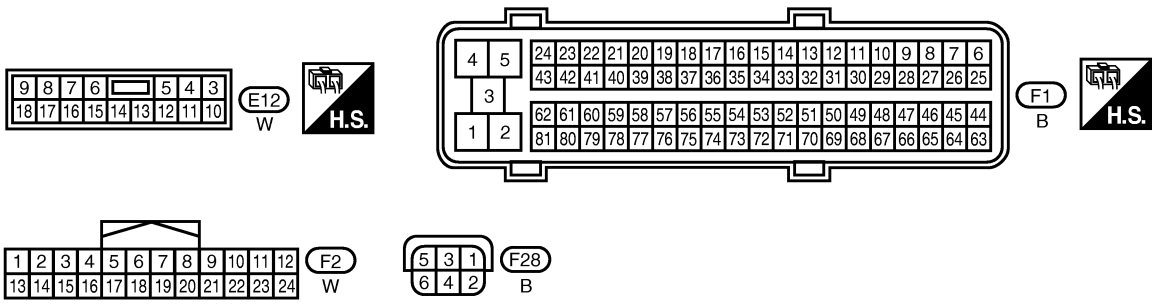


Wiring Diagram
BANK 1

GBS000PQ

EC-AF1B1-01



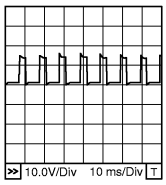


MBWA1336E

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

CAUTION:

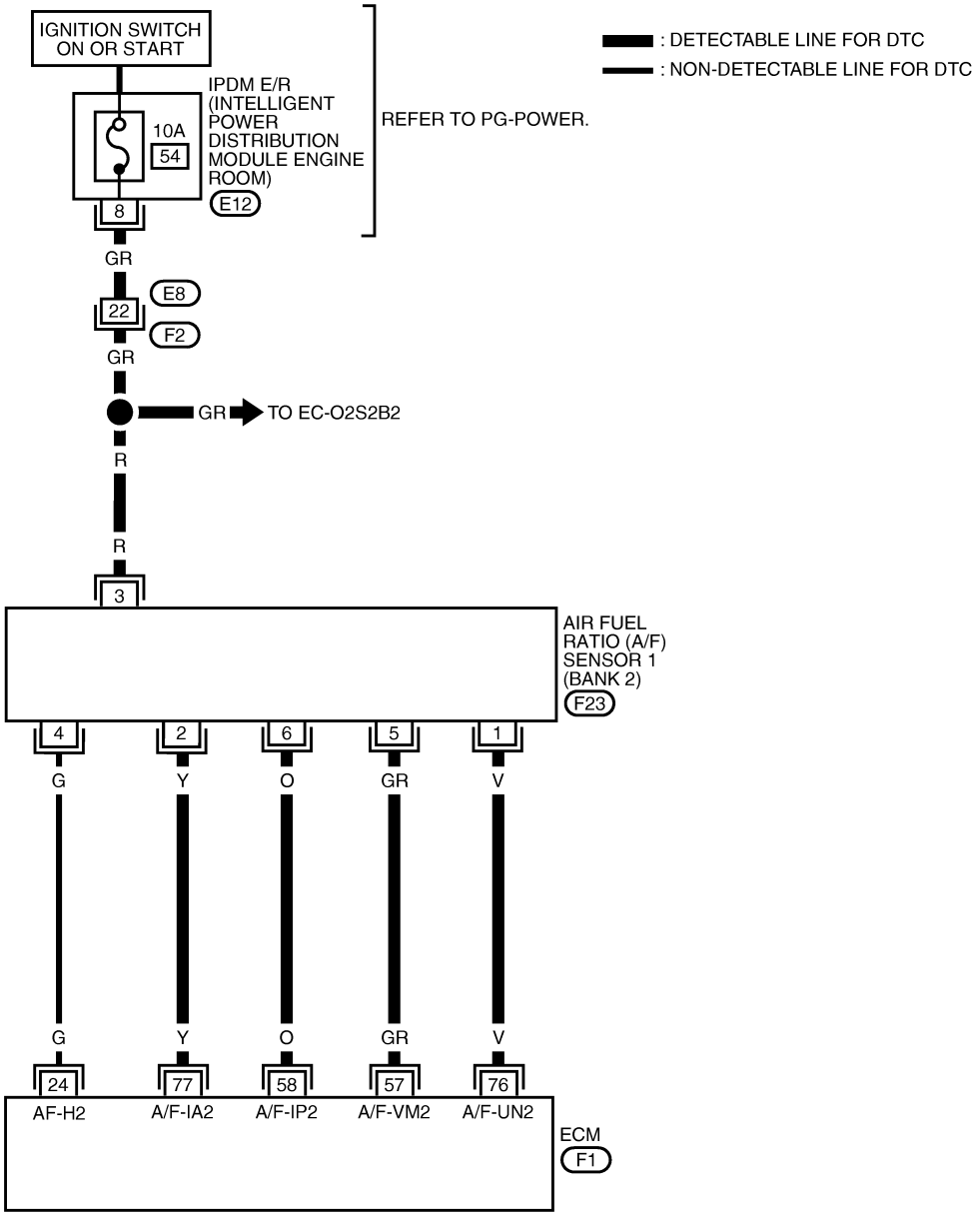
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

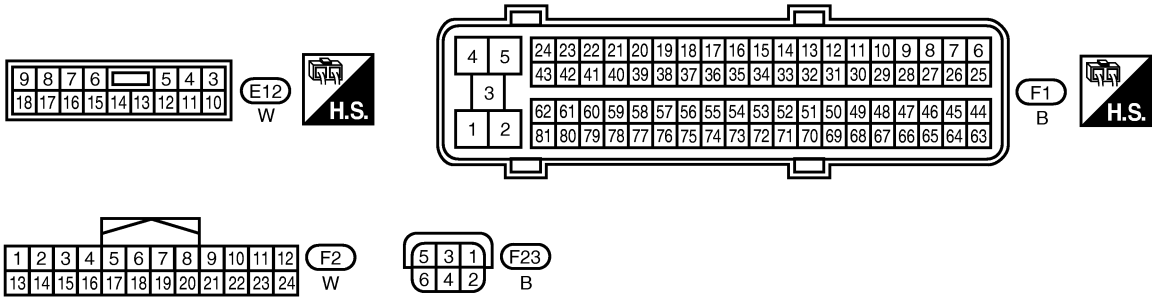
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



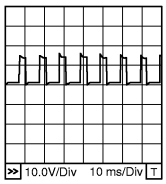


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

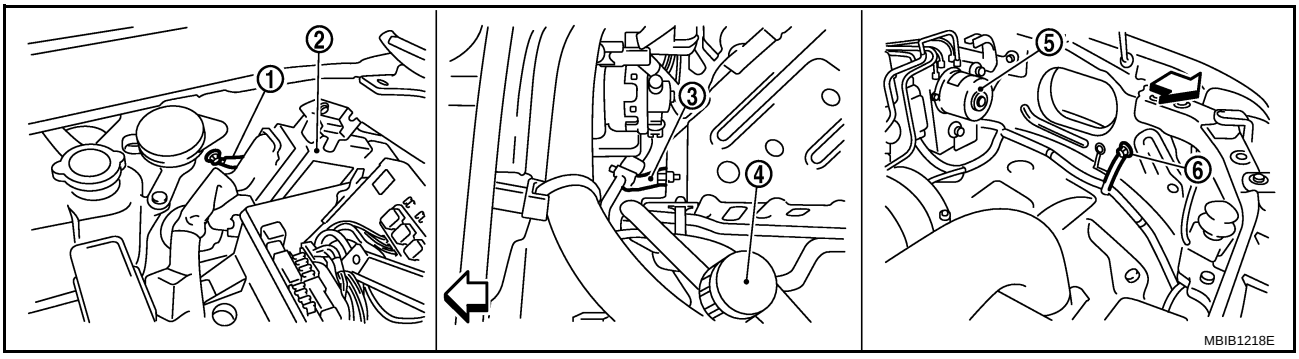
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000PR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

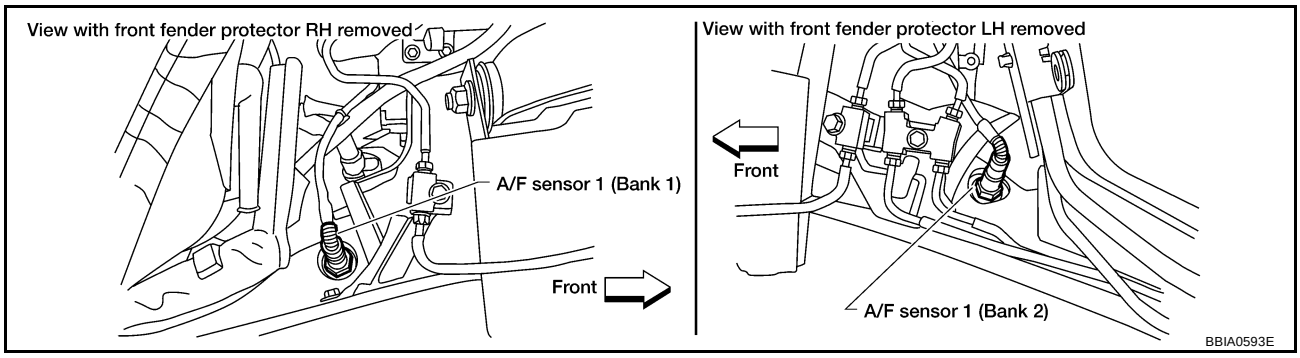
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



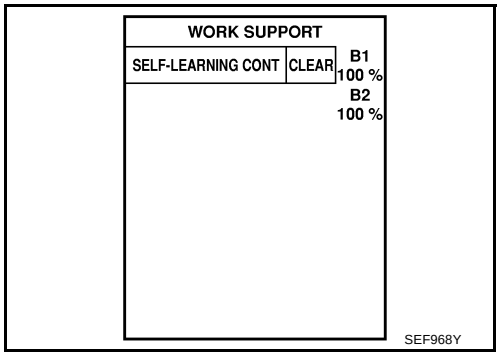
Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA.

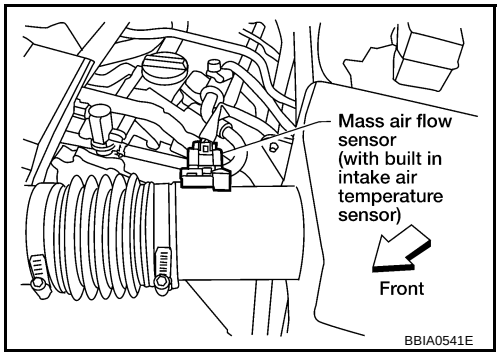
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



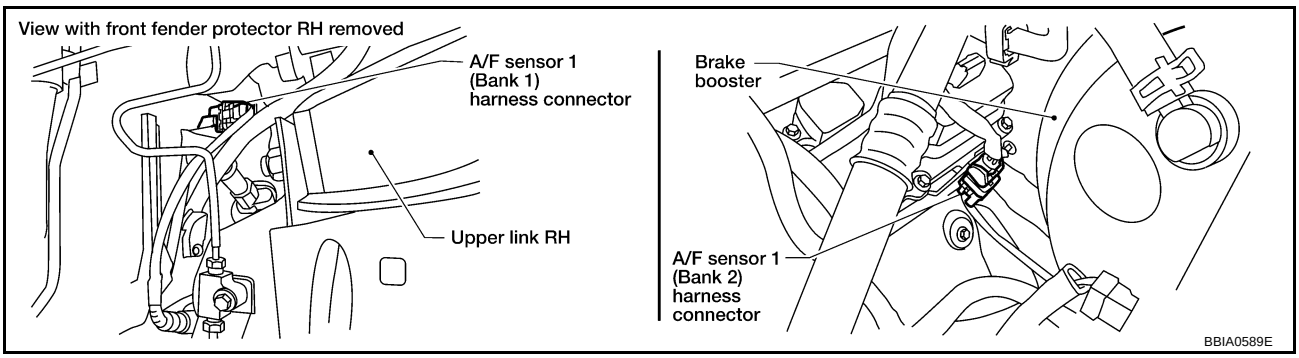
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171or P0174. Refer to EC-207, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

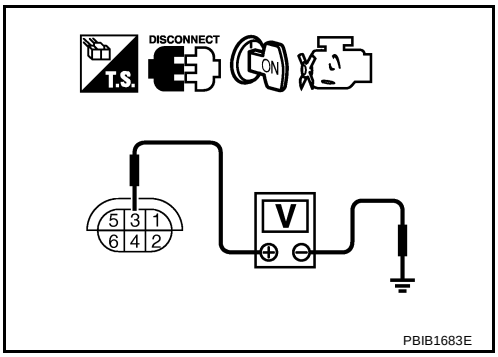
4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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

OK or NG

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

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

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> GO TO 9.

8. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000PS

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1274, P1284 A/F SENSOR 1

PFP:22693

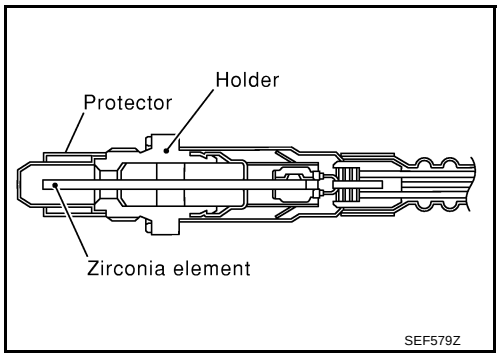
Component Description

GBS000PT

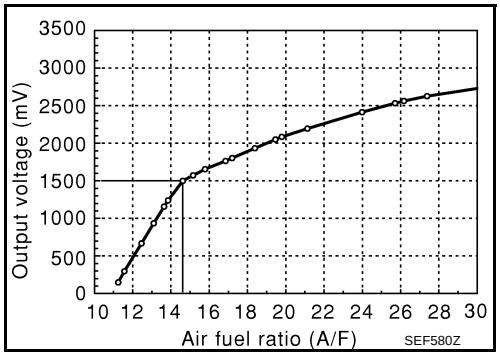
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000PU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000PV

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1274 1274 (Bank 1)	Air fuel ratio (A/F) sensor 1 rich shift monitoring	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is shifted to the rich side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater ● Fuel pressure ● Fuel injector
P1284 1244 (Bank 2)			

DTC Confirmation Procedure

GBS000PW

NOTE:

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

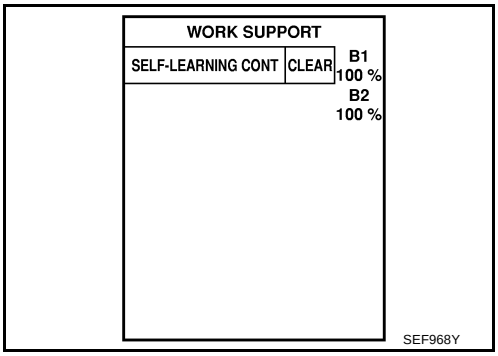
TESTING CONDITION:

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

WITH CONSULT-II

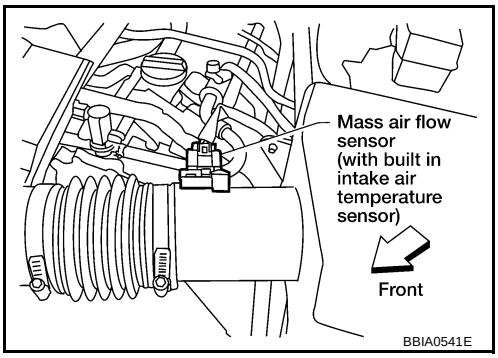
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.

4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-405, "Diagnostic Procedure" .



WITH GST

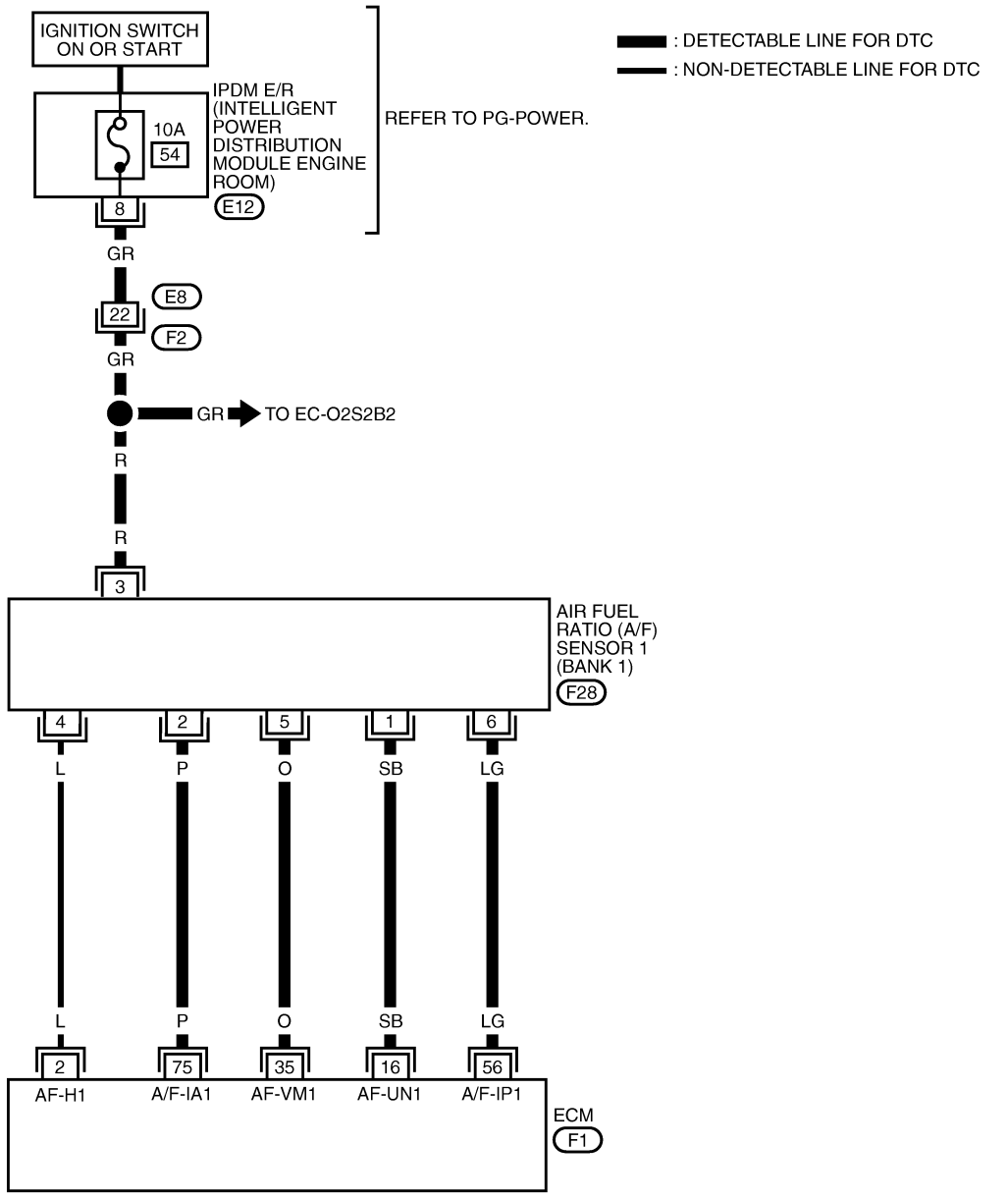
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-405, "Diagnostic Procedure" .

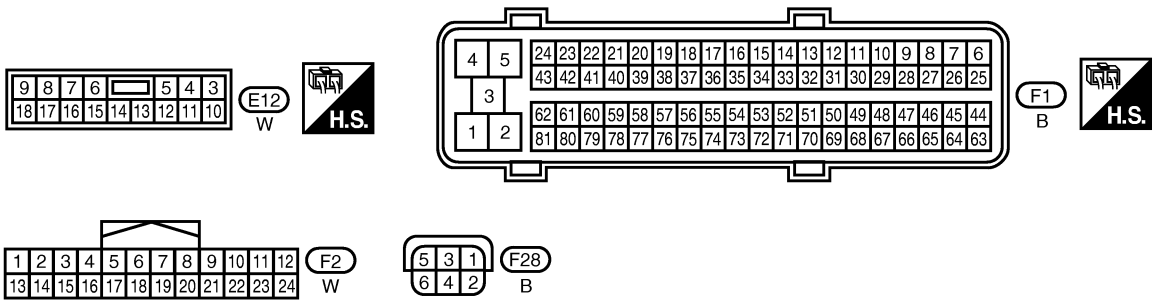


Wiring Diagram
BANK 1

GBS000PX

EC-AF1B1-01



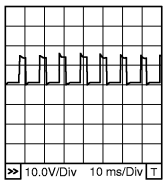


MBWA1336E

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

CAUTION:

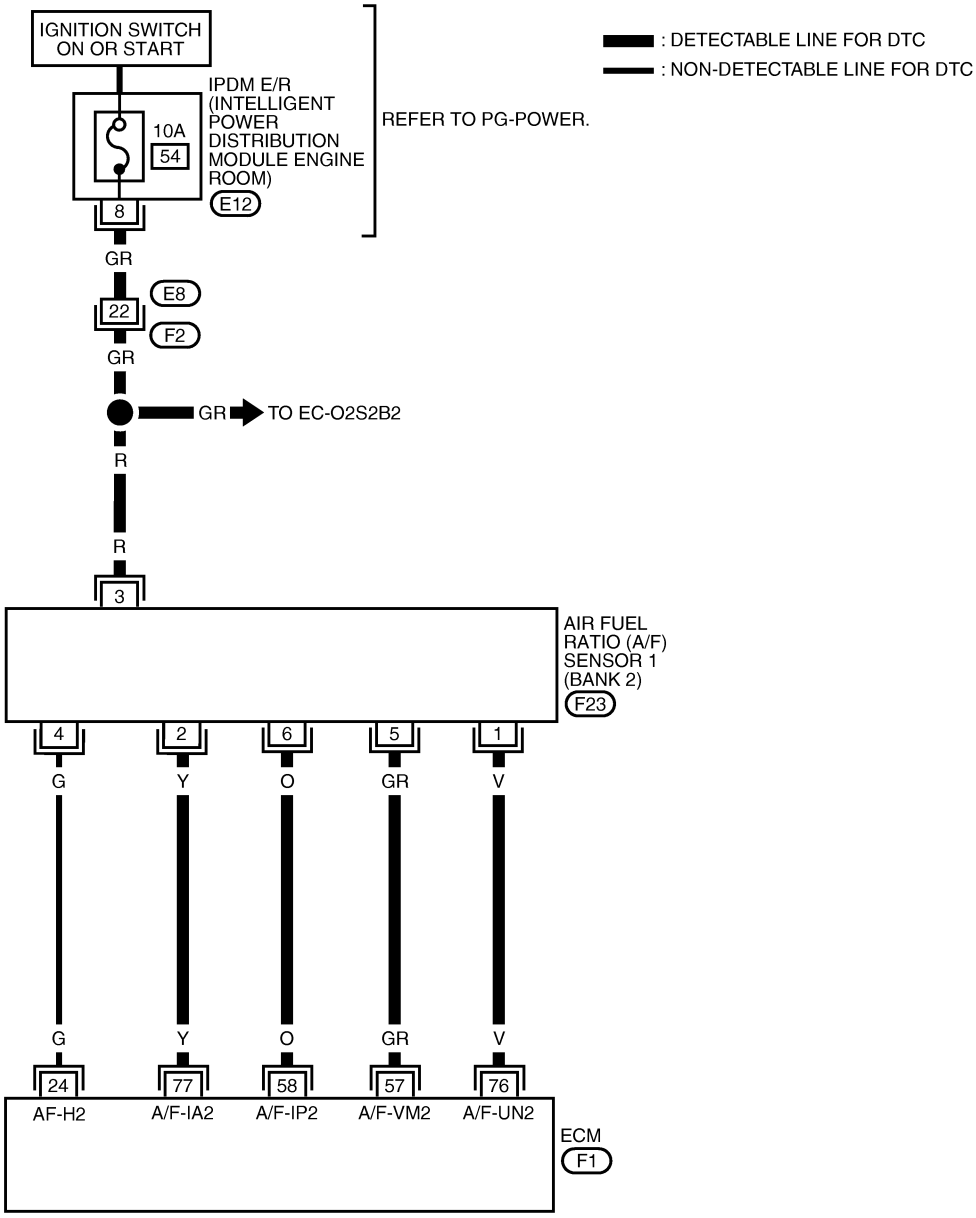
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

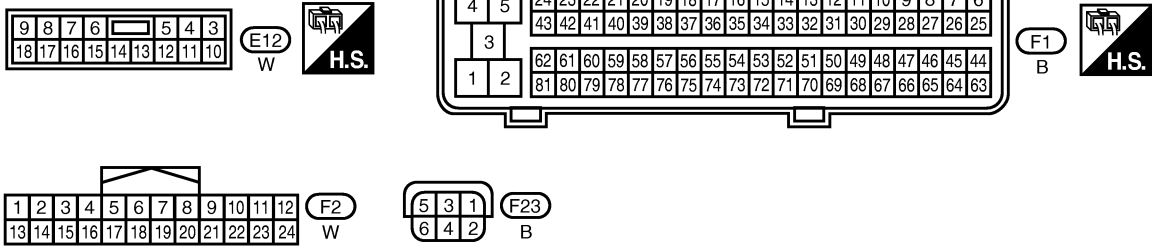
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



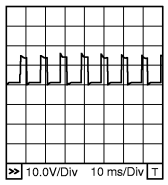


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

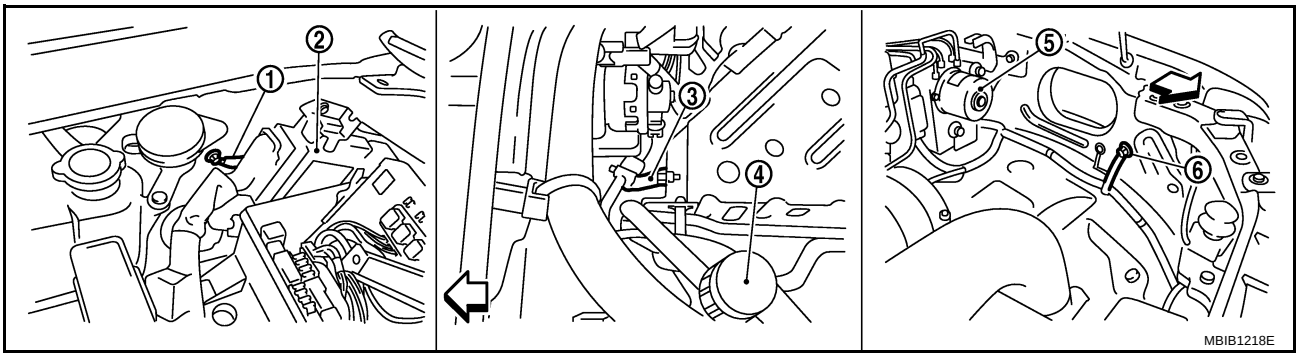
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000PY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

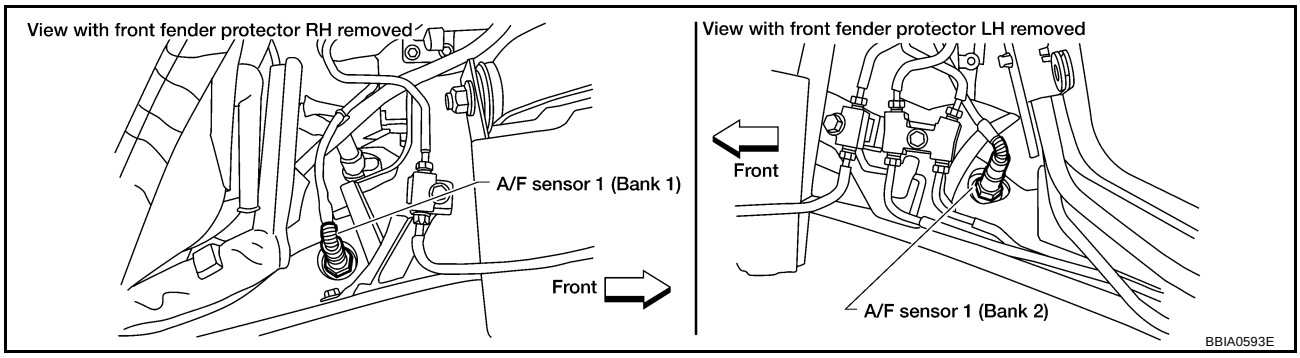
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



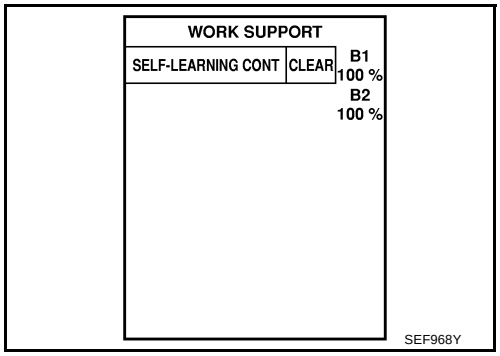
Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA.

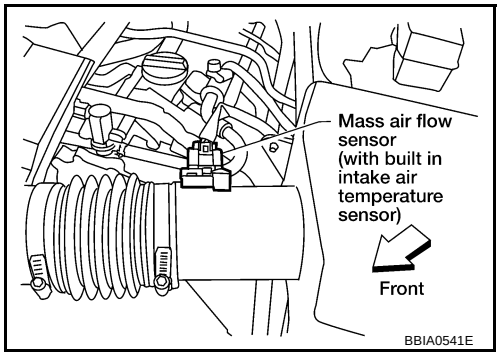
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



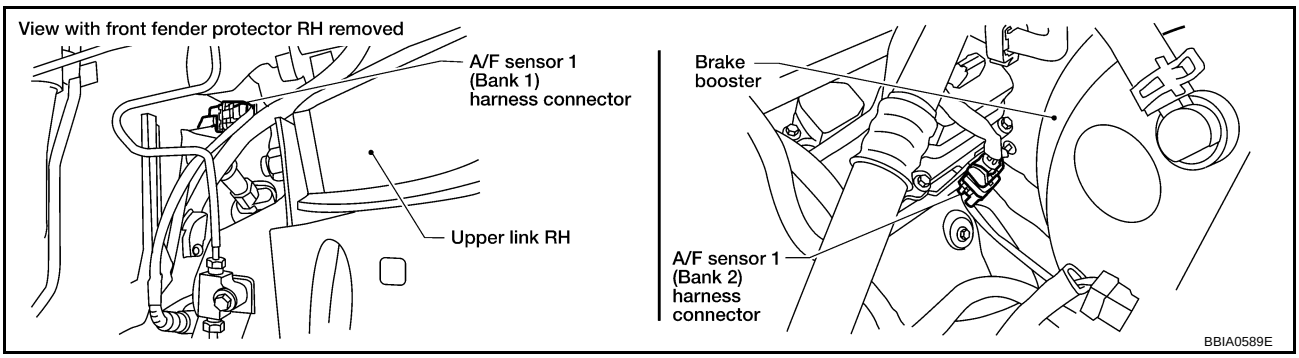
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172 or P0175. Refer to EC-219, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



3. Check harness connector for water.
   Water should not exit.

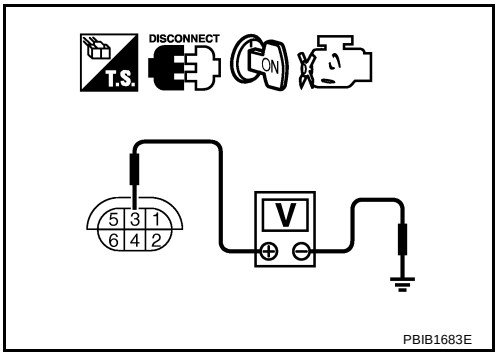
OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

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

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

Voltage: Battery voltage



OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

7. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 10.

9. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000PZ

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1276, P1286 A/F SENSOR 1

PFP:22693

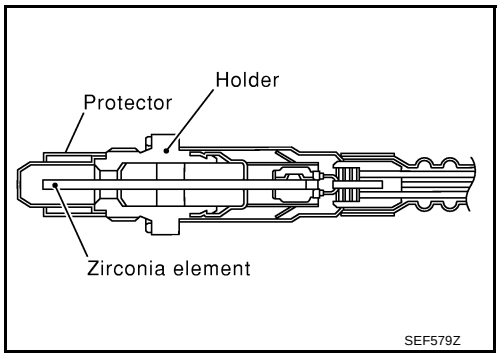
Component Description

GBS000Q0

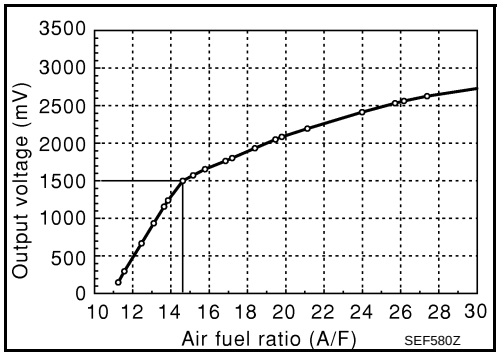
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000Q1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000Q2

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276 (Bank 1) P1286 1286 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit high voltage	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 1.5V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

GBS000Q3

CAUTION:
Always drive vehicle at a safe speed.

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

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

WITH CONSULT-II

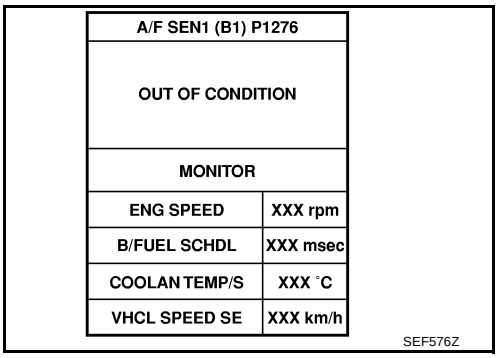
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.

If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-416, "Diagnostic Procedure" .
If the indication fluctuates around 1.5V, go to next step.

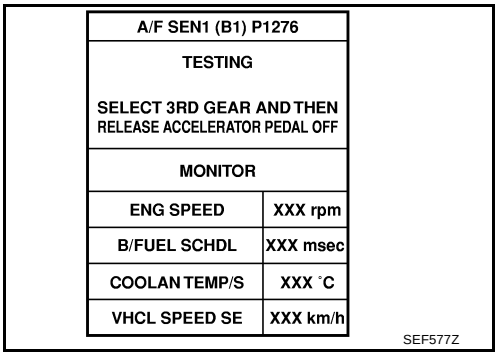
4. Select “A/F SEN1 (B1) P1276” or “A/F SEN1 (B2) P1286” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,750 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position with “OD” OFF (A/T) 5th position (M/T)

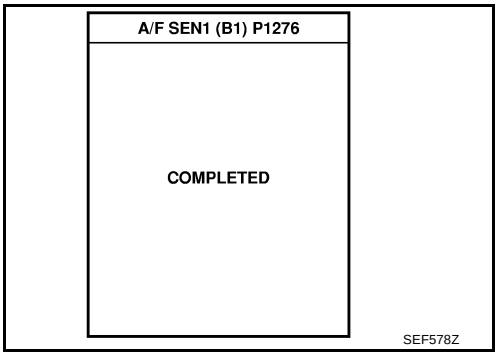
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Release accelerator pedal fully.
   NOTE:
   Never apply brake during releasing the accelerator pedal.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-416, "Diagnostic Procedure" .



Overall Function Check

GBS000Q4

Use this procedure to check the overall function of the air fuel ratio (A/F) sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

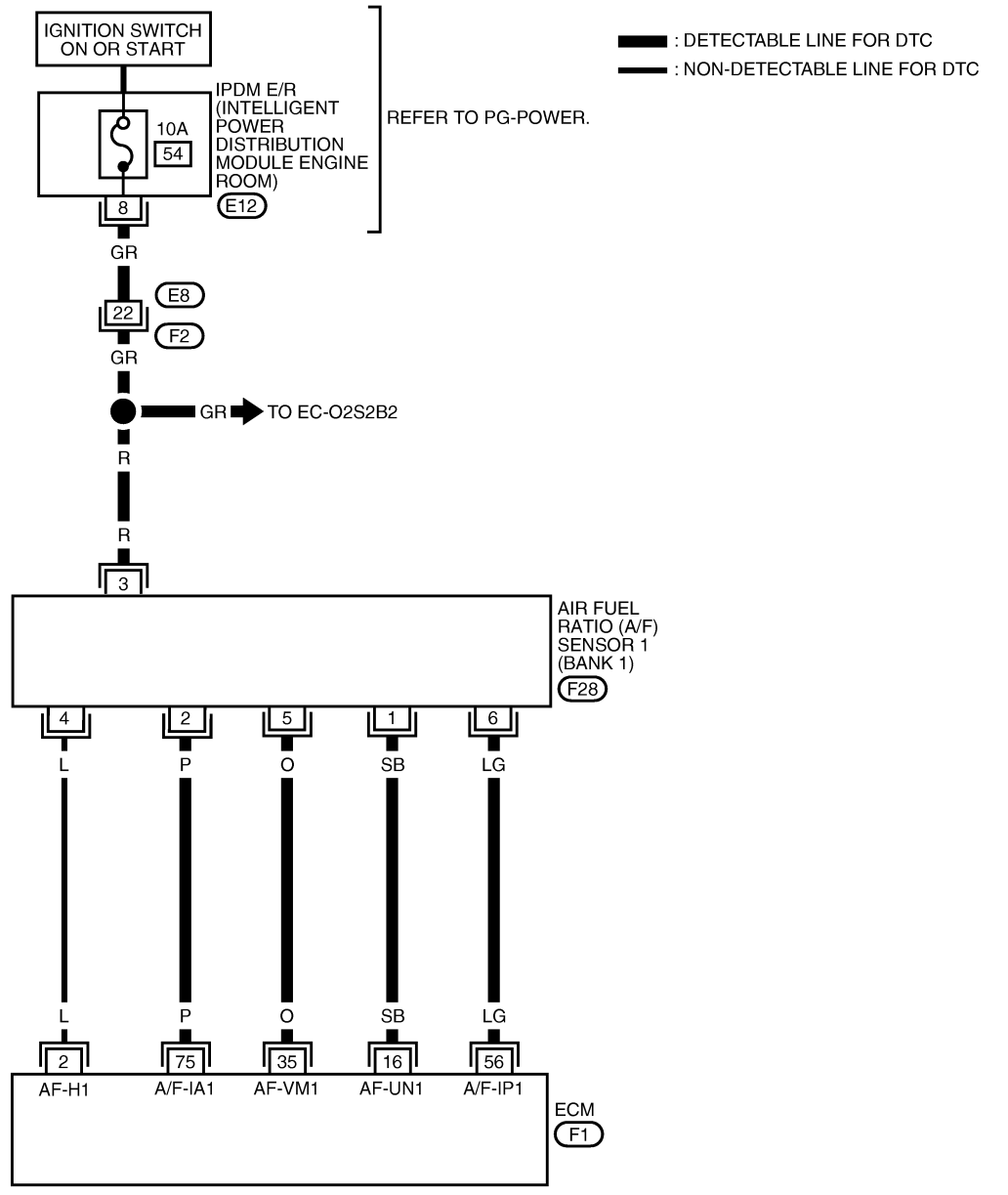
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set D position with “OD” OFF (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.

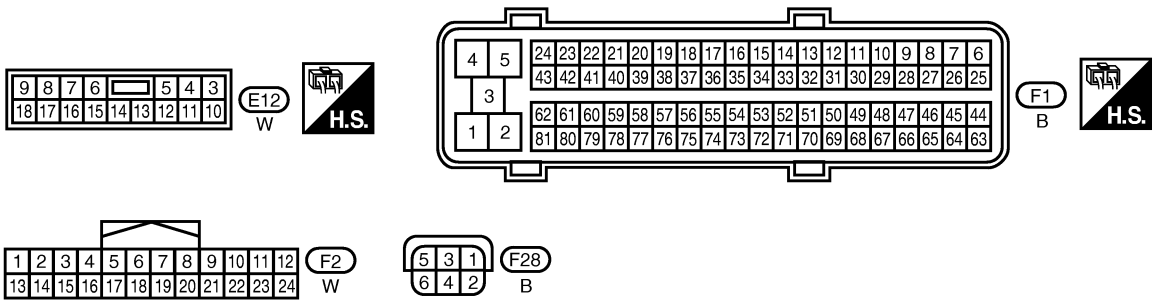
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-416, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000Q5

EC-AF1B1-01



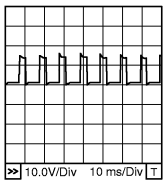


MBWA1336E

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

CAUTION:

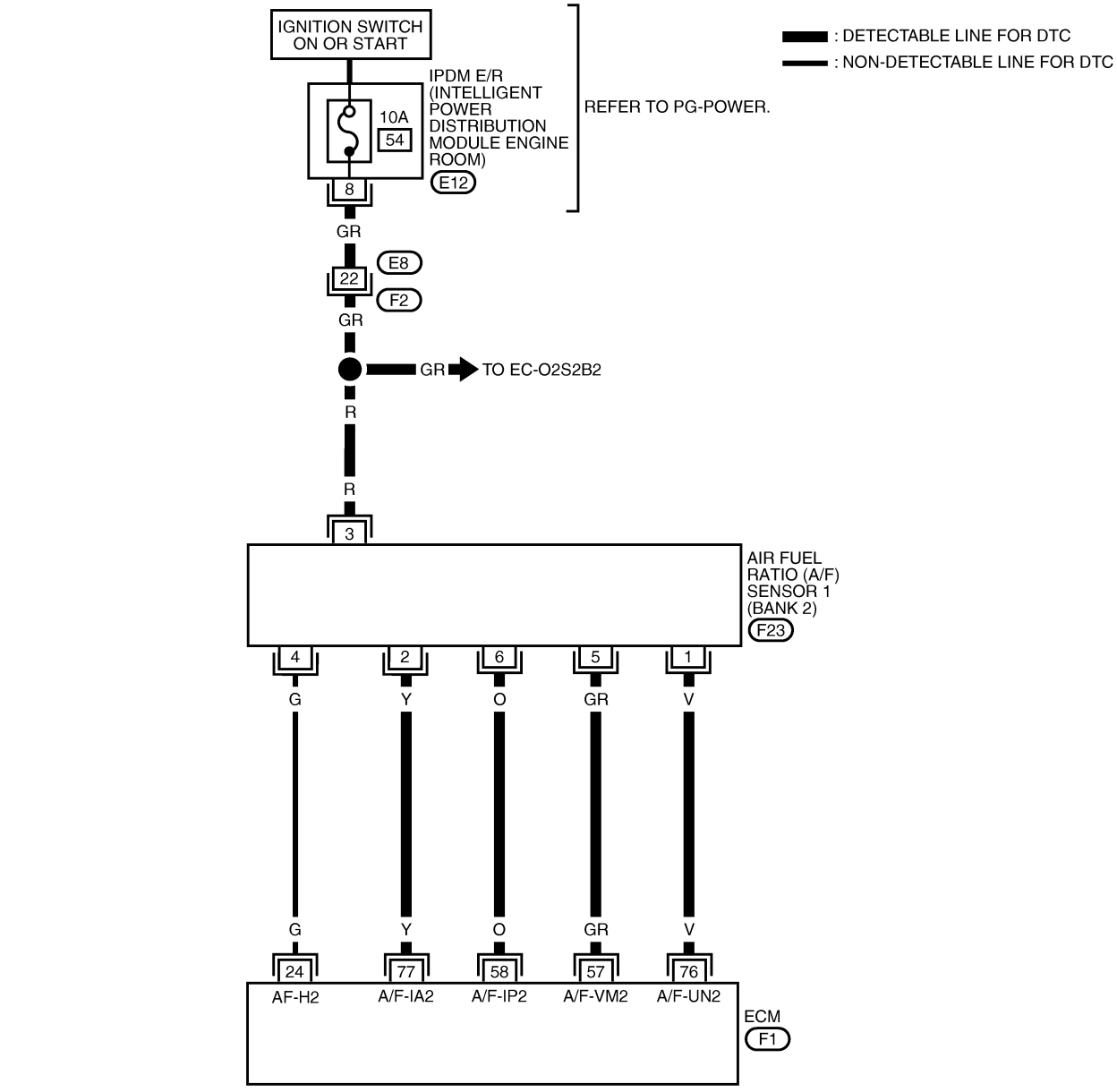
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

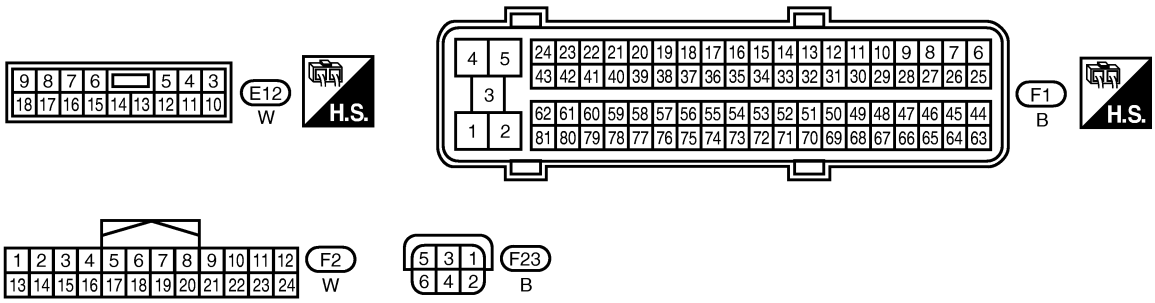
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



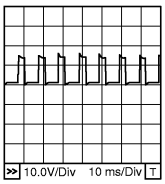


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

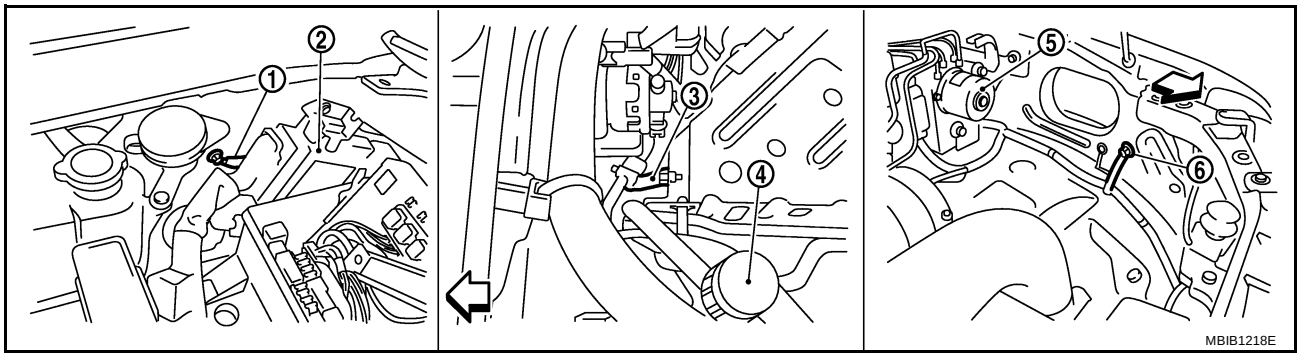
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000Q6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

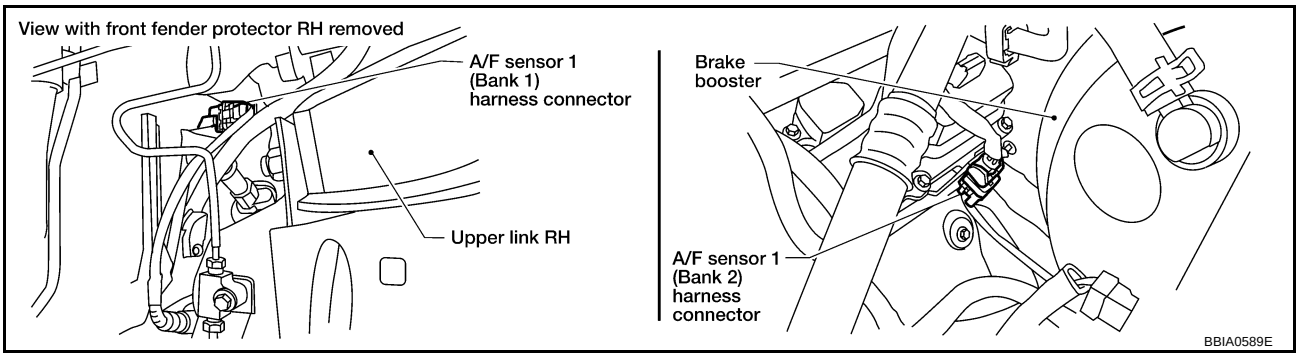
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

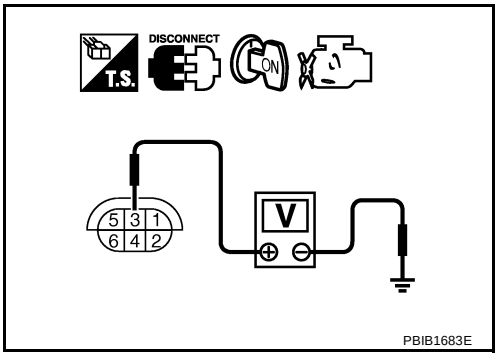
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000Q7

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

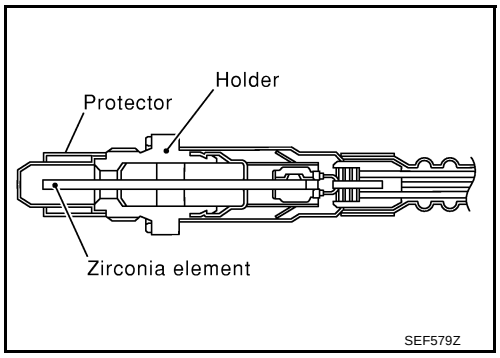
DTC P1278, P1288 A/F SENSOR 1

PFP:22693

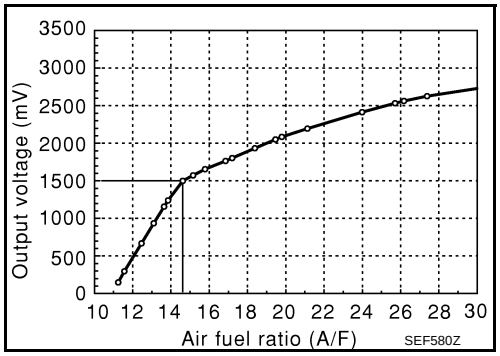
Component Description

GBS000Q8

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).
The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000Q9

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000QA

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1278 1278 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit slow response	● The response (from RICH to LEAN) of the A/F signal computed by ECM from air fuel ratio (A/F) sensor 1 signal takes more than the specified time.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor
P1288 1288 (Bank 2)			

DTC Confirmation Procedure

GBS000QB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

A/F SEN1 (B1) P1278/P1279	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB0756E

7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.

A/F SEN1 (B1) P1278/P1279	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB1925E

9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-426, "Diagnostic Procedure" .

A/F SEN1 (B1) P1278/P1279
COMPLETED

PBIB0758E

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.

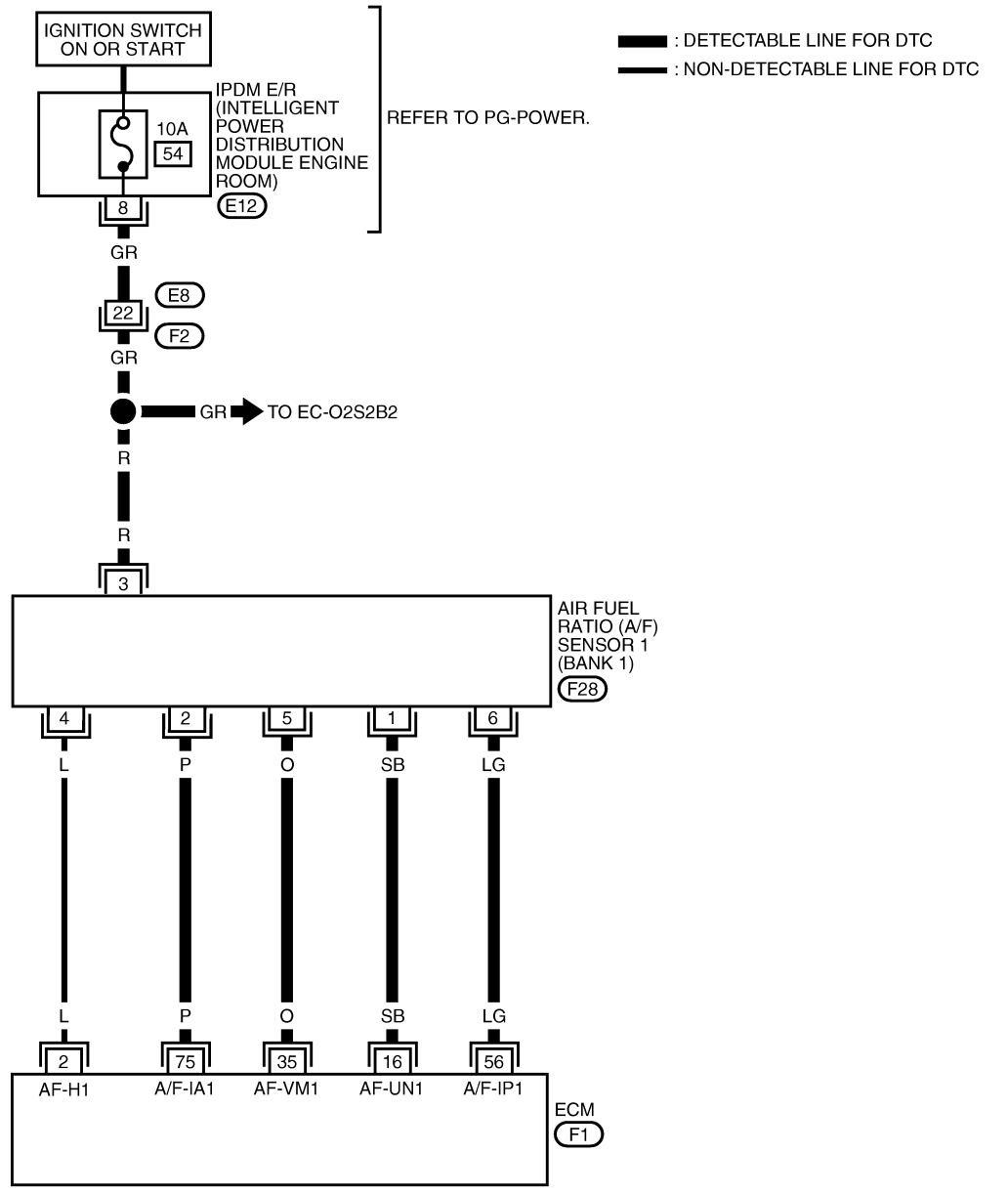
- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

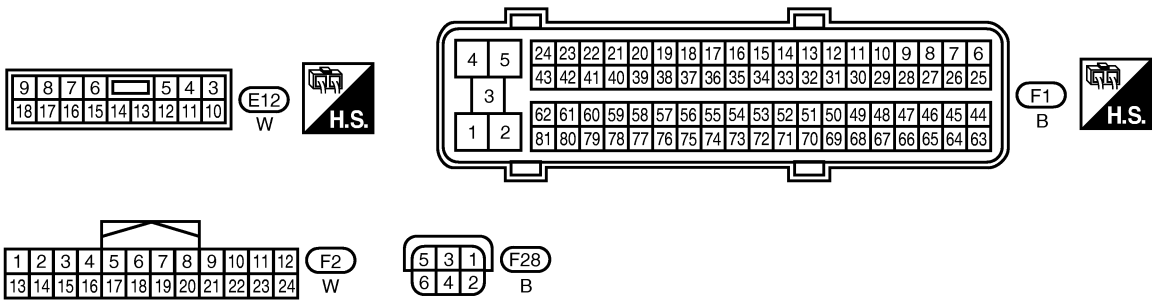
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If the 1st trip DTC is displayed, go to EC-426, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000QC

EC-AF1B1-01



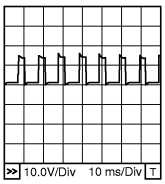


MBWA1336E

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

CAUTION:

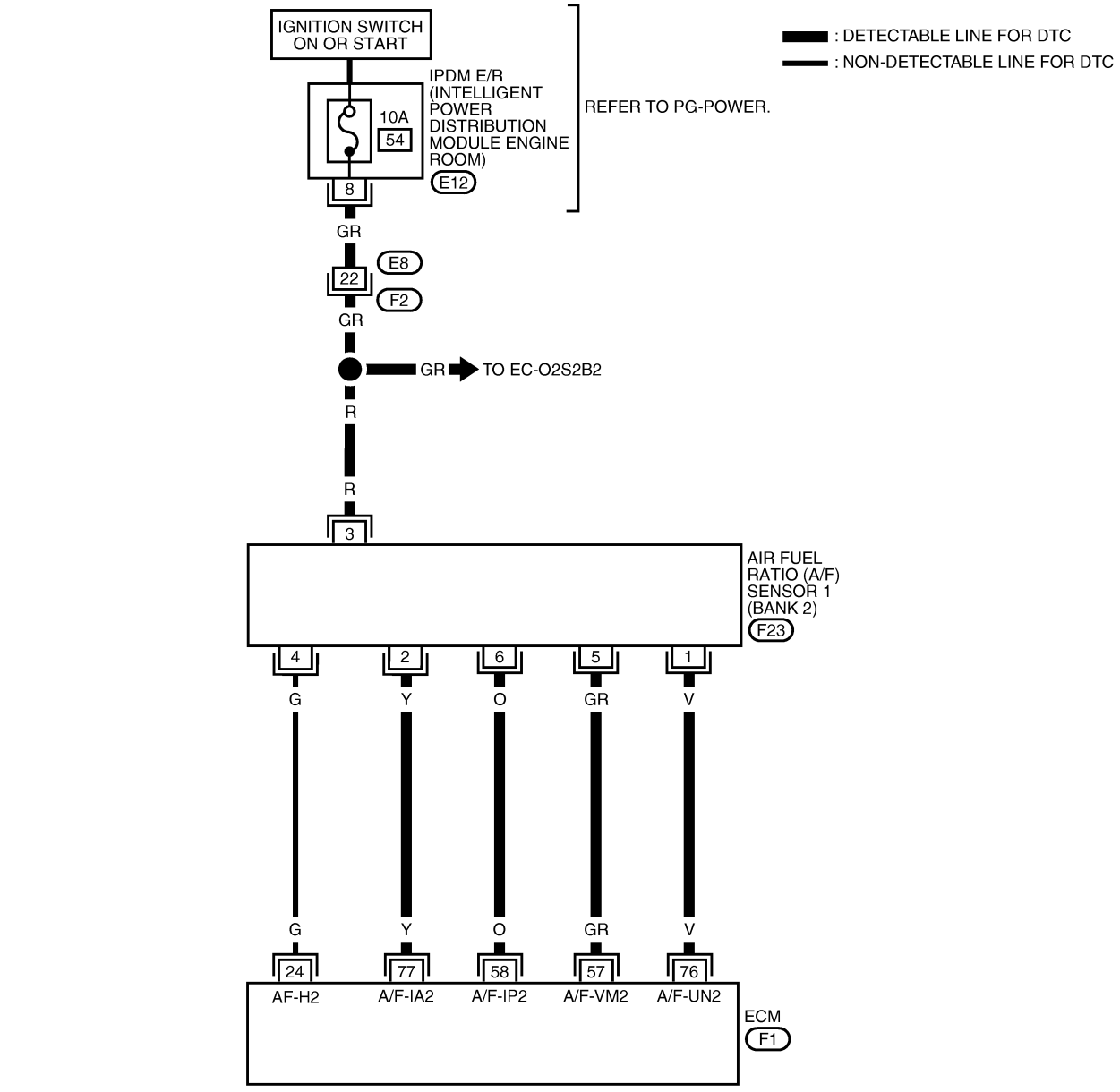
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

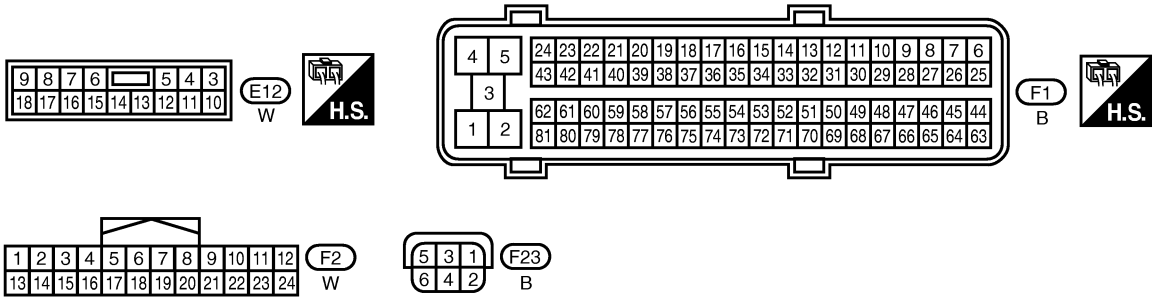
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



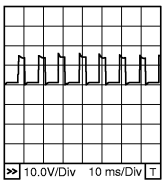


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

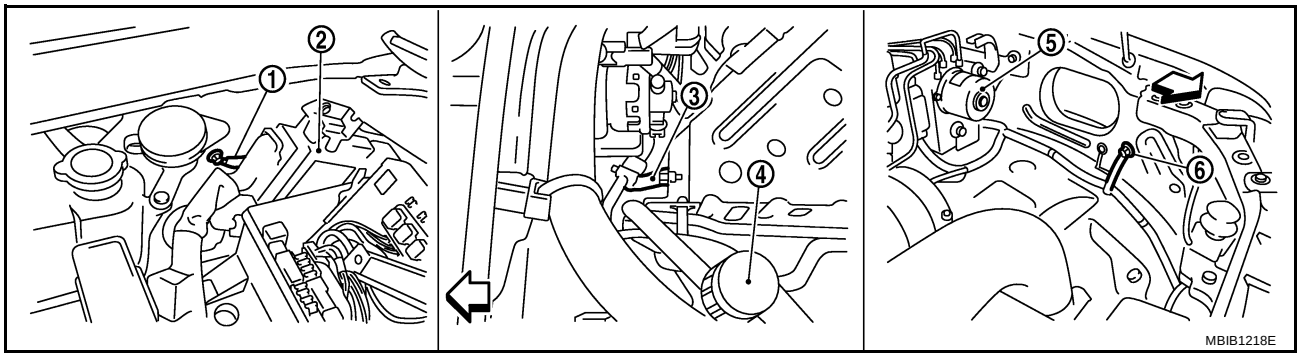
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000QD

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

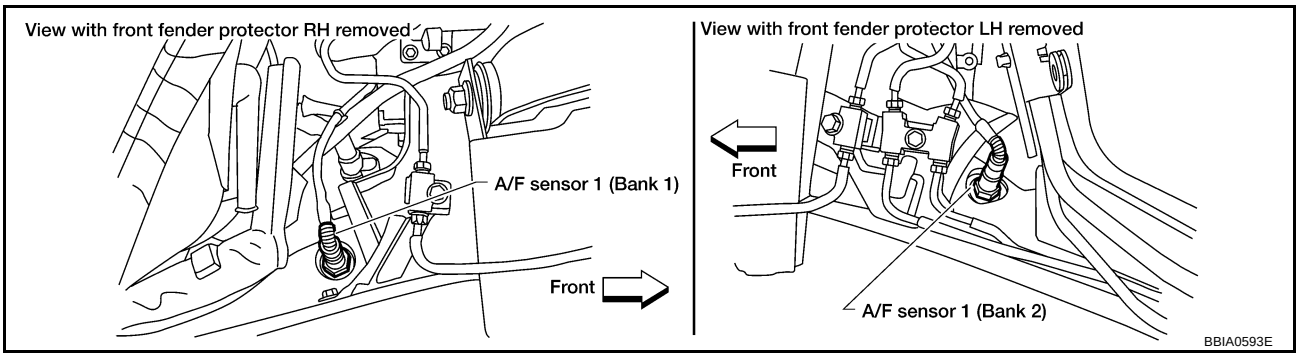
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

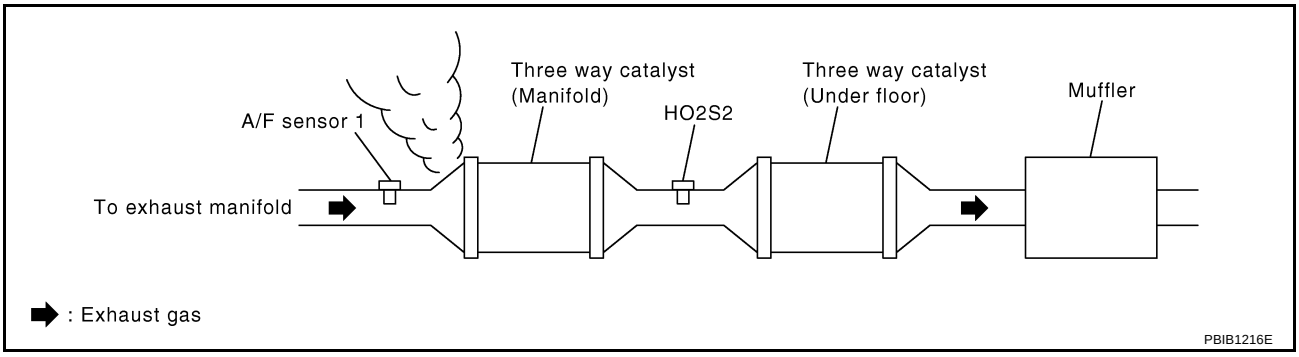


Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

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



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

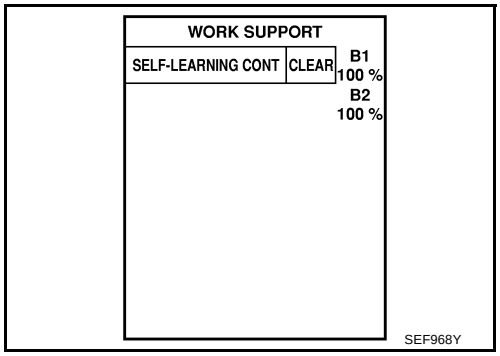
OK or NG

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

5. CLEAR THE SELF-LEARNING DATA

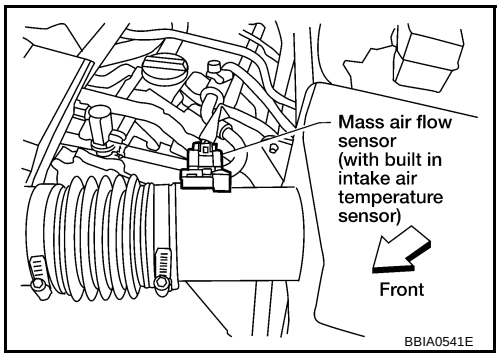
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P172, P0174 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



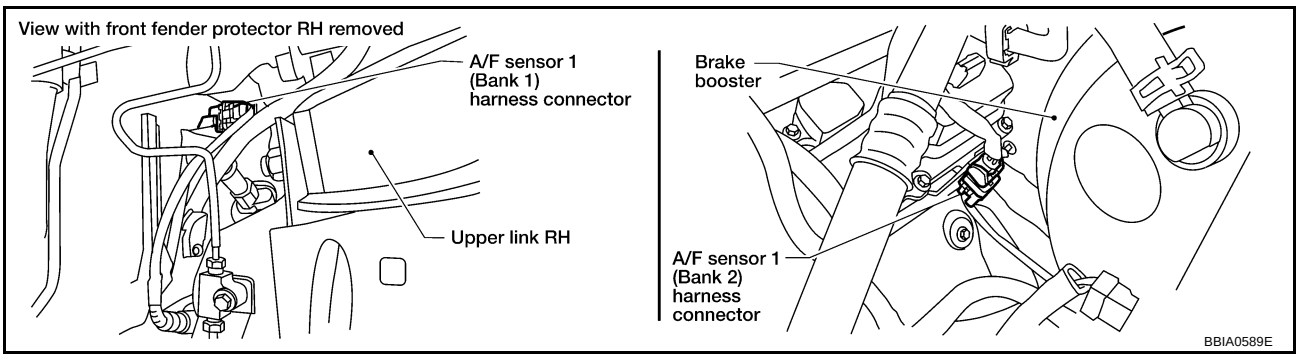
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-207, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" or EC-219, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 6.

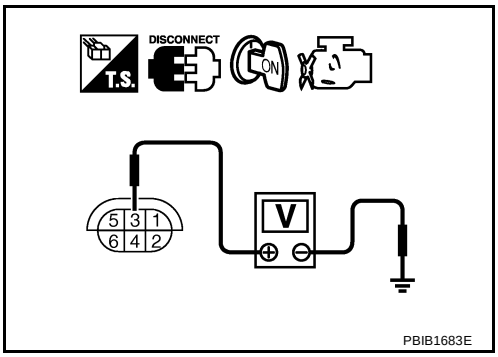
6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-168, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-41, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000QE

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

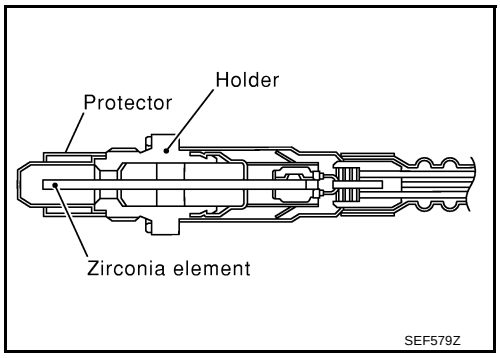
DTC P1279, P1289 A/F SENSOR 1

PFP:22693

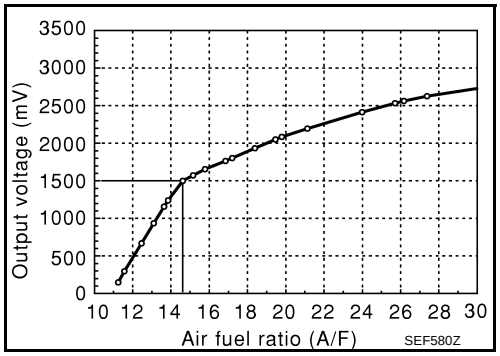
Component Description

GBS000QF

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).
The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000QG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000QH

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ration air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1279 1279 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit slow response	● The response (from LEAN to RICH) of the A/F signal computed by ECM from air fuel ratio (A/F) sensor 1 signal takes more than the specified time.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor
P1289 1289 (Bank 2)			

DTC Confirmation Procedure

GBS000QI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

A/F SEN1 (B1) P1278/P1279	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB0756E

7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.

A/F SEN1 (B1) P1278/P1279	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB1925E

9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-438, "Diagnostic Procedure" .

A/F SEN1 (B1) P1278/P1279
COMPLETED

PBIB0758E

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.

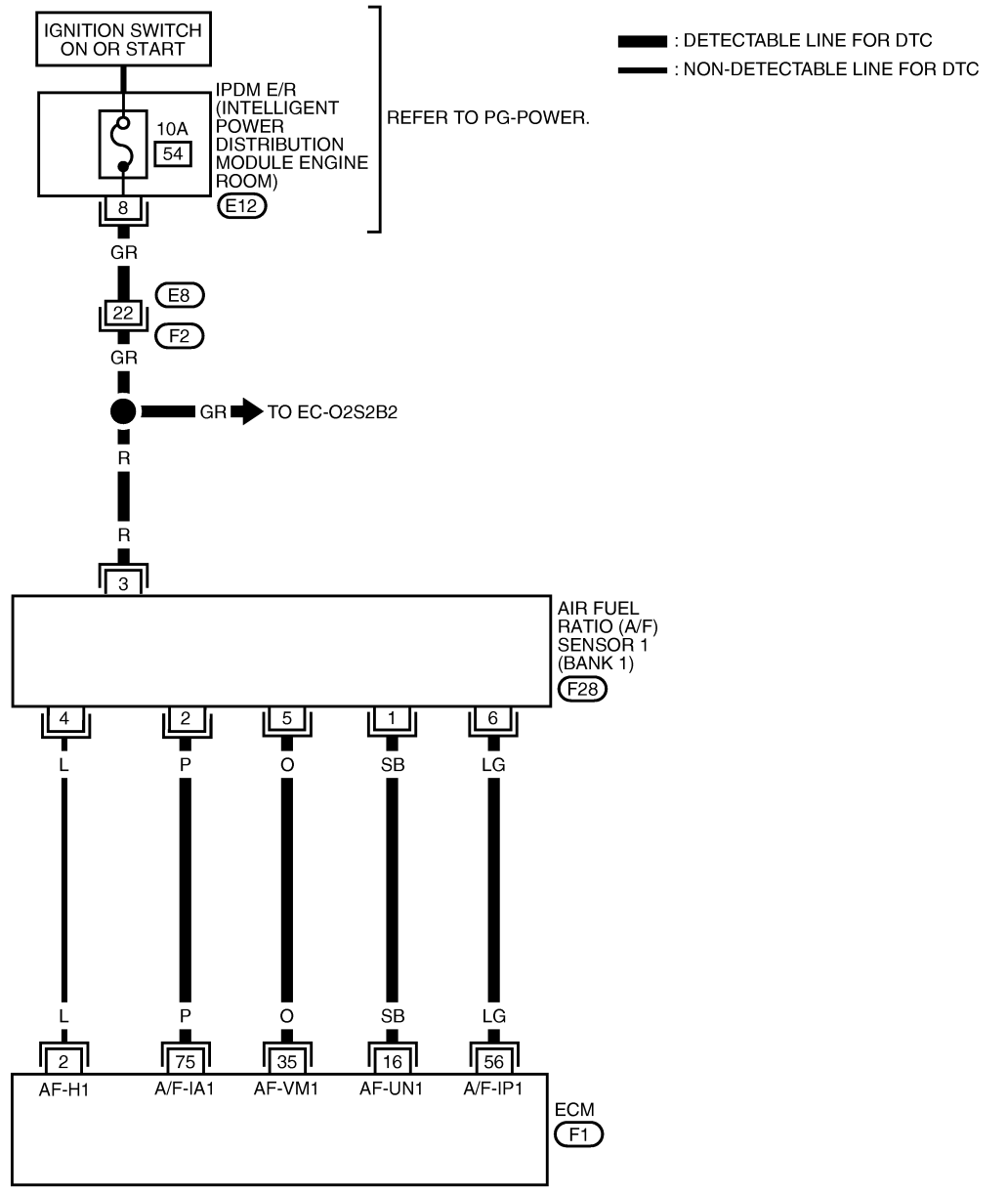
- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

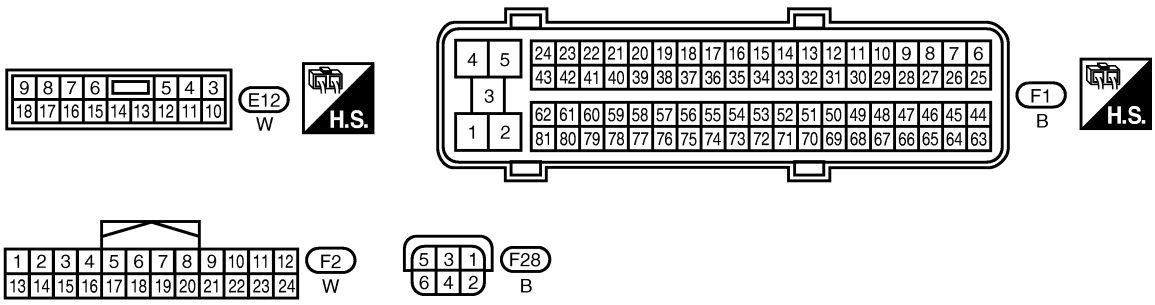
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If the 1st trip DTC is displayed, go to EC-438, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000QJ

EC-AF1B1-01



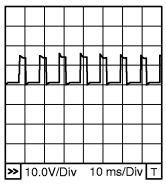


MBWA1336E

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

CAUTION:

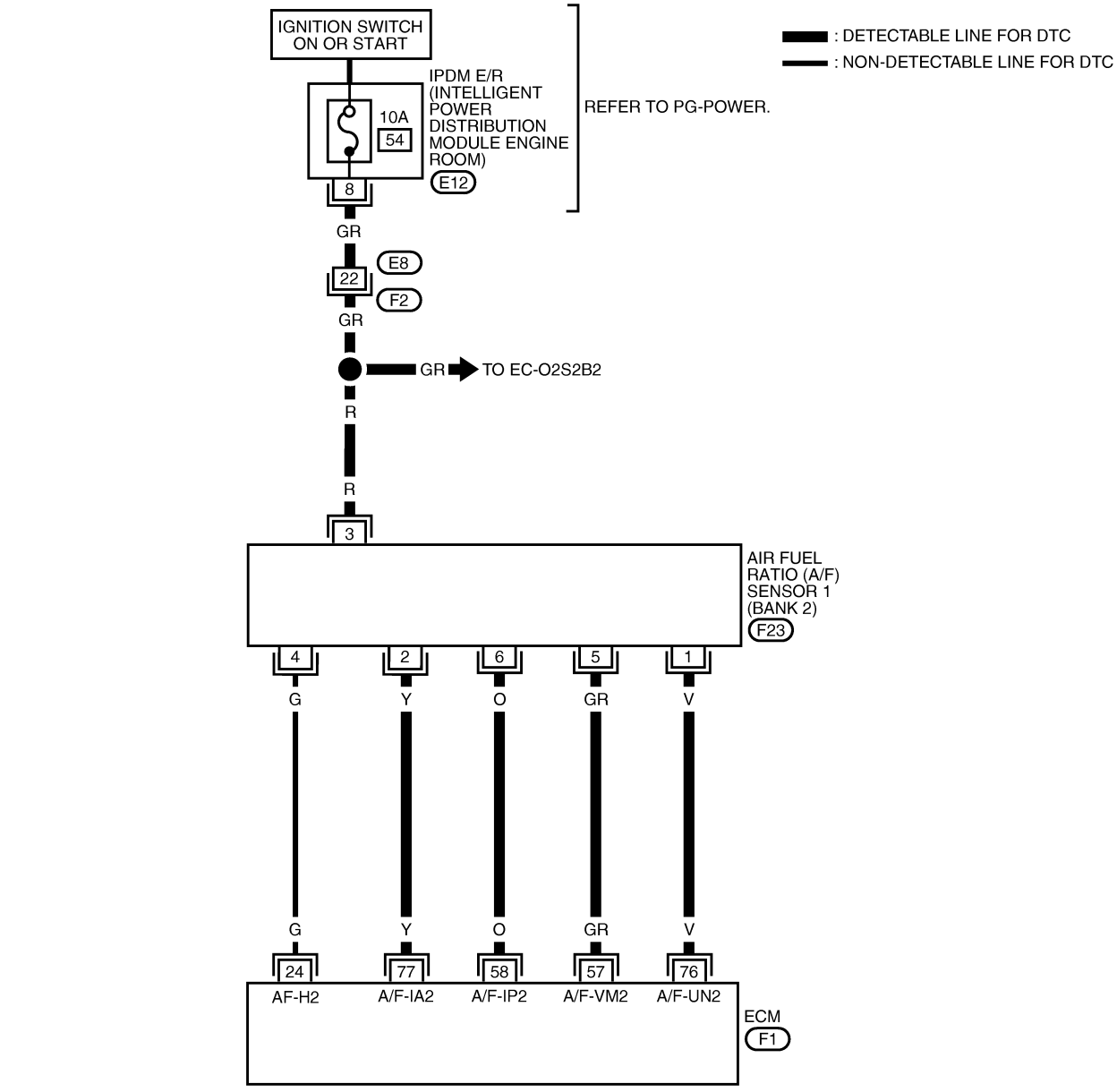
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

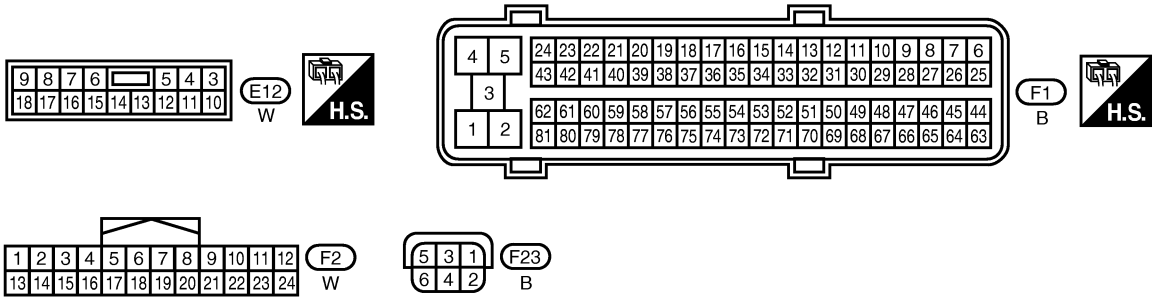
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

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

BANK 2

EC-AF1B2-01



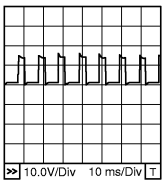


MBWA1337E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

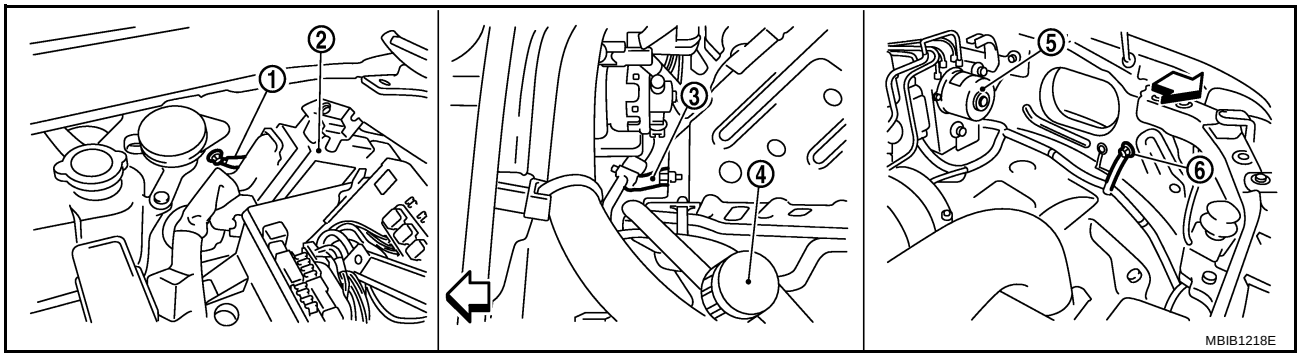
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000QK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

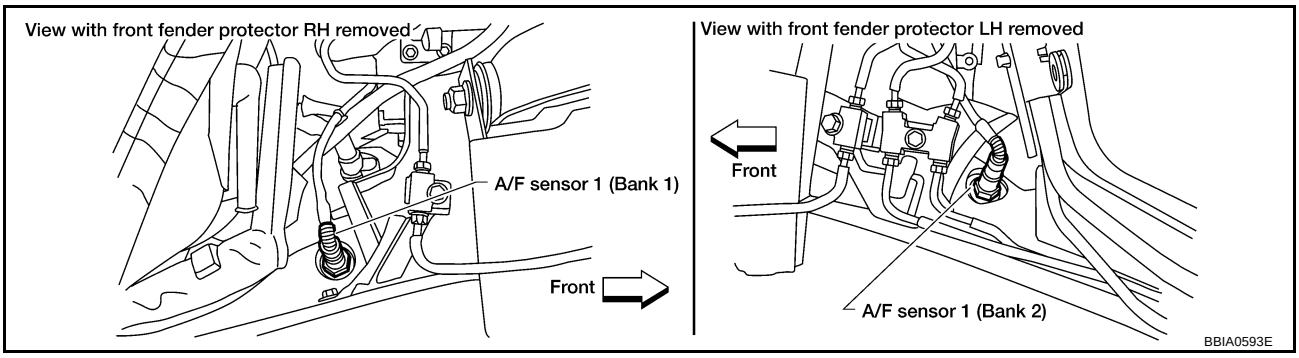
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

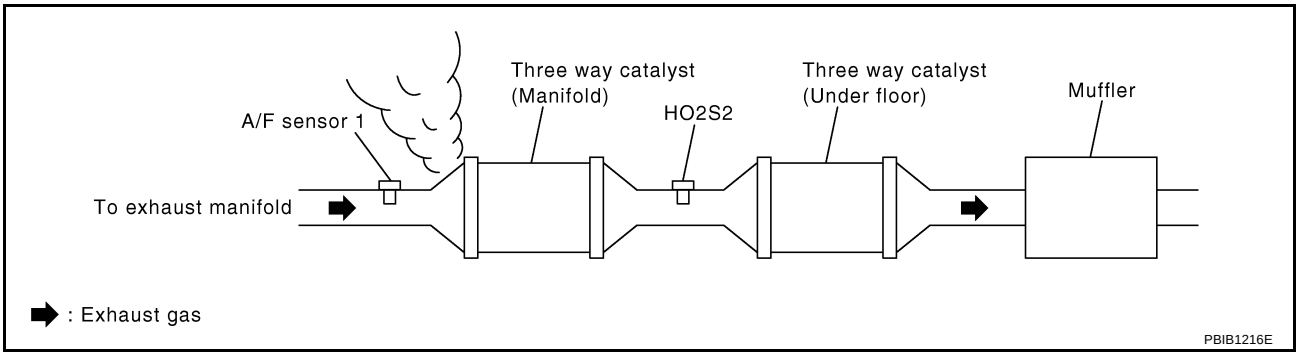


Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

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



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

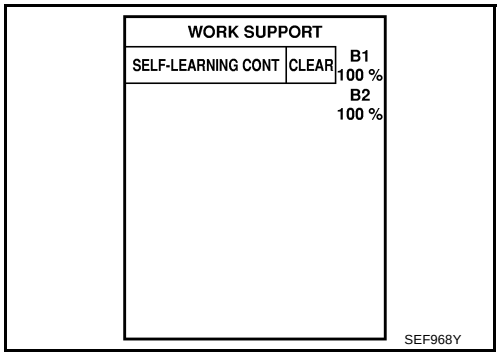
OK or NG

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

5. CLEAR THE SELF-LEARNING DATA

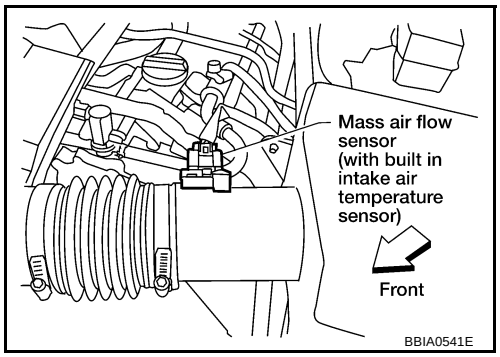
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P172, P0174 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 3 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-56, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



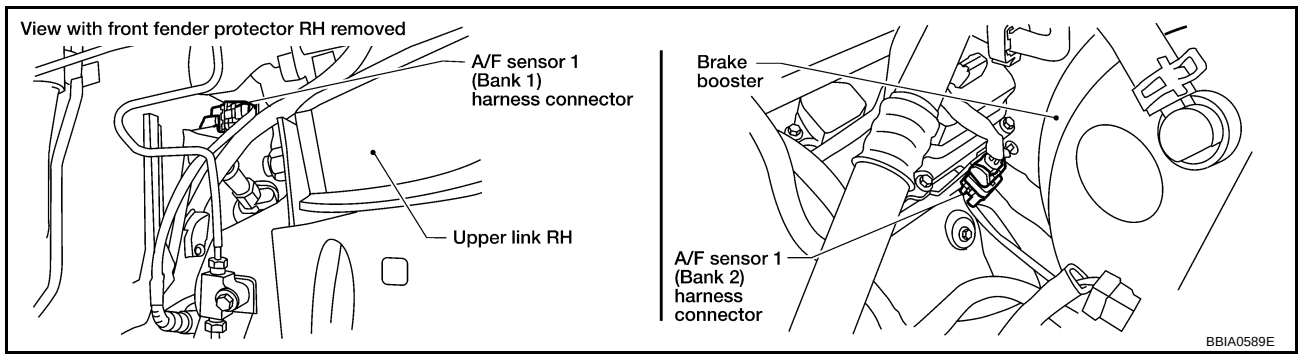
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-207, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" or EC-219, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 6.

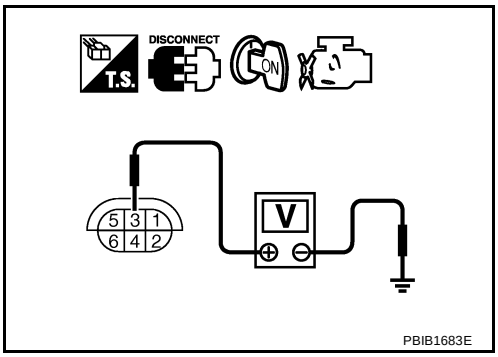
6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

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

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-168, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-41, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000QL

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST"

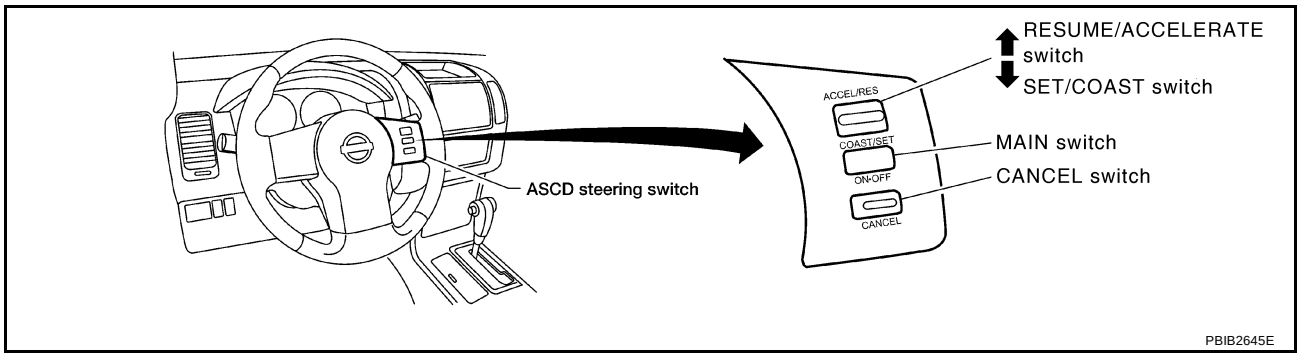
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

GBS000QM

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



Refer to EC-34, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

GBS000QN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

GBS000QO

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-288.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

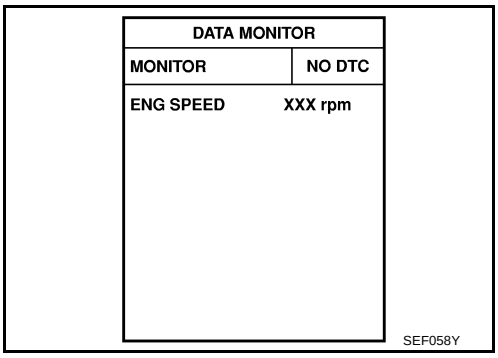
DTC Confirmation Procedure

GBS000QP

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-447, "Diagnostic Procedure" .



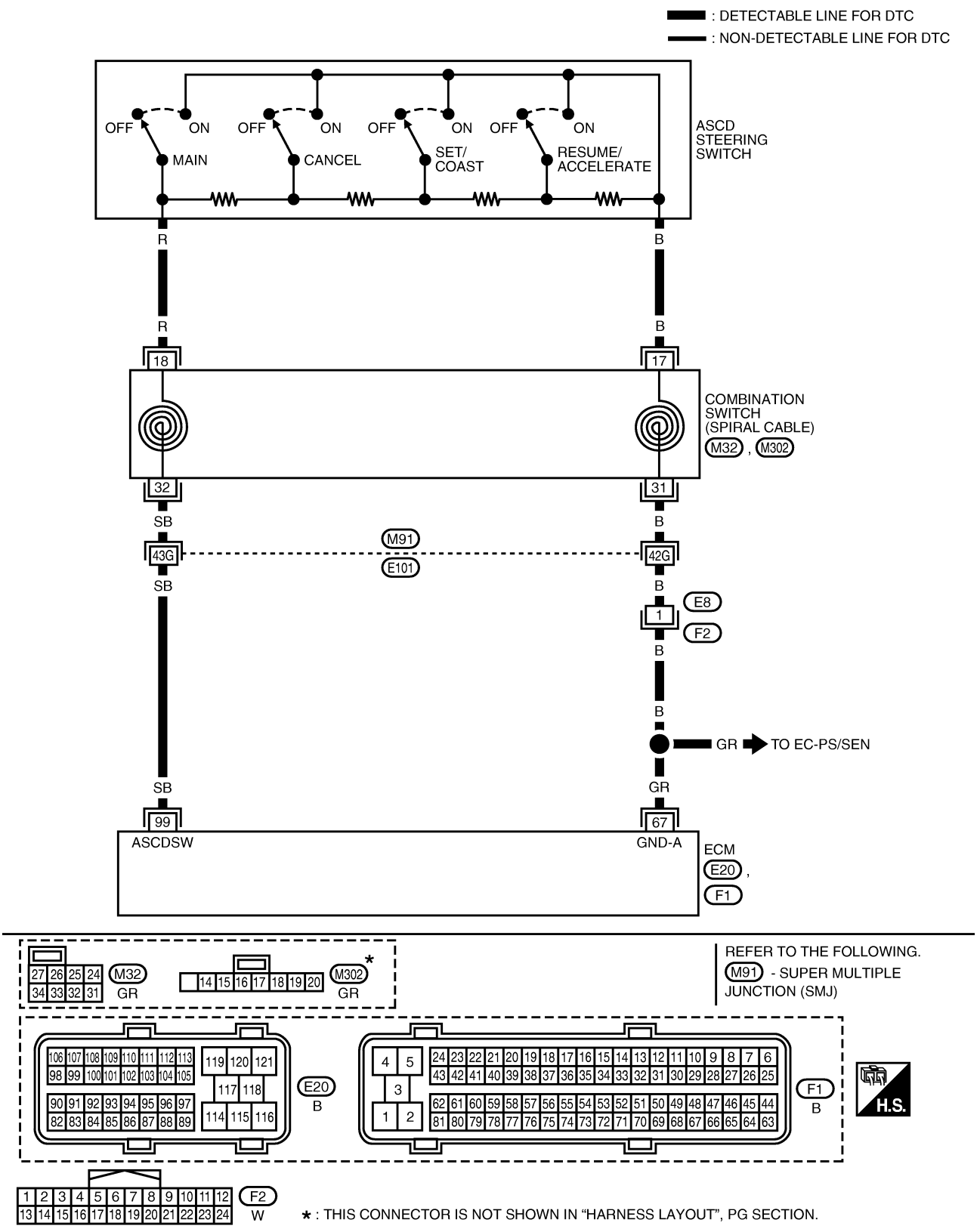
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000QQ

EC-ASC/SW-01



MBWA1339E

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

CAUTION:

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

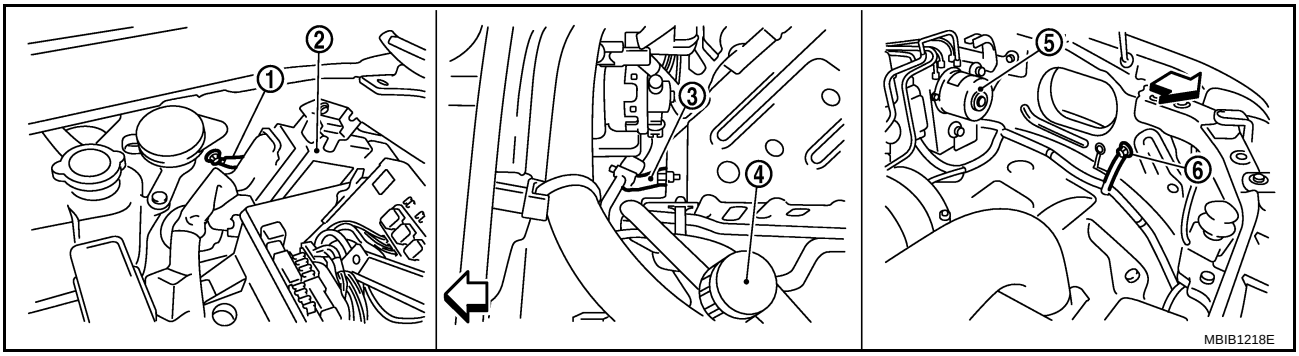
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	SB	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

Diagnostic Procedure

GBS000QR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.

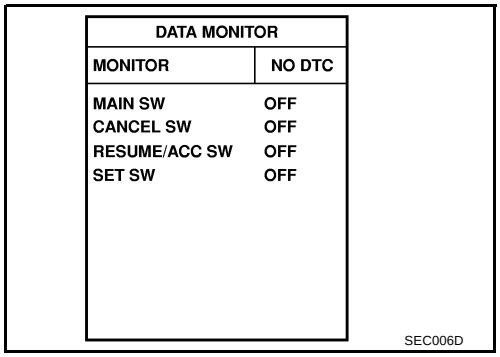
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

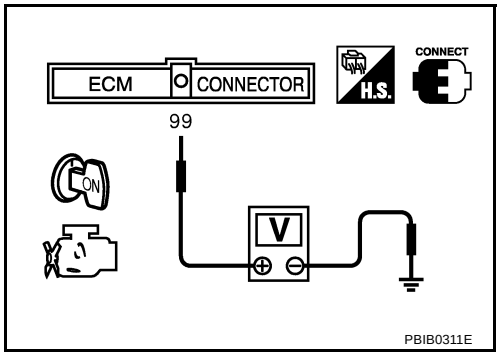
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCELER-ATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 17 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and combination switch terminal 18. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

7. CHECK ASCD STEERING SWITCH

Refer to EC-450, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

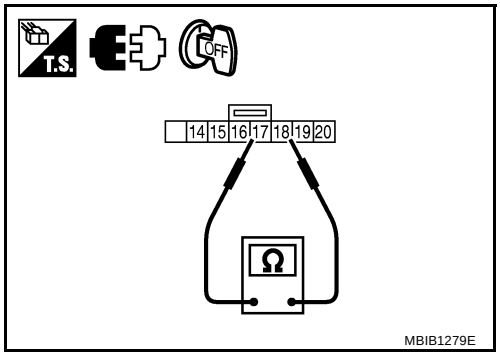
Component Inspection

GBS000QS

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M302.
2. Check continuity between combination switch (spiral cable) terminals 17 and 18 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



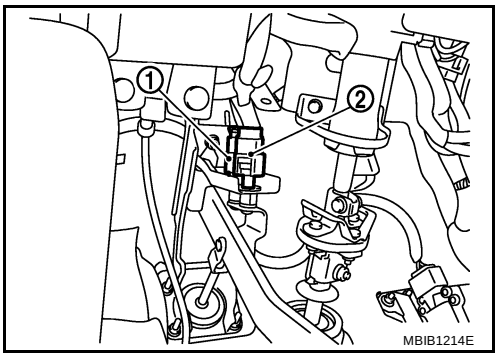
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

GBS000QT

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-34, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

GBS000QU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

GBS000QV

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-288**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.) ● Stop lamp switch ● ASCD brake switch ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

GBS000QW

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

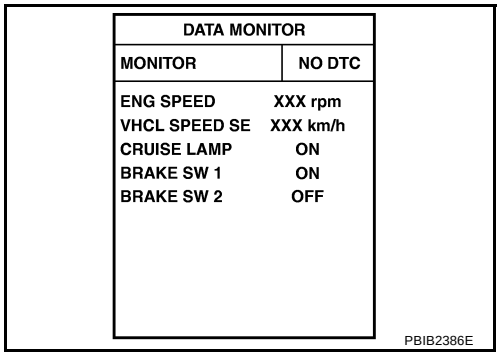
TESTING CONDITION:

Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position



If 1st trip DTC is detected, go to EC-454, "Diagnostic Procedure" .

If 1st trip DTC is not detected, go to the following step.

5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

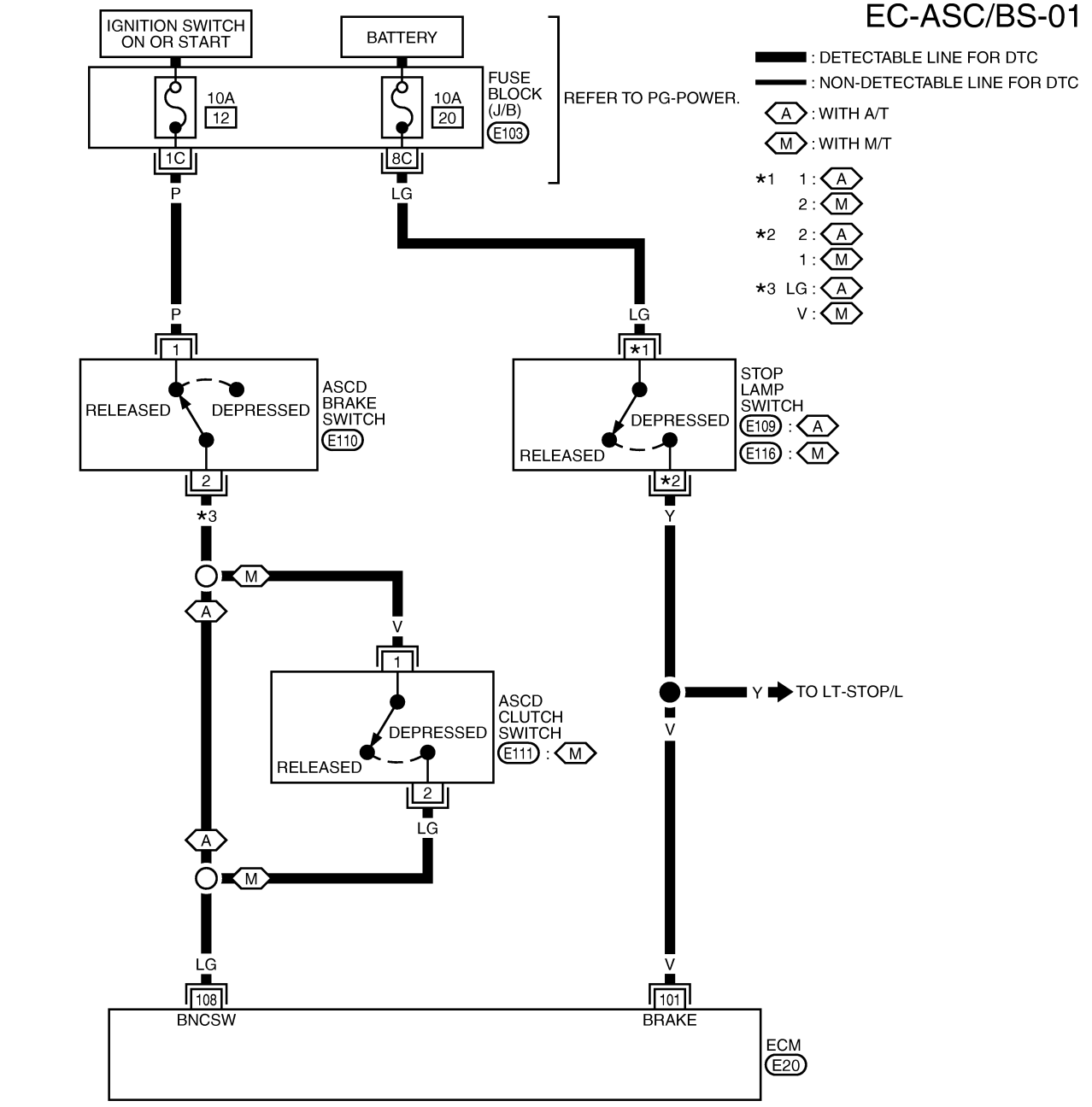
6. If 1st trip DTC is detected, go to EC-454, "Diagnostic Procedure" .

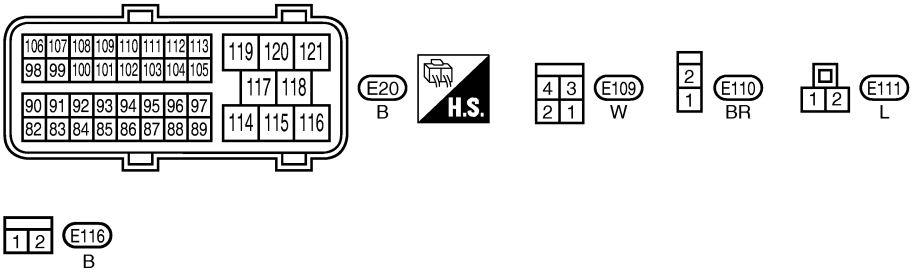
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000QX





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1419E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000QY

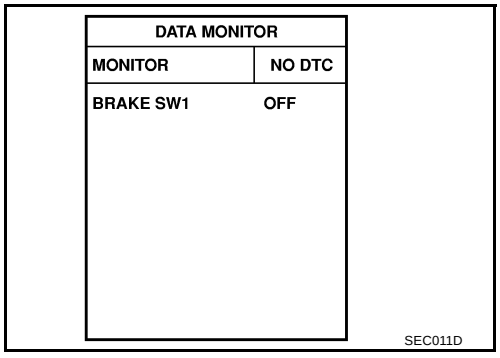
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

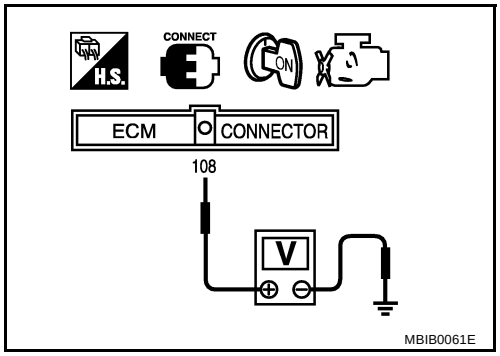
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

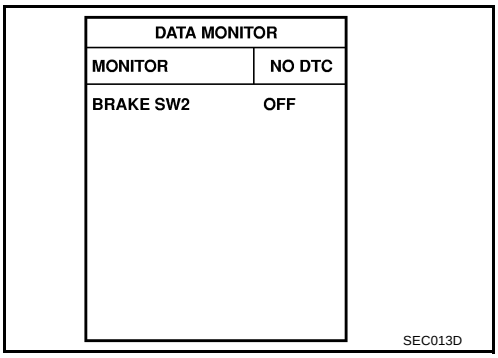
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

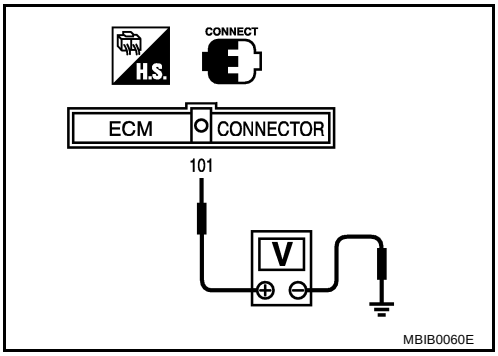
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

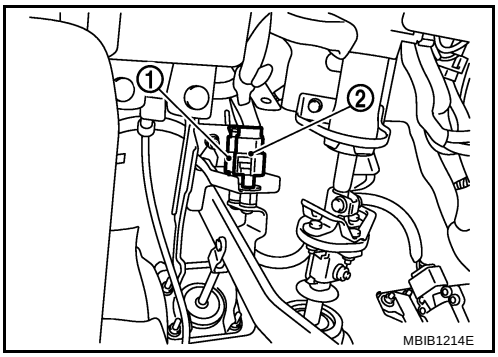


OK or NG

OK >> GO TO 11.
NG >> GO TO 7.

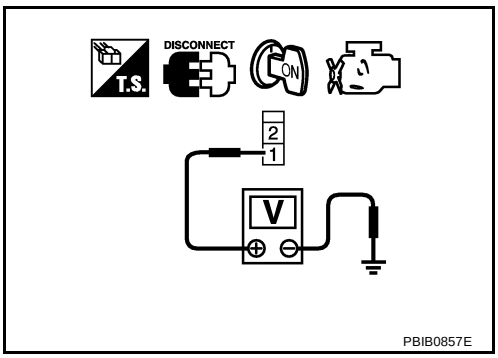
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
   - Stop lamp switch (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-462, "Component Inspection"

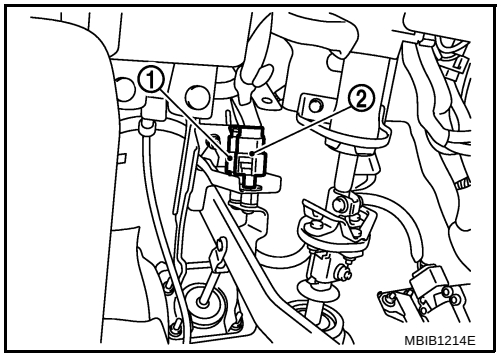
OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.

– ASCD brake switch (1)

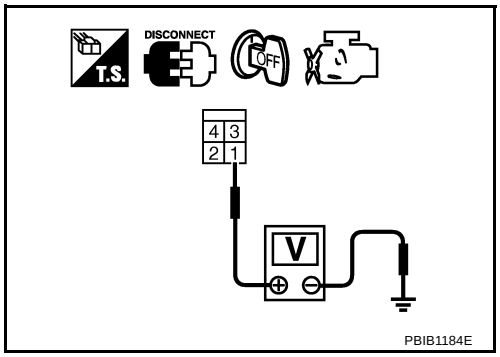


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

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

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-462, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

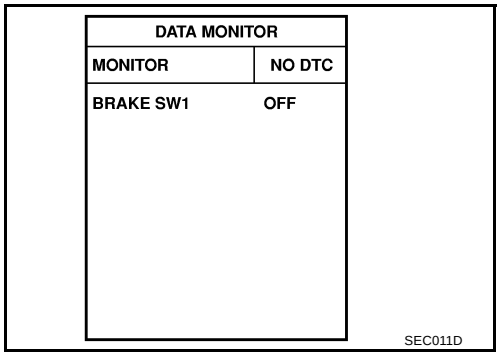
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

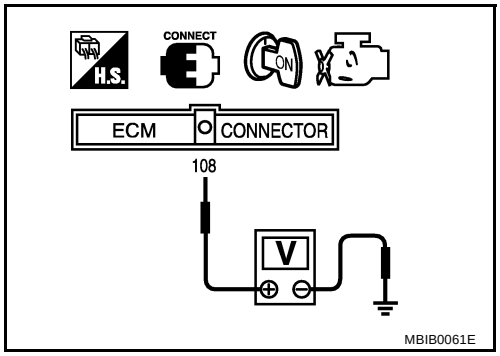
CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

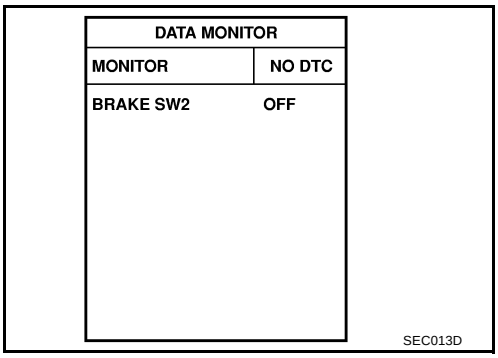
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

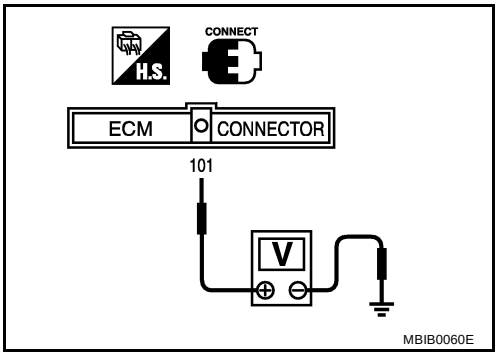
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

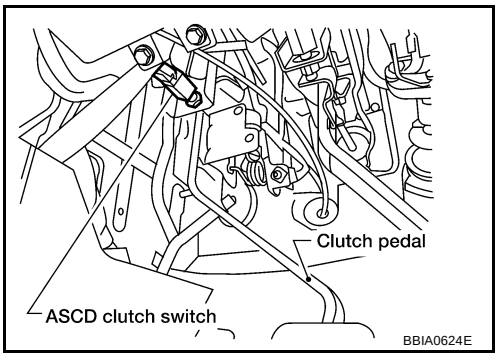


OK or NG

OK >> GO TO 14.
NG >> GO TO 10.

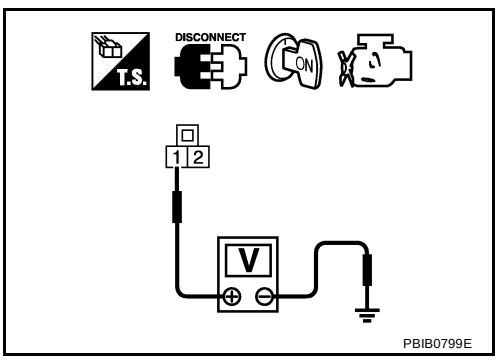
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

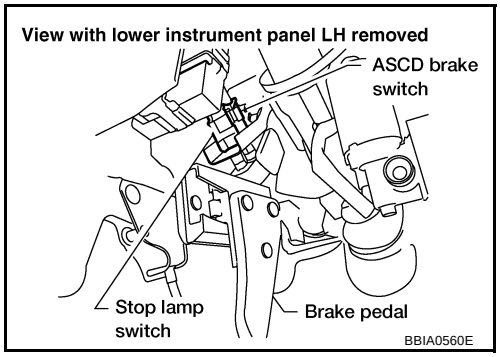


OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

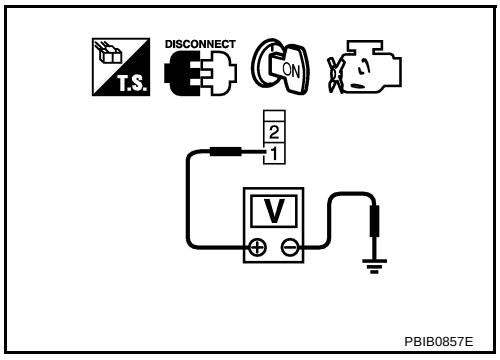
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

7. CHECK ASCD BRAKE SWITCH

Refer to EC-462, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

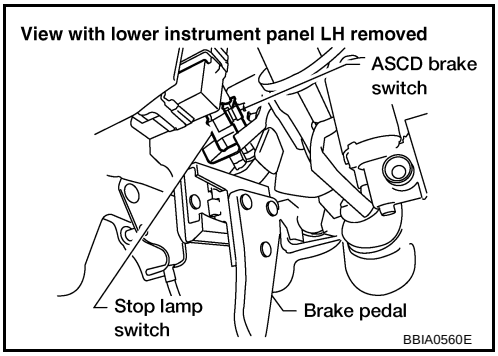
Refer to EC-462, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

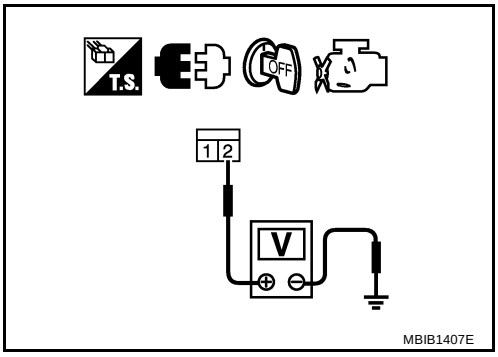
10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

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

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-462, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

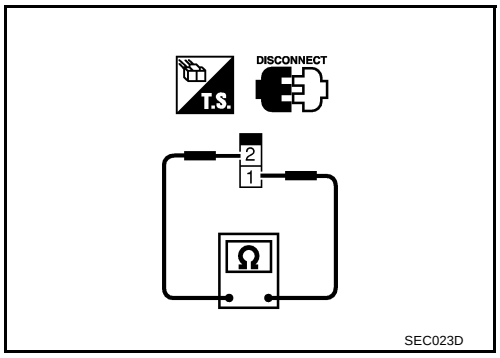
GBS000QZ

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

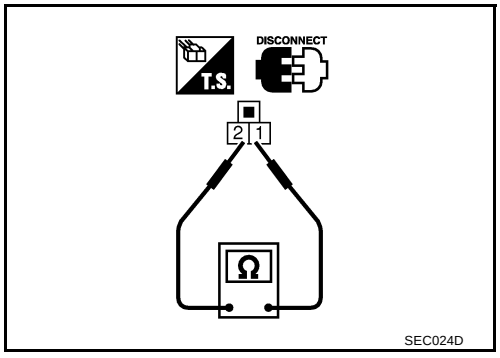


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

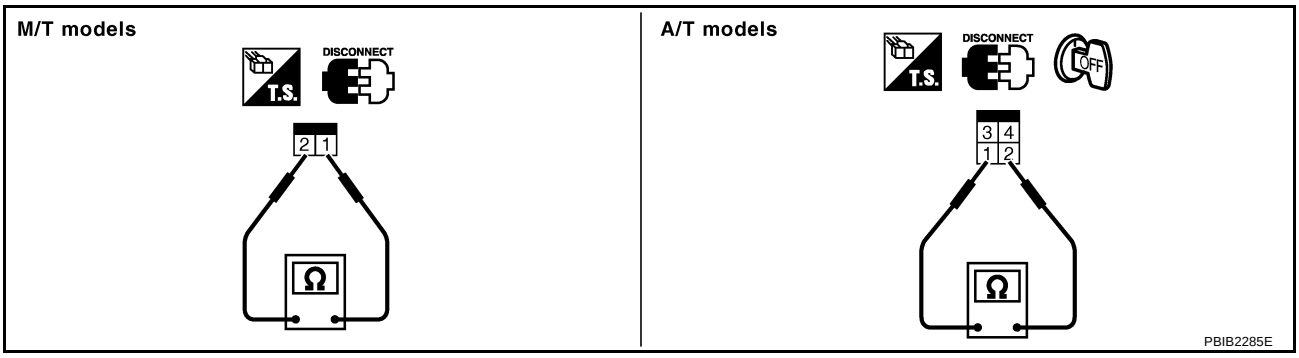
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

Component Description

GBS0014E

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-34, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

GBS0014F

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-281, "DTC P0500 VSS"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-288, "DTC P0605 ECM"**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) ● Wheel sensor ● TCM (A/T models) ● ECM

DTC Confirmation Procedure

GBS0014G

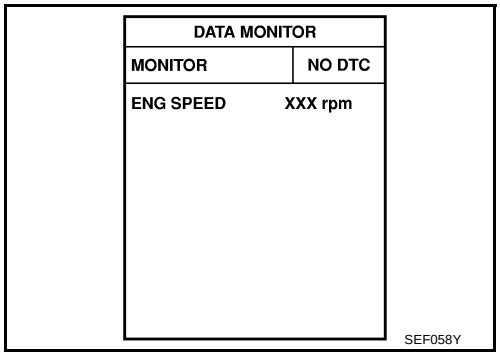
CAUTION:
Always drive vehicle at a safe speed.

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

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. If DTC is detected, go to EC-465, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

GBS0014H

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK COMBINATION METER

Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

GBS000R0

When the selector lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

GBS000R1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

GBS000R2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch ● Combination meter ● TCM (A/T models)

DTC Confirmation Procedure

GBS000R3

CAUTION:

Always drive vehicle at a safe speed.

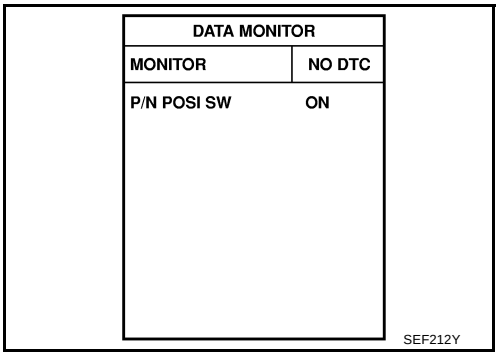
NOTE:

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

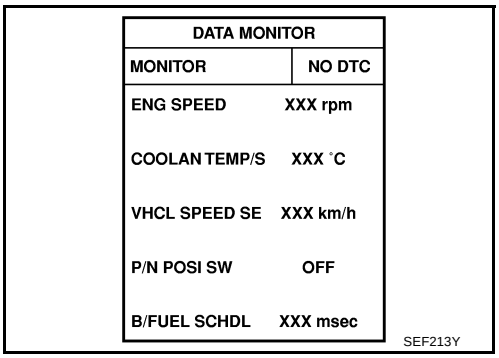
Position (Selector lever)	Known-good signal
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF



If NG, go to EC-469, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-469, "Diagnostic Procedure" .

Overall Function Check

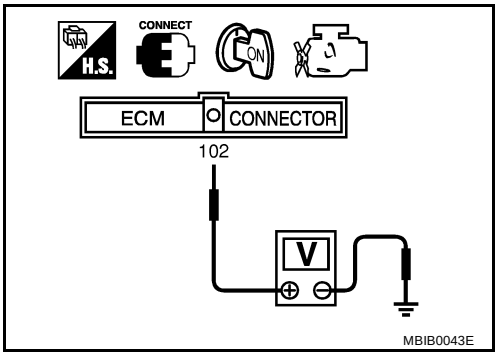
GBS000R4

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

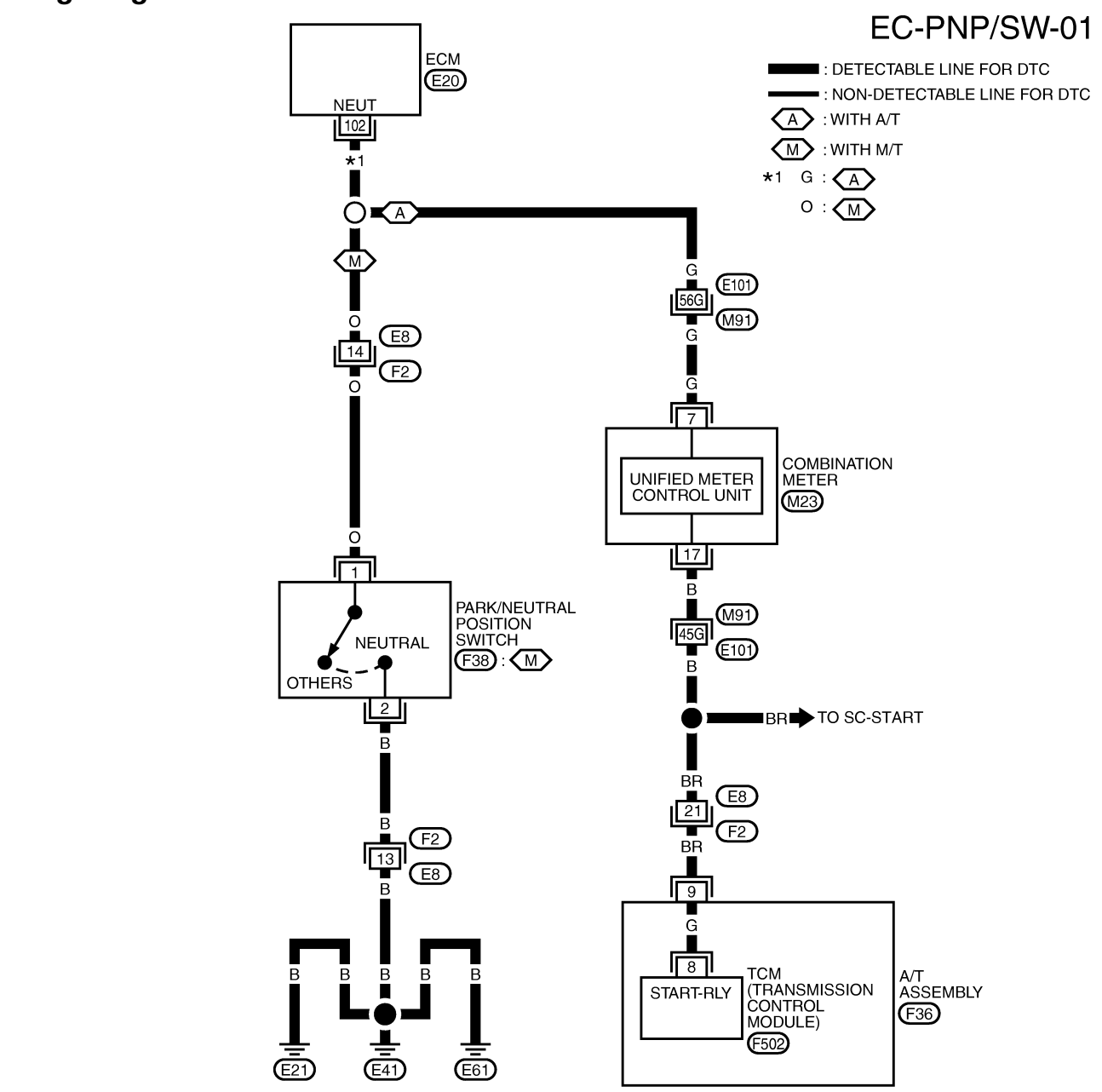
Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	BATTERY VOLTAGE (11 - 14V)

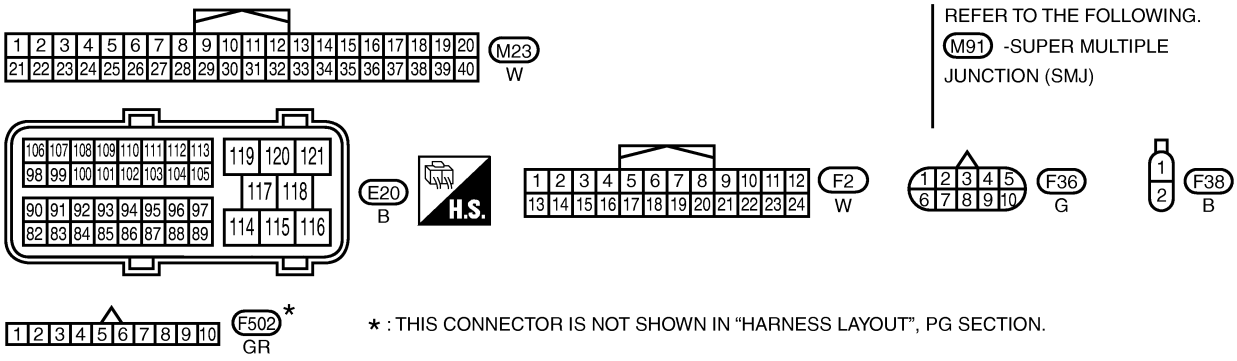


3. If NG, go to EC-469, "Diagnostic Procedure" .

Wiring Diagram

GBS000R5





MBWA1310E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G (A/T) O (M/T)	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000R6

A/T MODELS

1. CHECK DTC WITH TCM

Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

Yes or No

Yes >> GO TO 3.
No >> Refer to SC-30, "STARTING SYSTEM" .

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 17. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Harness for open or short between A/T assembly and combination meter.

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

5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 7. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E101, M91
- Harness for open or short between ECM and combination meter

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

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8. Refer to AT-99, "DTC P0615 START SIGNAL CIRCUIT" .

Continuity should exist.

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

OK or NG

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

8. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace.

9. REPLACE COMBINATION METER

Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

M/T MODELS

1. CHECK PNP SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F2, E8
- Harness for open or short between PNP switch and ground

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

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between PNP switch and ECM

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

5. CHECK PNP SWITCH

Refer to MT-12, "PARK/NEUTRAL POSITION (PNP) SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR)

PFP:31935

Description

GBS000R7

ECM receives turbine revolution sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT-II Reference Value in Data Monitor Mode

GBS000R8

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	● Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

GBS000R9

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-288, "DTC P0605 ECM" .**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-252, "DTC P0335 CKP SENSOR (POS)" .**
- **If DTC P1715 is displayed with DTC P0340, P0345 first perform the trouble diagnosis for DTC P0340, P0345. Refer to EC-259, "DTC P0340, P0345 CMP SENSOR (PHASE)" .**

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Turbine revolution sensor) (TCM output)	Turbine revolution sensor signal is different from the theoretical value calculated by ECM from revolution sensor signal and engine rpm signal.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Turbine revolution sensor circuit is open or shorted) ● TCM

Diagnostic Procedure

GBS000RA

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. REPLACE TCM

Replace TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

GBS000RB

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

GBS000RC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

GBS000RD

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FAIL-SAFE MODE

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

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

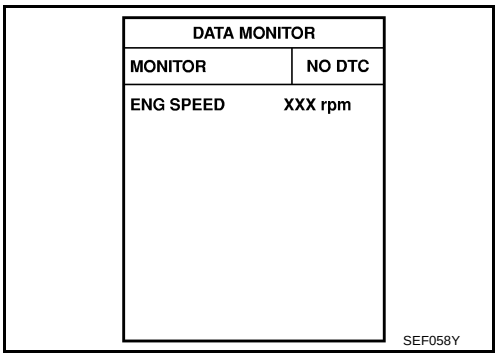
DTC Confirmation Procedure

GBS000RE

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

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-475, "Diagnostic Procedure"
.



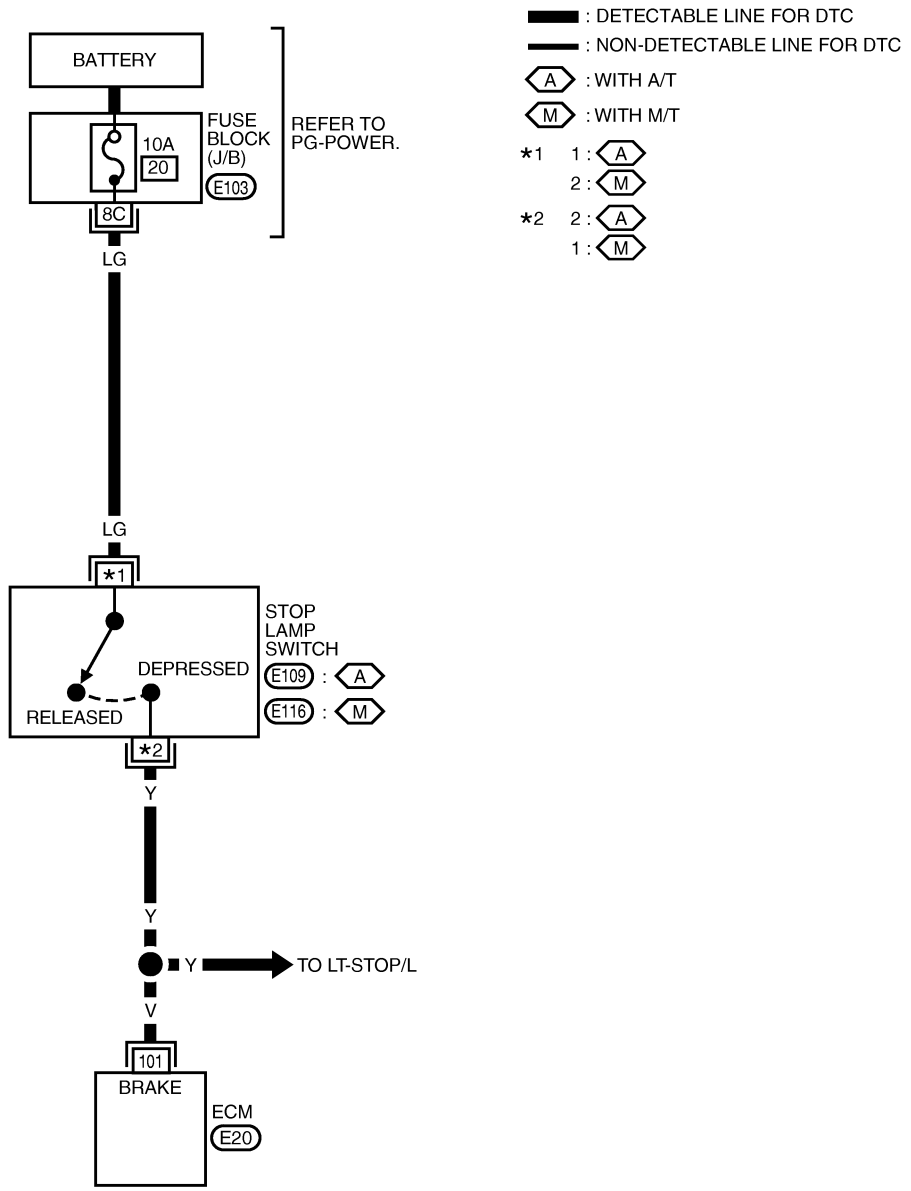
WITH GST

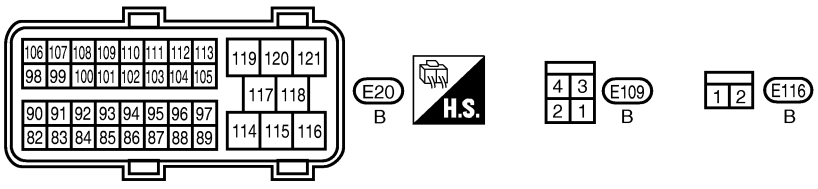
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000RF

EC-BRK/SW-01





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1420E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000RG

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

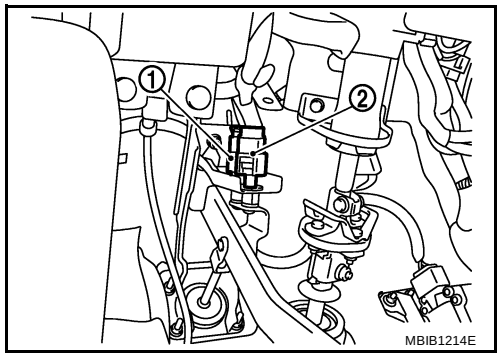
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

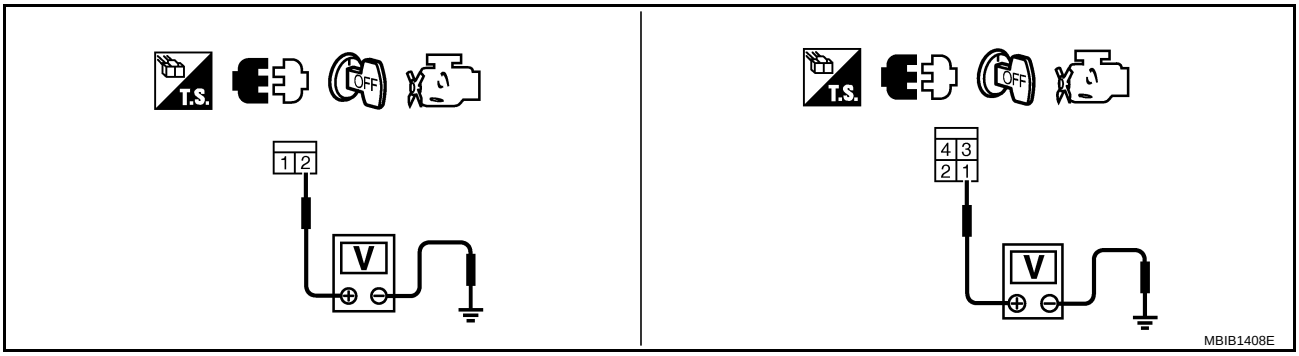
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (2) harness connector.
– ASCD brake switch (1)



2. Check voltage between stop lamp switch terminal 1 (A/T) or 2 (M/T) and ground with CONSULT-II or tester.



M/T models **A/T models**

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E103
- Harness for open and short between stop lamp switch and battery

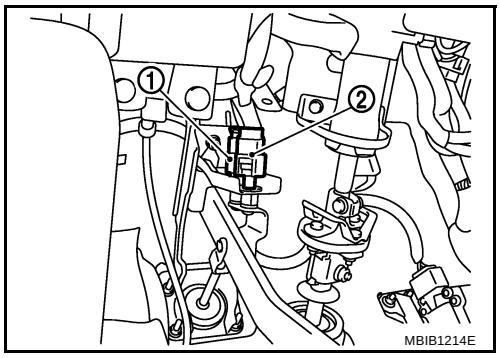
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch (2) harness connector.
   - ASCD brake switch (1)
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2 (A/T) or 1 (M/T).
   Refer to Wiring Diagram.

Continuity should exist.

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



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-477, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

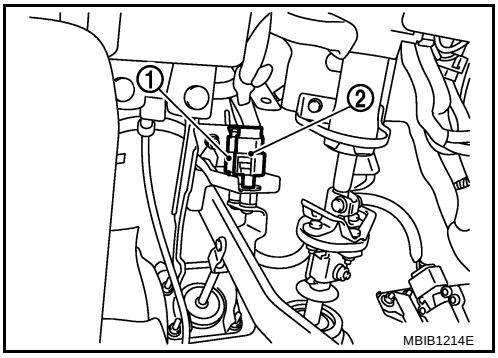
>> **INSPECTION END**

Component Inspection

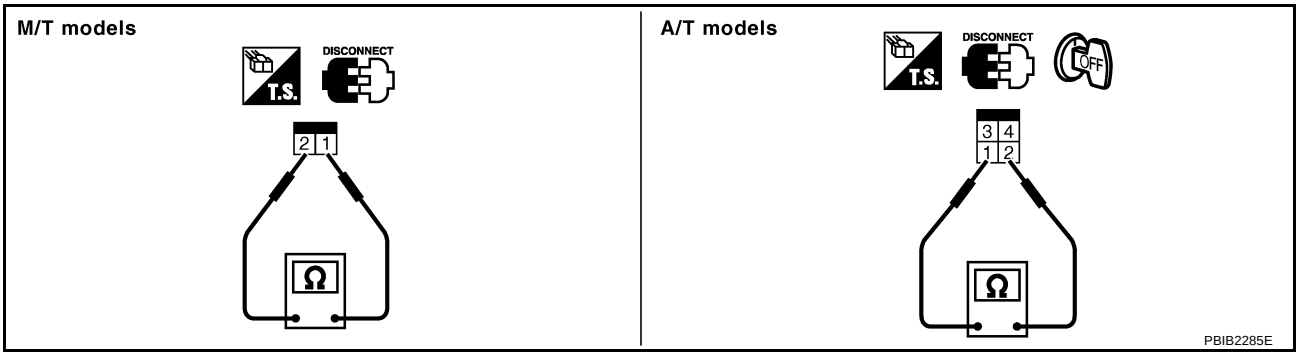
GBS000RH

STOP LAMP SWITCH

1. Disconnect stop lamp switch (2) harness connector.
   - ASCD brake switch (1)



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

3. If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 2 again.

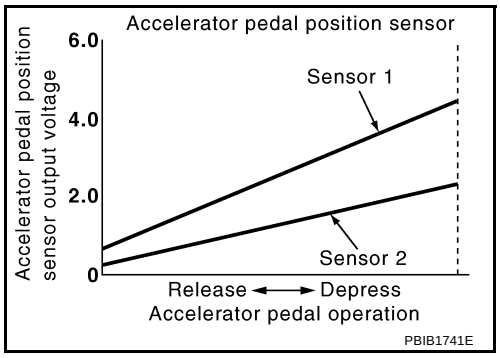
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

GBS000RI

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

GBS000RJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS000RK

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-365, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

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

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

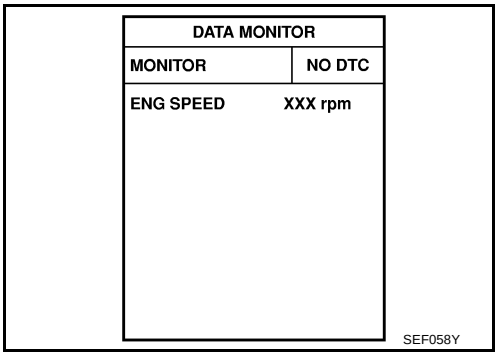
DTC Confirmation Procedure

GBS000RL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-481, "Diagnostic Procedure" .



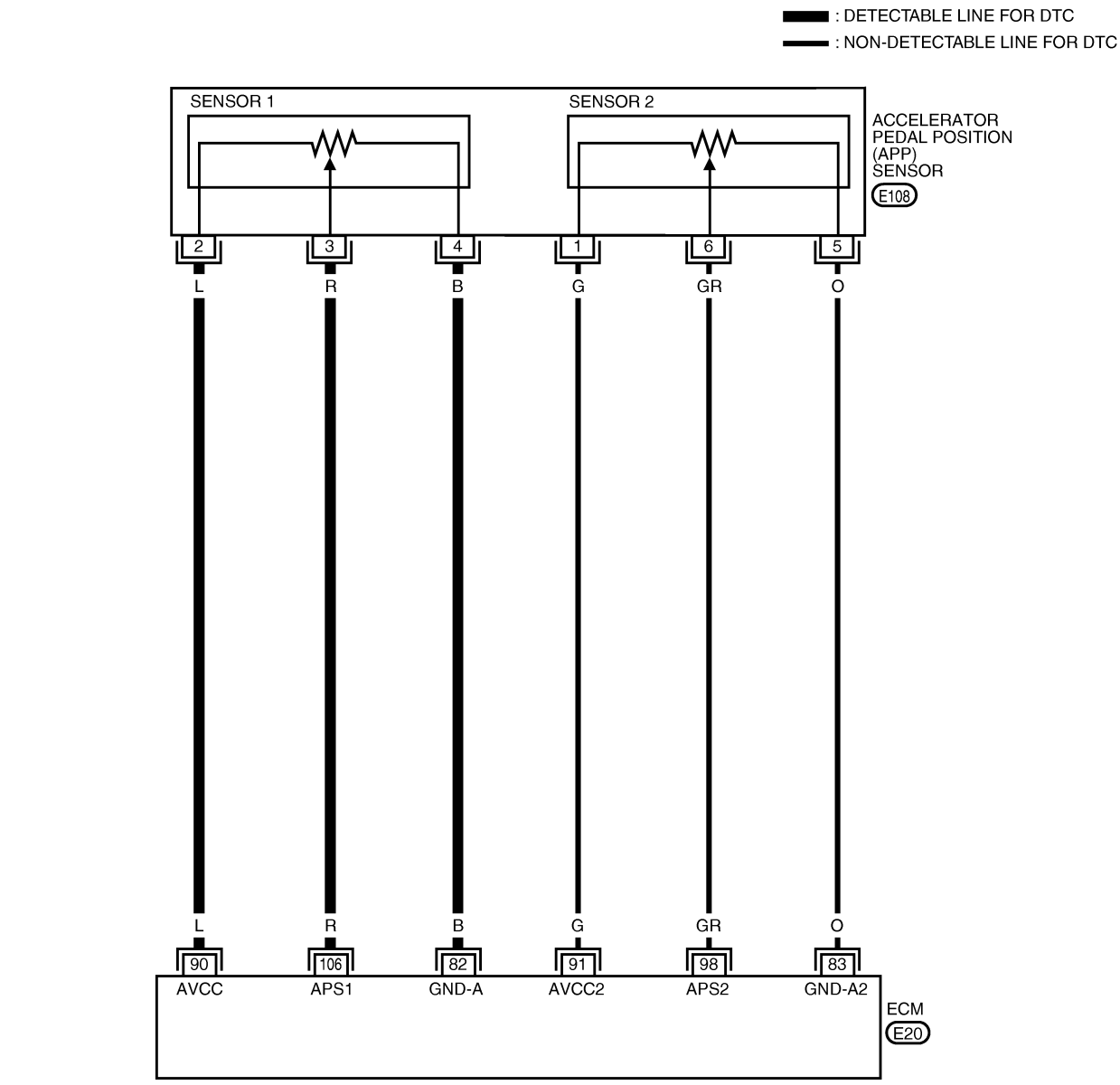
WITH GST

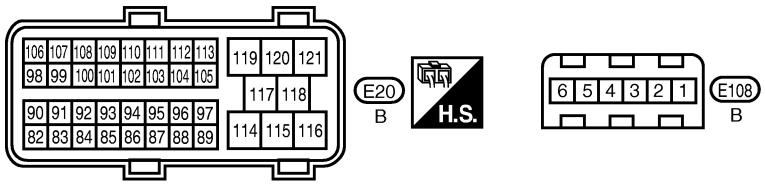
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000RM

EC-APPS1-01





MBWA1313E

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

CAUTION:

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

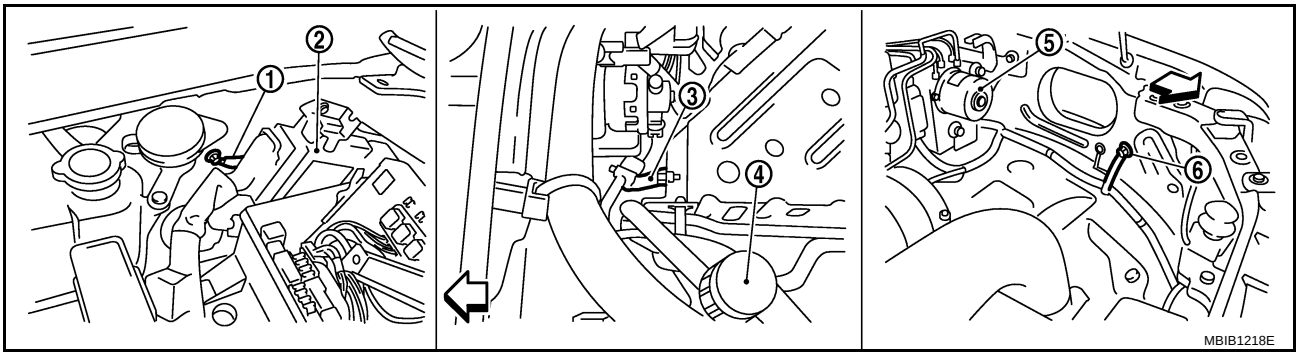
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS000RN

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

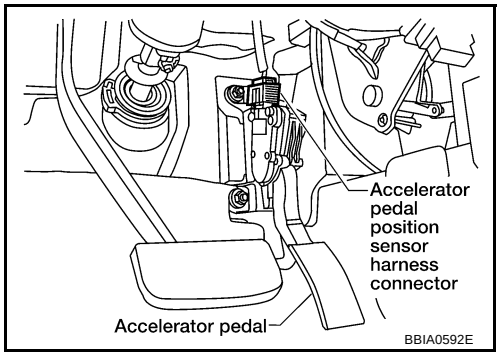
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

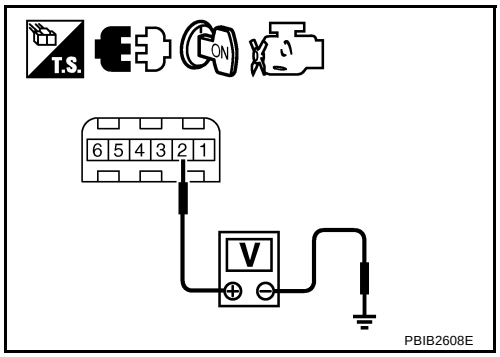
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-483, "Component Inspection" .

OK or NG

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

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

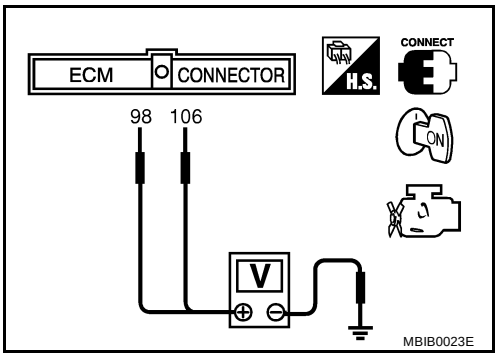
Component Inspection

GBS000RO

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-71, "Accelerator Pedal Released Position Learning" .
6. Perform EC-71, "Throttle Valve Closed Position Learning" .
7. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000RP

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

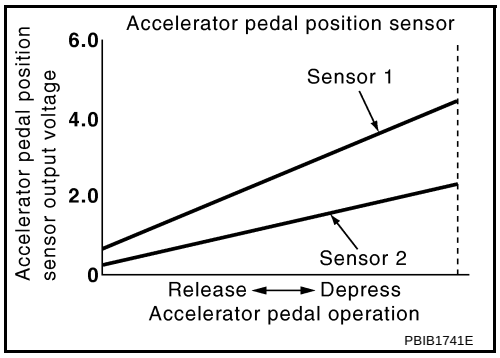
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

GBS000RQ

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

GBS000RR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS000RS

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit shorted.) ● Accelerator pedal position sensor (APP sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

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

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

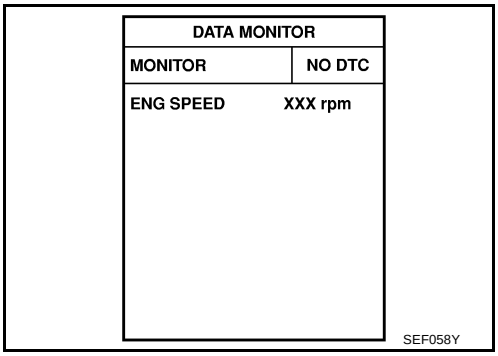
DTC Confirmation Procedure

GBS000RT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-488, "Diagnostic Procedure" .

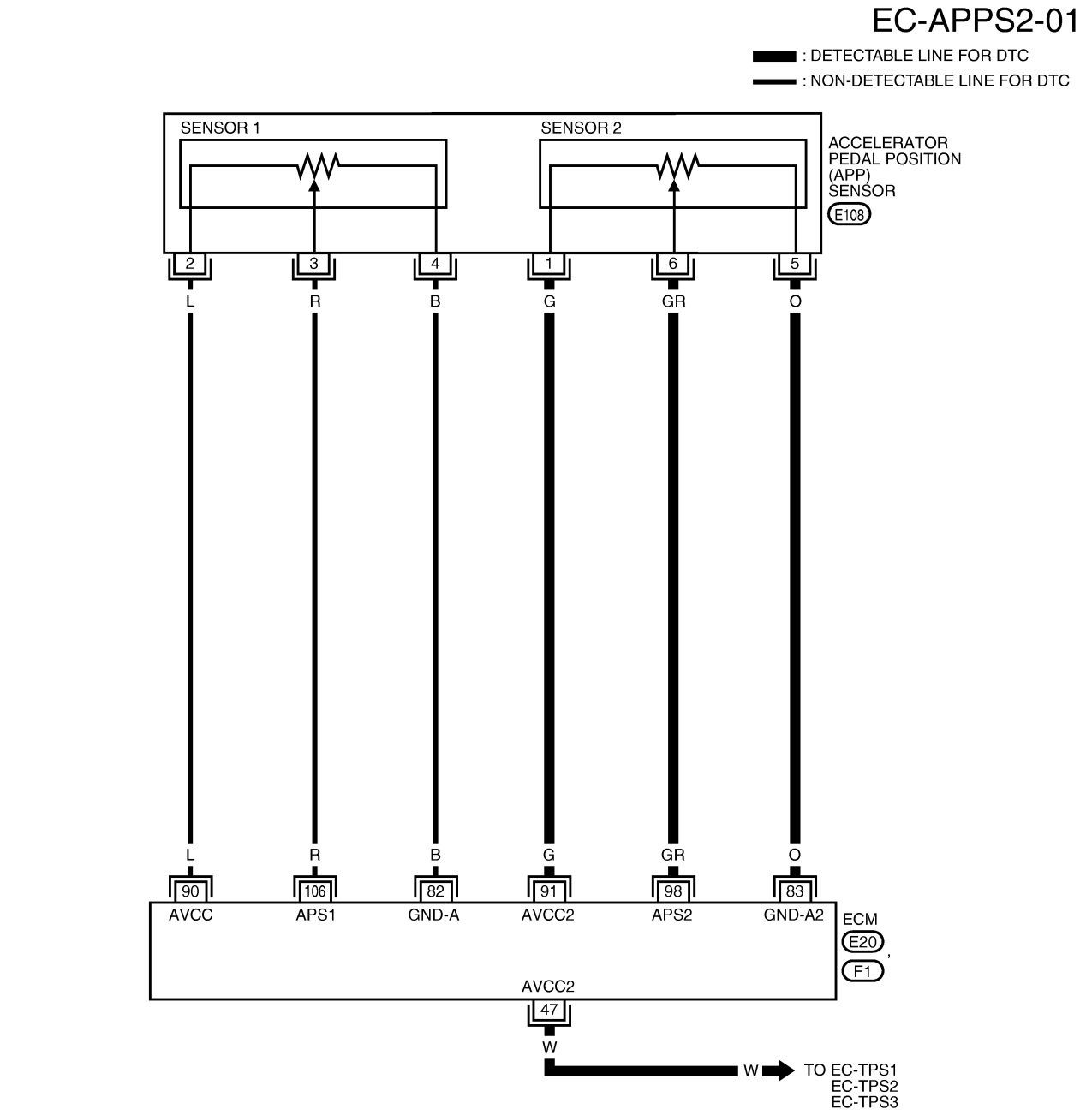


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000RU



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

CAUTION:

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

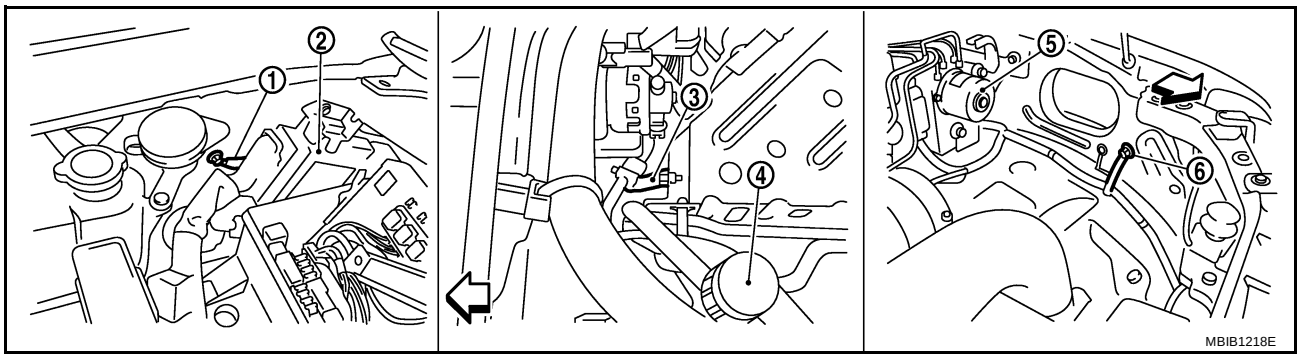
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS000RV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body, Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

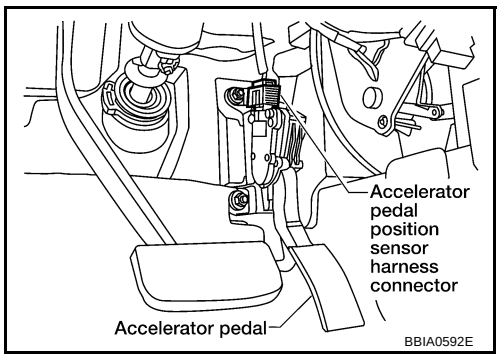
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

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

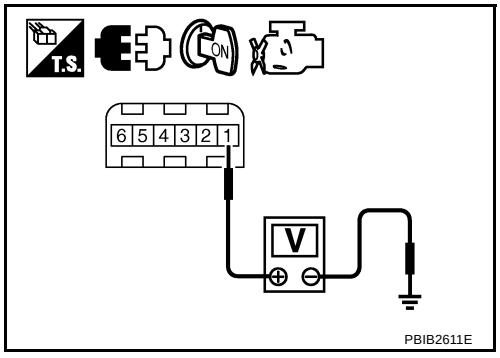
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91.
   Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-486
47	Electric throttle control actuator terminal 2	EC-233

OK or NG

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-237, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to EC-490, "Component Inspection" .

OK or NG

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

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

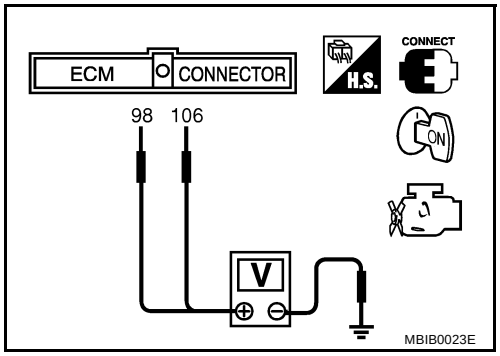
Component Inspection

GBS000RW

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-71, "Accelerator Pedal Released Position Learning" .
6. Perform EC-71, "Throttle Valve Closed Position Learning" .
7. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000RX

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

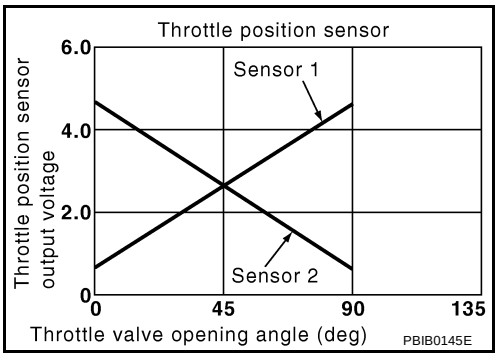
DTC P2135 TP SENSOR

PFP:16119

Component Description

GBS000RY

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



CONSULT-II Reference Value in Data Monitor Mode

GBS000RZ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS000S0

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted). ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

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

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

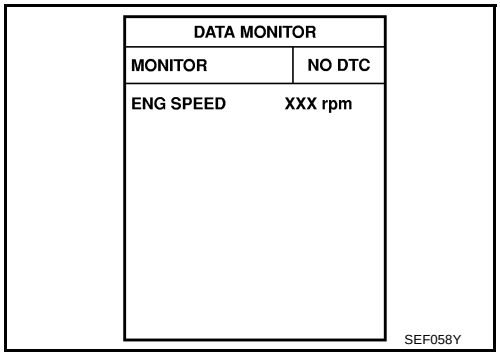
DTC Confirmation Procedure

GBS000S1

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-495, "Diagnostic Procedure" .



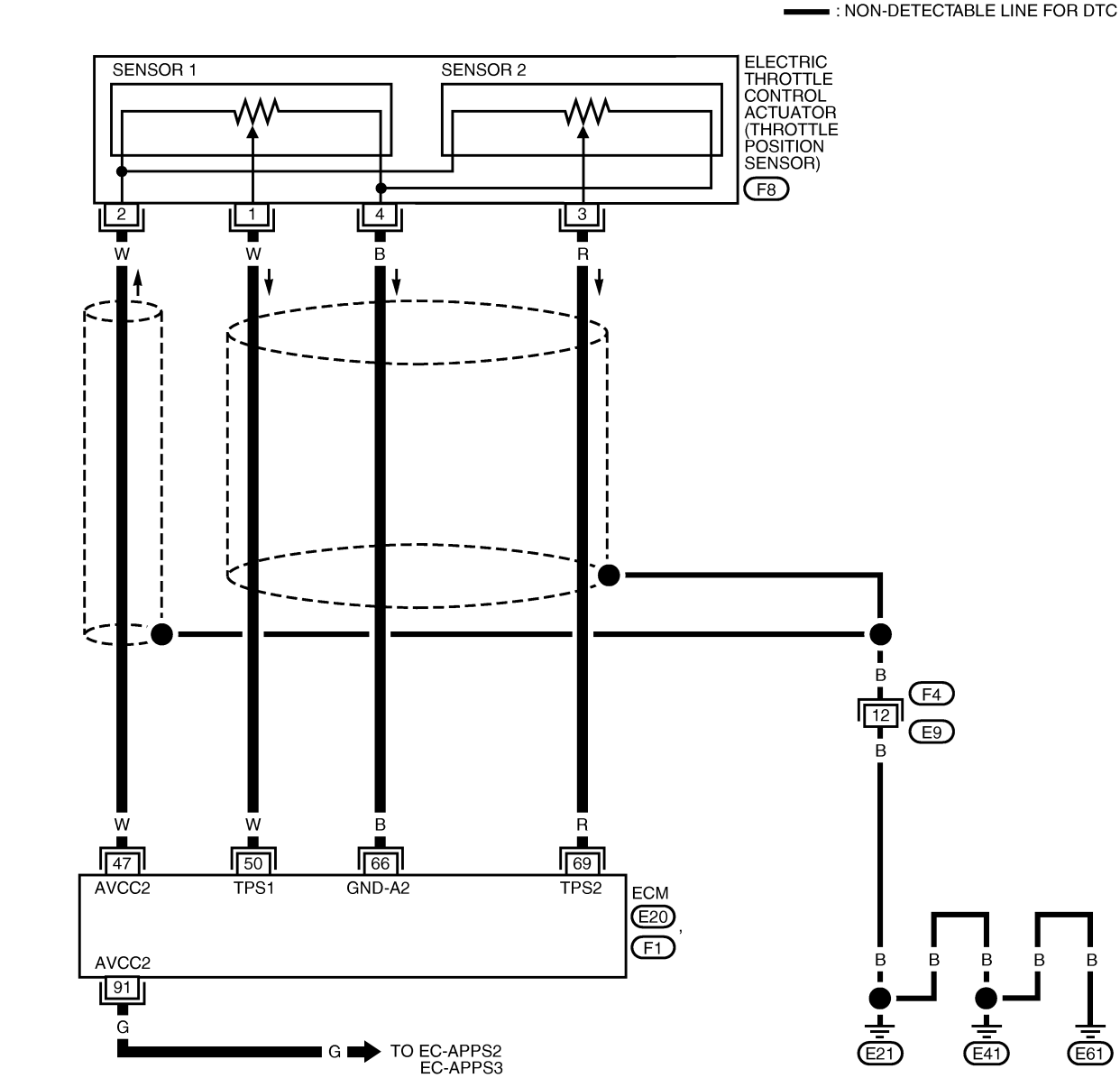
WITH GST

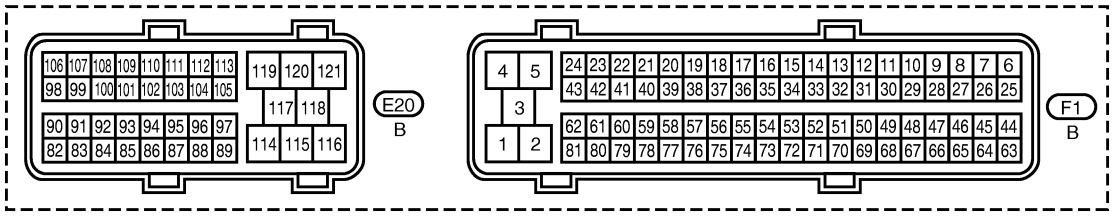
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000S2

EC-TPS3-01





MBWA1315E

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

CAUTION:

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

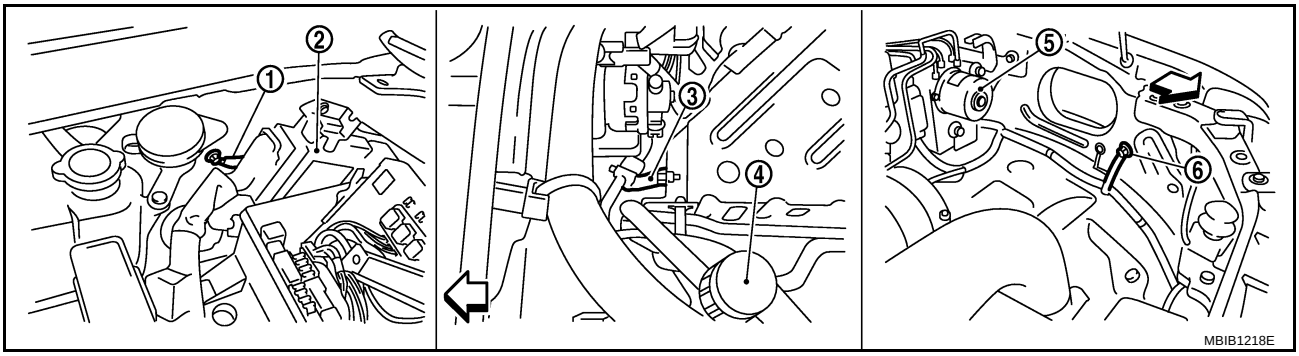
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More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

Diagnostic Procedure

GBS000S3

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

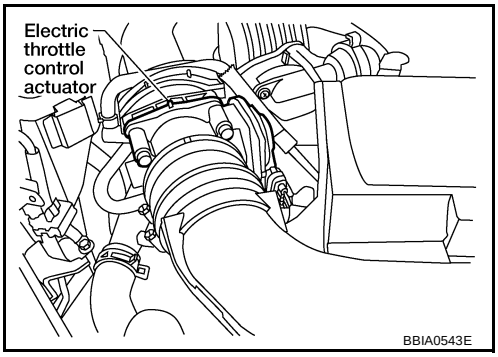
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

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

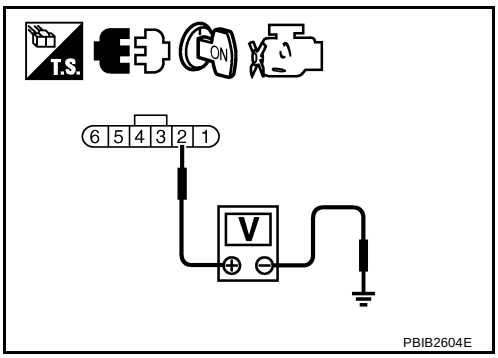
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

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



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

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

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-493
91	APP sensor terminal 1	EC-486

OK or NG

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

5. CHECK APP SENSOR

Refer to EC-490, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 and electric throttle control actuator terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-497, "Component Inspection" .

OK or NG

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

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

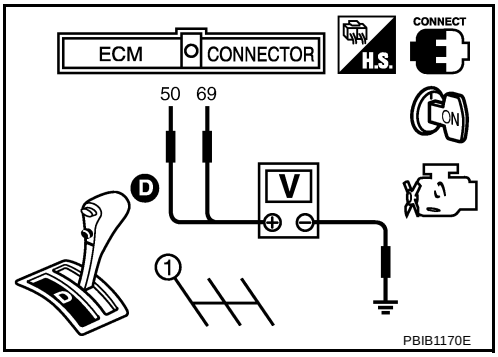
Component Inspection

GBS000S4

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

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



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-71, "Throttle Valve Closed Position Learning" .
8. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000S5

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

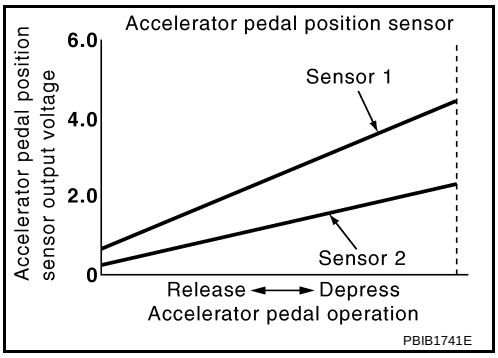
DTC P2138 APP SENSOR

PFP:18002

Component Description

GBS000S6

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

GBS000S7

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS000S8

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-365, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (The TP sensor circuit is shorted.) ● Accelerator pedal position sensor 1 and 2 ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

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

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

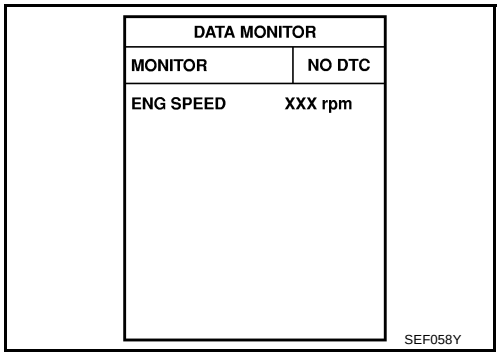
DTC Confirmation Procedure

GBS000S9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-503, "Diagnostic Procedure" .

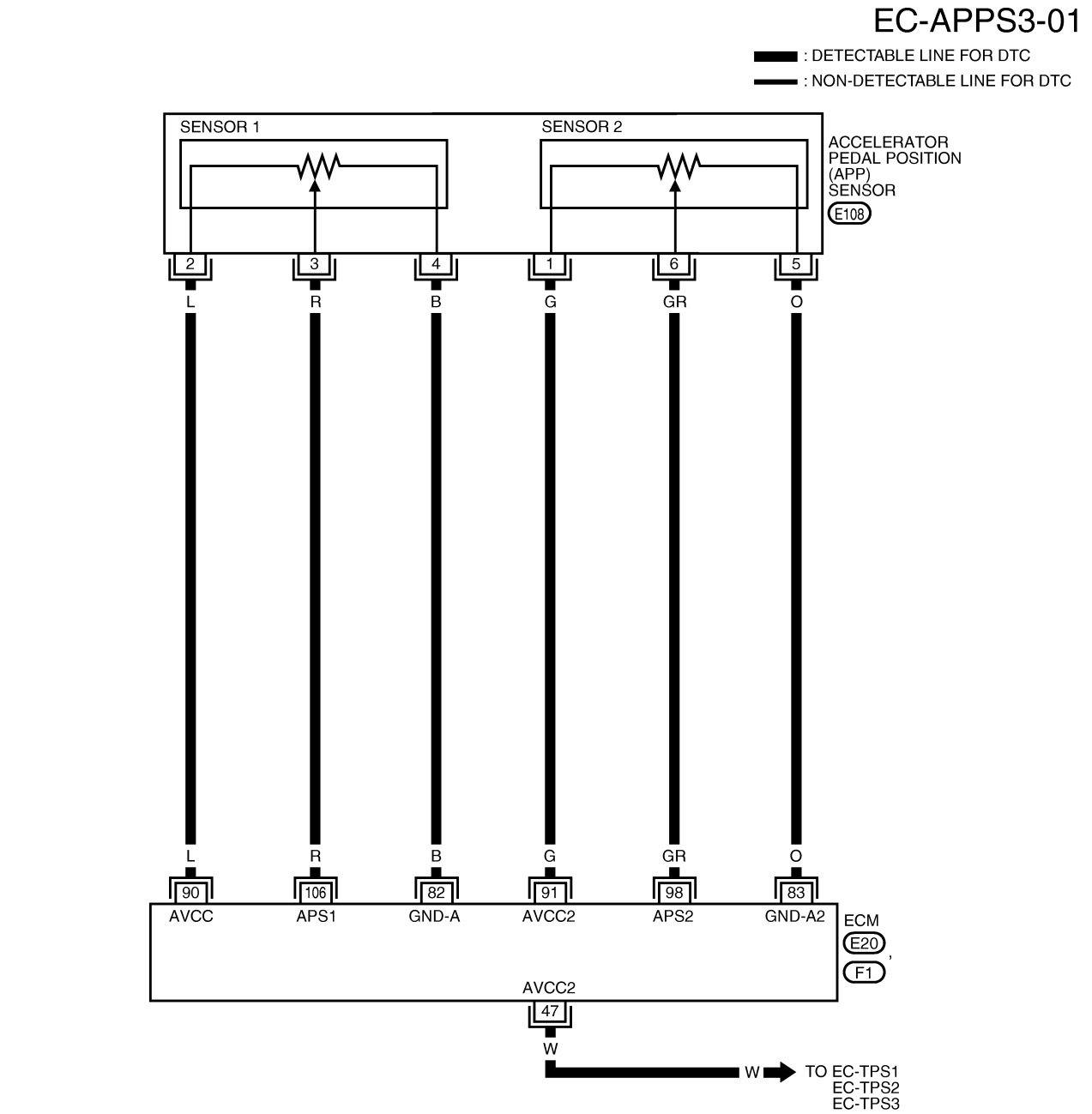


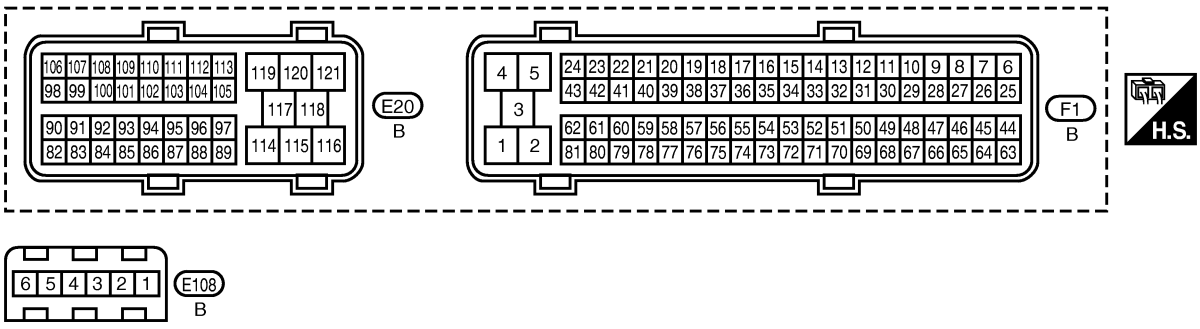
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

GBS000SA





MBWA1316E

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

CAUTION:

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

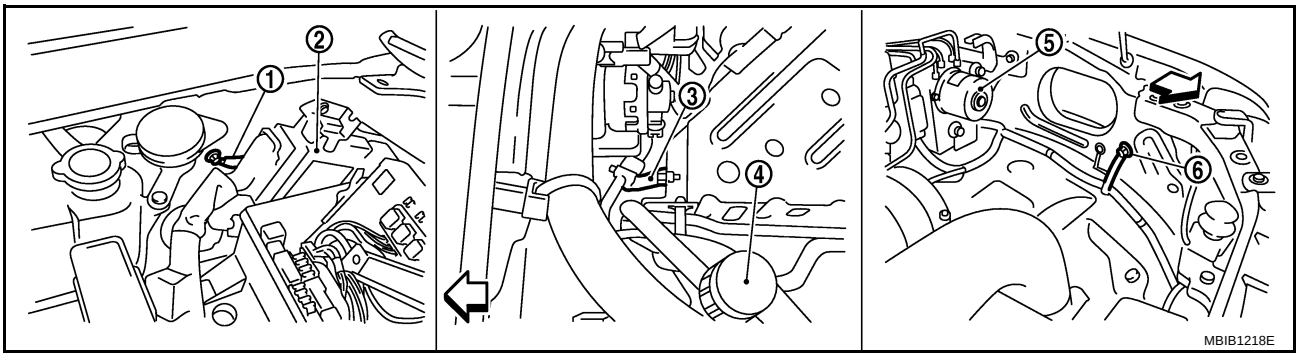
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS000SB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

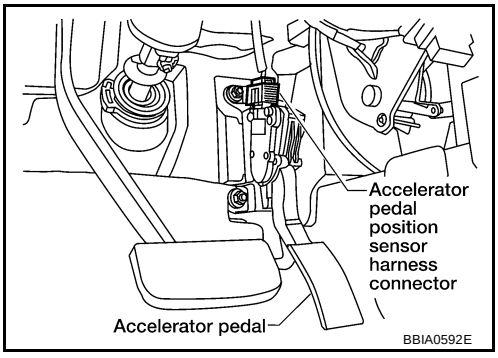
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

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

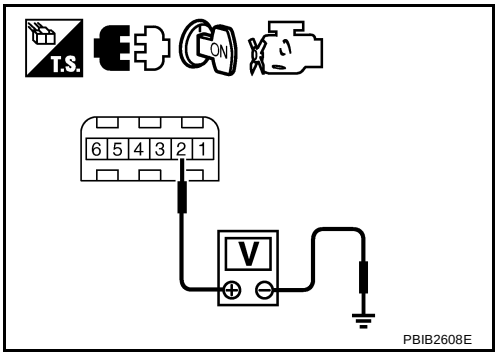
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

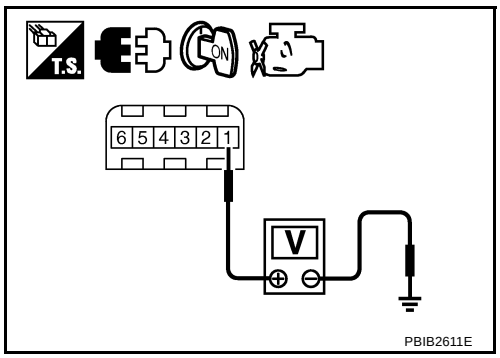


OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-501
47	Electric throttle control actuator terminal 2	EC-493

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-237, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-71, "Throttle Valve Closed Position Learning" .
3. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR

Refer to EC-505, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-71, "Accelerator Pedal Released Position Learning" .
3. Perform EC-71, "Throttle Valve Closed Position Learning" .
4. Perform EC-71, "Idle Air Volume Learning" .

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

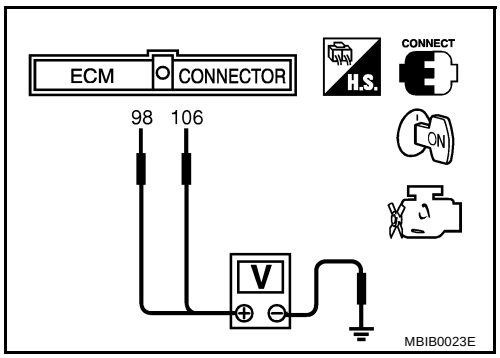
GBS000SC

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-71, "Accelerator Pedal Released Position Learning" .
6. Perform EC-71, "Throttle Valve Closed Position Learning" .
7. Perform EC-71, "Idle Air Volume Learning" .

Removal and Installation

GBS000SD

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

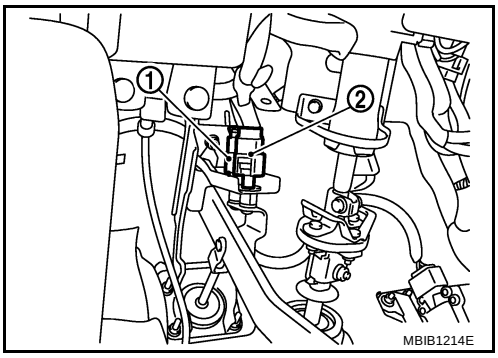
ASCD BRAKE SWITCH

PFP:25320

Component Description

GBS000SE

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-34, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

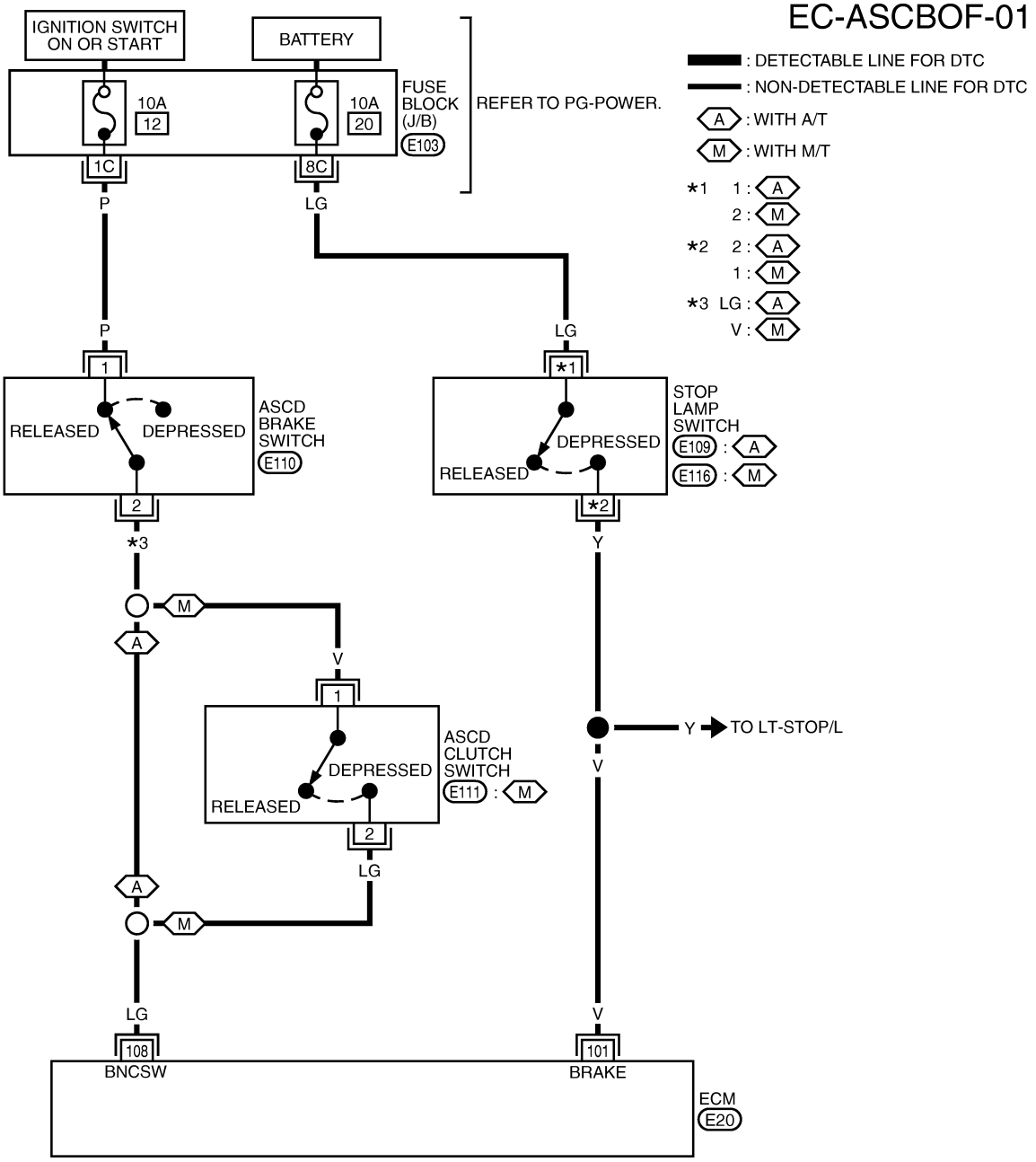
GBS000SF

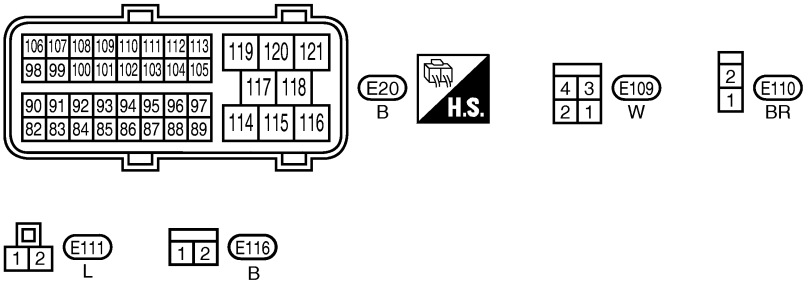
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW 2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

GBS000SG





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1421E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000SH

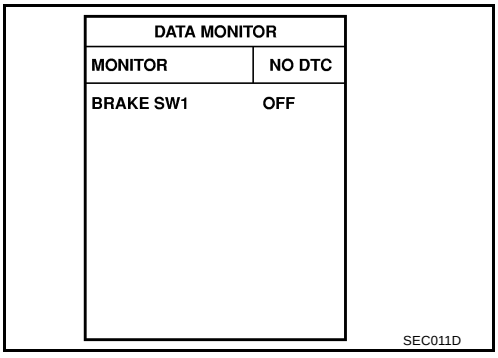
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

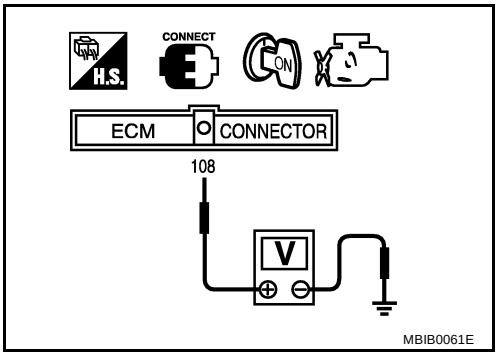
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

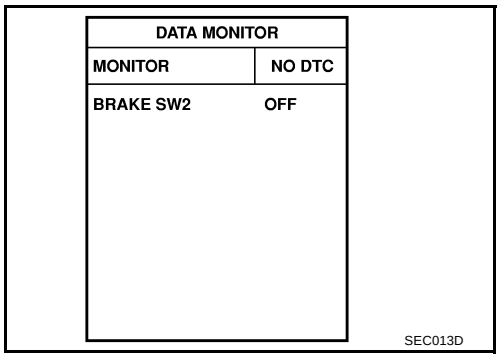
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

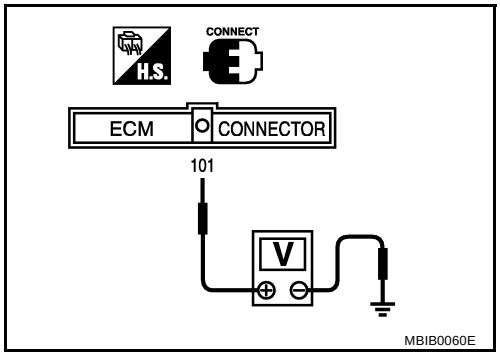
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

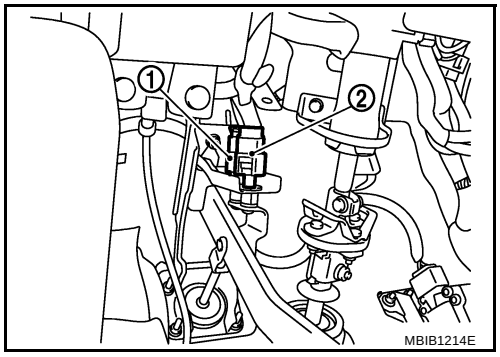


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

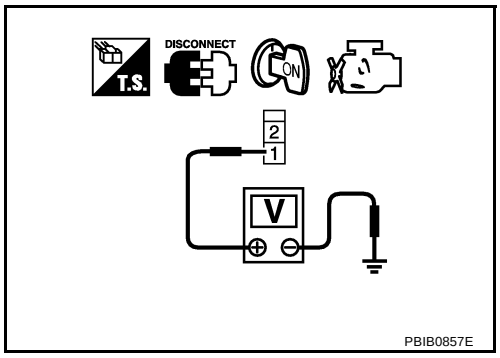
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
   – Stop lamp switch (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-518, "Component Inspection"

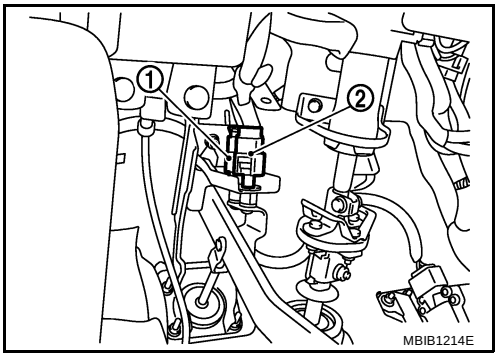
OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

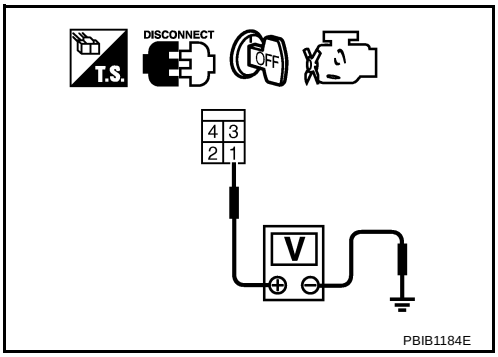
1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.

– ASCD brake switch (1)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-518, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

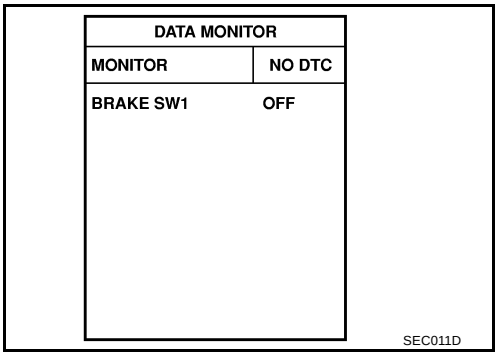
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

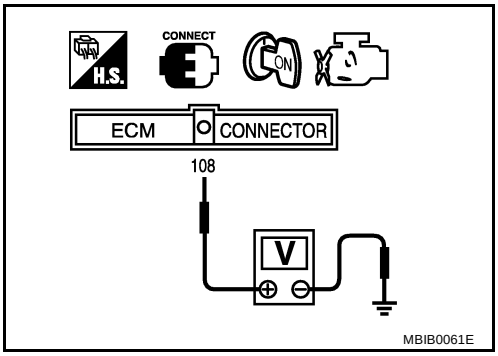
CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

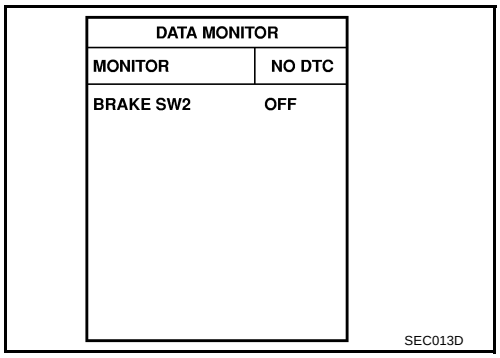
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

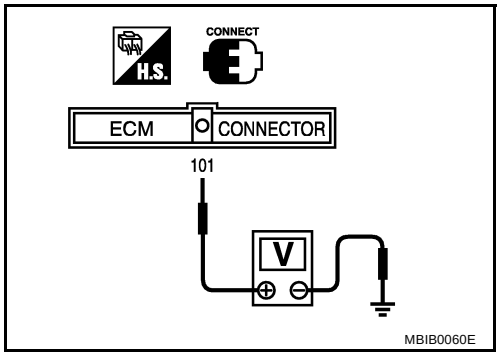
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



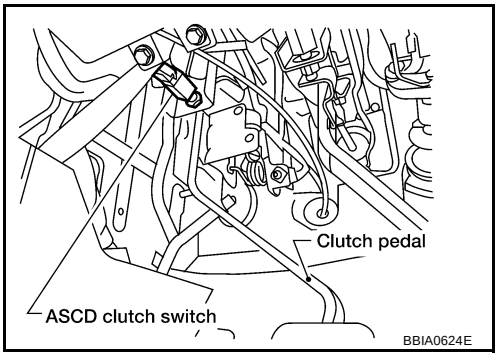
OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

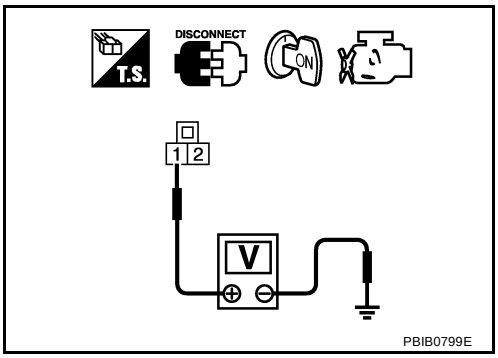


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

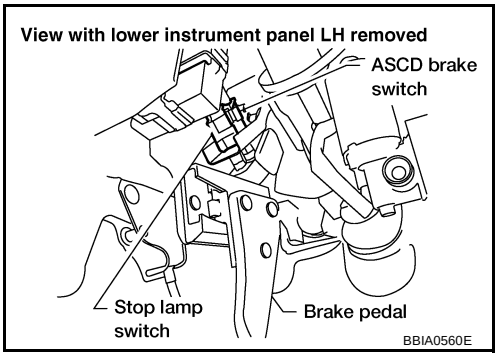
OK or NG

OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

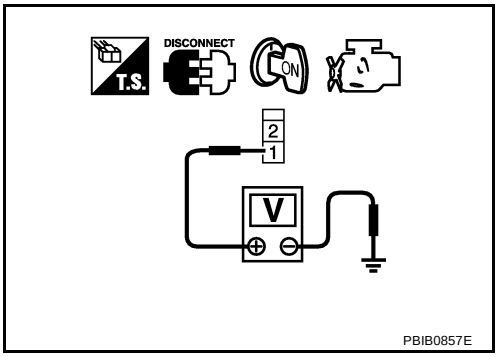


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-518, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

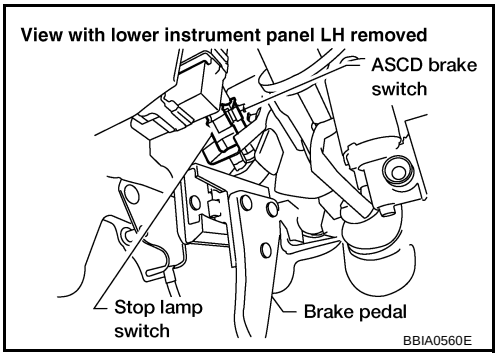
Refer to EC-518, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

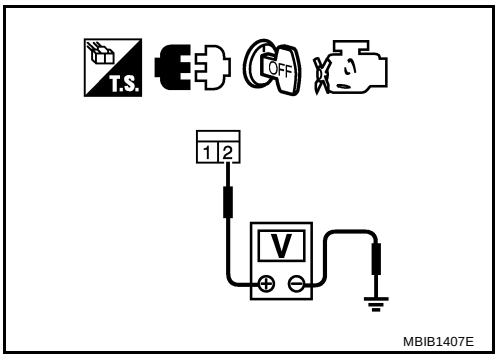


3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT -II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-518, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

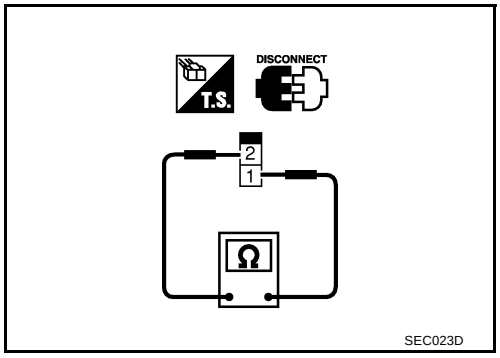
Component Inspection

GBS000SI

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

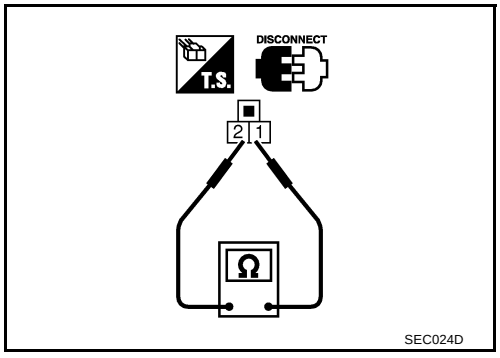


If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

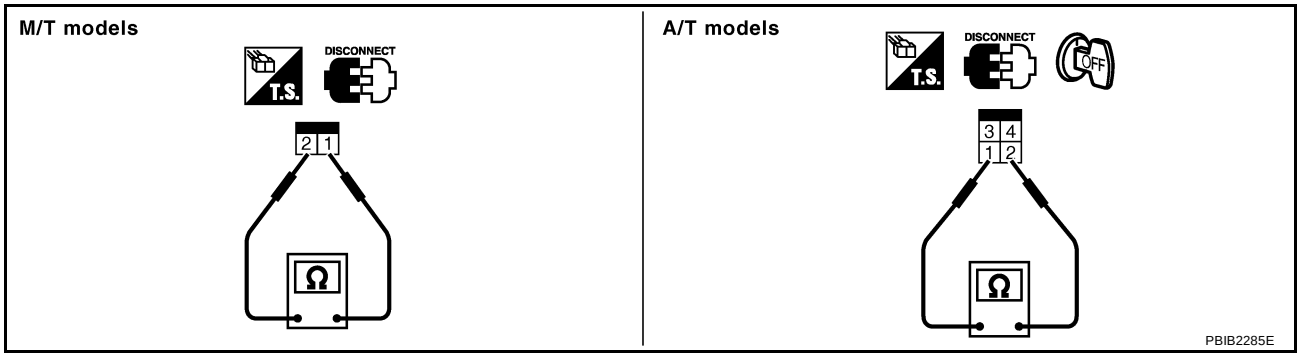
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist



If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

GBS000SJ

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-34, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

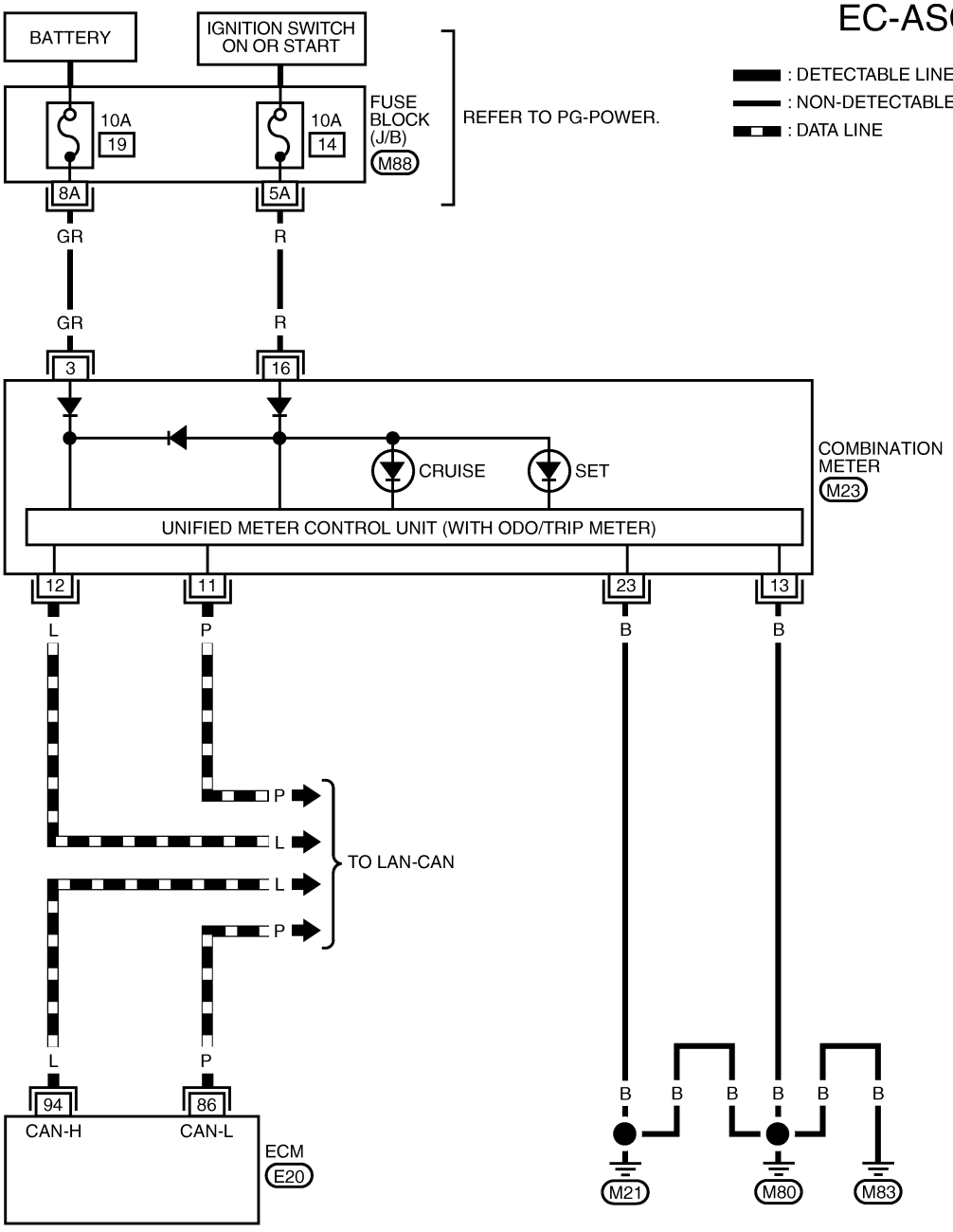
GBS000SK

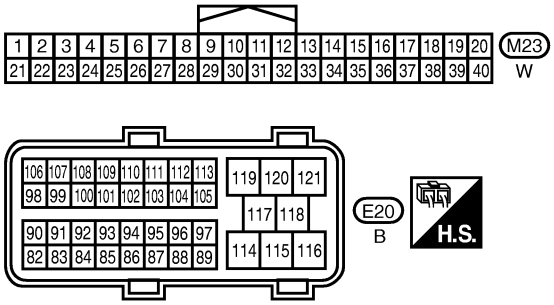
Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

Wiring Diagram

GBS000SL





REFER TO THE FOLLOWING.
M91 - SUPER MULTIPLE JUNCTION (SMJ)
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1325E

Diagnostic Procedure

GBS000SM

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-146, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

3. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

OK or NG

OK >> GO TO 4.
NG >> Go to DI-7, "Arrangement of Combination Meter" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

GBS000SN

The electrical load signal (Headlamp switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

CONSULT-II Reference Value in Data Monitor Mode

GBS000SO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch ON and/ or lighting switch is in 2nd.	ON
		Rear window defogger switch and lighting switch are OFF.	OFF
HEATER FAN SW	● Engine: After warning up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF

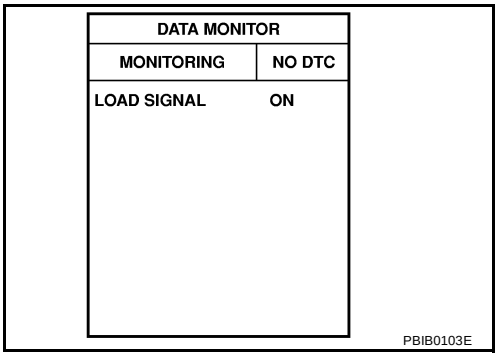
Diagnostic Procedure

GBS000SP

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Connect CONSULT-II and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



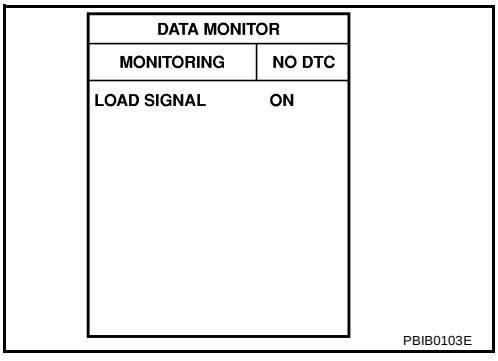
OK or NG

OK >> GO TO 2.
NG >> GO TO 4.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF



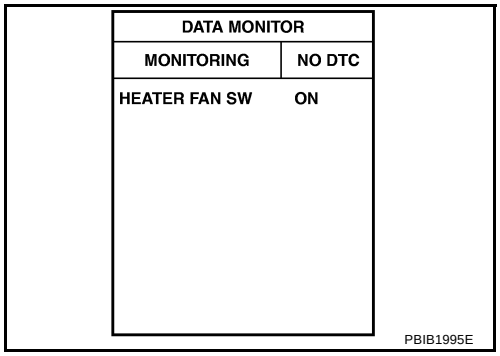
OK or NG

OK >> GO TO 3.
NG >> GO TO 5.

3. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-45, "REAR WINDOW DEFOGGER" .

>> **INSPECTION END**

5. CHECK HEADLAMP SYSTEM

Refer to LT-4, "HEADLAMP" or LT-31, "HEADLAMP AIMING CONTROL (MANUAL)" .

>> **INSPECTION END**

6. CHECK HEATER FAN CONTROL SYSTEM

Refer to MTC-32, "TROUBLE DIAGNOSIS" .

>> **INSPECTION END**

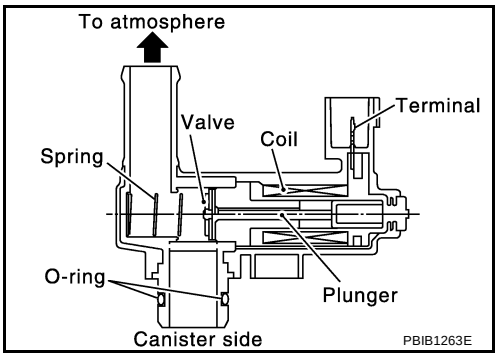
EVAP CANISTER VENT CONTROL VALVE

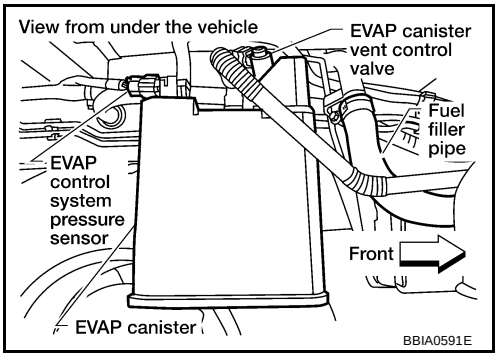
PFP:14935

Component Description

GBS000SQ

The EVAP canister vent control valve is located on the EVAP canister.
This solenoid valve is not used for engine control, and always remains open.
If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressured and EVAP canister may be damaged.

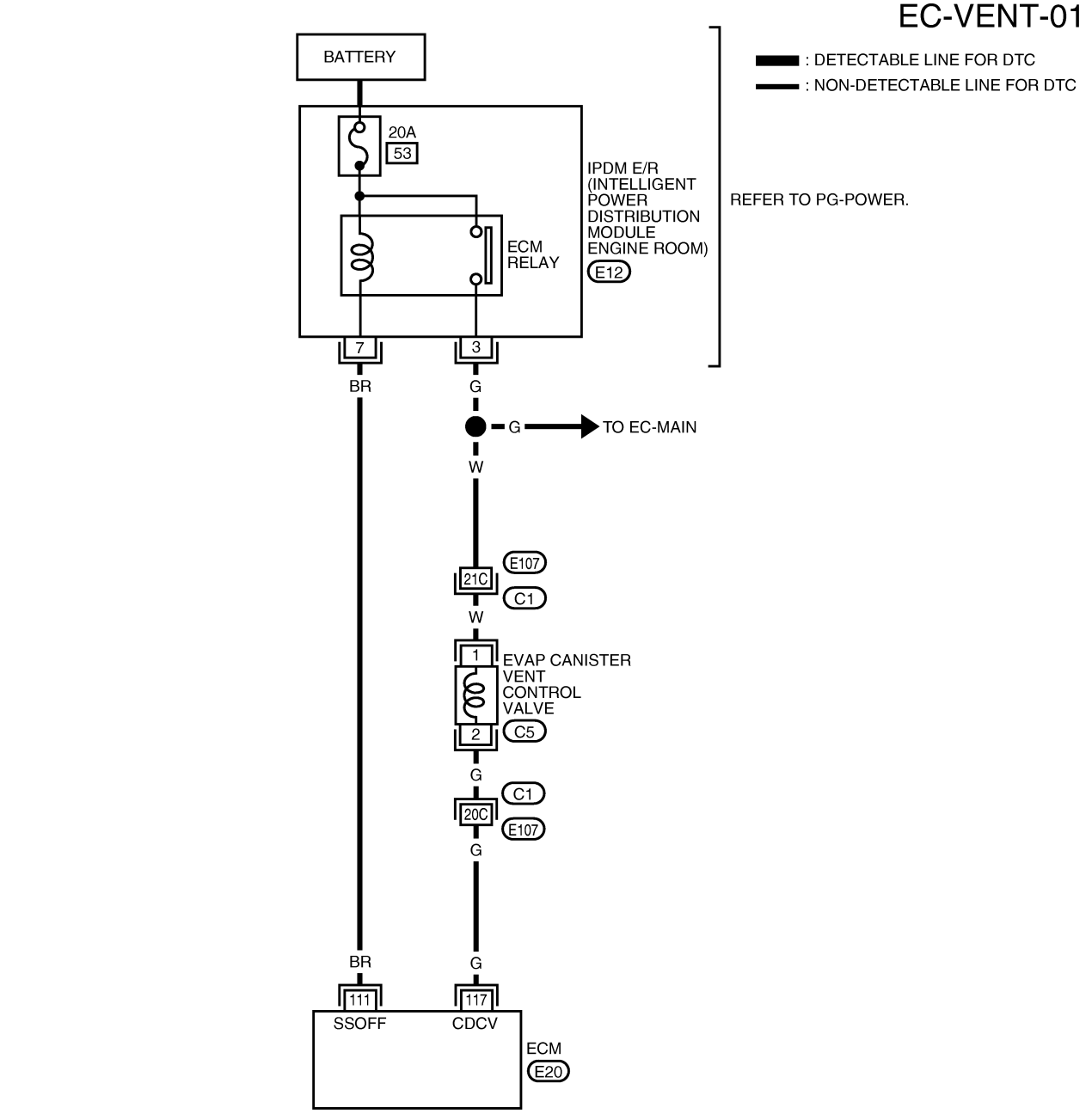


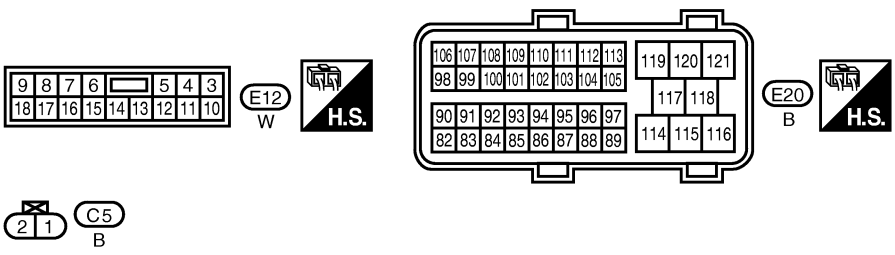


Wiring Diagram

GBS000SR

EC-VENT-01





REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1294E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

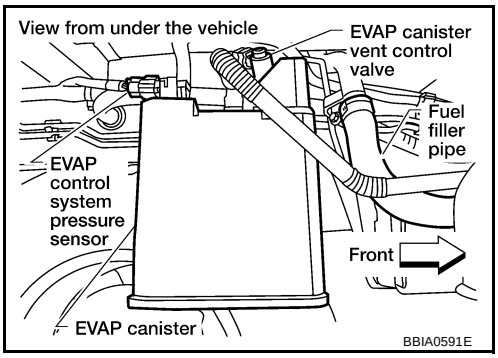
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000SS

1. CHECK OVERALL FUNCTION

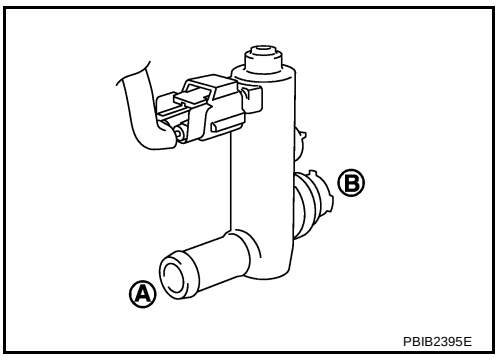
1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
3. Start engine.



4. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

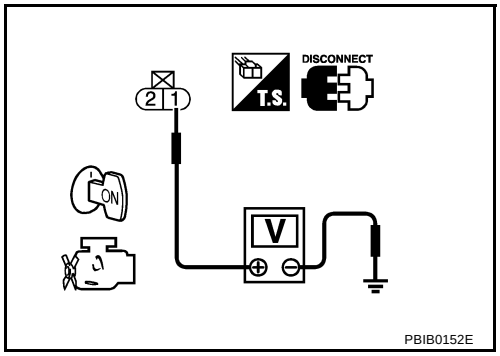
OK >> **INSPECTION END**
NG >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch ON.
3. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E107, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-529, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister vent control valve.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

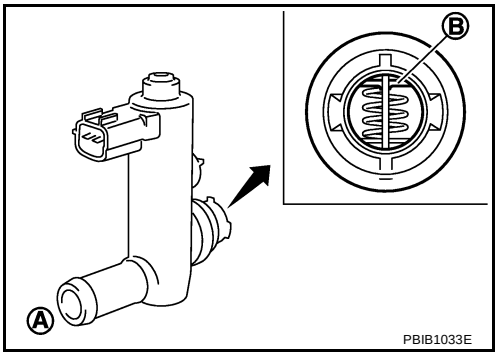
>> **INSPECTION END**

Component Inspection

GBS000ST

EVAP CANISTER VENT CONTROL VALVE

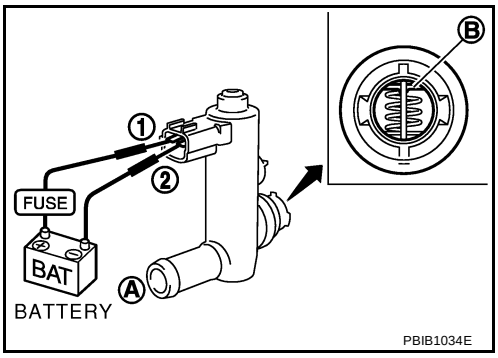
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

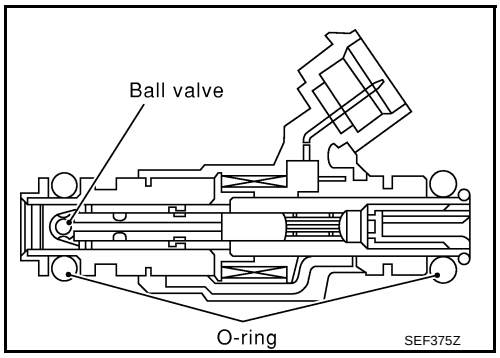
FUEL INJECTOR

PFP:16600

Component Description

GBS000SU

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

GBS000SV

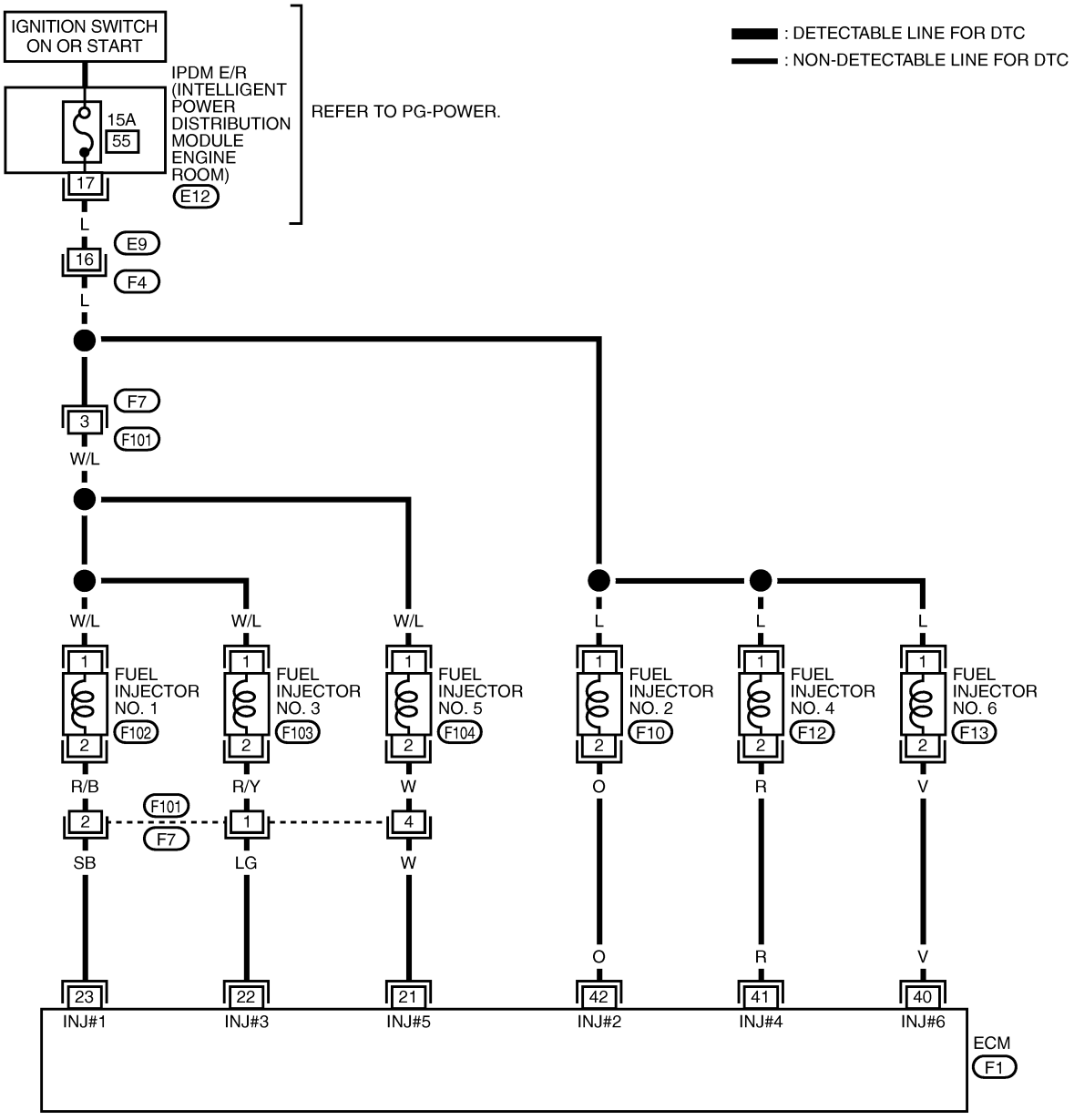
Specification data are reference values.

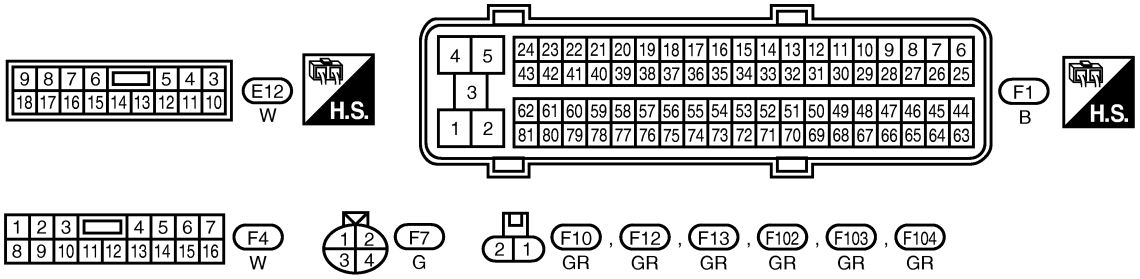
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-127, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

GBS000SW

EC-INJECT-01

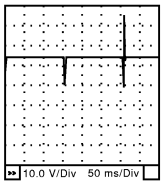
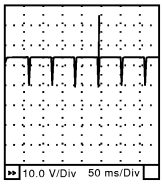




MBWA1321E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 40 41 42	W LG SB V R O	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000SX

1. INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

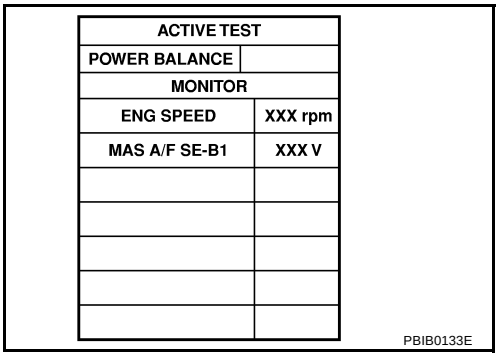
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 7.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



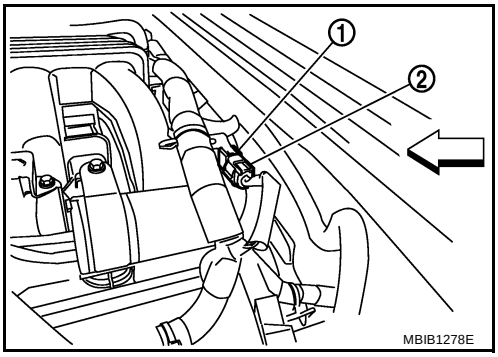
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

3. CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-II

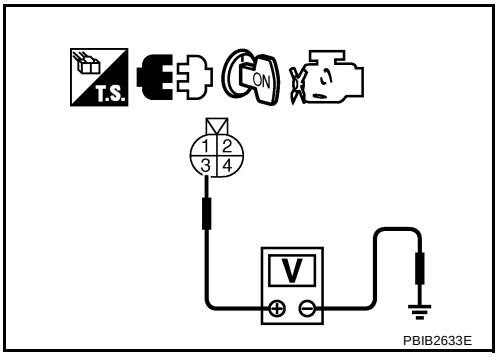
1. Stop engine.
2. Disconnect harness connector F101 (1), F7 (2).
   - ⇦: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
   Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

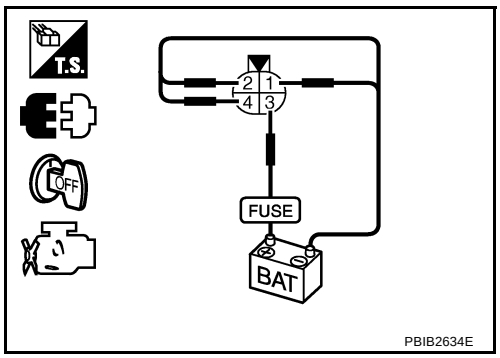
- Harness connectors E9, F4
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between harness connector F7 and fuse
- Harness for open or short between harness connector F7 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4



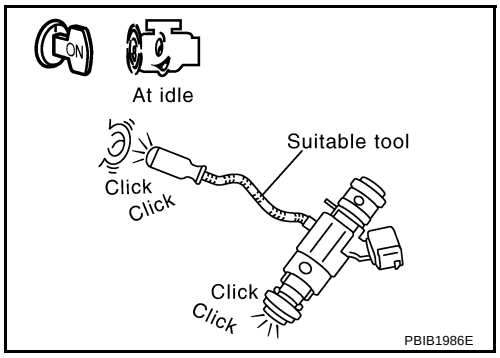
Operating sound should exist.

OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK FUNCTION OF FUEL INJECTOR-III

1. Reconnect all harness connector disconnected.
2. Start engine.
3. Listen to fuel injectors No. 2, No. 4, No.6 operating sound.



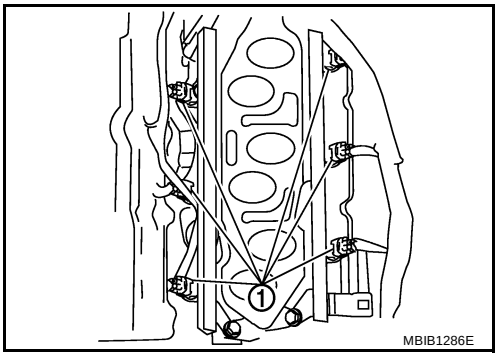
Clicking noise should exist.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

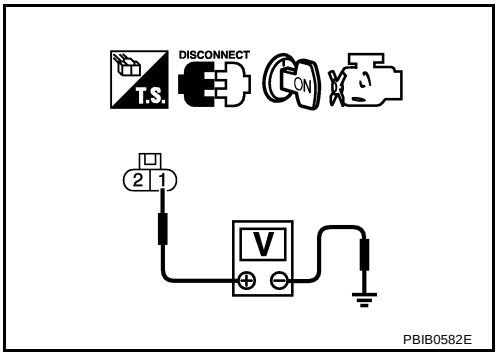
7. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector (1).



3. Turn ignition switch ON.
4. Check voltage between fuel injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F7, F101
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

9. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F101, F7 (bank 1)
- Harness for open or short between fuel injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK FUEL INJECTOR

Refer to EC-536, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel injector.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

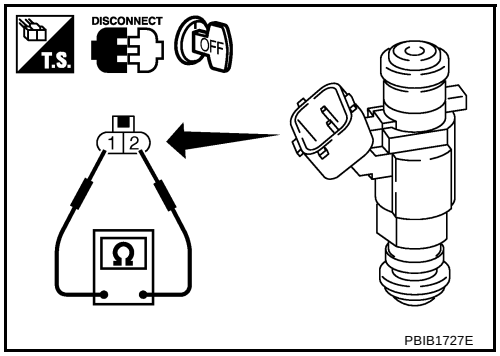
Component Inspection

GBS000SY

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



Removal and Installation

GBS000SZ

FUEL INJECTOR

Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .

FUEL PUMP

PFP:17042

Description

GBS000T0

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

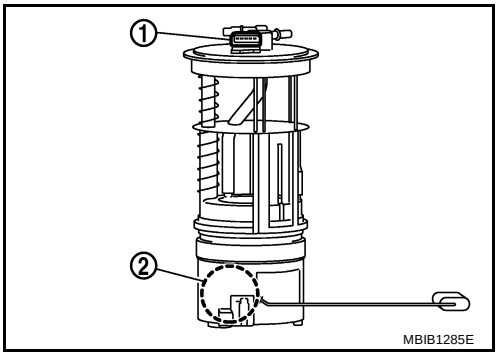
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump
- Fuel pressure regulator



CONSULT-II Reference Value in Data Monitor Mode

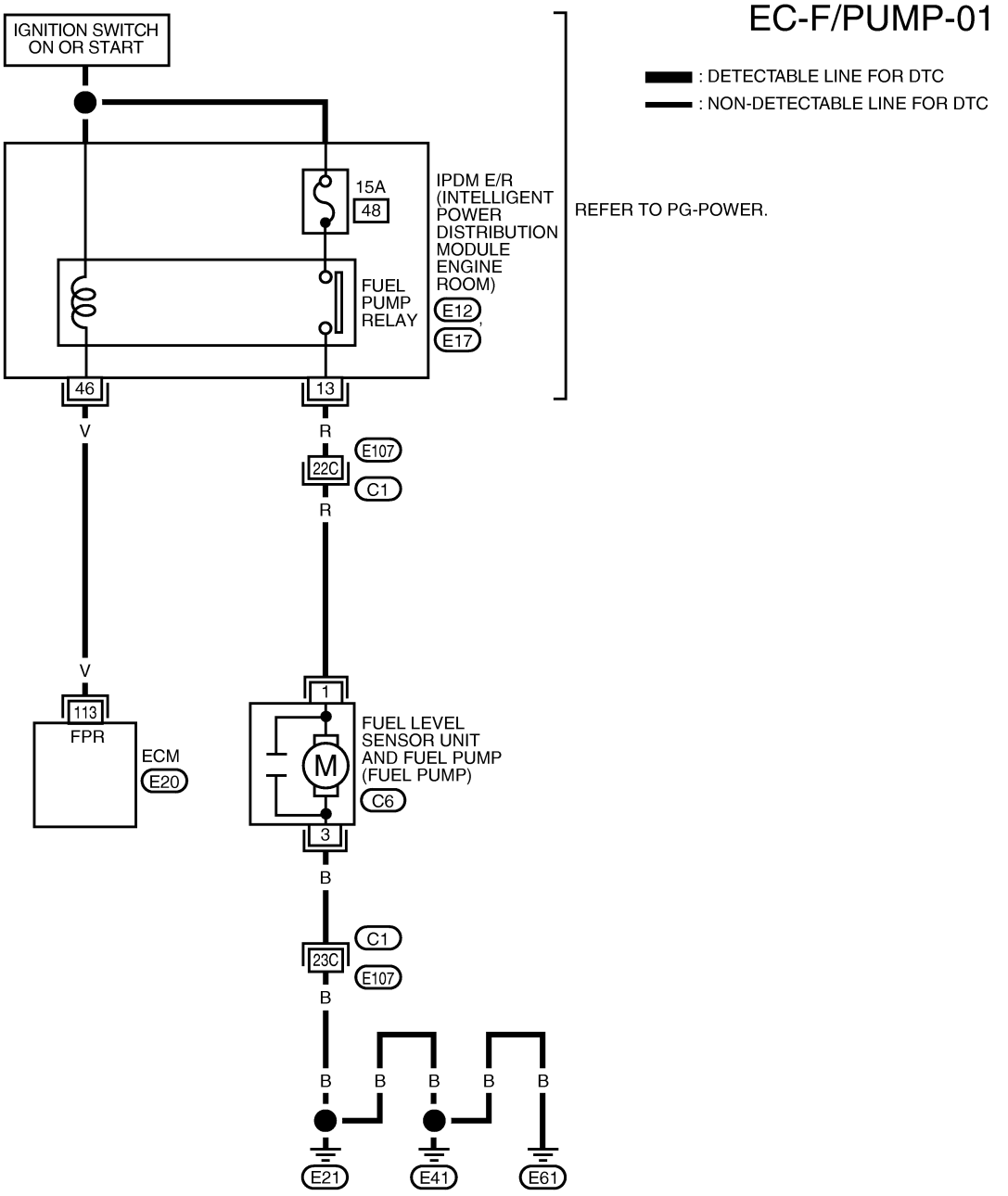
GBS000T1

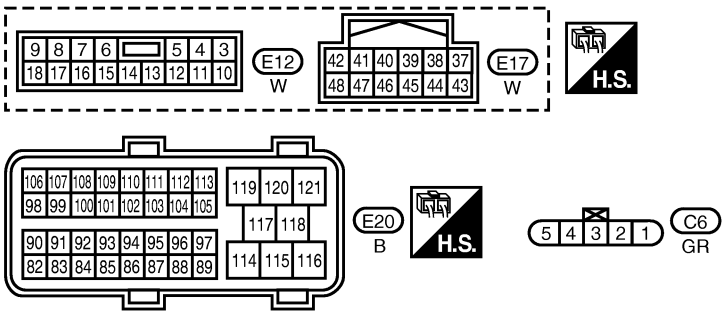
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

GBS000T2





REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1322E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

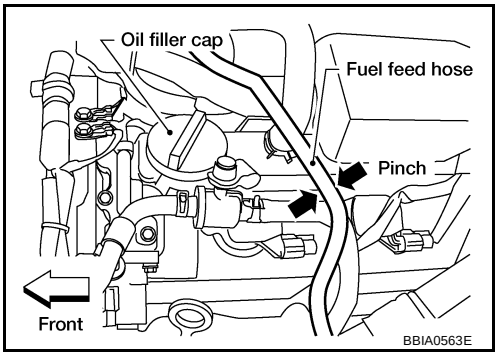
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000T3

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



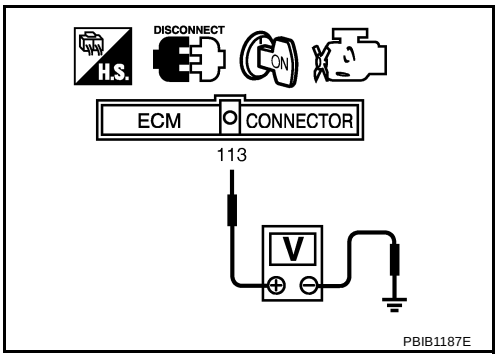
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

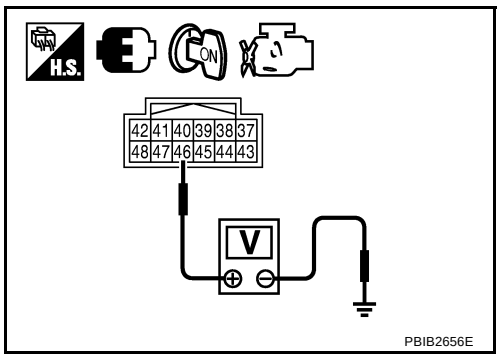
3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 12.



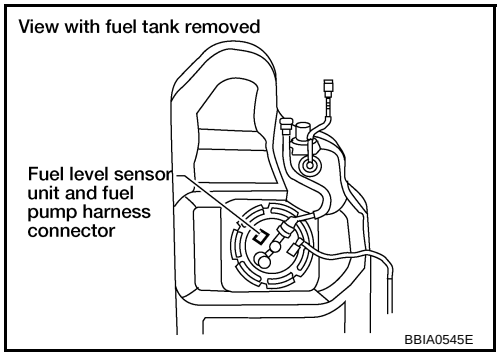
4. DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.

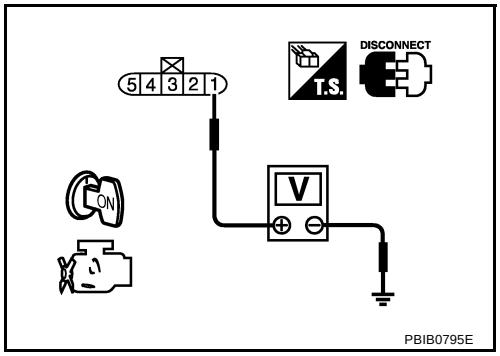


5. Check voltage between “fuel level sensor unit and fuel pump” terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.



6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CURCUIT-IV

1. Disconnect IPDM E/R harness connector E12.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 1 and IPDM E/R terminal 13.
   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 12.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

>> Repair open circuit or short to power in harness or connectors.

11. CHECK FUEL PUMP

Refer to EC-542, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair or replace harness or connectors.

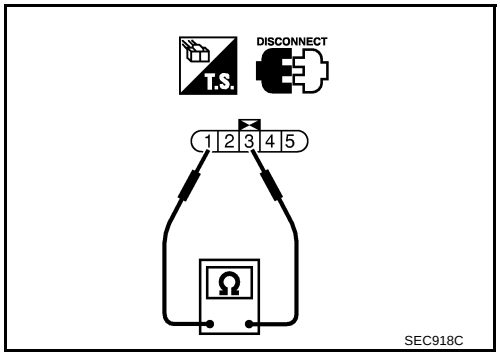
Component Inspection

GBS000T4

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]



Removal and Installation

GBS000T5

FUEL PUMP

Refer to FL-10, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

IGNITION SIGNAL

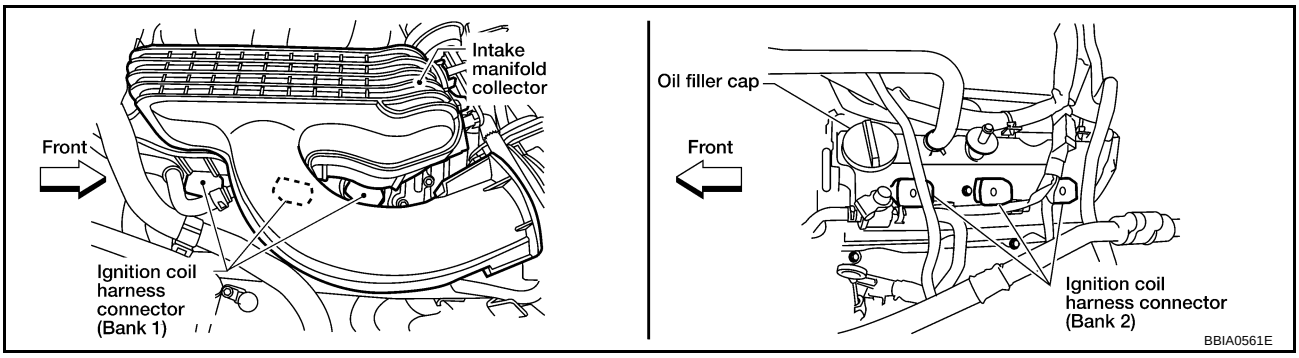
PFP:22448

Component Description

GBS000T6

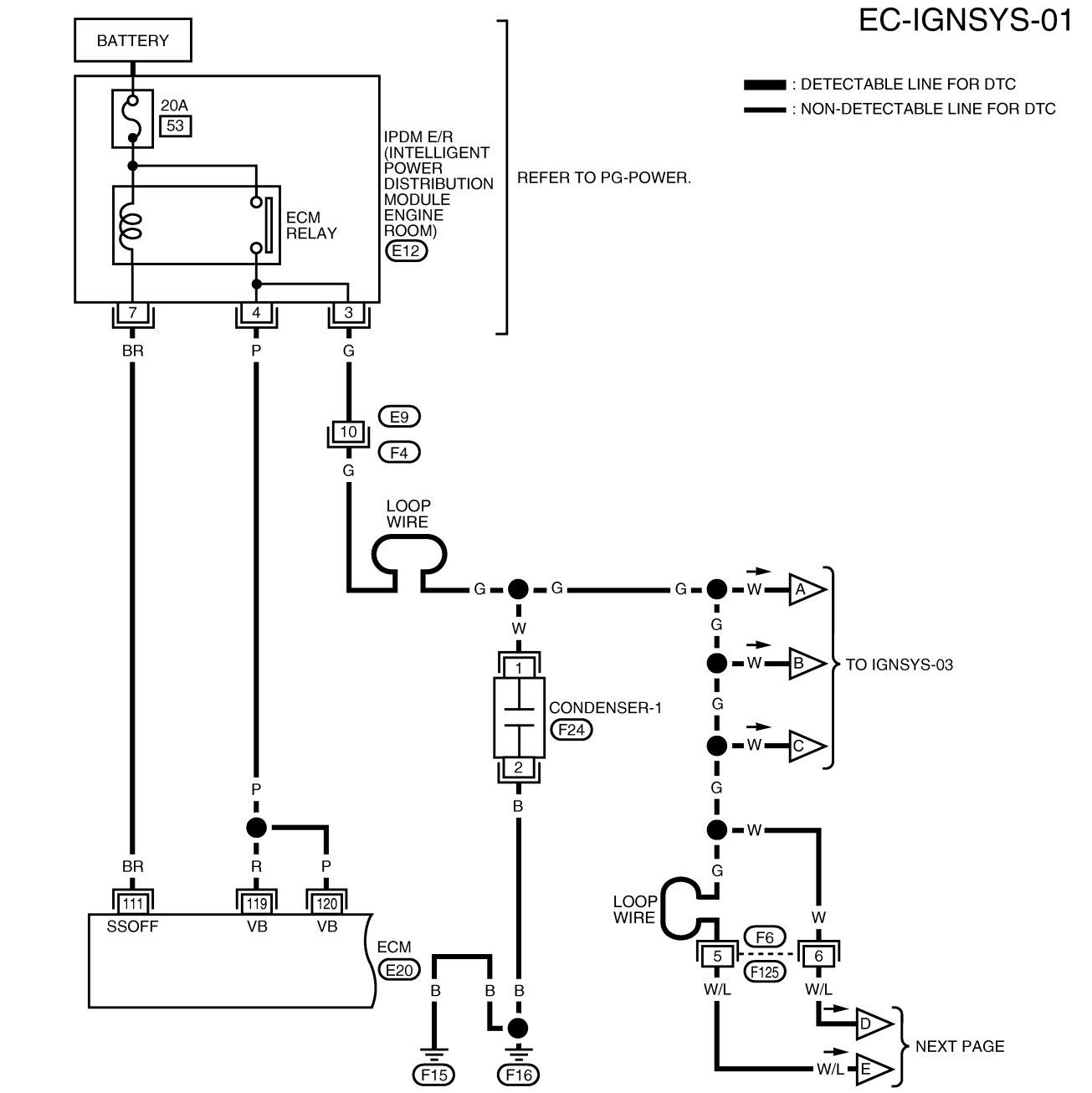
IGNITION COIL & POWER TRANSISTOR

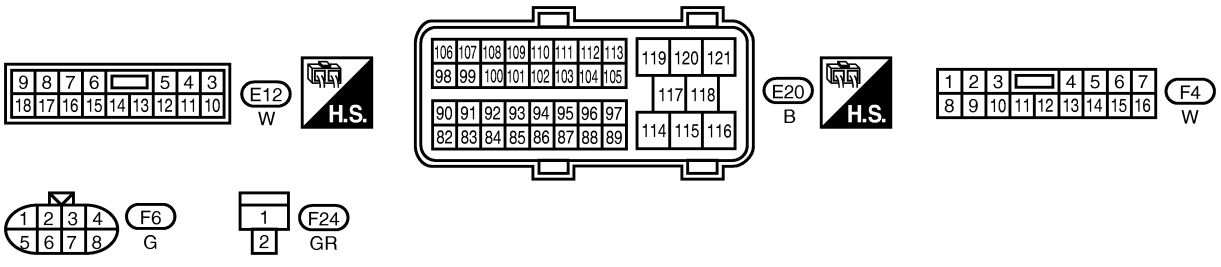
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Wiring Diagram

GBS000T7





MBWA1317E

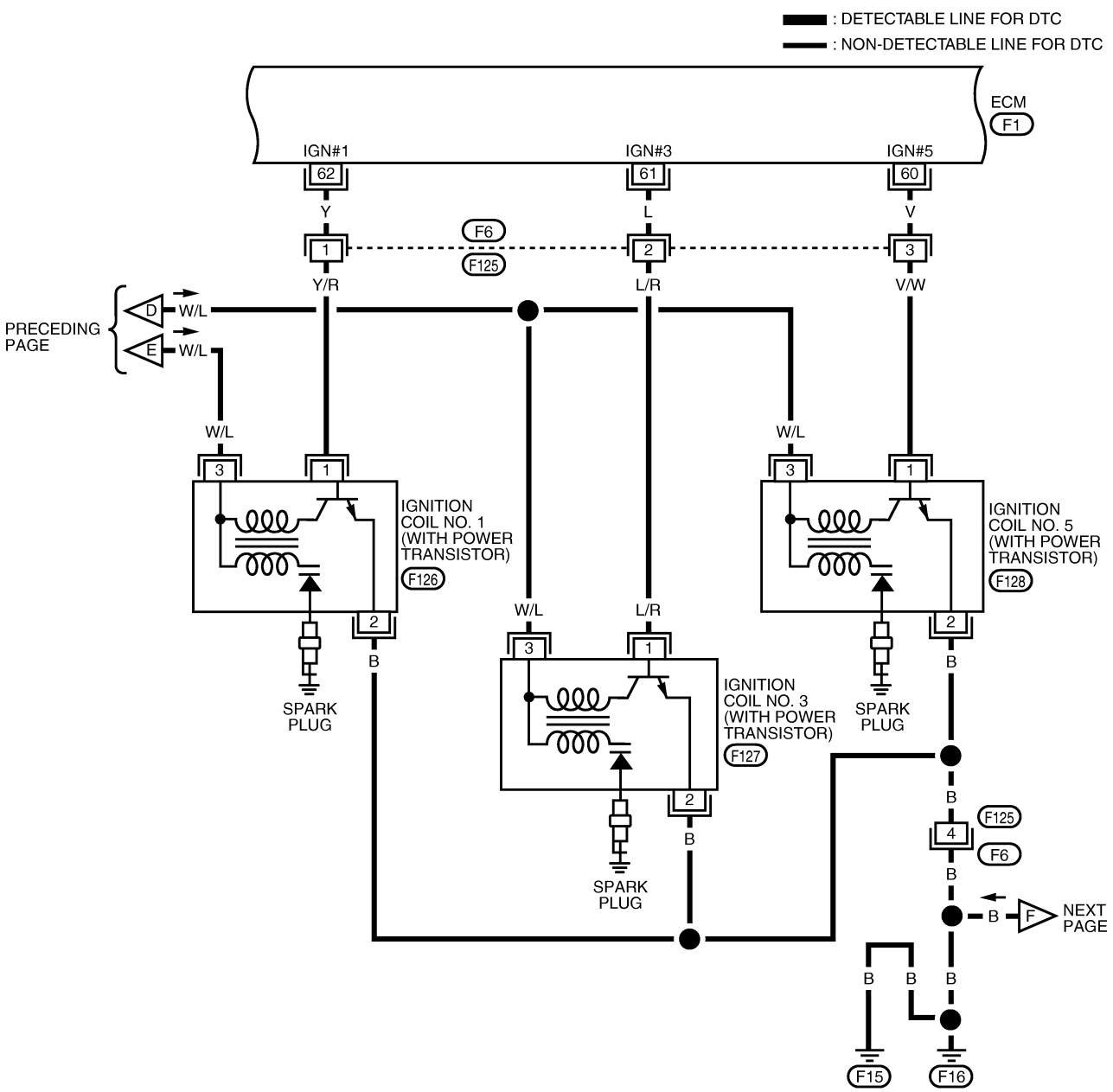
Specification data are reference values and are measured between each terminal and ground.

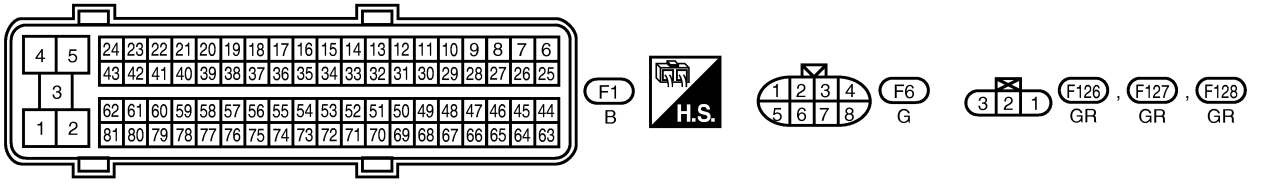
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02

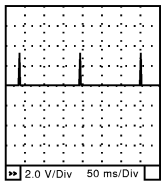
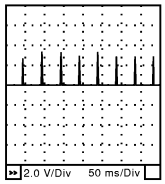




MBWA1318E

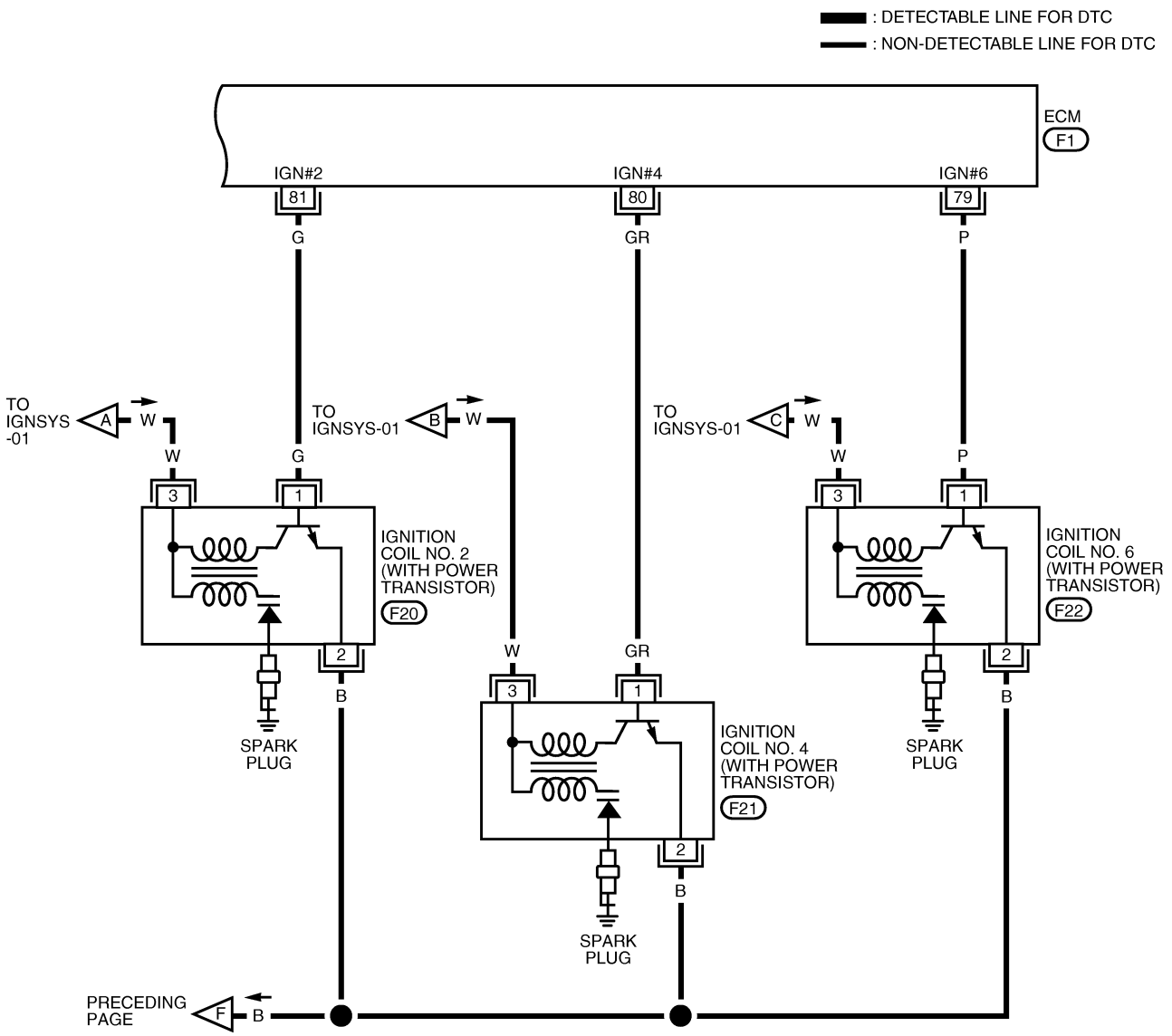
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

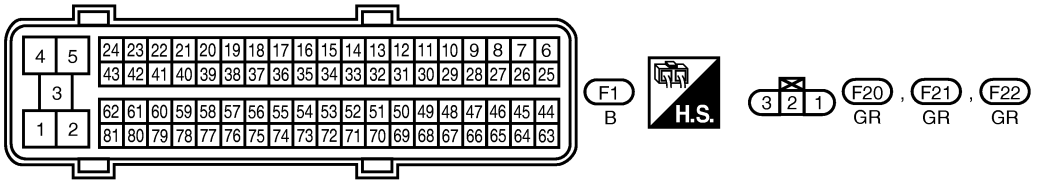
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03

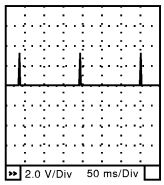
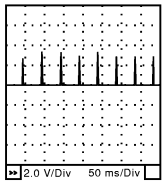




MBWA1319E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000T8

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

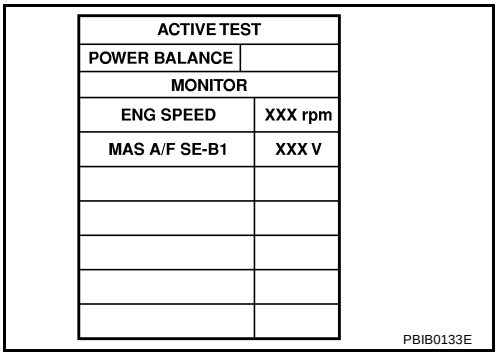
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

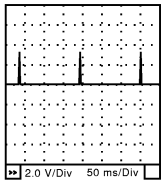
OK >> **INSPECTION END**
NG >> GO TO 10.



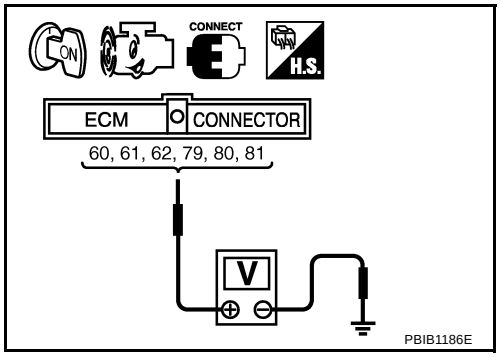
3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.
   NOTE:
   The pulse cycle changes depending on rpm at idle.



SEC986C



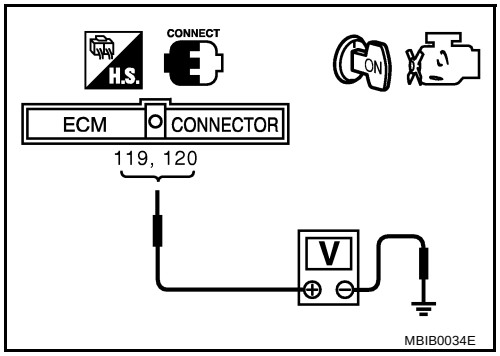
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

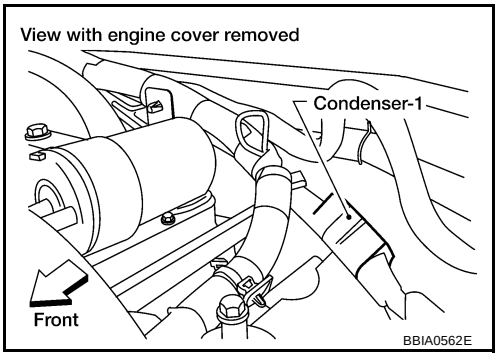


OK or NG

OK >> GO TO 5.
NG >> Go to EC-138, "POWER SUPPLY AND GROUND CIRCUIT" .

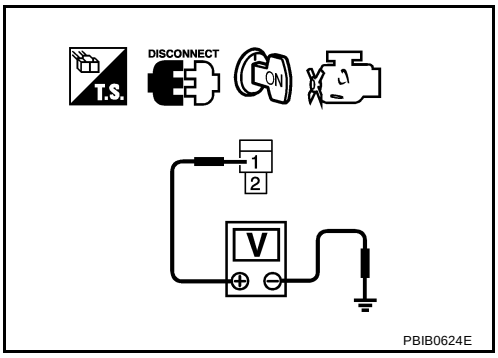
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Turn ignition switch ON.



4. Check voltage between condenser-1 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between condenser-1 and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to power in harness or connectors.

9. CHECK CONDENSER-1

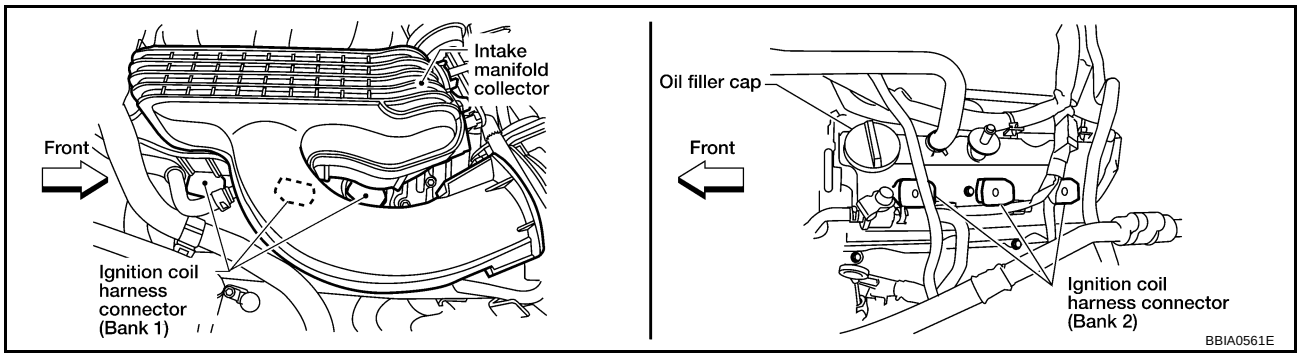
Refer to EC-554, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace condenser-1.

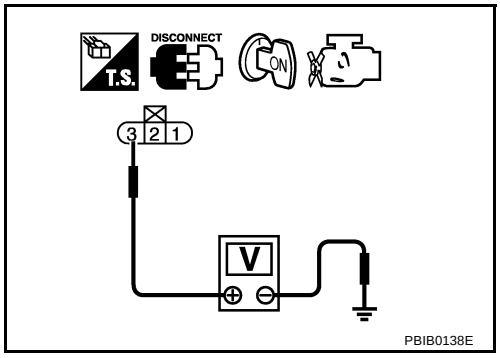
10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.



4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and harness connector F4

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6
- Harness for open or short between ignition coil and ground

>> Repair open circuit or short to power in harness or connectors.

14. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 and ignition coil terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-554, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000T9

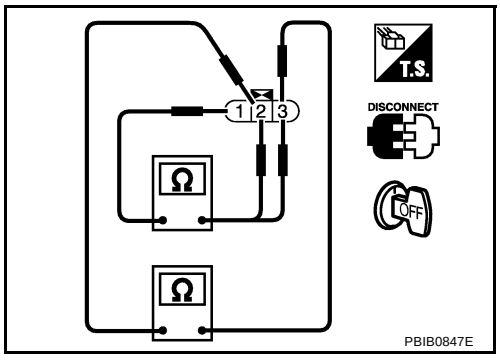
IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

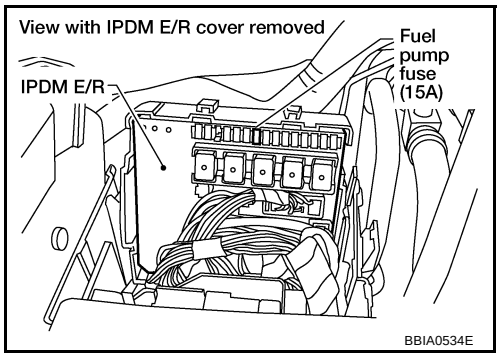
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	



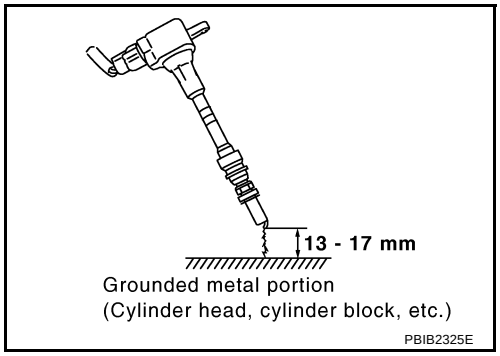
4. If NG, Replace ignition coil with power transistor.
   If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.



8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

    Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

NOTE:

When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

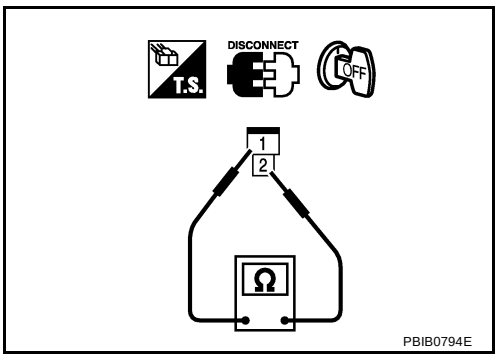
17. If NG, Replace ignition coil with power transistor.

CONDENSER-1

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.

3. Check resistance between condenser-1 terminals 1 and 2.

Resistance	Above 1 MΩ at 25°C (77°F)



GBS000TA

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-33, "IGNITION COIL" .

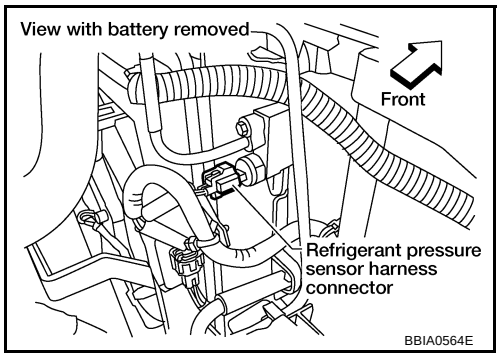
REFRIGERANT PRESSURE SENSOR

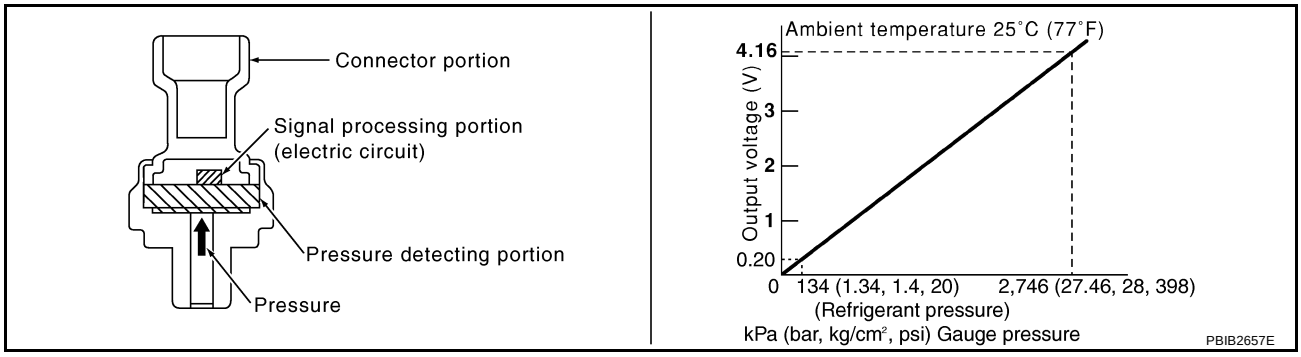
PFP:92136

Component Description

GBS000TB

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

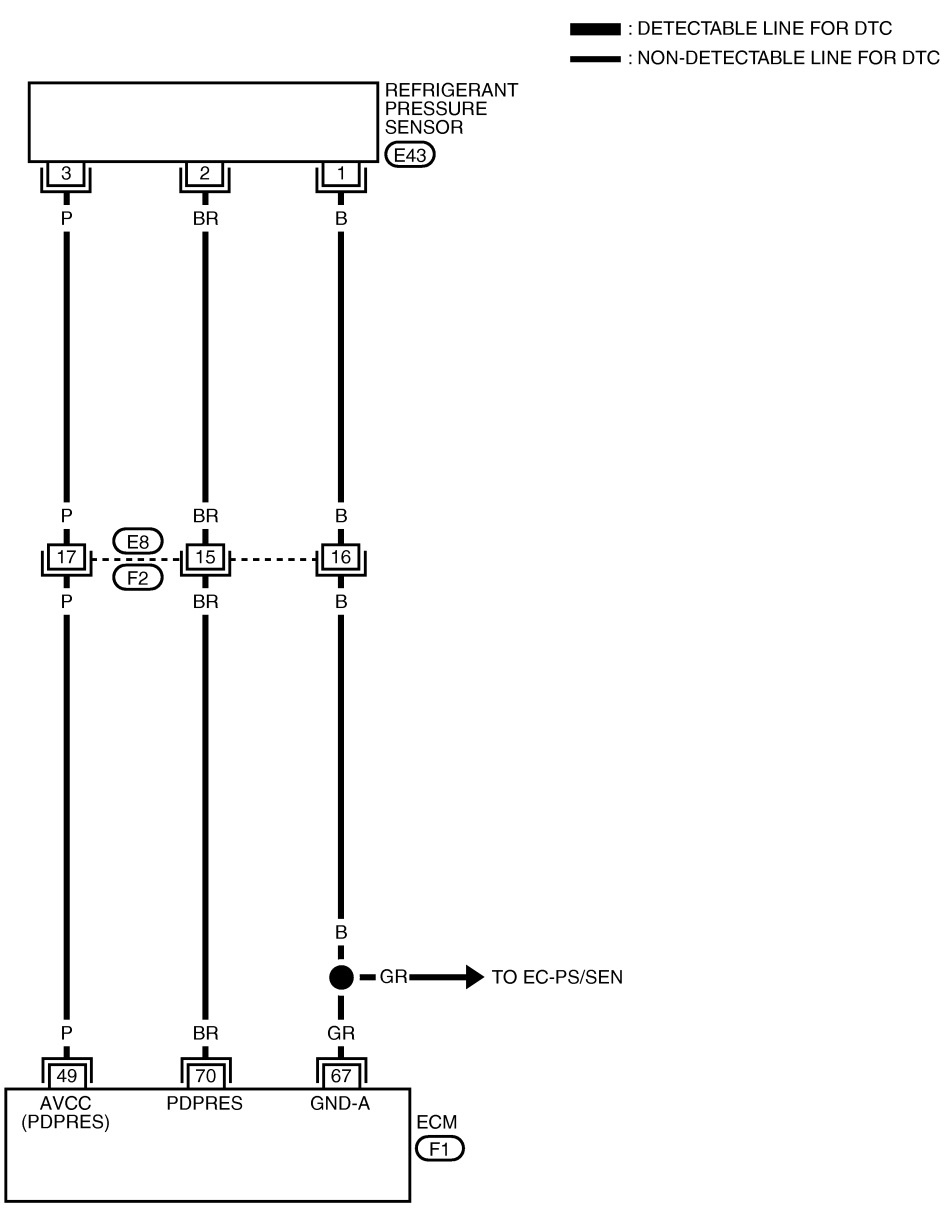


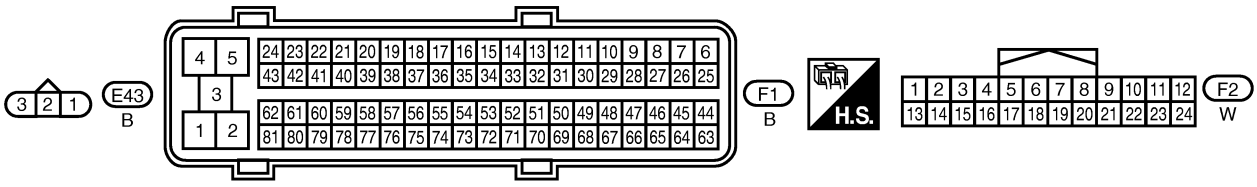


Wiring Diagram

GBS000TC

EC-RP/SEN-01





MBWA1323E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
70	BR	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V

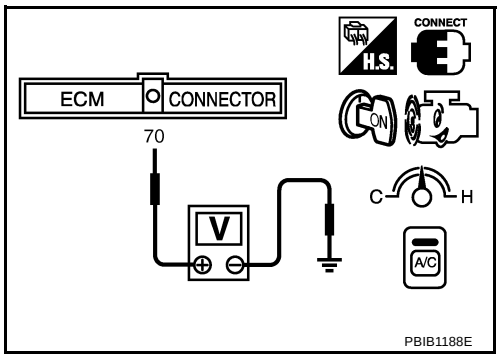
Diagnostic Procedure

GBS000TD

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

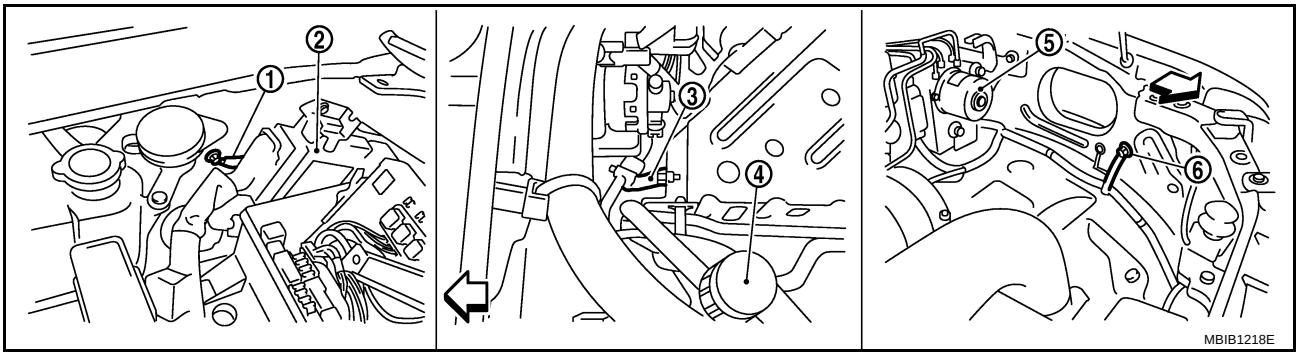


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to EC-145, "Ground Inspection" .



⇦ : Vehicle front

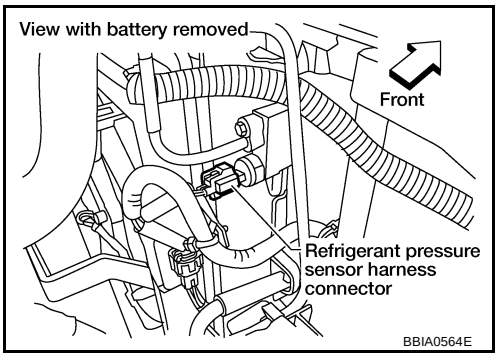
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

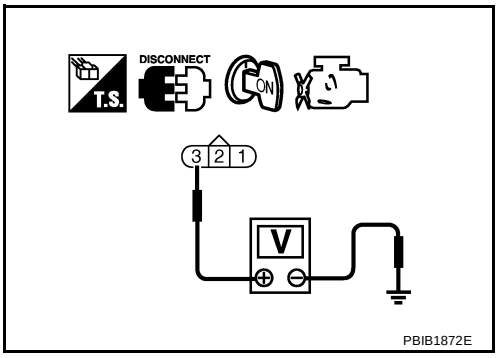
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

GBS000TE

REFRIGERANT PRESSURE SENSOR

Refer to MTC-121, "Removal and Installation for Refrigerant Pressure Sensor" .

VIAS

PFP:14956

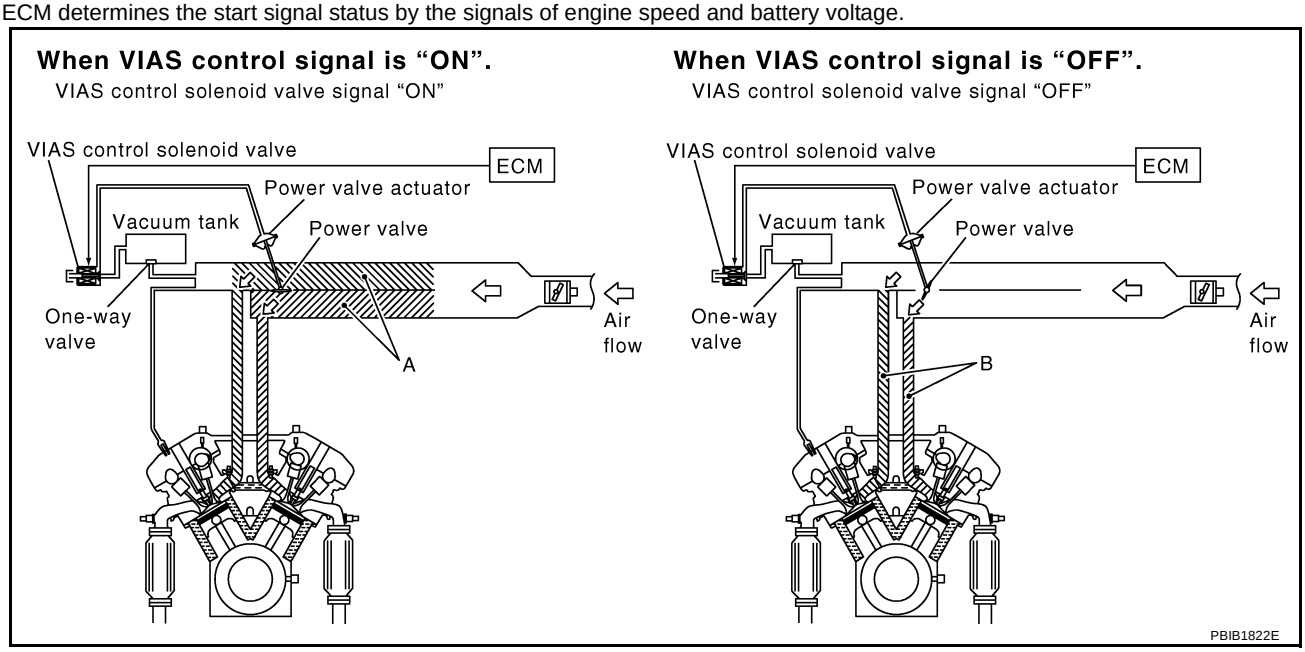
Description

GBS000TF

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.

Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.

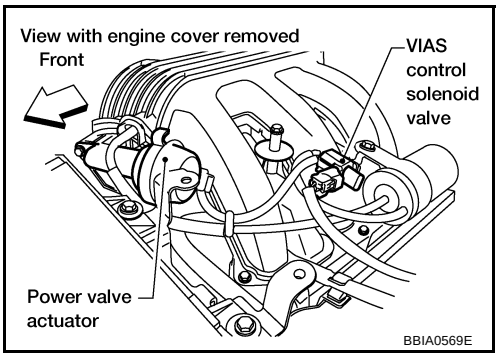
When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.

Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

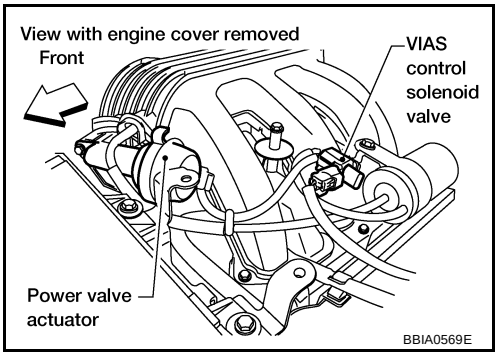
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

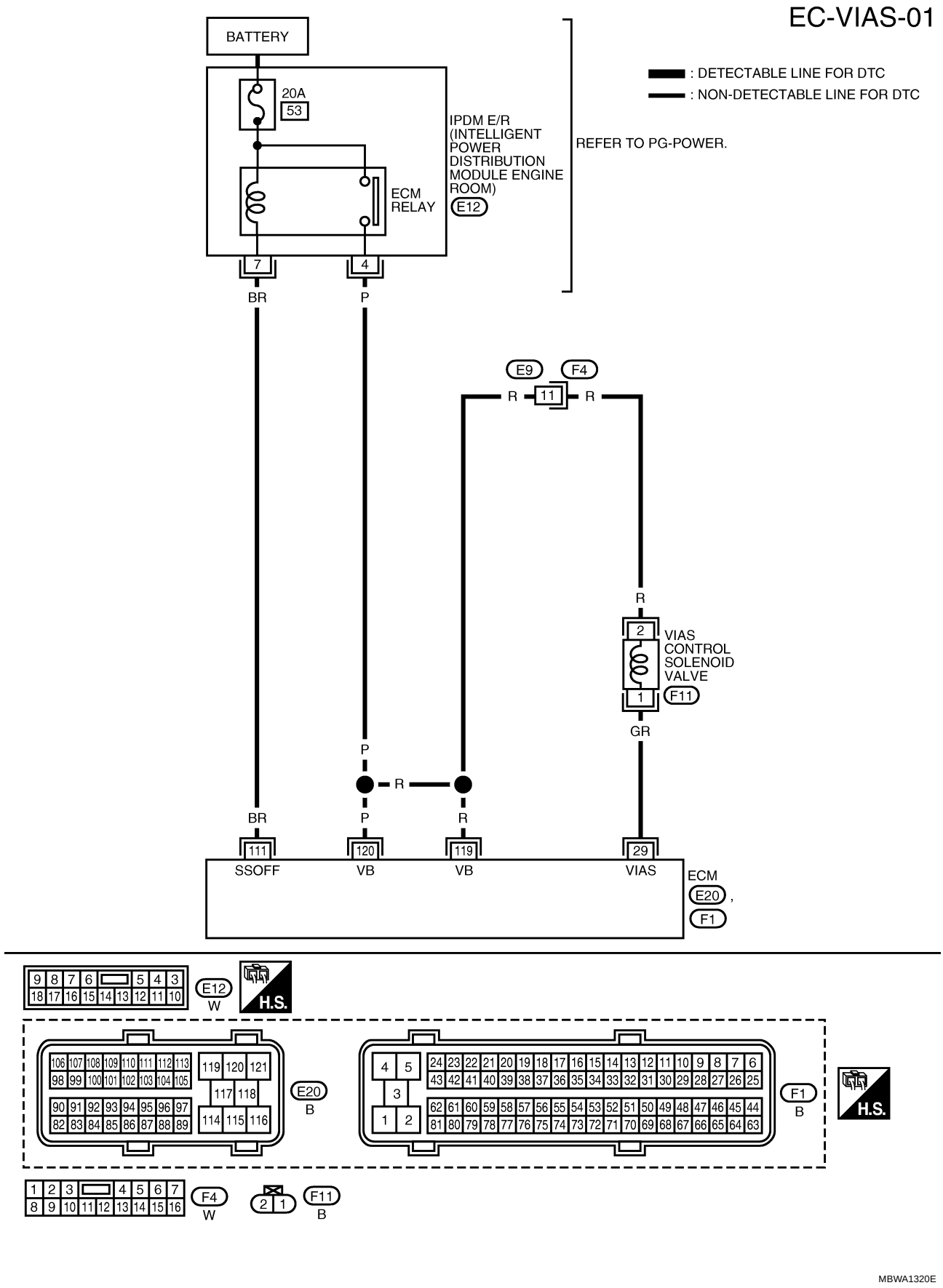
GBS000TG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF

Wiring Diagram

GBS000TH



MBWA1320E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	GR	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000TI

1. CHECK OVERALL FUNCTION

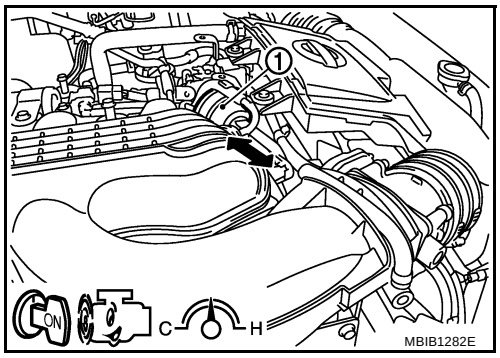
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

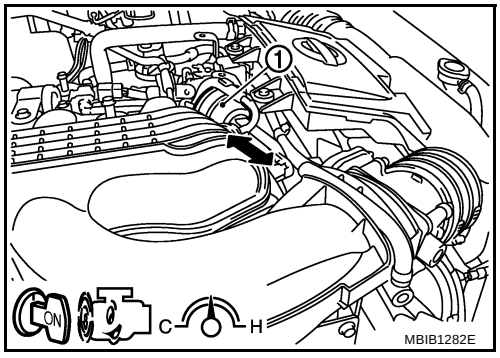
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator (1) rod moves.



MBIB1282E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to between 2,200 and 3,300 rpm and make sure that power valve actuator (1) rod moves.



MBIB1282E

OK or NG

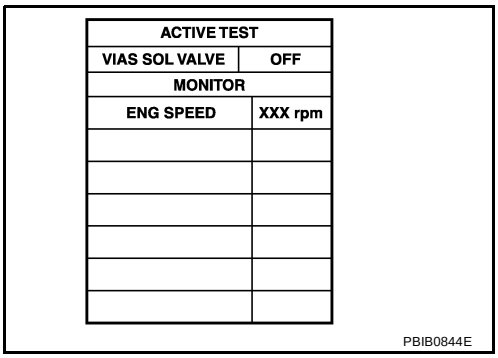
OK >> **INSPECTION END**
NG (With CONSULT-II) >>GO TO 2.
NG (Without CONSULT-II) >>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.



OK or NG

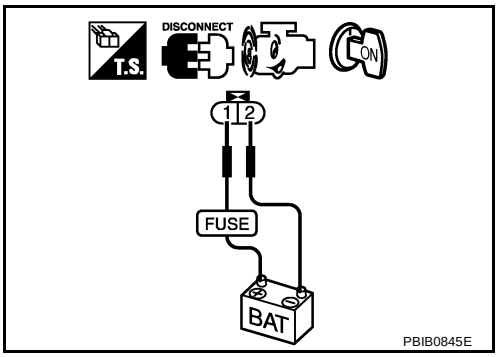
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.



OK or NG

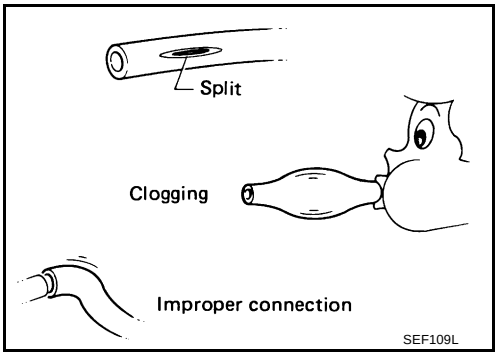
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-96, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



5. CHECK VACUUM TANK

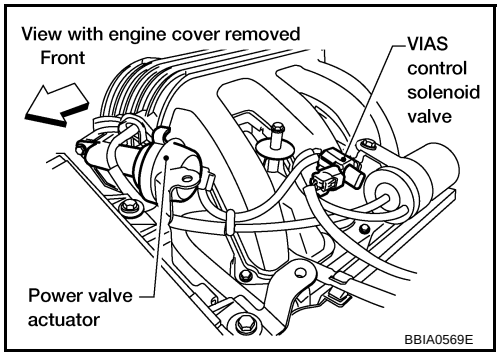
Refer to EC-569, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

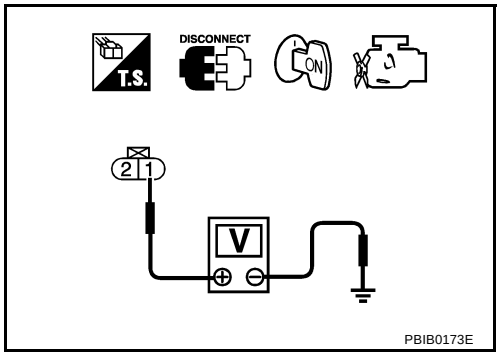
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
- Harness for open or short between VIAS control solenoid valve and ECM

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-569, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-137, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000TJ

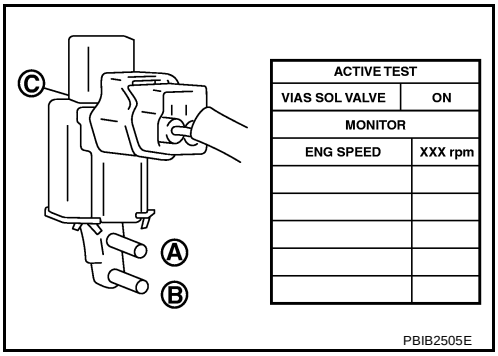
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

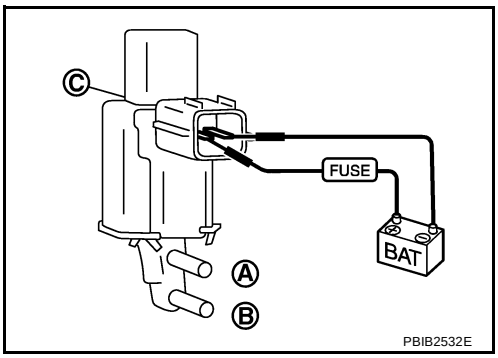


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

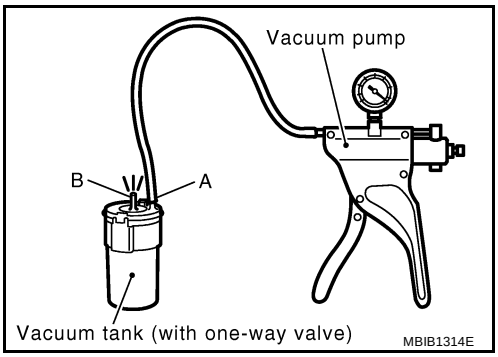
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



Removal and Installation

GBS000TK

VIAS CONTROL SOLENOID VALVE

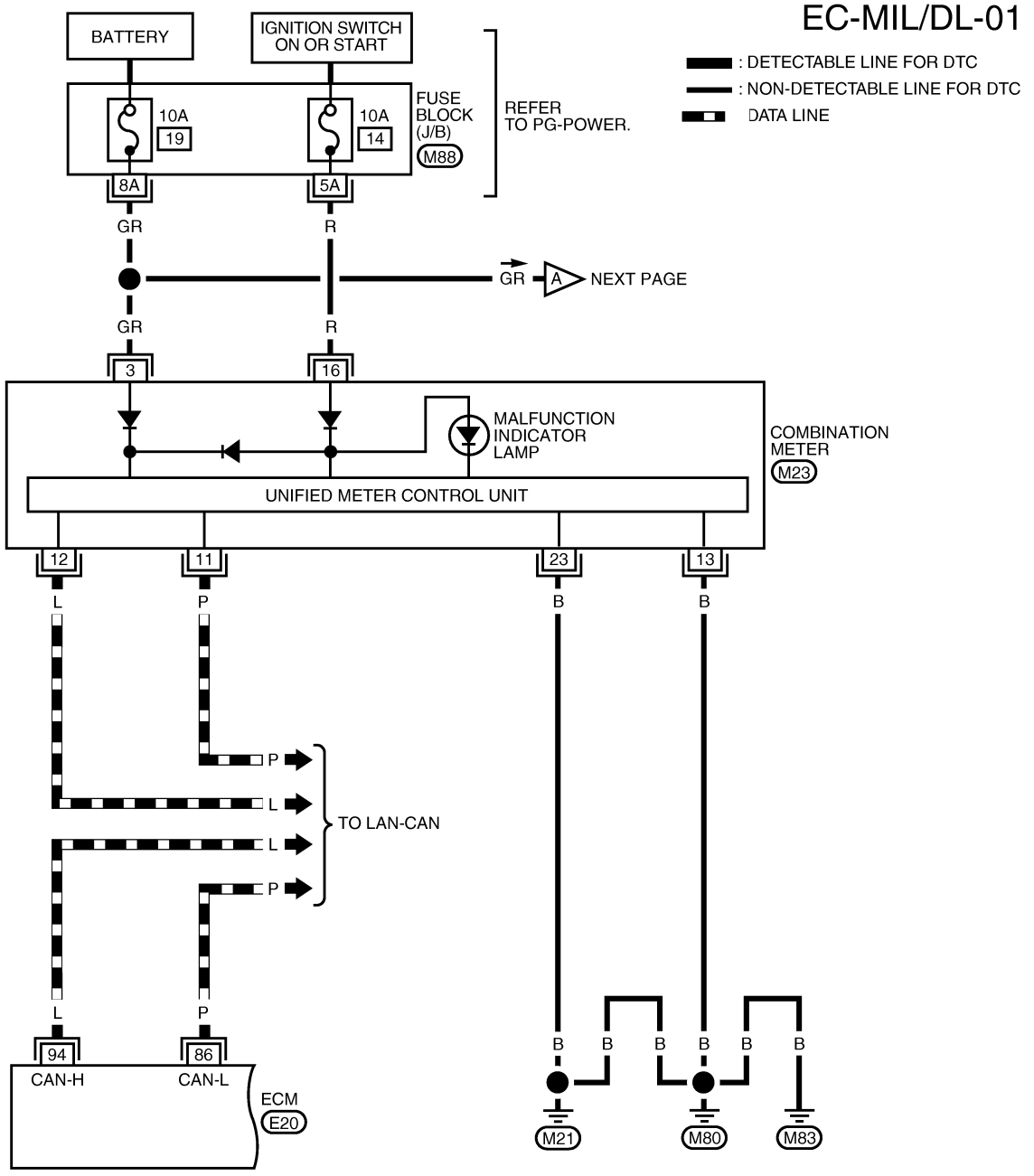
Refer to EM-21, "INTAKE MANIFOLD" .

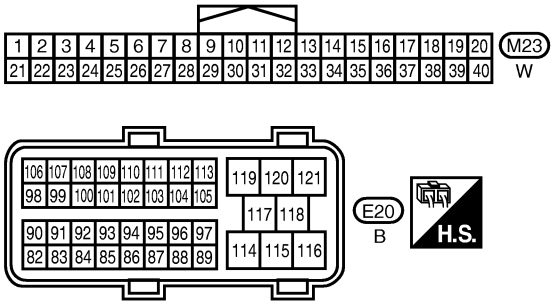
MIL AND DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

GBS000TL

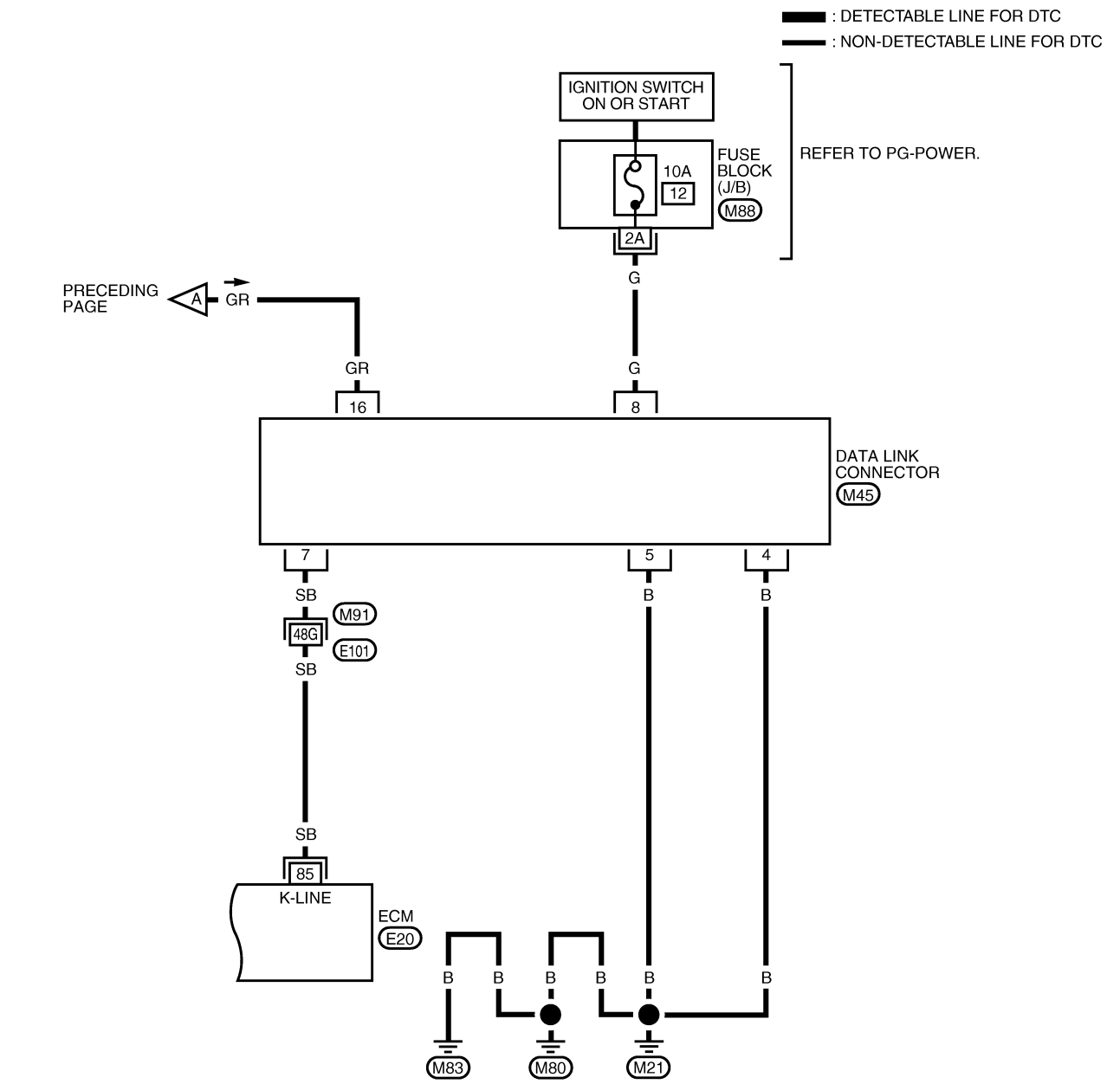


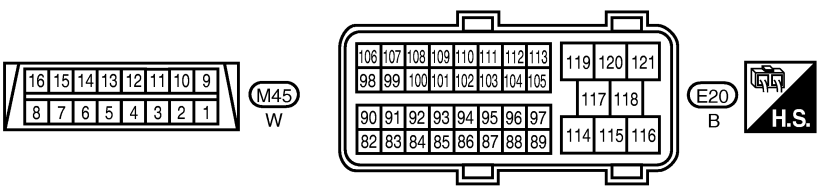


REFER TO THE FOLLOWING.
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1326E

EC-MIL/DL-02





REFER TO THE FOLLOWING.
M91 - SUPER MULTIPLE JUNCTION (SMJ)
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1327E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

GBS000TM

Fuel pressure at idling kPa (bar, kg/cm^2 , psi)	Approximately 350 (3.5, 3.57, 51)

Idle Speed and Ignition Timing

GBS000TN

Target idle speed	No load* [in P or N position (A/T), Neutral position (M/T)]	625 ± 50 rpm
Air conditioner: ON	In P or N position (A/T), Neutral position (M/T)	775 rpm or more
Ignition timing	In P or N position (A/T), Neutral position (M/T)	15 ± 5° BTDC

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

GBS000TO

Condition	Calculated load value% (Using CONSULT-II or GST)
At idle	5 - 35
At 2,500 rpm	5 - 35

Mass Air Flow Sensor

GBS000TP

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.2V*
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

GBS000TQ

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

GBS000TR

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

GBS000TS

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen sensor 2 Heater

GBS000TT

Resistance [at 25°C (77°F)]	9.9 - 13.3Ω

Crankshaft Position Sensor (POS)

GBS000TU

Refer to EC-258, "Component Inspection" .

Camshaft Position Sensor (PHASE)

GBS000TV

Refer to EC-267, "Component Inspection" .

Throttle Control Motor

GBS000TW

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

GBS000TX

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω

Fuel Pump

GBS000TY

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

INDEX FOR DTC

PFP:00024

DTC No. Index

GBS000TZ

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II	ECM*2		
U1000	1000*3	CAN COMM CIRCUIT	EC-686
U1001	1001*3	CAN COMM CIRCUIT	EC-686
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—
P0011	0011	INT/V TIM CONT-B1	EC-689
P0021	0021	INT/V TIM CONT-B2	EC-689
P0102	0102	MAF SEN/CIRCUIT	EC-694
P0103	0103	MAF SEN/CIRCUIT	EC-694
P0117	0117	ECT SEN/CIRC	EC-701
P0118	0118	ECT SEN/CIRC	EC-701
P0122	0122	TP SEN 2/CIRC	EC-706
P0123	0123	TP SEN 2/CIRC	EC-706
P0222	0222	TP SEN 1/CIRC	EC-713
P0223	0223	TP SEN 1/CIRC	EC-713
P0327	0327	KNOCK SEN/CIRC-B1	EC-720
P0328	0328	KNOCK SEN/CIRC-B1	EC-720
P0332	0332	KNOCK SEN/CIRC-B2	EC-720
P0333	0333	KNOCK SEN/CIRC-B2	EC-720
P0335	0335	CKP SEN/CIRCUIT	EC-725
P0340	0340	CMP SEN/CIRC-B1	EC-732
P0345	0345	CMP SEN/CIRC-B2	EC-732
P0550	0550	PW ST P SEN/CIRC	EC-741
P0605	0605	ECM	EC-746
P1031	1031	A/F SEN1 HTR (B1)	EC-749
P1032	1032	A/F SEN1 HTR (B1)	EC-749
P1051	1051	A/F SEN1 HTR (B2)	EC-749
P1052	1052	A/F SEN1 HTR (B2)	EC-749
P1065	1065	ECM BACK UP/CIRCUIT	EC-757
P1111	1111	INT/V TIM V/CIR-B1	EC-761
P1121	1121	ETC ACTR	EC-769
P1122	1122	ETC FUNCTION/CIRC	EC-772
P1124	1124	ETC MOT PWR	EC-778
P1126	1126	ETC MOT PWR	EC-778
P1128	1128	ETC MOT	EC-784
P1136	1136	INT/V TIM V/CIR-B2	EC-761
P1217	1217	ENG OVER TEMP	EC-789
P1225	1225	CTP LEARNING	EC-799

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II	ECM*2		
P1226	1226	CTP LEARNING	EC-801
P1229	1229	SENSOR POWER/CIRC	EC-803
P1271	1271	A/F SENSOR1 (B1)	EC-810
P1272	1272	A/F SENSOR1 (B1)	EC-819
P1276	1276	A/F SENSOR1 (B1)	EC-828
P1281	1281	A/F SENSOR1 (B2)	EC-810
P1282	1282	A/F SENSOR1 (B2)	EC-819
P1286	1286	A/F SENSOR1 (B2)	EC-828
P1564	1564	ASCD SW	EC-837
P1572	1572	ASCD BRAKE SW	EC-844
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-600
P1706	1706	P-N POS SW/CIRCUIT	EC-858
P1715	1715	IN PLUY SPEED	EC-863
P1805	1805	BRAKE SW/CIRCUIT	EC-864
P2122	2122	APP SEN 1/CIRC	EC-870
P2123	2123	APP SEN 1/CIRC	EC-870
P2127	2127	APP SEN 2/CIRC	EC-876
P2128	2128	APP SEN 2/CIRC	EC-876
P2135	2135	TP SENSOR	EC-883
P2138	2138	APP SENSOR	EC-891

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*3: The troubleshooting for this DTC needs CONSULT-II.

Alphabetical Index

GBS000U0

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II	ECM*2	
A/F SENSOR1 (B1)	P1271	1271	EC-810
A/F SENSOR1 (B1)	P1272	1272	EC-819
A/F SENSOR1 (B1)	P1276	1276	EC-828
A/F SENSOR1 (B2)	P1281	1281	EC-810
A/F SENSOR1 (B2)	P1282	1282	EC-819
A/F SENSOR1 (B2)	P1286	1286	EC-828
A/F SEN1 HTR (B1)	P1031	1031	EC-749
A/F SEN1 HTR (B1)	P1032	1032	EC-749
A/F SEN1 HTR (B2)	P1051	1051	EC-749
A/F SEN1 HTR (B2)	P1052	1052	EC-749
APP SEN 1/CIRC	P2122	2122	EC-870
APP SEN 1/CIRC	P2123	2123	EC-870
APP SEN 2/CIRC	P2127	2127	EC-876
APP SEN 2/CIRC	P2128	2128	EC-876
APP SENSOR	P2138	2138	EC-891
ASCD BRAKE SW	P1572	1572	EC-844
ASCD SW	P1564	1564	EC-837
BRAKE SW/CIRCUIT	P1805	1805	EC-864
CAN COMM CIRCUIT	U1000	1000*3	EC-686
CAN COMM CIRCUIT	U1001	1001*3	EC-686
CKP SEN/CIRCUIT	P0335	0335	EC-725
CMP SEN/CIRC-B1	P0340	0340	EC-732
CMP SEN/CIRC-B2	P0345	0345	EC-732
CTP LEARNING	P1225	1225	EC-799
CTP LEARNING	P1226	1226	EC-801
ECM	P0605	0605	EC-746
ECM BACK UP/CIRCUIT	P1065	1065	EC-757
ECT SEN/CIRC	P0117	0117	EC-701
ECT SEN/CIRC	P0118	0118	EC-701
ENG OVER TEMP	P1217	1217	EC-789
ETC ACTR	P1121	1121	EC-769
ETC FUNCTION/CIRC	P1122	1122	EC-772
ETC MOT	P1128	1128	EC-784
ETC MOT PWR	P1124	1124	EC-778
ETC MOT PWR	P1126	1126	EC-778
IN PULY SPEED	P1715	1715	EC-863
INT/V TIM CONT-B1	P0011	0011	EC-689
INT/V TIM CONT-B2	P0021	0021	EC-689
INT/V TIM V/CIR-B1	P1111	1111	EC-761

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II	ECM*2	
INT/V TIM V/CIR-B2	P1136	1136	EC-761
KNOCK SEN/CIRC-B1	P0327	0327	EC-720
KNOCK SEN/CIRC-B1	P0328	0328	EC-720
KNOCK SEN/CIRC-B2	P0332	0332	EC-720
KNOCK SEN/CIRC-B2	P0333	0333	EC-720
MAF SEN/CIRCUIT	P0102	0102	EC-694
MAF SEN/CIRCUIT	P0103	0103	EC-694
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EC-600
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—
P-N POS SW/CIRCUIT	P1706	1706	EC-858
PW ST P SEN/CIRC	P0550	0550	EC-741
SENSOR POWER/CIRC	P1229	1229	EC-803
TP SEN 1/CIRC	P0222	0222	EC-713
TP SEN 1/CIRC	P0223	0223	EC-713
TP SEN 2/CIRC	P0122	0122	EC-706
TP SEN 2/CIRC	P0123	0123	EC-706
TP SENSOR	P2135	2135	EC-883

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*3: The troubleshooting for this DTC needs CONSULT-II.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

GBS000U1

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine

GBS000U2

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

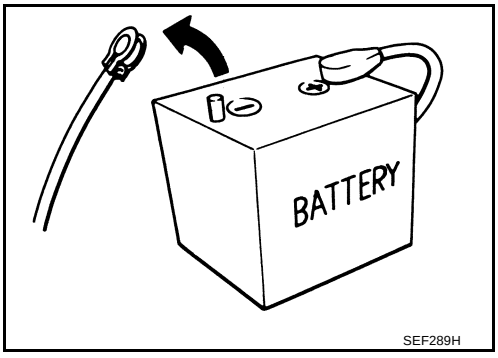
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-65, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precaution

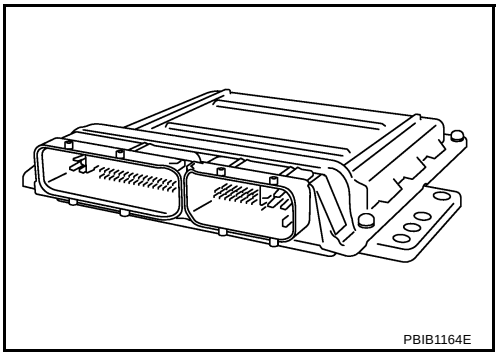
GBS000U3

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.**

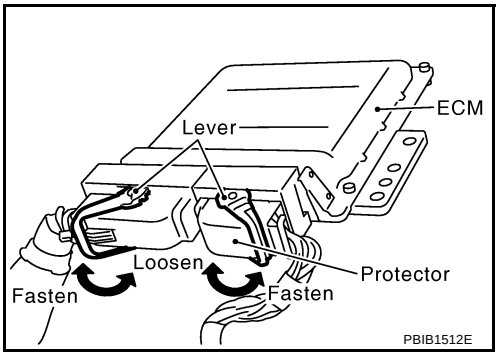


SEF289H

- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - Freeze frame data
  - 1st trip freeze frame data

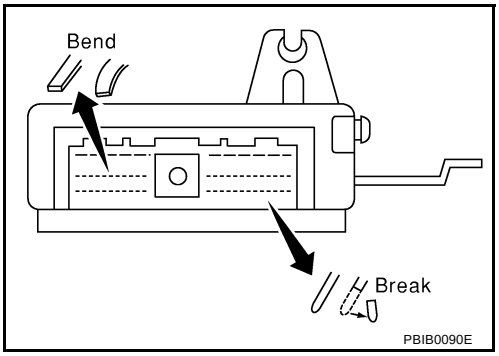

PBIB1164E

- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.



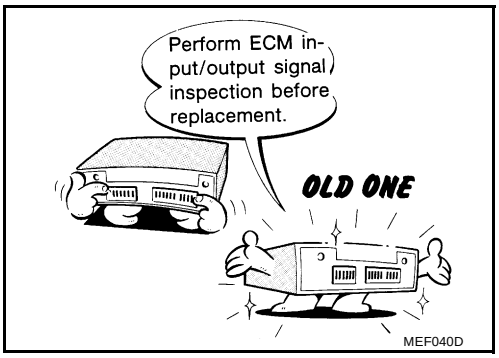
PBIB1512E

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.



PBIB0090E

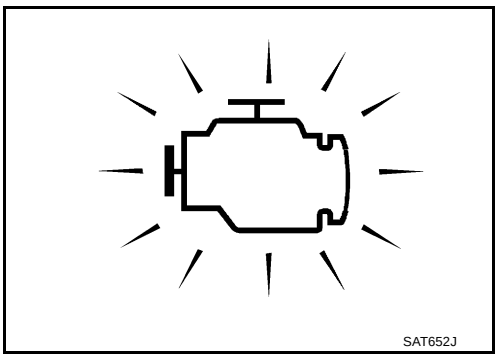
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-642, "ECM Terminals and Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.



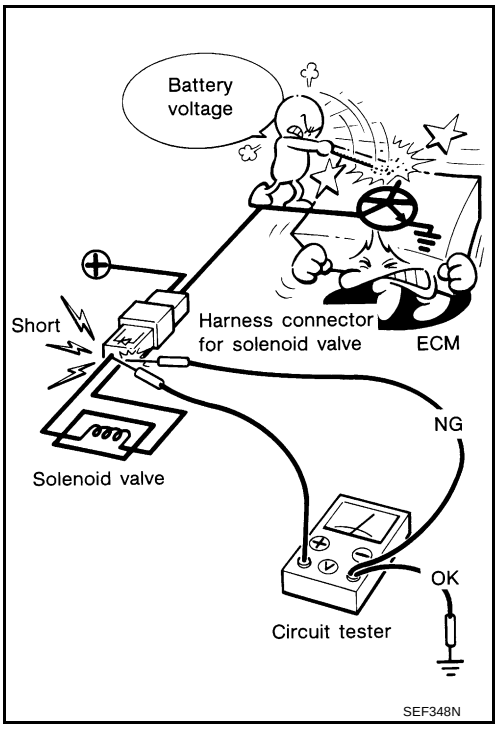
MEF040D

- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

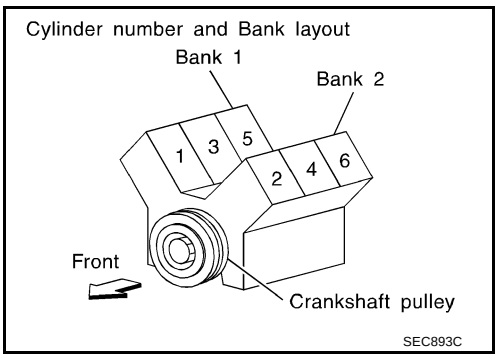

SAT652J

- **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.**



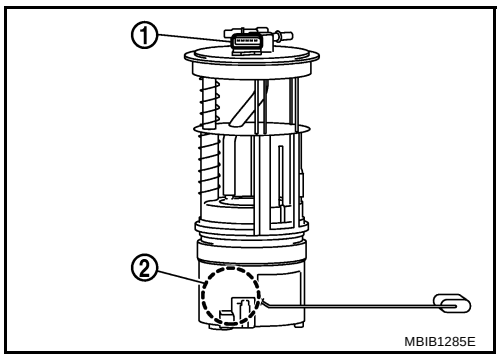
SEF348N

- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**

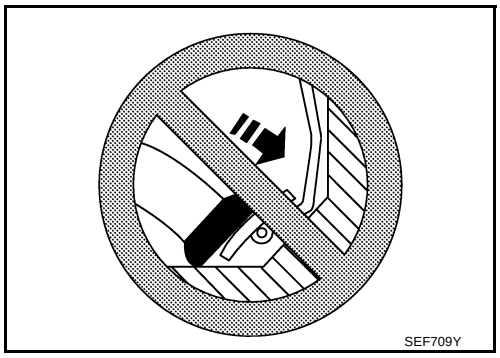


SEC893C

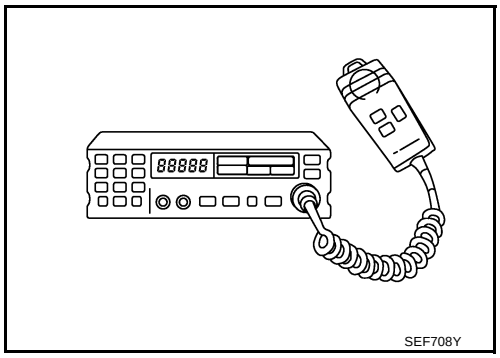
- **Do not operate fuel pump when there is no fuel in lines.**
  - Fuel level sensor unit and fuel pump (1)
  - Fuel pressure regulator (2)
- **Tighten fuel hose clamps to the specified torque.**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**

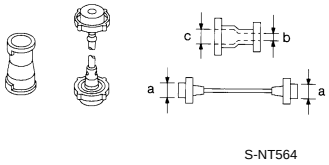
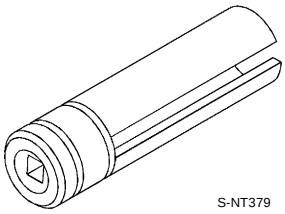
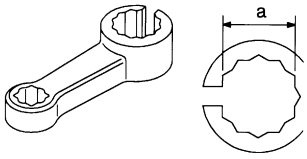
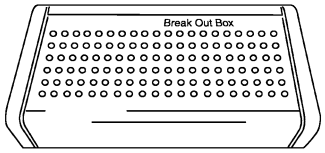
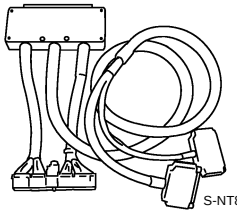
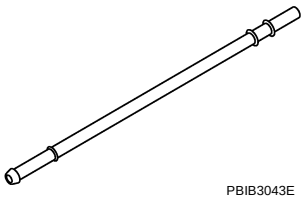


PREPARATION

PFP:00002

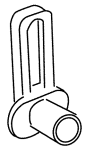
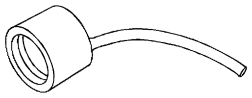
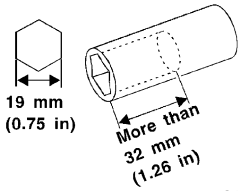
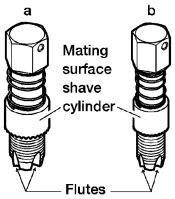
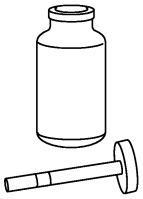
Special Service Tools

GBS000U5

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening air fuel ratio (A/F) sensor **a: 22 mm (0.87 in)**
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester
KV101118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

GBS000U6

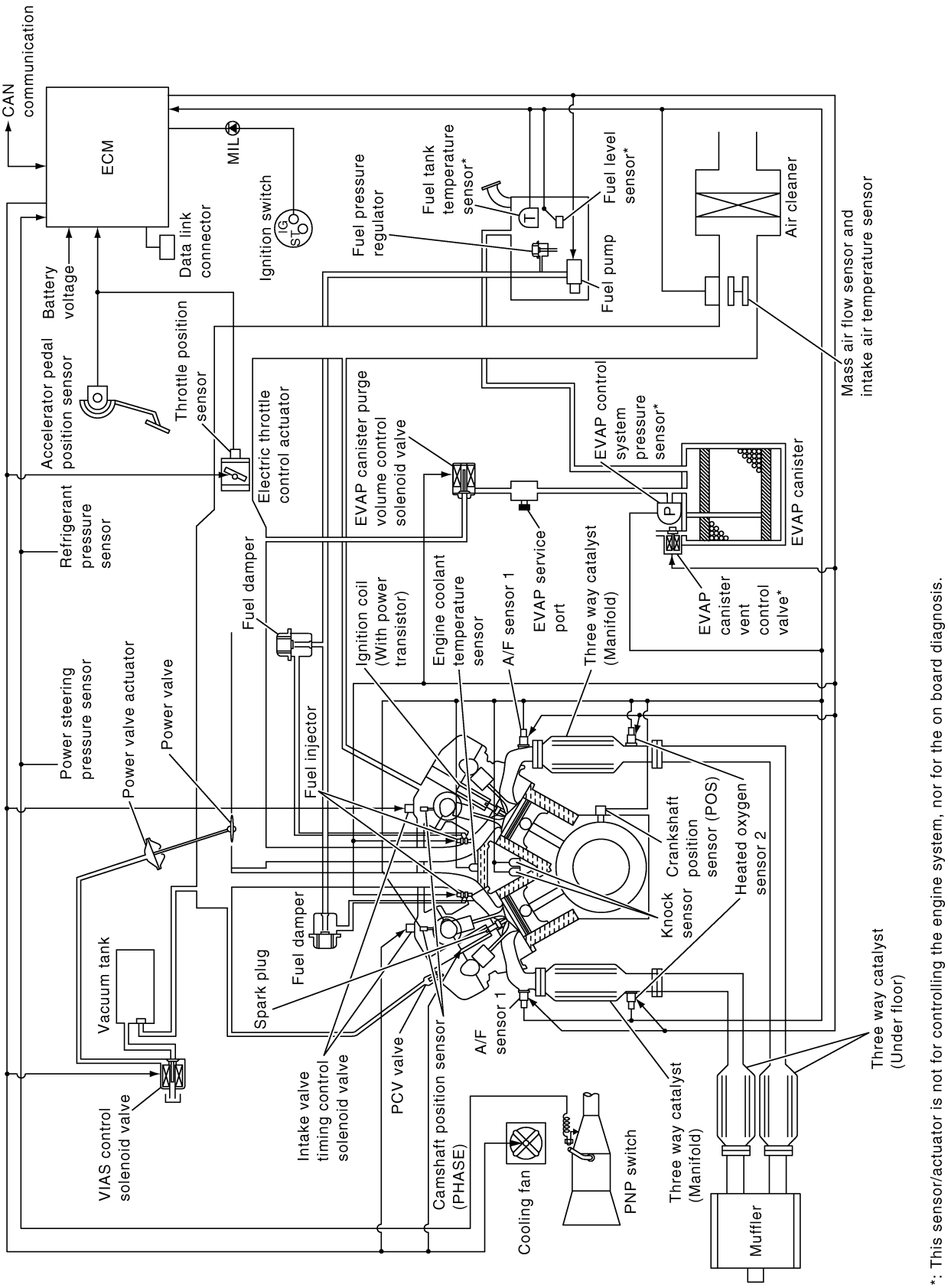
Tool name	Description
Quick connector release  PBIC0198E	Remove fuel tube quick connectors in engine room
Fuel filler cap adapter  S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

GBS000U7



*: This sensor/actuator is not for controlling the engine system, nor for the on board diagnosis.

MBIB1265E

Multiport Fuel Injection (MFI) System

GBS000U8

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation*2		
Wheel sensor	Vehicle speed*2		

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

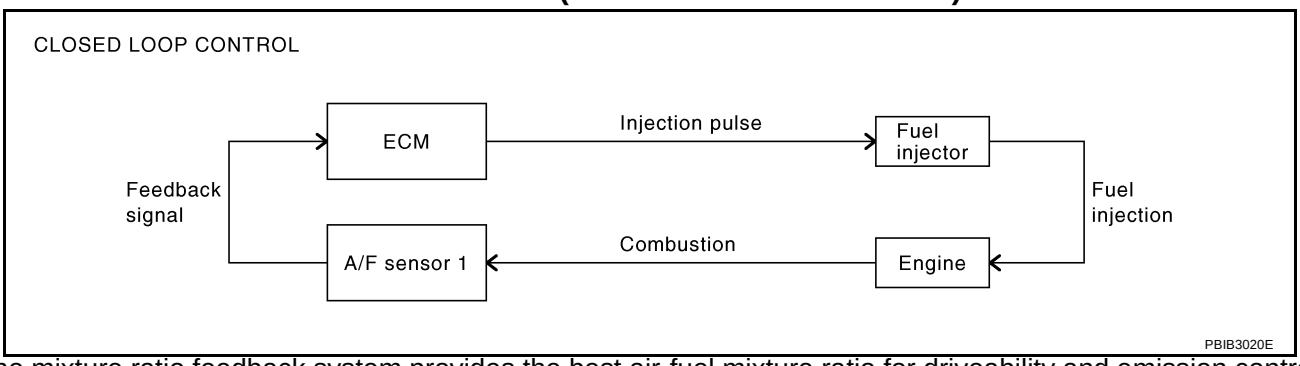
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to EC-810 . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

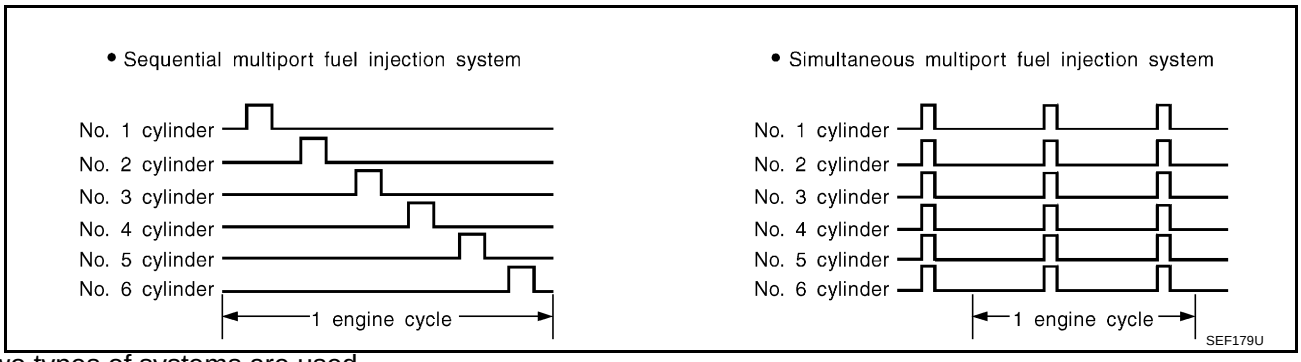
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six fuel injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

GBS000U9

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1-2-3-4-5-6
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage

- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

GBS000UA

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-586, "Multiport Fuel Injection (MFI) System"
.

AIR CONDITIONING CUT CONTROL

PFP:23710

Input/Output Signal Chart

GBS000UB

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

System Description

GBS000UC

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

GBS000UD

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch	Gear position		
Combination meter	Vehicle speed*		
TCM	Powertrain revolution*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 175 km/h (109 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by depressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 175 km/h (109 MPH)

Component Description

GBS000UE

ASCD STEERING SWITCH

Refer to EC-837 .

ASCD BRAKE SWITCH

Refer to EC-844 and EC-899 .

STOP LAMP SWITCH

Refer to EC-844 , EC-864 and EC-899 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-769 , EC-772 , EC-778 and EC-784 .

ASCD INDICATOR

Refer to EC-912 .

CAN COMMUNICATION

PFP:23710

System Description

GBS000UF

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-21, "CAN COMMUNICATION" , about CAN communication for detail.

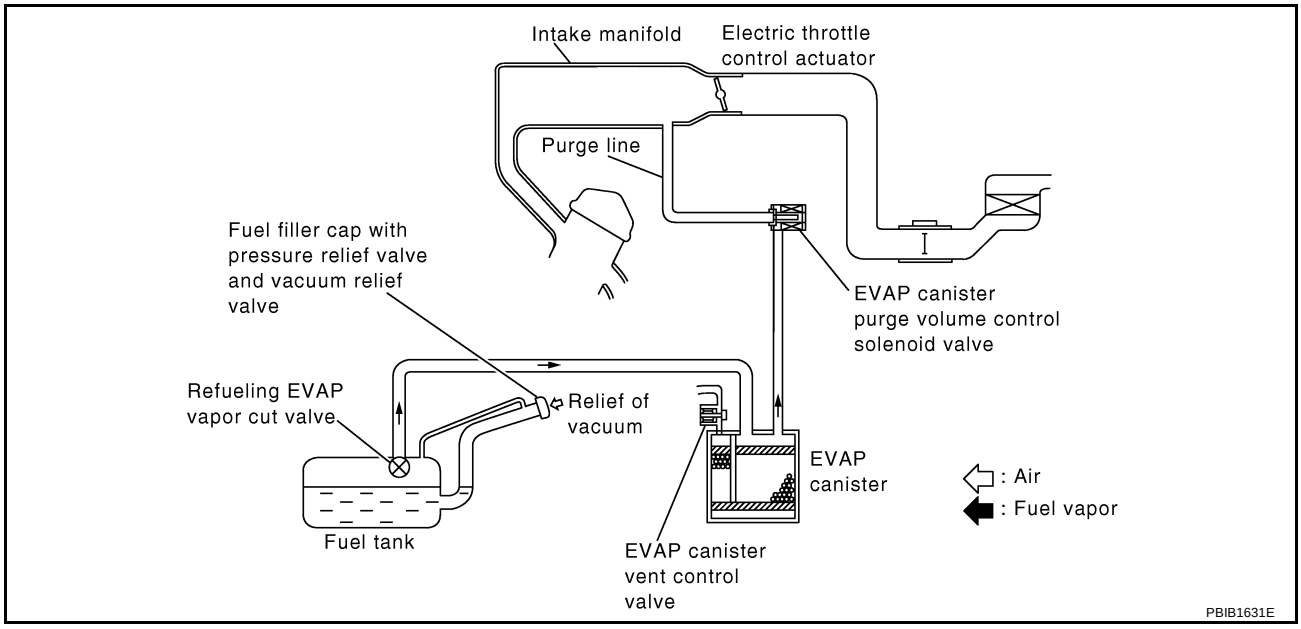
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

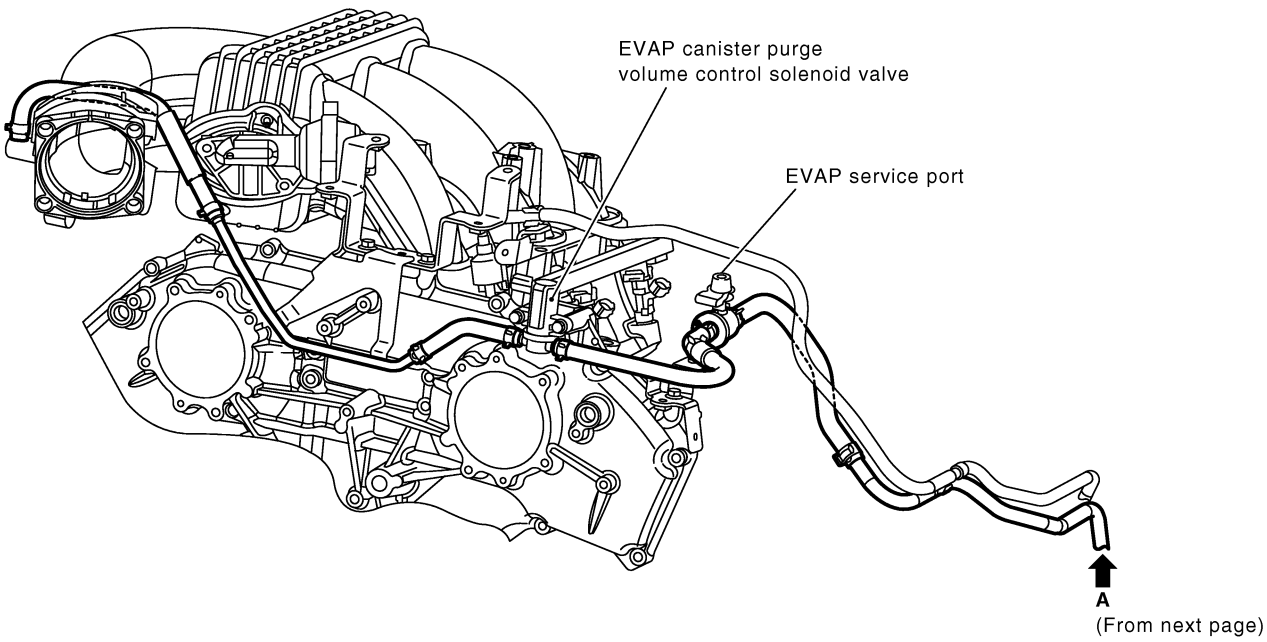
GBS000UG

SYSTEM DESCRIPTION



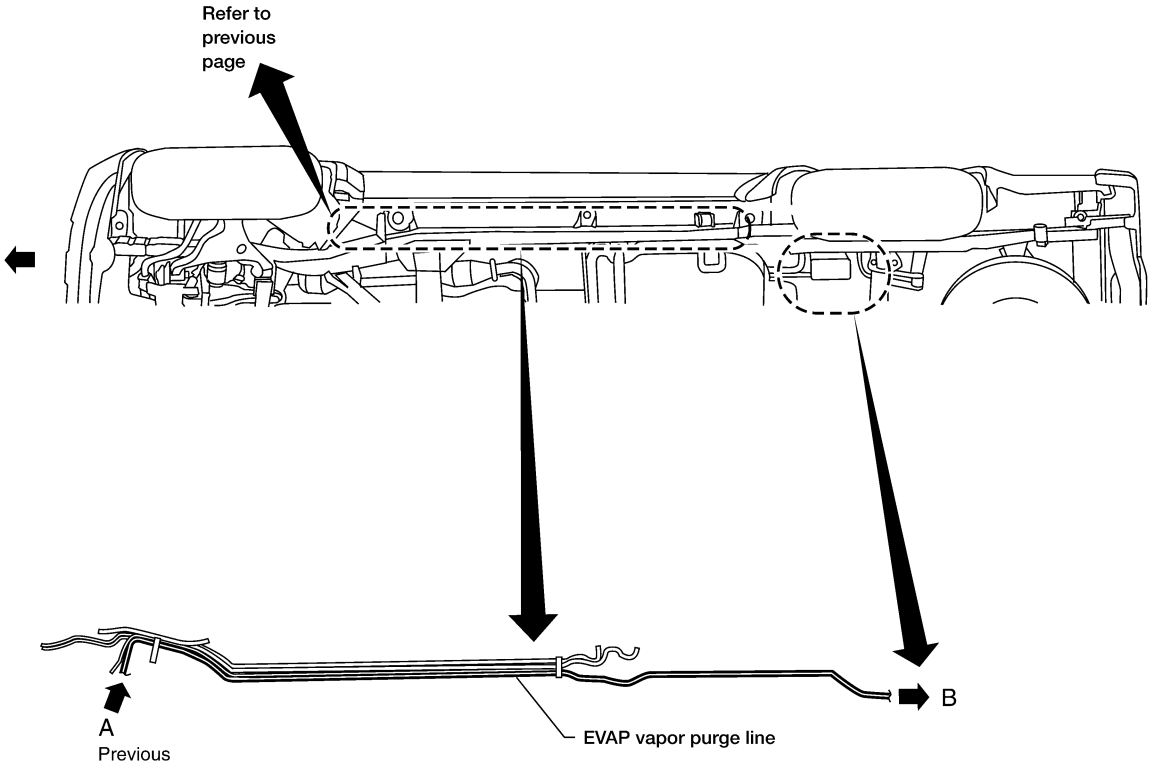
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

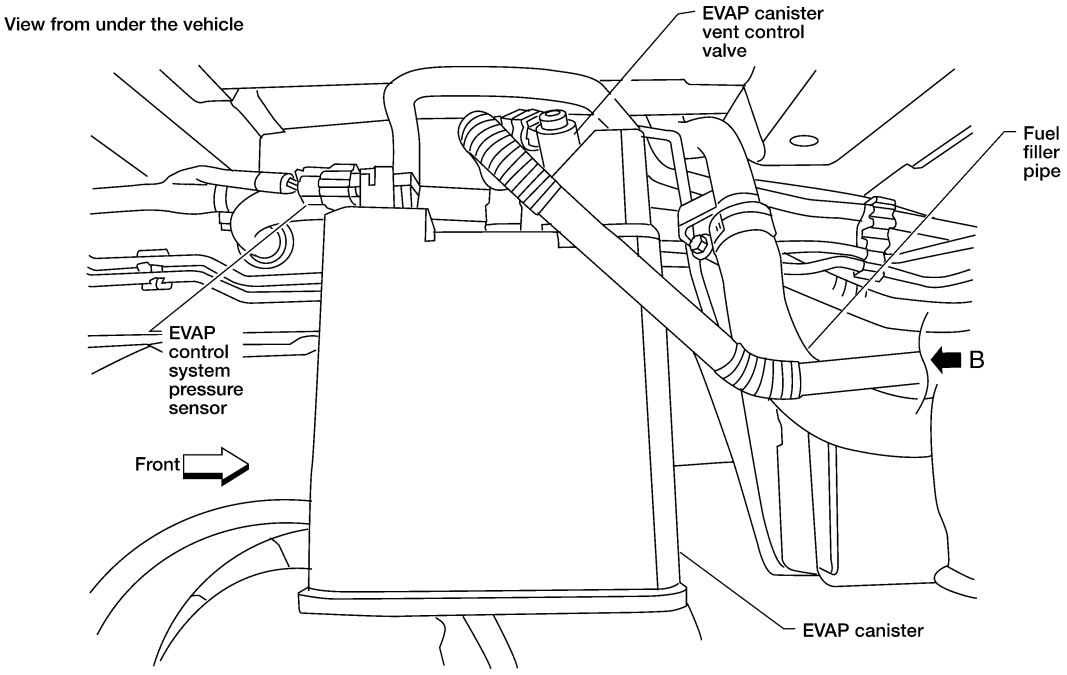
EVAPORATIVE EMISSION LINE DRAWING



NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB2774E


Refer to previous page
A
Previous
B
EVAP vapor purge line


View from under the vehicle
EVAP canister vent control valve
Fuel filler pipe
EVAP control system pressure sensor
Front
B
EVAP canister

BBIA0594E

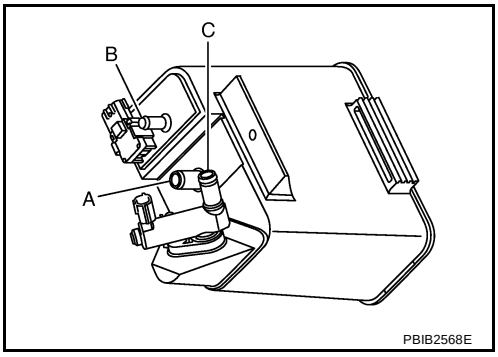
Component Inspection

GBS000UH

EVAP CANISTER

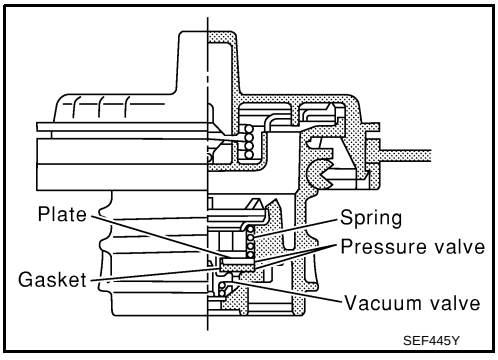
Check EVAP canister as follows:

1. Block port **B** .
2. Blow air into port **A** and check that it flows freely out of port **C** .
3. Release blocked port **B** .
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C** .
5. Block port **A** and **B** .
6. Apply pressure to port **C** and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

1. Wipe clean valve housing.

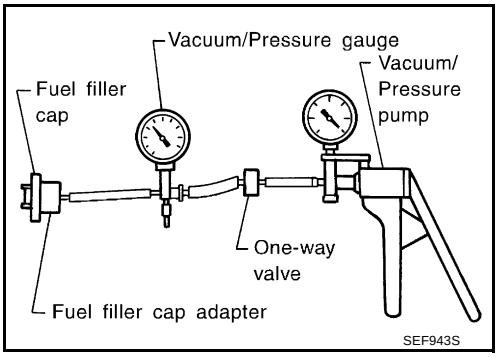


2. Check valve opening pressure and vacuum.

   Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

   Vacuum: –6.0 to –3.3 kPa (–0.060 to –0.033 bar, –0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-923 .

EVAP CANISTER VENT CONTROL VALVE

Refer to EC-928 .

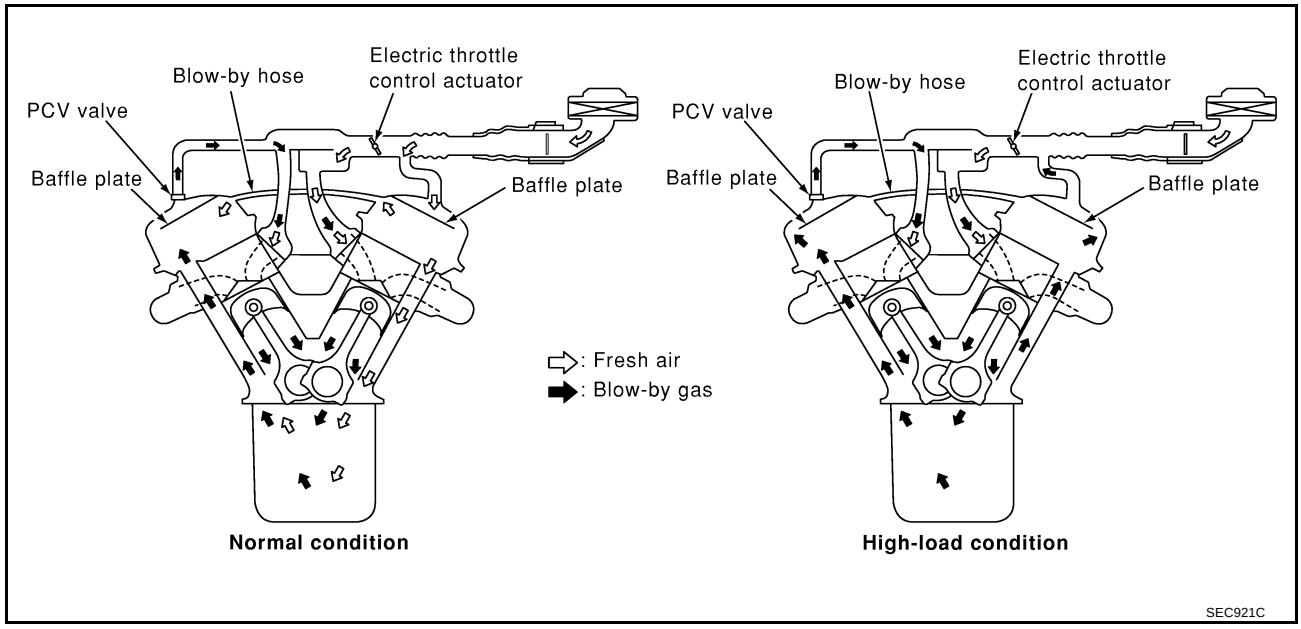
POSITIVE CRANKCASE VENTILATION

PFP:11810

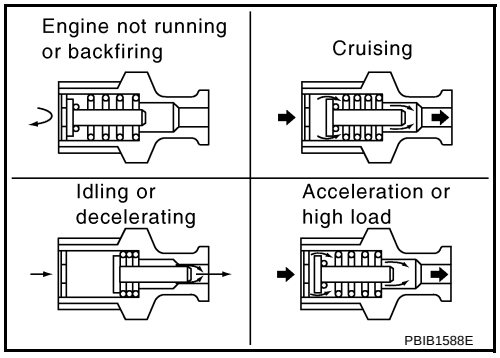
Description

GBS000UI

SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

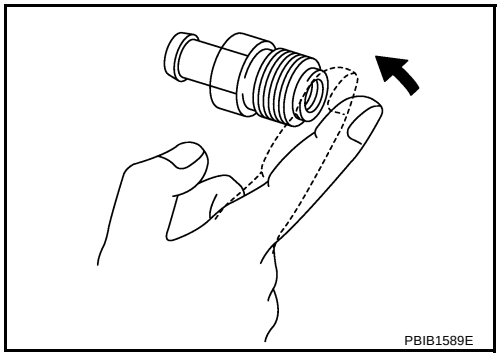


Component Inspection

GBS000UJ

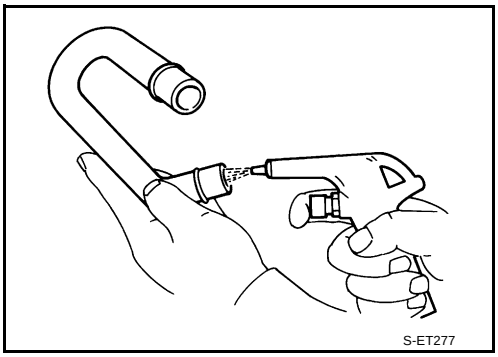
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

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.



NATS (NISSAN ANTI-THEFT SYSTEM)

PFP:25386

Description

GBS000UK

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-81, "NATS(Nissan Anti-Theft System)" .
- 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 procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II Operation Manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

GBS000UL

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information
Diagnostic 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.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-II	×	×	×	×
ECM	×	×*	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-627, "Fail-Safe Chart" .)

Two Trip Detection Logic

GBS000UM

When a malfunction is detected for the 1st time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. When the ECM enters fail-safe mode (Refer to EC-627, "Fail-Safe Chart"), the DTC is stored in the ECM memory even in the 1st trip.
When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-Related Diagnostic Information

GBS000UN

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-II	ECM*2			
CAN COMM CIRCUIT	U1000	1000*3	2	—	EC-686
CAN COMM CIRCUIT	U1001	1001*3	2	—	EC-686
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—
INT/V TIM CONT-B1	P0011	0011	2	—	EC-689
INT/V TIM CONT-B2	P0021	0021	2	—	EC-689
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-694
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-694

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-II	ECM*2			
ECT SEN/CIRC	P0117	0117	2	×	EC-701
ECT SEN/CIRC	P0118	0118	2	×	EC-701
TP SEN 2/CIRC	P0122	0122	1	×	EC-706
TP SEN 2/CIRC	P0123	0123	1	×	EC-706
TP SEN 1/CIRC	P0222	0222	1	×	EC-713
TP SEN 1/CIRC	P0223	0223	1	×	EC-713
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-720
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-720
KNOCK SEN/CIRC-B2	P0332	0332	2	—	EC-720
KNOCK SEN/CIRC-B2	P0333	0333	2	—	EC-720
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-725
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-732
CMP SEN/CIRC-B2	P0345	0345	2	×	EC-732
PW ST P SEN/CIRC	P0550	0550	2	—	EC-741
ECM	P0605	0605	1 or 2	× or —	EC-746
A/F SEN1 HTR (B1)	P1031	1031	2	×	EC-749
A/F SEN1 HTR (B1)	P1032	1032	2	×	EC-749
A/F SEN1 HTR (B2)	P1051	1051	2	×	EC-749
A/F SEN1 HTR (B2)	P1052	1052	2	×	EC-749
ECM BACK UP/CIRC	P1065	1065	2	×	EC-757
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-761
ETC ACTR	P1121	1121	1	×	EC-769
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-772
ETC MOT PWR	P1124	1124	1	×	EC-778
ETC MOT PWR	P1126	1126	1	×	EC-778
ETC MOT	P1128	1128	1	×	EC-784
INT/V TIM V/CIR-B2	P1136	1136	2	×	EC-761
ENG OVER TEMP	P1217	1217	1	×	EC-789
CTP LEARNING	P1225	1225	2	—	EC-799
CTP LEARNING	P1226	1226	2	—	EC-801
SENSOR POWER/CIRC	P1229	1229	1	×	EC-803
A/F SENSOR1 (B1)	P1271	1271	2	×	EC-810
A/F SENSOR1 (B1)	P1272	1272	2	×	EC-819
A/F SENSOR1 (B1)	P1276	1276	2	×	EC-828
A/F SENSOR1 (B2)	P1281	1281	2	×	EC-810
A/F SENSOR1 (B2)	P1282	1282	2	×	EC-819
A/F SENSOR1 (B2)	P1286	1286	2	×	EC-828
ASCD SW	P1564	1564	1	—	EC-837
ASCD BRAKE SW	P1572	1572	1	—	EC-844
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-600
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-858
IN PULY SPEED	P1715	1715	2	—	EC-863
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-864

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-II	ECM*2			
APP SEN 1/CIRC	P2122	2122	1	×	EC-870
APP SEN 1/CIRC	P2123	2123	1	×	EC-870
APP SEN 2/CIRC	P2127	2127	1	×	EC-876
APP SEN 2/CIRC	P2128	2128	1	×	EC-876
TP SENSOR	P2135	2135	1	×	EC-883
APP SENSOR	P2138	2138	1	×	EC-891

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*3: The troubleshooting for this DTC need CONSULT-II.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For 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 EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-621, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II
CONSULT-II Examples: P0117, P0340, P1065, etc.
(CONSULT-II also displays the malfunctioning component or system.)

No Tools
The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC.
Example: 0117, 0340, 1065, etc.
These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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, 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-654, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM.
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 EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

WITH CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

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 again.

SELECT SYSTEM
ENGINE

2. Turn CONSULT-II “ON” and touch “ENGINE”.

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
CAN DIAG SUPPORT MNTR
ACTIVE TEST

3. Touch “SELF-DIAG RESULTS”.

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0102]	0

4. Touch “ERASE”. (The DTC in the ECM will be erased.)

PBIB2392E

WITHOUT CONSULT-II

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.
   Refer to EC-606, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

– Diagnostic trouble codes
– 1st trip diagnostic trouble codes
– Freeze frame data
– 1st trip freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

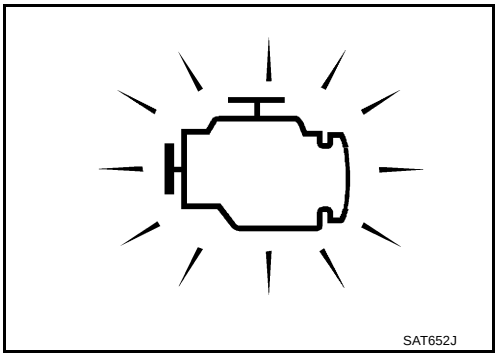
Malfunction Indicator Lamp (MIL)

GBS000UO

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not light up, refer to DI-32, "WARNING LAMPS" , or see EC-993 .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.


SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. One trip detection diagnoses will light up the MIL in the 1st trip.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

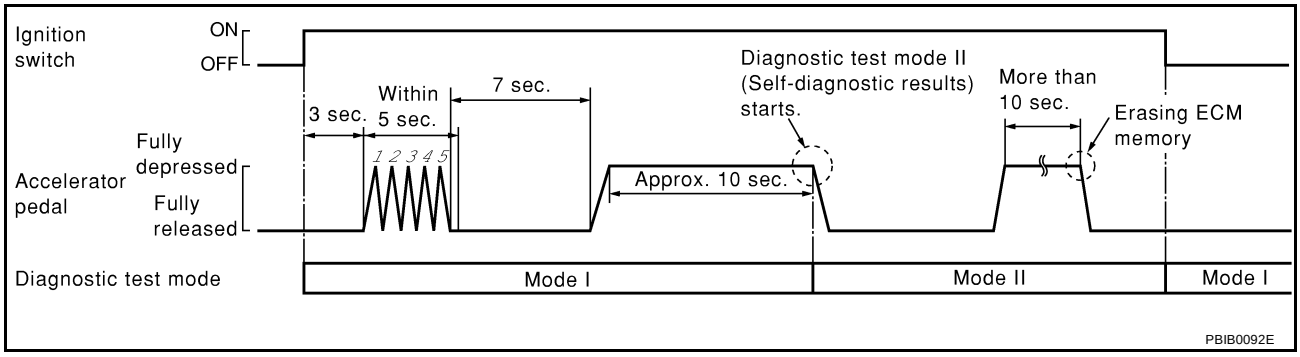
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-606, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-32, "WARNING LAMPS" or see EC-993 .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

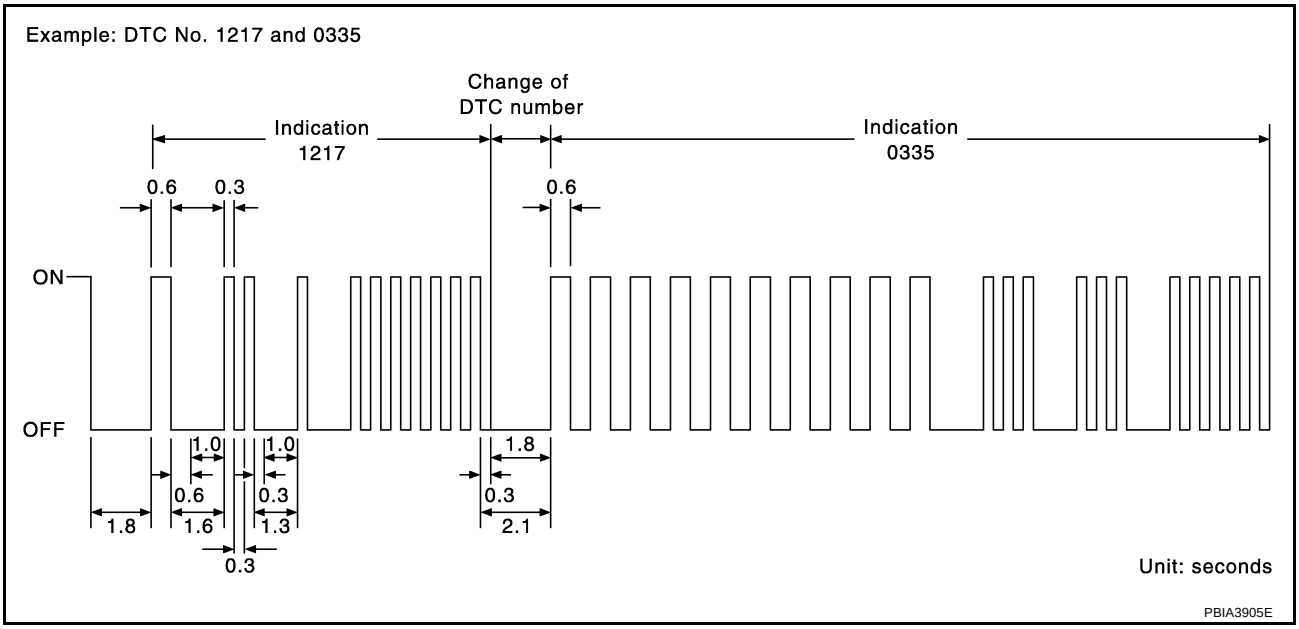
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL

illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are 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. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-575, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-606, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

BASIC SERVICE PROCEDURE

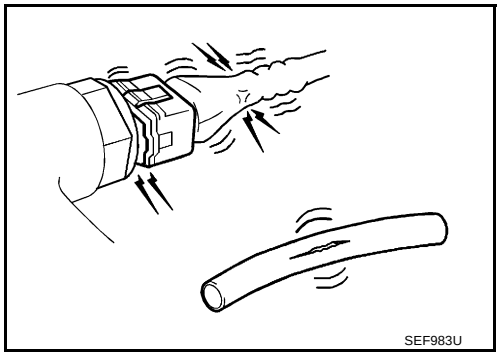
PFP:00018

Basic Inspection

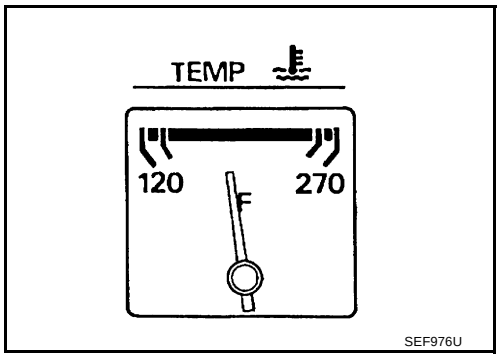
GBS000UP

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

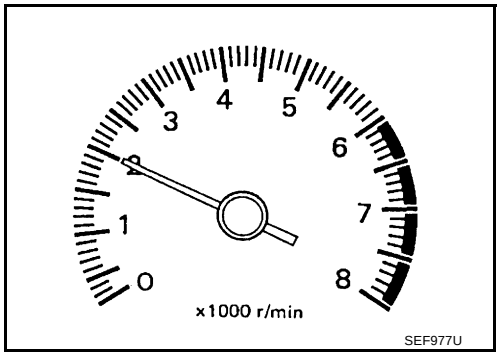


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-II.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

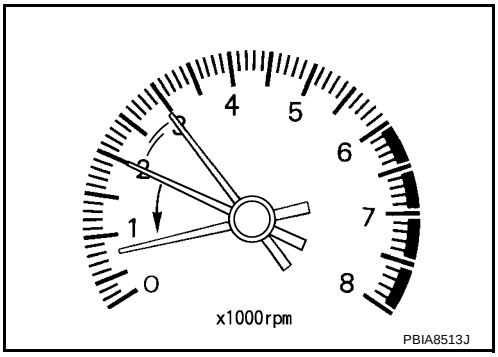
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

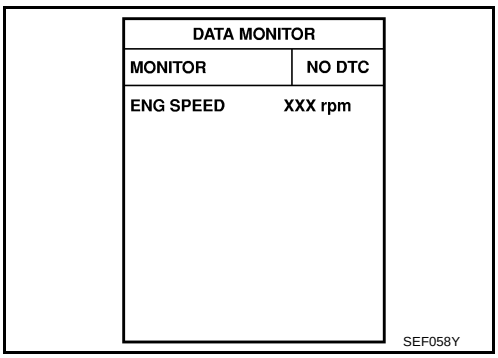
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-614, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-614, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

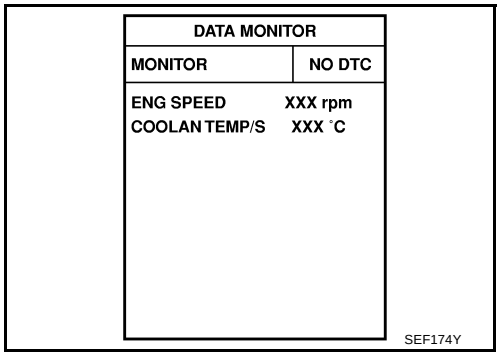
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-732 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-725 .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

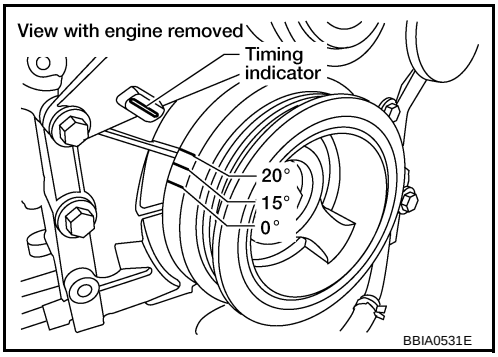
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-613, "IGNITION TIMING" .

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-614, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-614, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

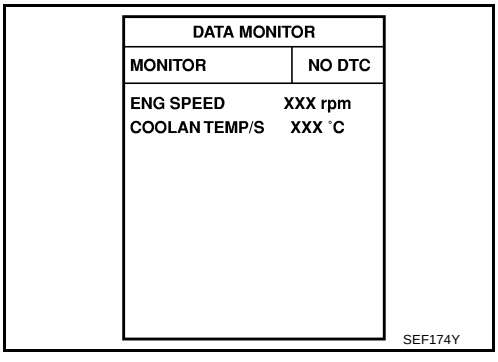
Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-612, "IDLE SPEED" .

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625± 50 rpm (in P or N position)

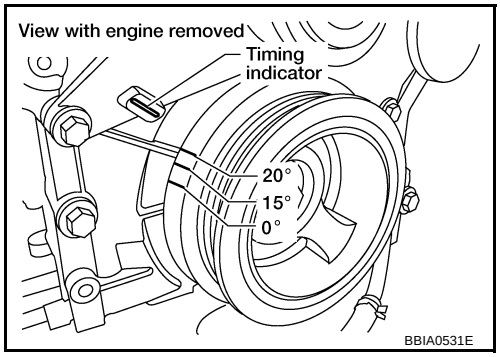
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-613, "IGNITION TIMING" .

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-53, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-732 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-725 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .

>> GO TO 4.

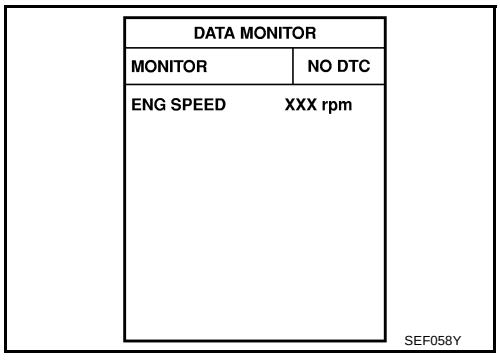
Idle Speed and Ignition Timing Check

GBS000UQ

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire with installed between No.4 ignition coil and No.4 spark plug.

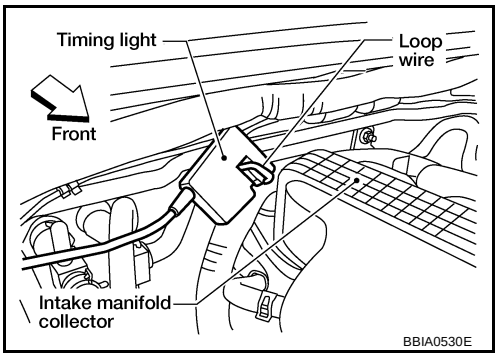
NOTE:
For the method of installing the tachometer, refer to EC-613, "IGNITION TIMING" .

IGNITION TIMING

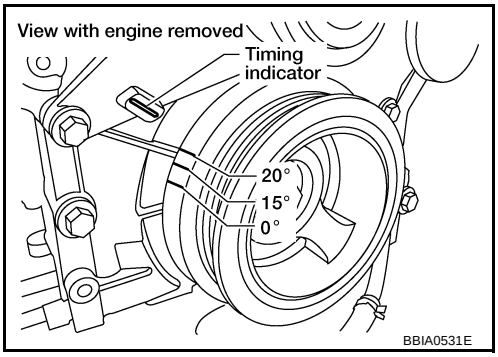
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire as shown.

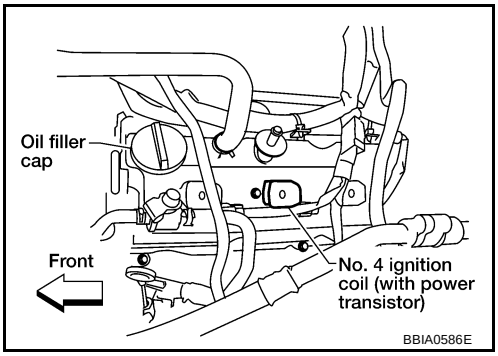


2. Check ignition timing.

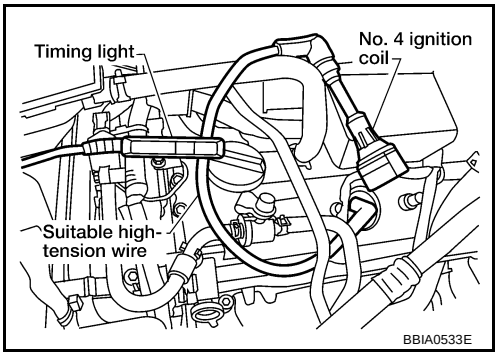


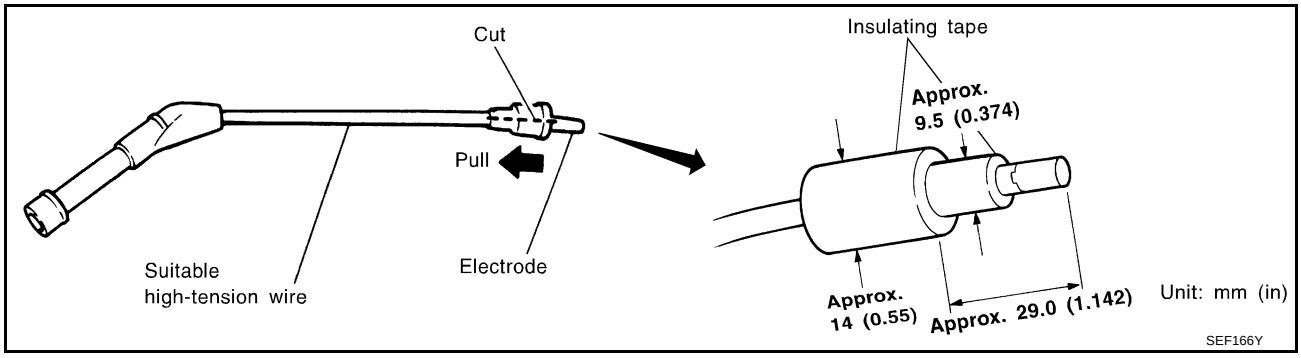
Method B

1. Remove No. 4 ignition coil.

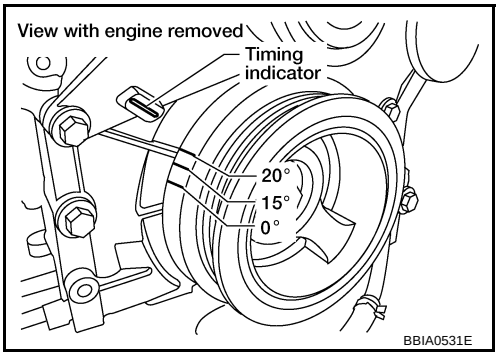


2. Connect No. 4 ignition coil and No. 4 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



Accelerator Pedal Released Position Learning

GBS000UR

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

GBS000US

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

GBS000UT

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

– A/T models

• With CONSULT-II: Drive vehicle until “ATF TEMP SE 1” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
• Without CONSULT-II: Drive vehicle for 10 minutes.

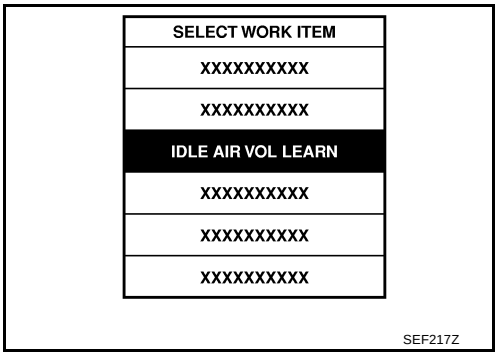
– M/T models

• Drive vehicle for 10 minutes.

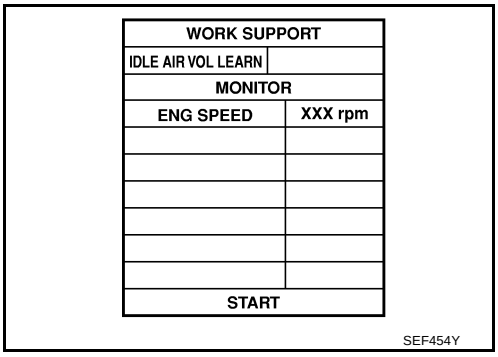
OPERATION PROCEDURE

With CONSULT-II

1. Perform EC-614, "Accelerator Pedal Released Position Learning" .
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.

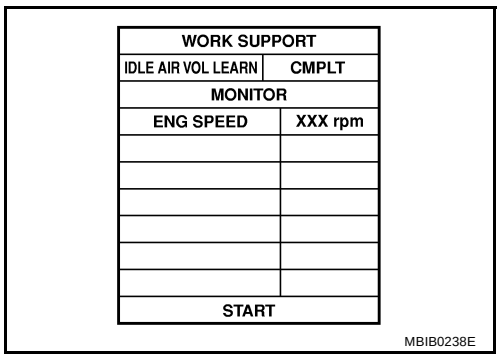


6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)



Without CONSULT-II

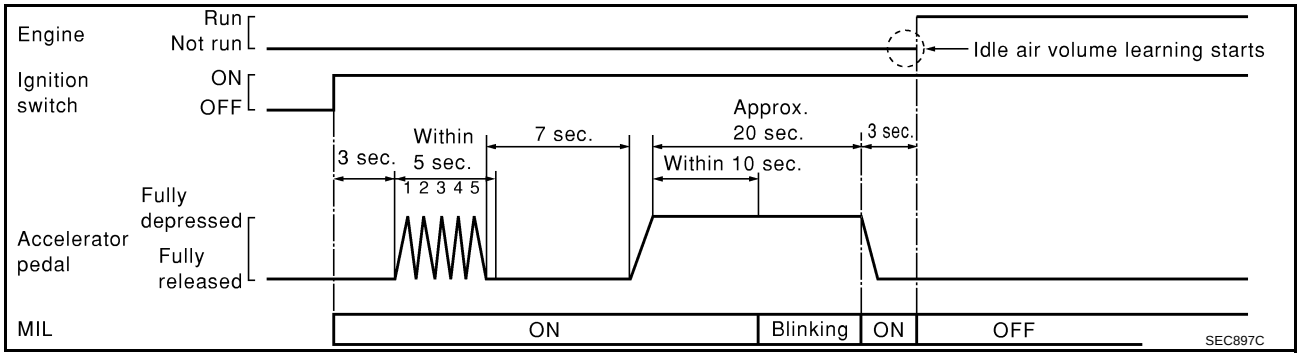
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-614, "Accelerator Pedal Released Position Learning" .
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, then turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.
11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**

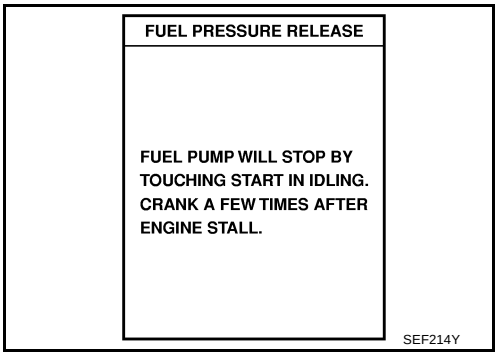
Fuel Pressure Check

GBS000UU

FUEL PRESSURE RELEASE

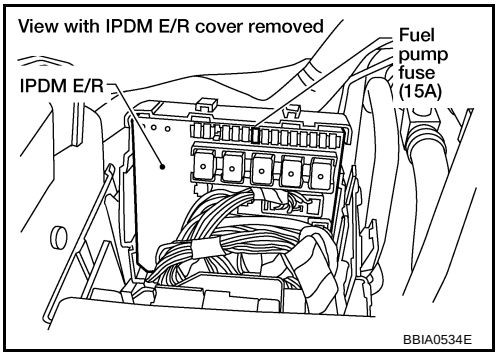
With CONSULT-II

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

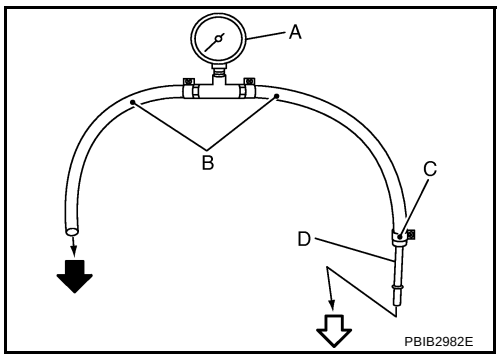
- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

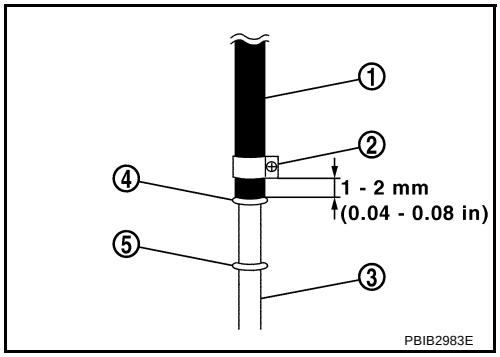
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because D40 models do not have fuel return system.

1. Release fuel pressure to zero. Refer to EC-617, "FUEL PRESSURE RELEASE" .

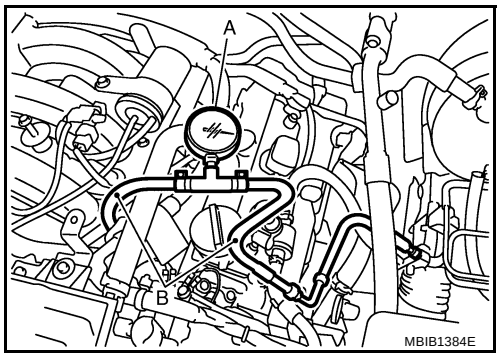
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose. Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .
   - Do not twist or kink fuel hose because it is plastic hose.
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



   Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)
   - Make sure that clamp screw does not contact adjacent parts.
5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



   At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)
10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

If OK, replace fuel pressure regulator.
If NG, repair or replace.

TROUBLE DIAGNOSIS

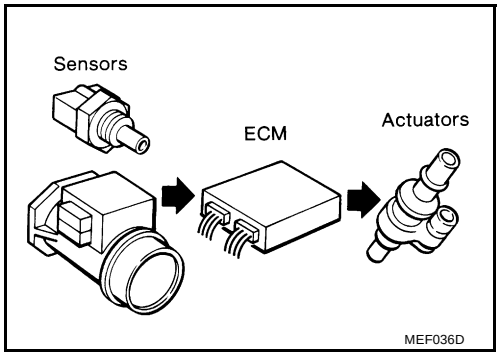
PFP:00004

Trouble Diagnosis Introduction

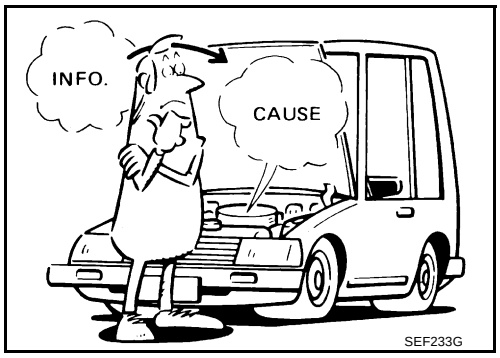
GBS000UV

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



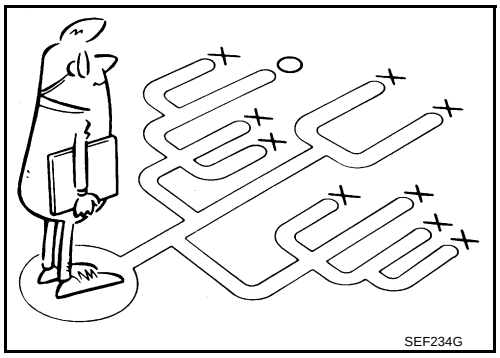
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



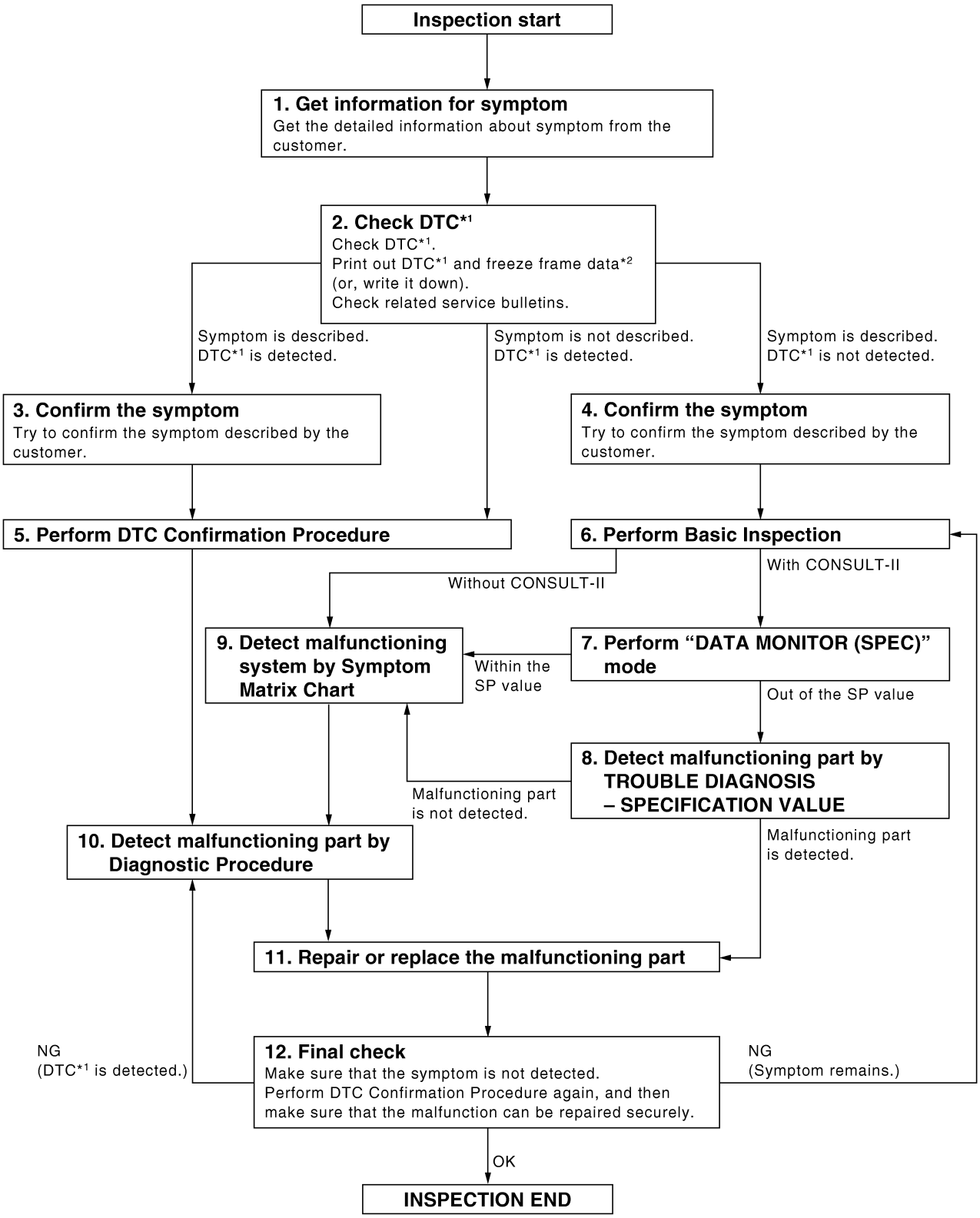
A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the WORK FLOW on EC-621 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on EC-625 should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



WORK FLOW
Overall Sequence



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB2267E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the EC-624, "DIAGNOSTIC WORKSHEET" .

>> GO TO 2.

2. CHECK DTC*1

1. Check DTC*1 .
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2 . (Print them out with CONSULT-II.)
- Erase DTC*1 . (Refer to EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-628 .)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*1 , and then make sure that DTC*1 is detected again.
At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on “DATA MONITOR (AUTO TRIG)”.
If two or more DTCs*1 are detected, refer to EC-626, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data*2 is useful if the DTC*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*1 cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC*1 by DTC Confirmation Procedure.

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

6. PERFORM BASIC INSPECTION

Perform EC-608, "Basic Inspection" .

With CONSULT-II>>GO TO 7.
Without CONSULT-II>>GO TO 9.

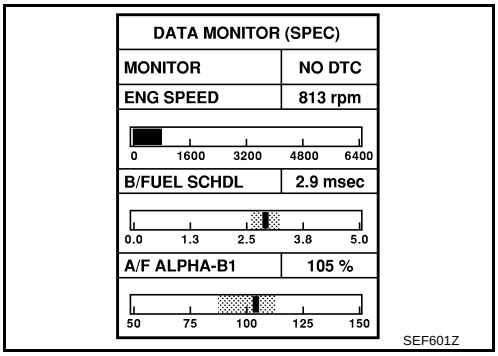
7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT-II

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1”, “A/F ALPHA-B2” are within the SP value using CONSULT-II “DATA MONITOR (SPEC)” mode. Refer to EC-668, "Diagnostic Procedure" .

Are they within the SP value?

Yes >> GO TO 9.
No >> GO TO 8.



8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-628, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to EC-662, "CONSULT-II Reference Value in Data Monitor" , EC-642, "ECM Terminals and Reference Value" .

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM. (Refer to EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
2. **INSPECTION END**

*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

LEC031A

DTC Inspection Priority Chart

GBS000UW

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0327 P0328 P0332 P0333 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 P0345 Camshaft position sensor (PHASE) ● P0605 ECM ● P1229 Sensor power supply ● P1610 - P1615 NATS ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	● P0550 Power steering pressure sensor ● P1031 P1032 P1051 P1052 Air fuel ratio (A/F) sensor 1 heater ● P1065 ECM power supply ● P1111 P1136 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT) ● P1271 P1272 P1276 P1281 P1282 P1286 Air fuel ratio (A/F) sensor 1 ● P1805 Brake switch
3	● P0011 P0021 Intake valve timing control ● P1121 Electric throttle control actuator ● P1564 ASCD steering switch ● P1572 ASCD brake switch ● P1715 Turbine revolution sensor

Fail-Safe Chart

GBS000UX

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition: Driving condition
		When engine is idling: Normal
		When accelerating: Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

GBS000UY

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-936
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-617
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-929
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-594
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-598
	Incorrect idle speed adjustment						1	1	1	1		1			EC-608
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-769, EC-772
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-608
	Ignition circuit	1	1	2	2	2		2	2			2			EC-964
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-678
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-694
Engine coolant temperature sensor circuit							3			3					EC-701
Air fuel ratio (A/F) sensor					3										EC-810, EC-819, EC-828
Throttle position sensor circuit							2			2					EC-706, EC-713, EC-799, EC-801, EC-883
Accelerator pedal position sensor circuit				3	2	1									EC-803, EC-870, EC-876, EC-891
Knock sensor circuit				2								3			EC-720
Crankshaft position sensor (POS) circuit		2	2												EC-725
Camshaft position sensor (PHASE) circuit		3	2												EC-732
Vehicle speed signal circuit			2	3		3						3			EC-992
Power steering pressure sensor circuit			2					3	3						EC-741
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-746, EC-757

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-761
PNP switch circuit			3		3		3	3			3			EC-858
VIAS control solenoid valve circuit					1									EC-983
Refrigerant pressure sensor circuit		2				3			3		4			EC-977
Electrical load signal circuit							3							EC-915
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-32
ABS actuator and electric unit (control unit)			4											BRC-8

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-5
	Fuel piping			5	5	5		5	5			5			FL-3
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

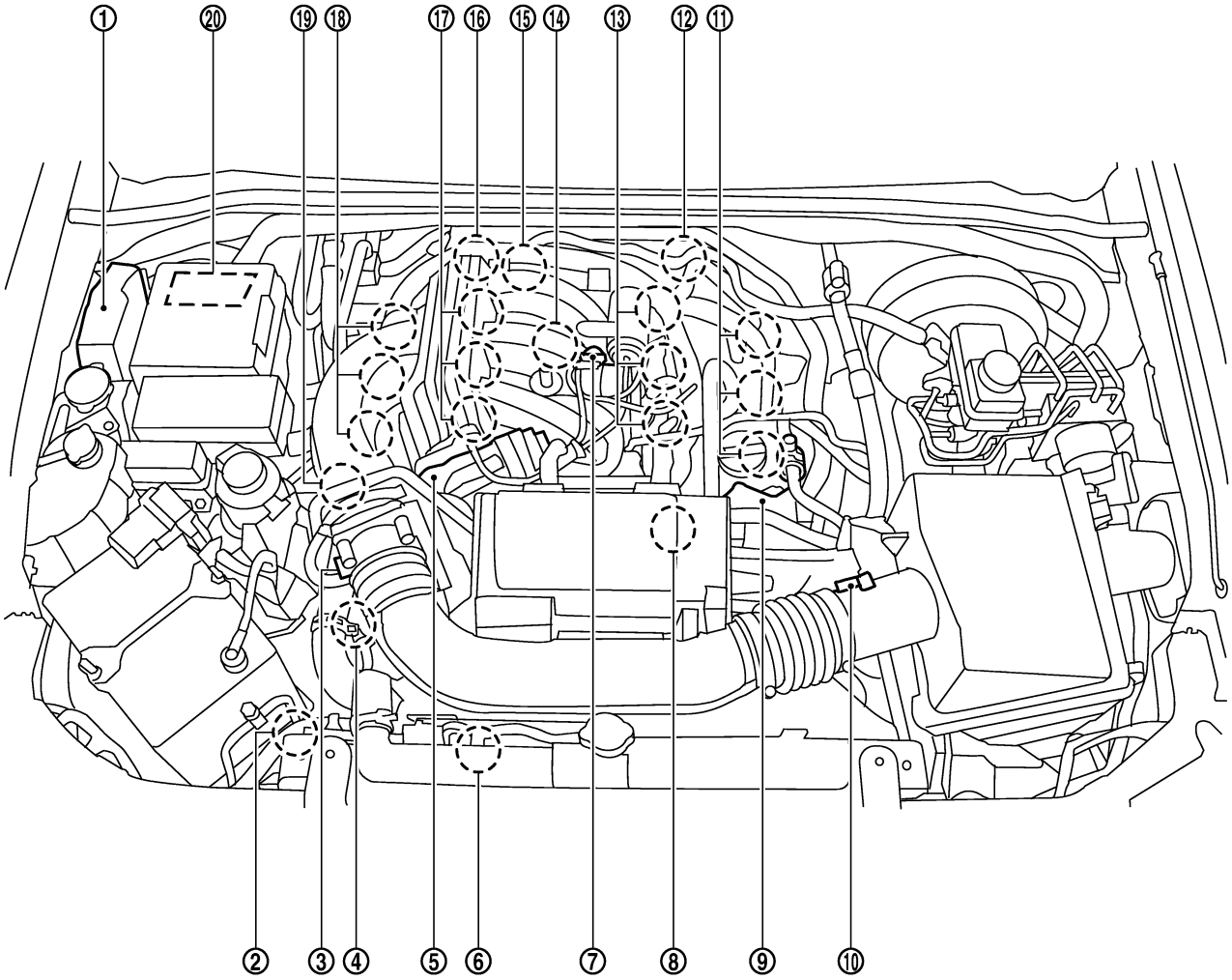
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct		5	5		5		5	5			5			EM-17
	Air cleaner														EM-17
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-17
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														EM-18, EM-21
Cranking	Battery	1	1	1		1		1	1			1		1	SC-5
	Generator circuit														SC-14
	Starter circuit	3													SC-30
	Signal plate	6													EM-107
	PNP switch	4													MT-12, AT-104
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-91
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-107
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-53
	Camshaft														EM-73
	Intake valve timing control														EM-53
	Intake valve												3		EM-91
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-23, EX-2
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-28, LU-13 , LU-10 , LU-11
	Oil level (Low)/Filthy oil														LU-7

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-13
	Thermostat									5					CO-27
	Water pump														CO-23
	Water gallery														CO-29
	Cooling fan									5					CO-21
	Coolant level (Low)/Contaminated coolant									5					CO-10
NATS (Nissan Anti-theft system)		1	1												EC-600 or BL-81

1 - 6: The numbers refer to the order of inspection.

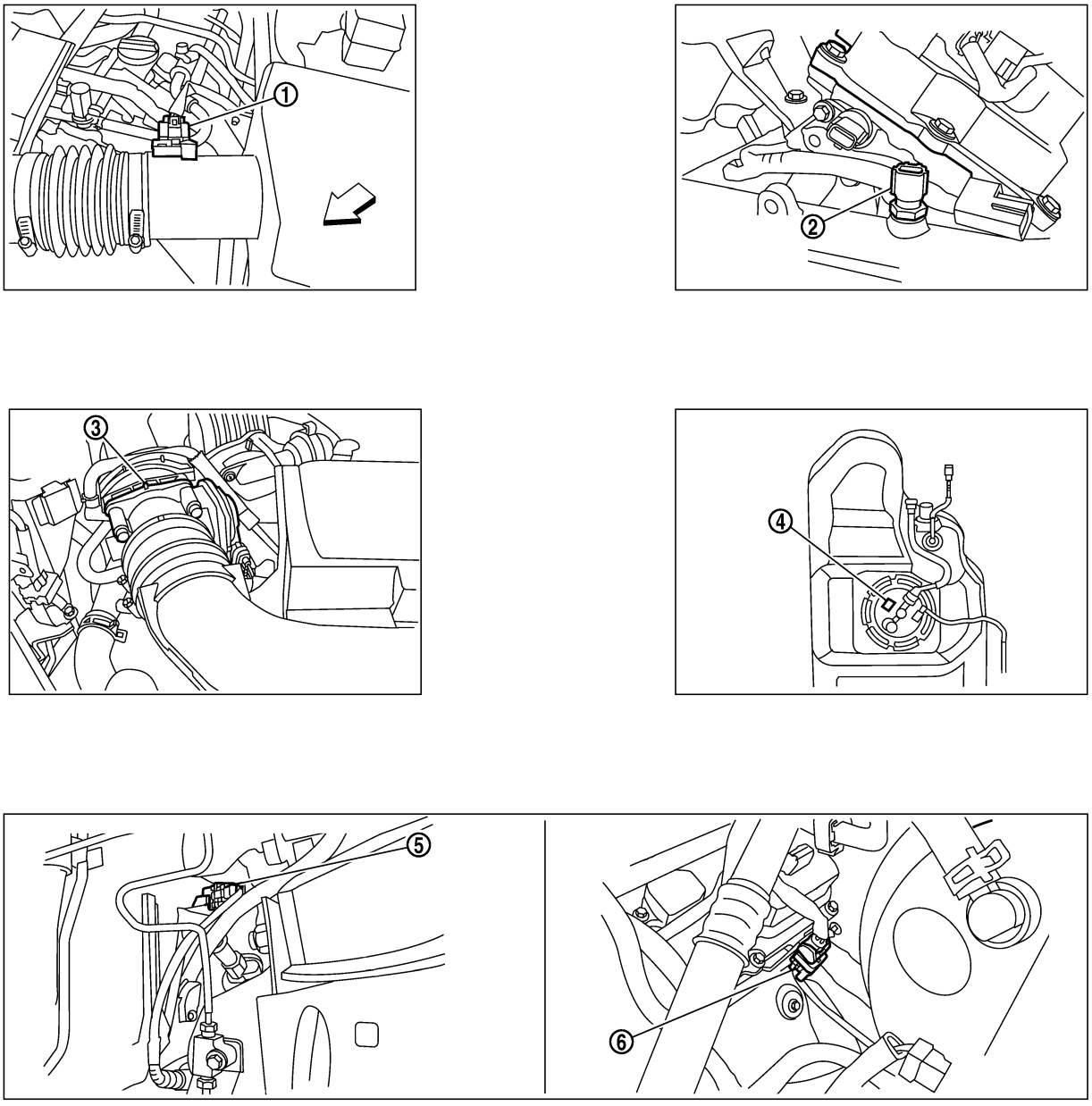
Engine Control Component Parts Location

GBS000UZ



MBIB1270E

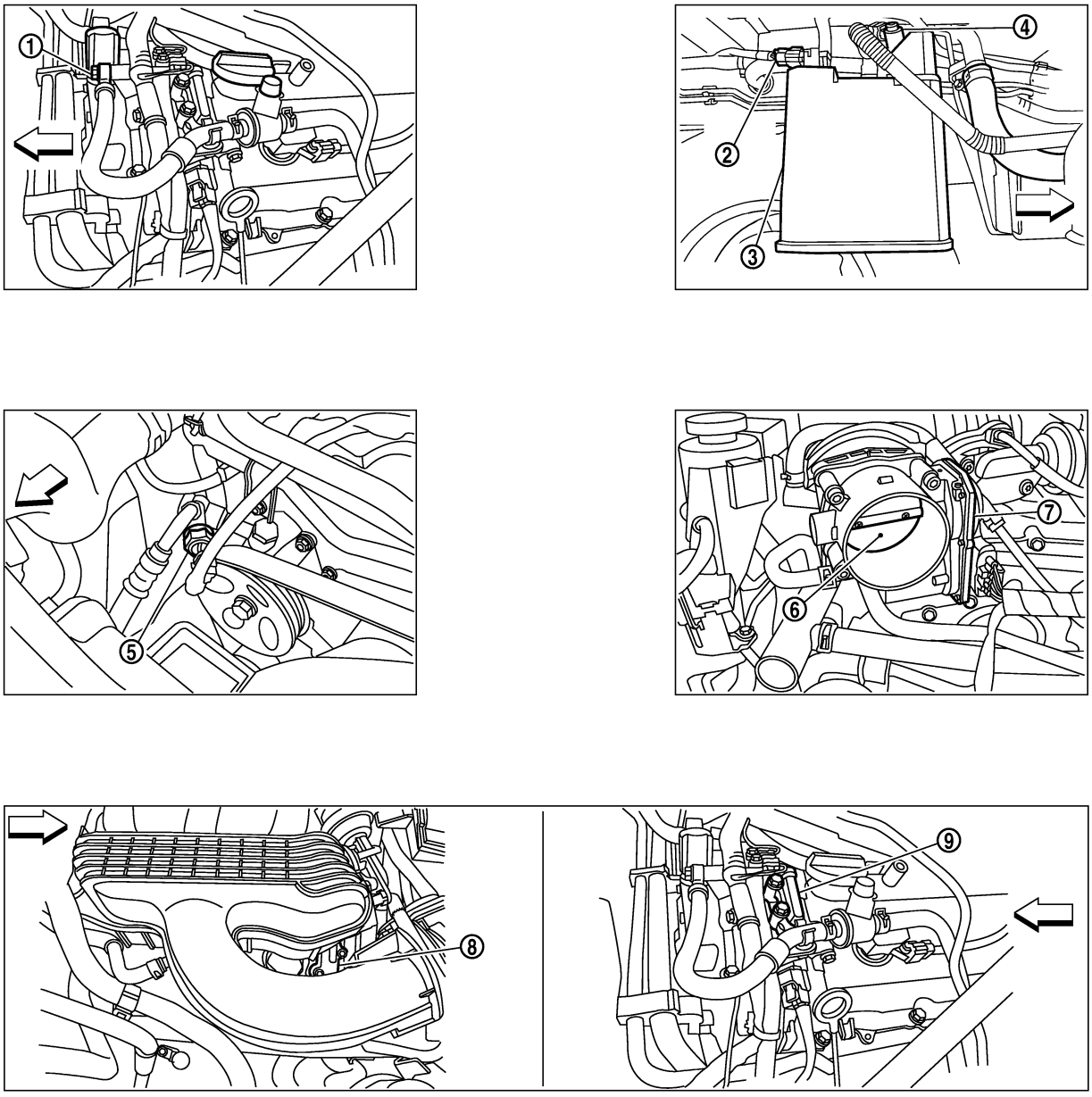
1. ECM
2. Refrigerant pressure sensor
3. Electric throttle control actuator
4. Power steering pressure sensor
5. Power valve actuator
6. Cooling fan motor
7. VIAS control solenoid valve
8. EVAP canister purge volume control solenoid valve
9. Intake valve timing control solenoid valve (bank 2)
10. Mass air flow sensor (with intake air temperature sensor)
11. Ignition coil (with power transistor) and spark plug (bank 2)
12. Camshaft position sensor (PHASE) (bank 2)
13. Fuel injector (bank 2)
14. Knock sensor
15. Camshaft position sensor (PHASE) (bank 1)
16. Engine coolant temperature sensor
17. Fuel injector (bank 1)
18. Ignition coil (with power transistor) and spark plug (bank 1)
19. Intake valve timing control solenoid valve (bank 1)
20. IPDM E/R



MBIB1271E

⇦ : Vehicle front

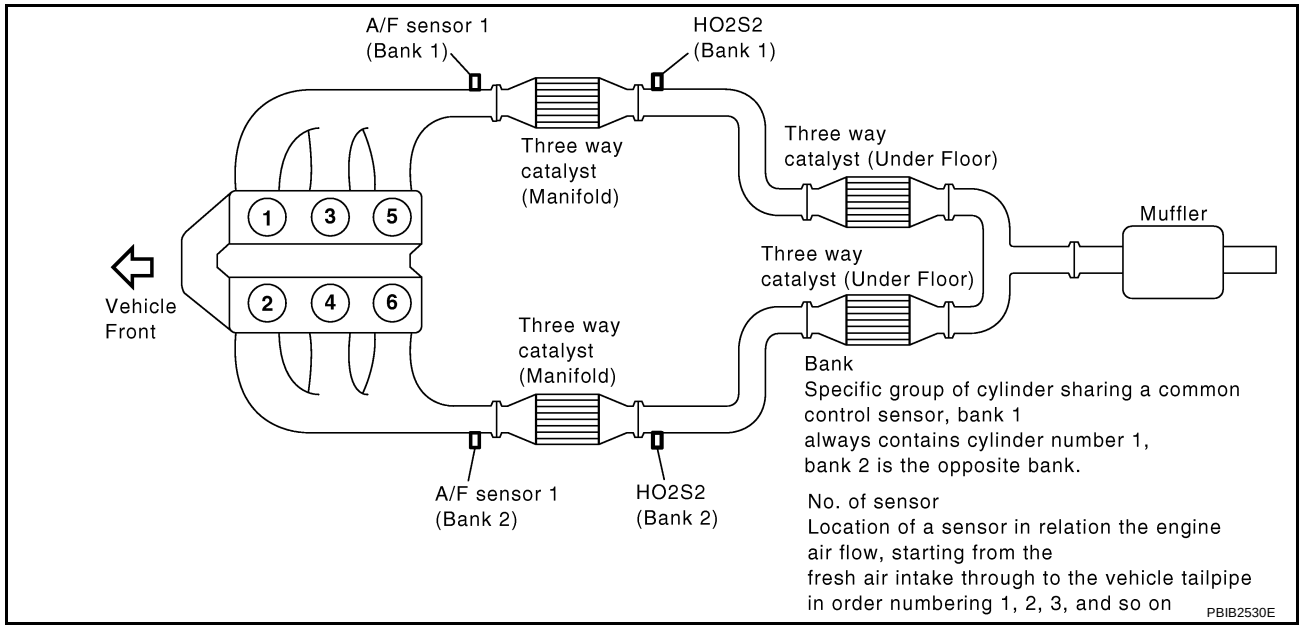
1. Mass air flow sensor
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Fuel level sensor unit and fuel pump harness connector
5. Air fuel ratio (A/F) sensor 1 (bank 1) harness connector
6. Air fuel ratio (A/F) sensor 1 (bank 2) harness connector

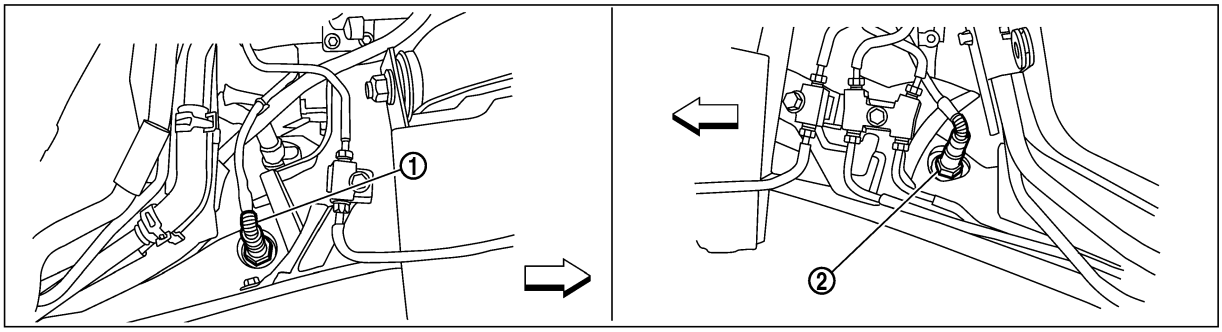


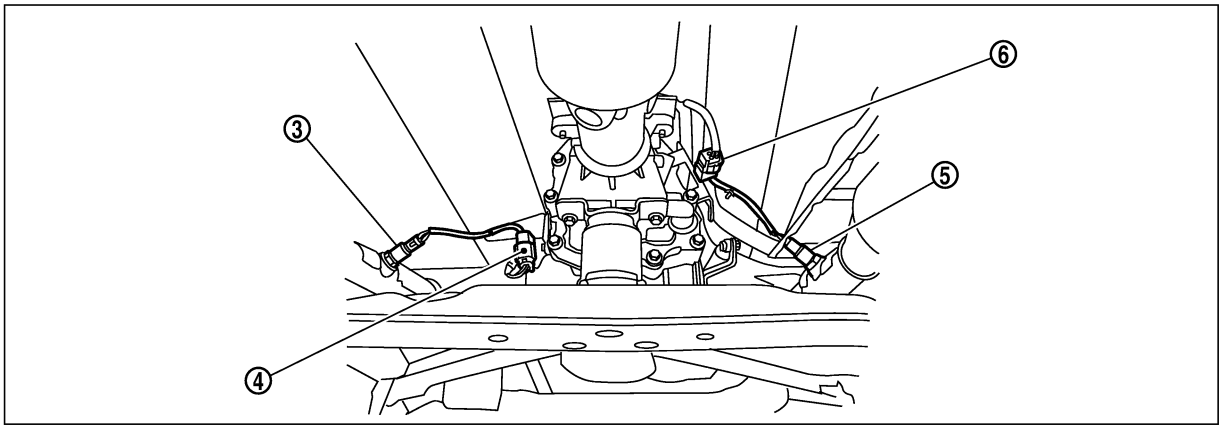
MBIB1409E

⇦ : Vehicle front

1. EVAP canister purge volume control solenoid valve
2. EVAP control system pressure sensor
3. EVAP canister
4. EVAP canister vent control valve
5. Power steering pressure sensor
6. Throttle valve
7. Electric throttle control actuator
8. Intake valve timing control solenoid valve (bank 1)
9. Intake valve timing control solenoid valve (bank 2)



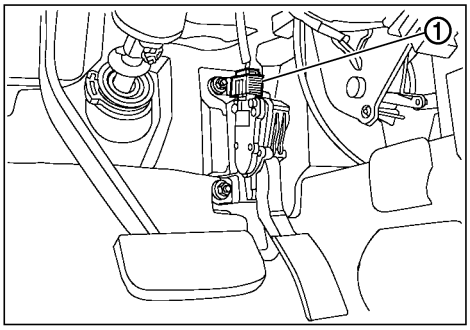


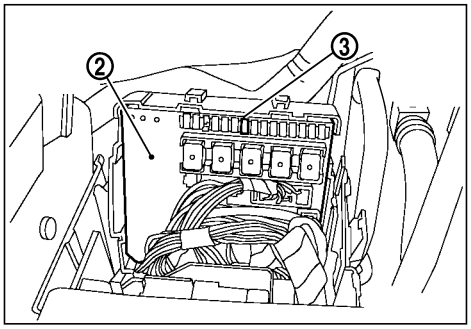


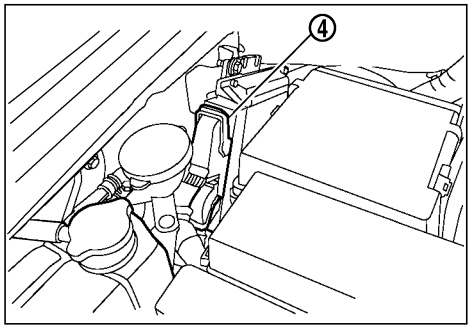
MBIB1273E

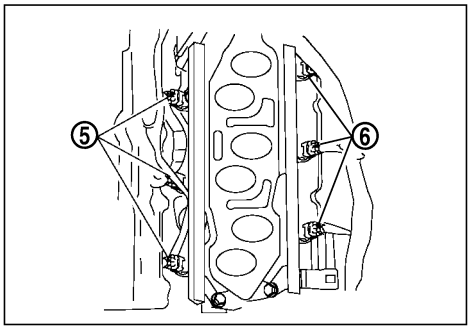
⇦ : Vehicle front

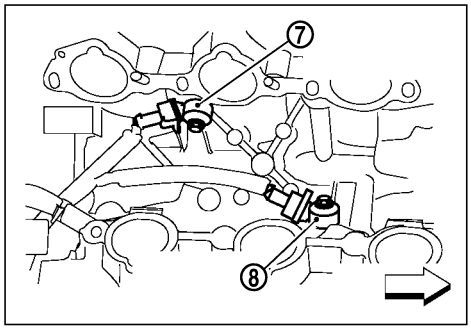
1. Air fuel ratio (A/F) sensor 1 (bank 1)
2. Air fuel ratio (A/F) sensor 1 (bank 2)
3. Heated oxygen sensor 2 (bank 2)
4. Heated oxygen sensor 2 (bank 2) harness connector
5. Heated oxygen sensor 2 (bank 1)
6. Heated oxygen sensor 2 (bank 1) harness connector







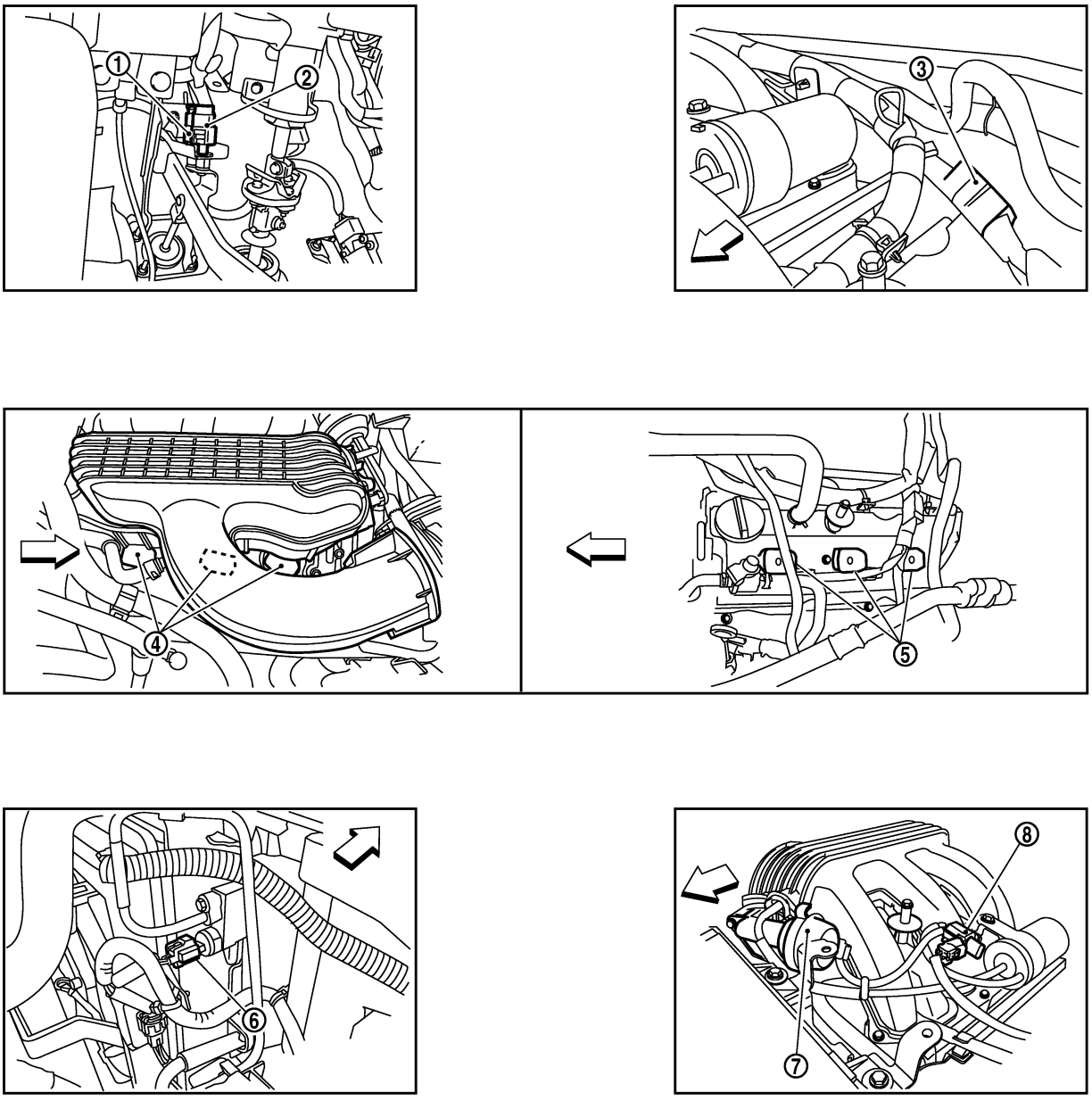




MBIB1274E

⇦ : Vehicle front

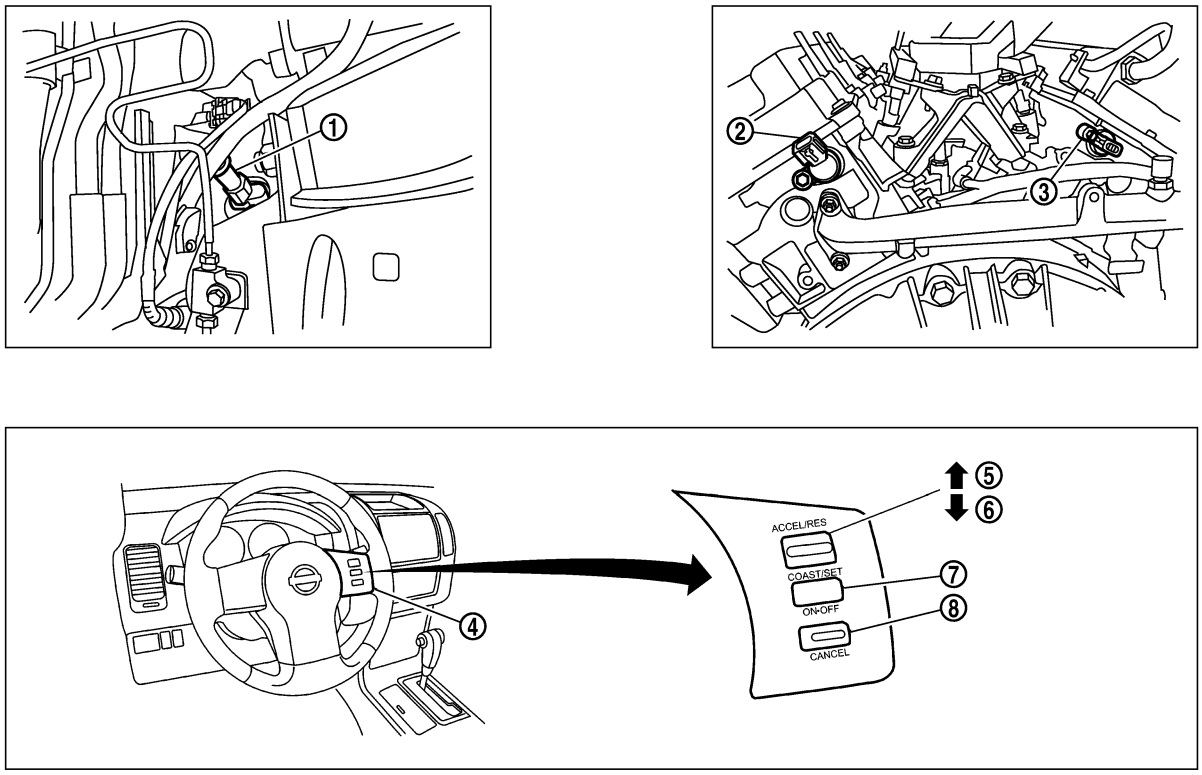
1. Accelerator pedal position sensor harness connector
2. IPDM E/R
3. Fuel pump fuse (15A)
4. ECM harness connectors
5. Fuel injector (bank 1) harness connector
6. Fuel injector (bank 2) harness connector
7. Knock sensor (bank 2)
8. Knock sensor (bank 1)



MBIB1275E

⇦ : Vehicle front

1. ASCD brake switch
2. Stop lamp switch
3. Condenser-1
4. Ignition coil (with power transistor) (bank 1)
5. Ignition coil (with power transistor) (bank 2)
6. Refrigerant pressure sensor harness connector
7. Power valve actuator
8. VIAS control solenoid valve

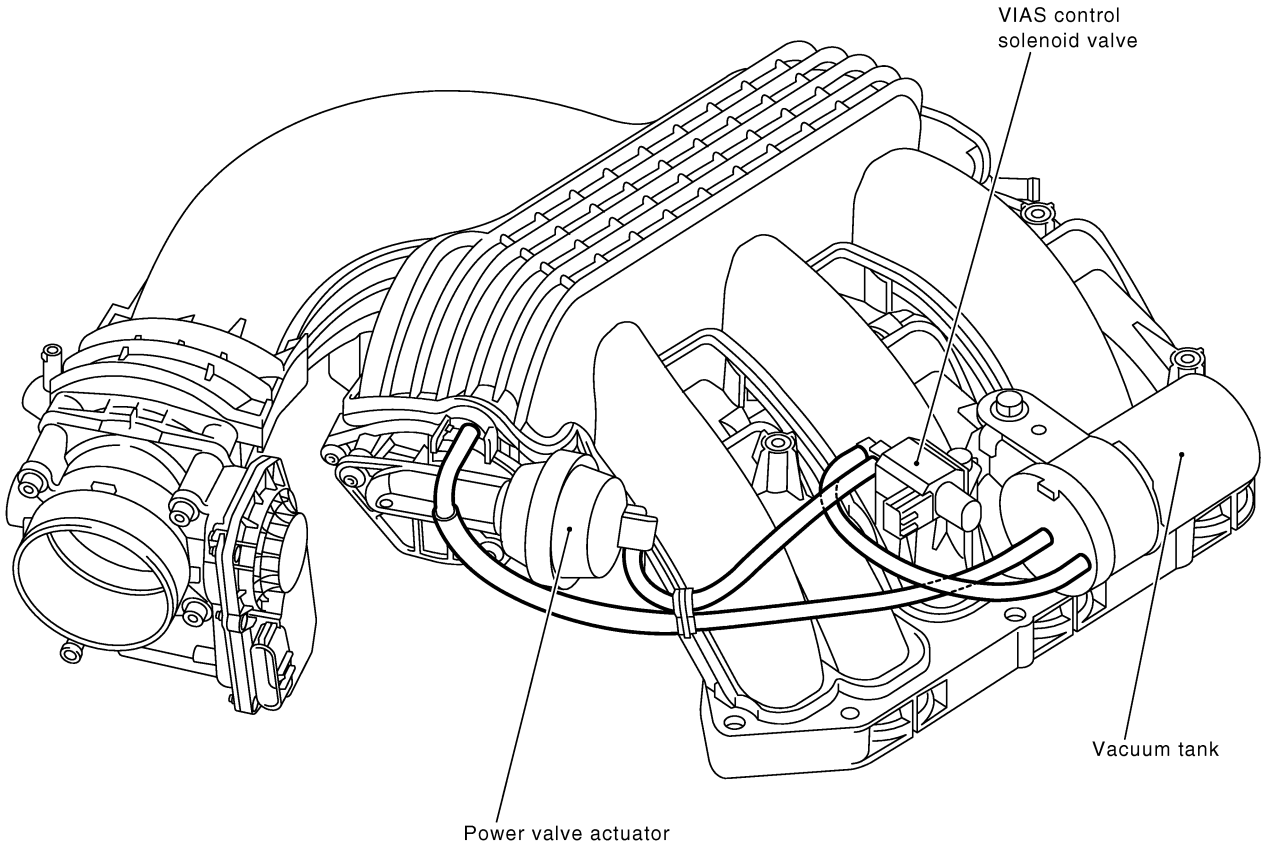


MBIB1276E

1. Crankshaft position sensor (POS)
2. Camshaft position sensor (PHASE) (bank 2)
3. Camshaft position sensor (PHASE) (bank 1)
4. ASCD steering switch
5. RESUME/ACCELERATE switch
6. SET/COAST switch
7. MAIN switch
8. CANCEL switch
9. Cooling fan control motor harness connector
10. Fuel level sensor unit and fuel pump
11. Fuel pressure regulator

Vacuum Hose Drawing

GBS000V0



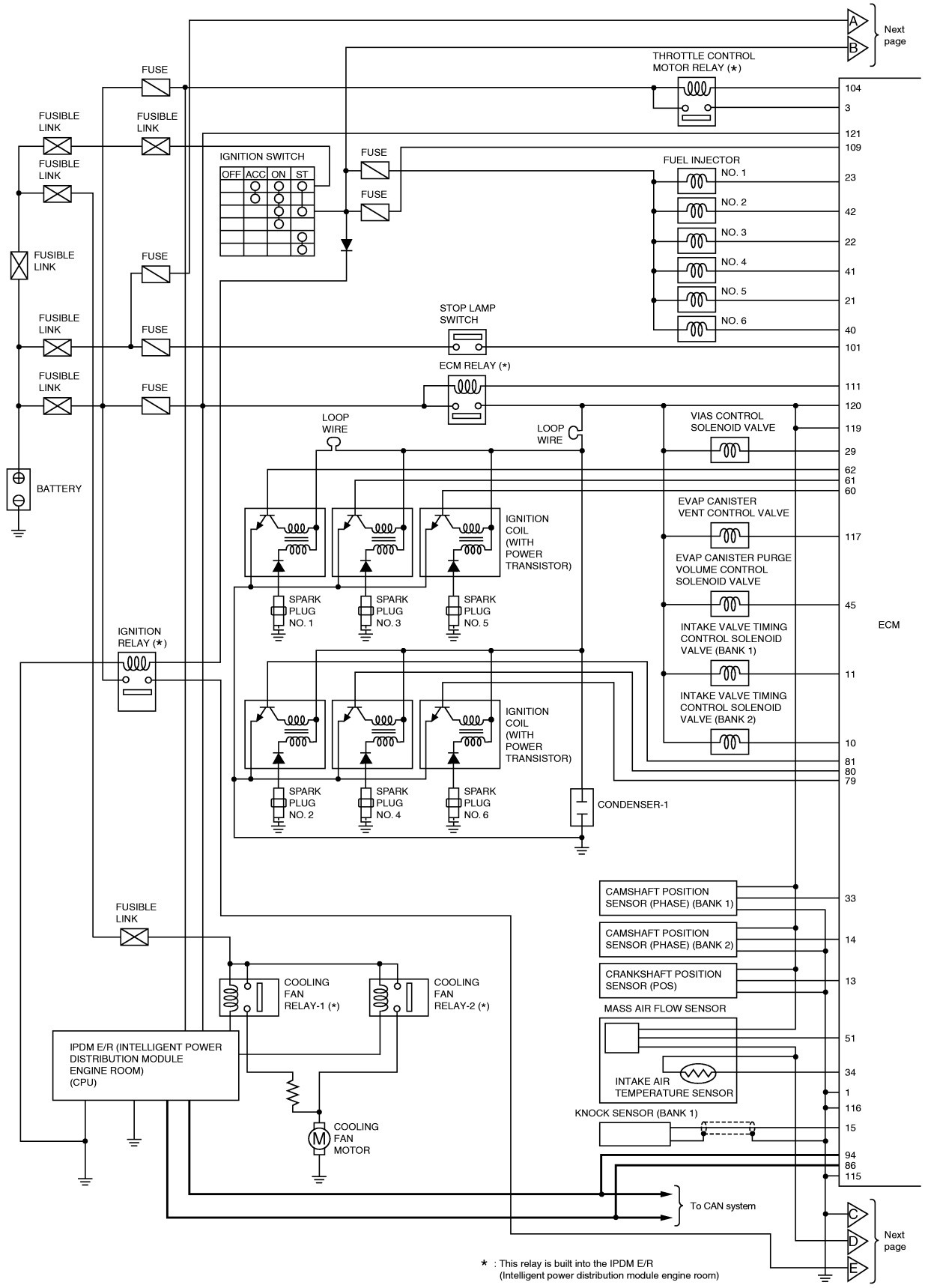
NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB2529E

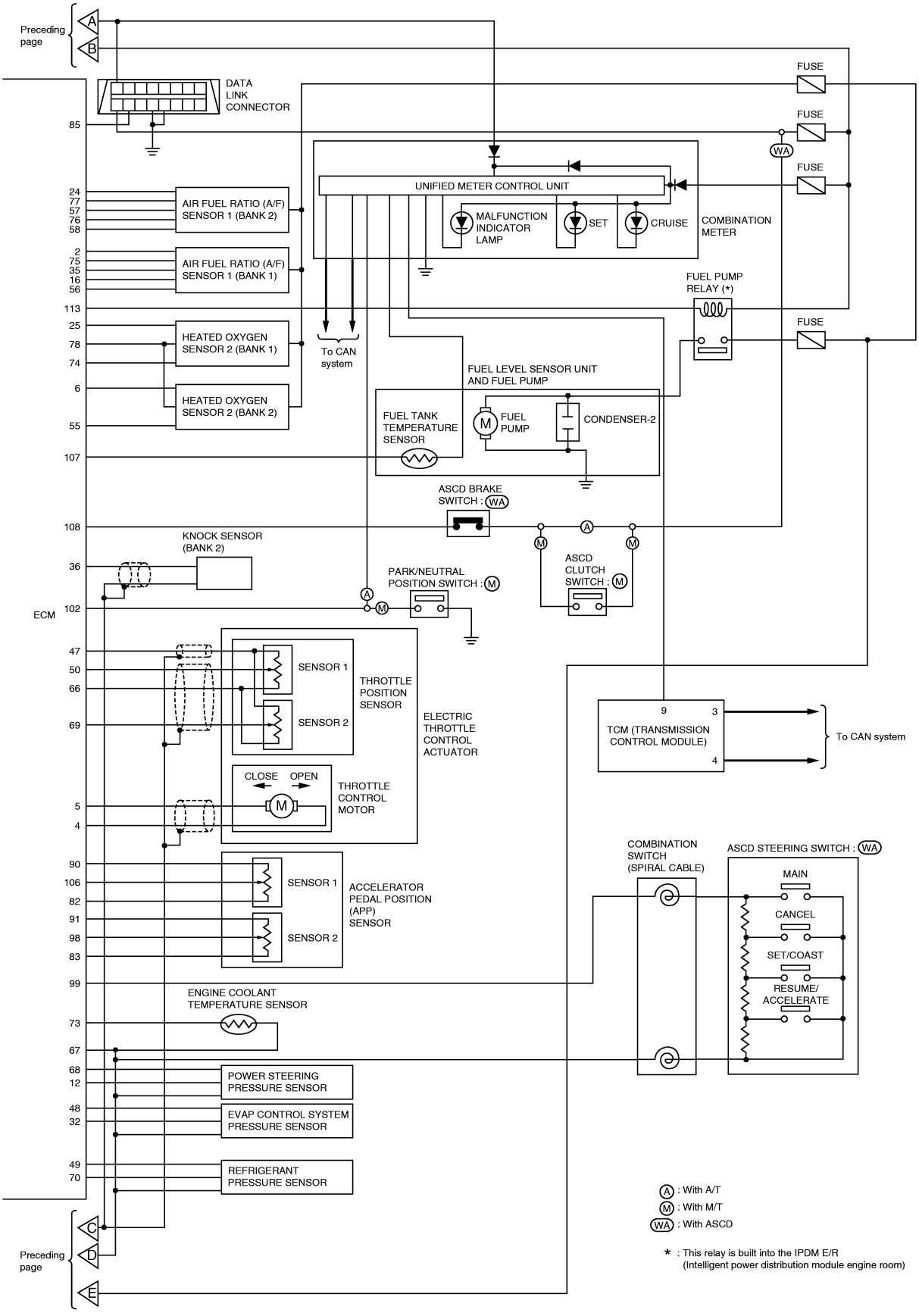
Refer to EC-585, "System Diagram" for Vacuum Control System.

Circuit Diagram

GBS000V1



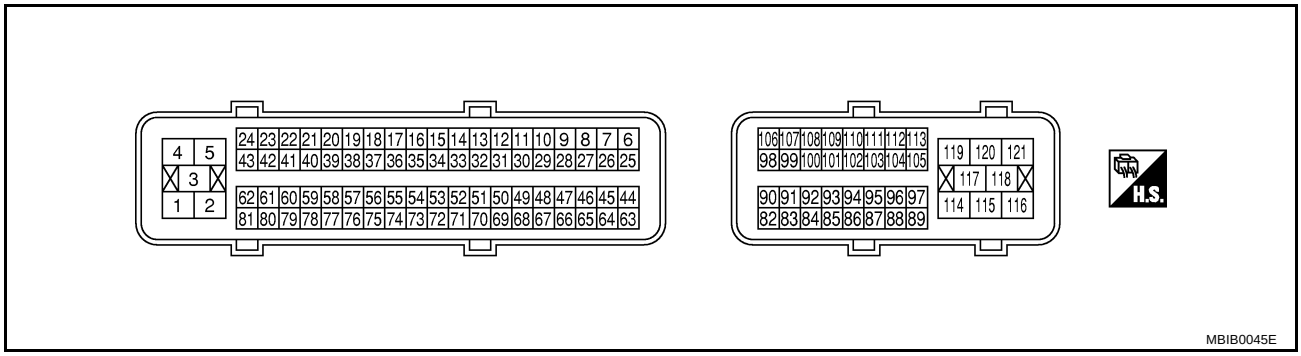
MBWA1272E


Preceding page
A
B
DATA LINK CONNECTOR
85
FUSE
FUSE
FUSE
WA
UNIFIED METER CONTROL UNIT
MALFUNCTION INDICATOR LAMP
SET
CRUISE
COMBINATION METER
24
77
57
76
58
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
2
75
35
16
56
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
FUEL PUMP RELAY (*)
113
25
78
74
HEATED OXYGEN SENSOR 2 (BANK 1)
To CAN system
FUSE
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
6
55
HEATED OXYGEN SENSOR 2 (BANK 2)
FUEL TANK TEMPERATURE SENSOR
M
FUEL PUMP
CONDENSER-2
107
ASCD BRAKE SWITCH : WA
108
KNOCK SENSOR (BANK 2)
A
M
M
ASCD CLUTCH SWITCH : M
36
PARK/NEUTRAL POSITION SWITCH : M
A
M
ECM
102
47
50
66
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
ELECTRIC THROTTLE CONTROL ACTUATOR
69
9
3
TCM (TRANSMISSION CONTROL MODULE)
4
To CAN system
CLOSE
OPEN
M
THROTTLE CONTROL MOTOR
5
4
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH : WA
MAIN
CANCEL
SET/COAST
RESUME/ ACCELERATE
90
106
82
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION (APP) SENSOR
91
98
83
99
ENGINE COOLANT TEMPERATURE SENSOR
73
67
68
12
POWER STEERING PRESSURE SENSOR
48
32
EVAP CONTROL SYSTEM PRESSURE SENSOR
49
70
REFRIGERANT PRESSURE SENSOR
A : With A/T
M : With M/T
WA : With ASCD
* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room)
Preceding page
C
D
E

MBWA1418E

ECM Harness Connector Terminal Layout

GBS000V2

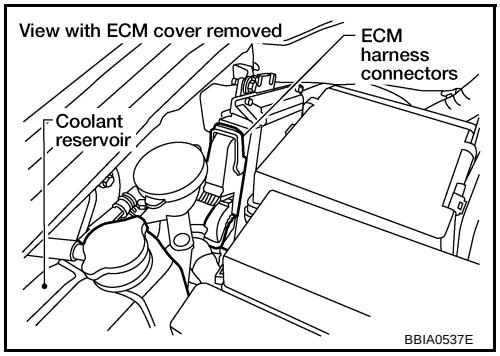


ECM Terminals and Reference Value

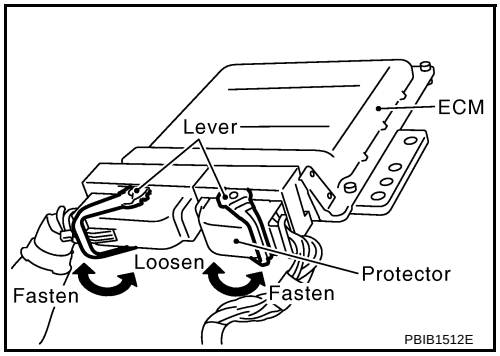
GBS000V3

PREPARATION

1. ECM located in the engine room passenger side behind reservoir tank.
2. Remove ECM harness connector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

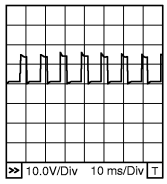


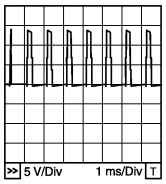
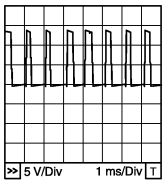
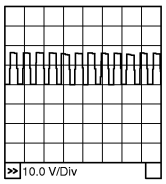
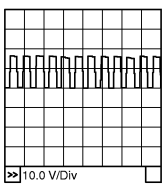
ECM INSPECTION TABLE

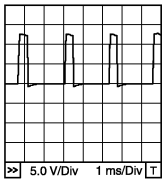
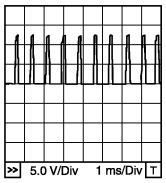
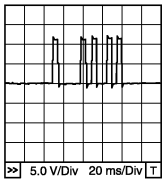
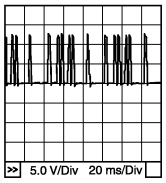
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

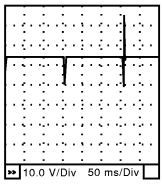
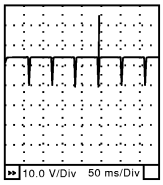
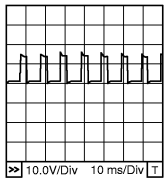
CAUTION:

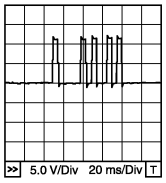
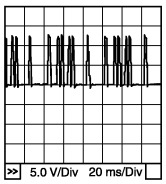
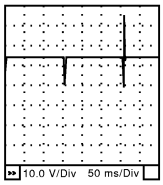
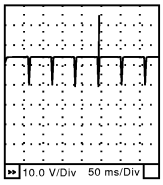
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

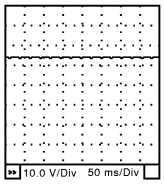
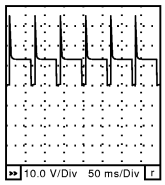
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

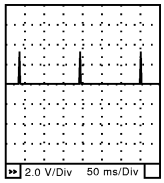
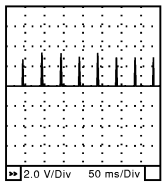
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
10	W	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
11	V	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E

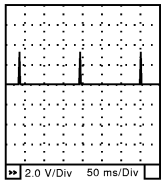
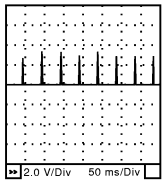
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] ● Steering wheel: Not being turned	0.4 - 0.8V
13	G	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] ● Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
14	Y	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
15	W	Knock sensor (Bank 1)	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
29	GR	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
32	W	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
36	W	Knock sensor (Bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
48	SB	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
51	P	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
70	BR	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
73	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
85	SB	Data link connector	**[Ignition switch: ON]** ● CONSULT-II: Disconnected	Approximately 5V - Battery voltage (11 - 14V)
86	P	CAN communication line	**[Ignition switch: ON]**	Approximately 1.1 - 2.3V Output voltage varies with the communication status.
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch: ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	SB	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G (A/T) O (M/T)	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	BATTERY VOLTAGE (11 - 14V)
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
117	G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	V	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function (ENGINE)

GBS000V4

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE					
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2			
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×	
		Camshaft position sensor (PHASE)		×	×	×	×	
		Mass air flow sensor		×		×	×	
		Engine coolant temperature sensor		×	×	×	×	×
		Air fuel ratio (A/F) sensor 1		×		×	×	
		Heated oxygen sensor 2				×	×	
		Wheel sensor			×	×	×	
		Accelerator pedal position sensor		×		×	×	
		Throttle position sensor		×		×	×	
		Intake air temperature sensor			×	×	×	
		Knock sensor		×				
		Refrigerant pressure sensor				×	×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×	
		Air conditioner switch				×	×	
		Park/neutral position (PNP) switch		×		×	×	
		Stop lamp switch		×		×	×	
		Power steering pressure sensor		×		×	×	
		Battery voltage				×	×	
		Load signal				×	×	
		ASCD steering switch		×		×	×	
		ASCD brake switch		×		×	×	
		ASCD clutch switch		×		×	×	
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×
		Power transistor (Ignition timing)				×	×	×
		Throttle control motor relay		×		×	×	
		Throttle control motor		×				
		Air conditioner relay				×	×	
		Fuel pump relay	×			×	×	×
		Cooling fan relay		×		×	×	×
		Air fuel ratio (A/F) sensor 1 heater		×		×	×	
		Heated oxygen sensor 2 heater				×	×	
		Intake valve timing control solenoid valve		×		×	×	×
		VIAS control solenoid valve				×	×	×

X: Applicable

*1: This item includes 1st trip DTCs.

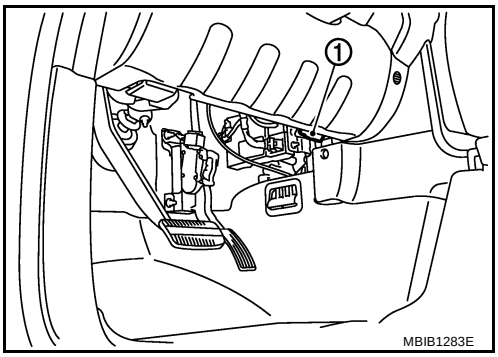
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-654 .

INSPECTION PROCEDURE

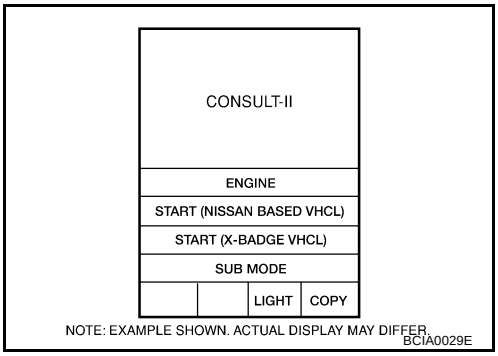
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

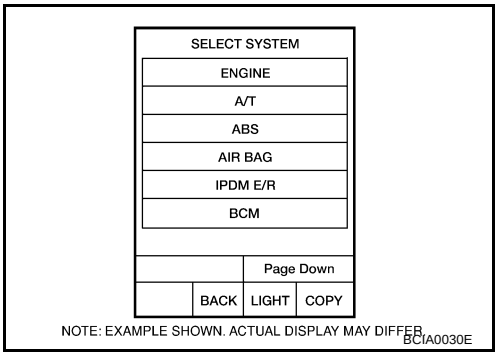
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector (1), which is located under LH dash panel near the hood opener handle.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

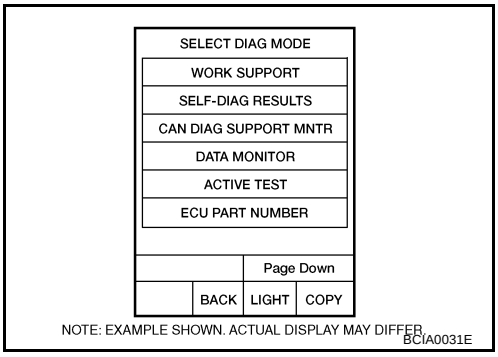


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-47, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	● IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-601, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-575, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2	● One mode in the following is displayed. “Mode2”: Open loop due to detected system malfunction “Mode3”: Open loop due to driving conditions (power enrichment, deceleration enleanment) “Mode4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “Mode5”: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1) [V]	×	×	● The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
A/F SEN1 (B2) [V]	×			
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	×			
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH: Means the amount of oxygen after three way catalyst is relatively small. LEAN: Means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	×			
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL [ON/OFF]	×	×	● Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ● The advance angle becomes larger as the value increases.	
INT/V SOL (B2) [%]				
VIAS S/V [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve is operating. OFF: VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]		×	● The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
I/P PULLY SPD [rpm]			● Indicates the engine speed computed from the turbine revolution sensor signal.	
VEHICLE SPEED [km/h] or [MPH]			● Indicates the vehicle speed computed from the revolution sensor signal.	
IDL A/V LEARN [YET/CMPLT]			● Display the condition of idle air volume learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MIL is activated.	
A/F S1 HTR (B1) [%]			● Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. ● The current flow to the heater becomes larger as the value increases.	
A/F S1 HTR (B2) [%]				
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			● Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW [ON/OFF]			● Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1 [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2 [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
VHCL SPD CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
CRUISE LAMP [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only # is displayed if item is unable to be measured. ● Figures with #s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE
Monitored Item

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%] A/F ALPHA-B2 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● Air fuel ratio (A/F) sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● Cut off each fuel injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN*	● Ignition switch: ON ● Turn the cooling fan HI, LOW and OFF using CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan motor ● IPDM E/R
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VIAS SOL VALVE	● Ignition switch: ON ● Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

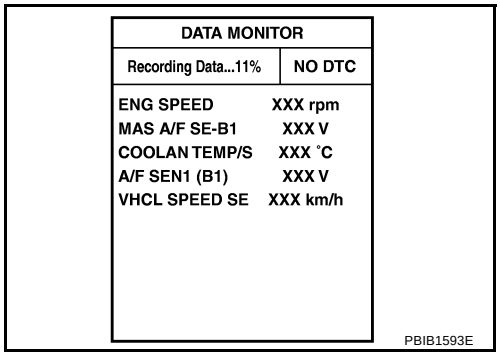
*: Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.

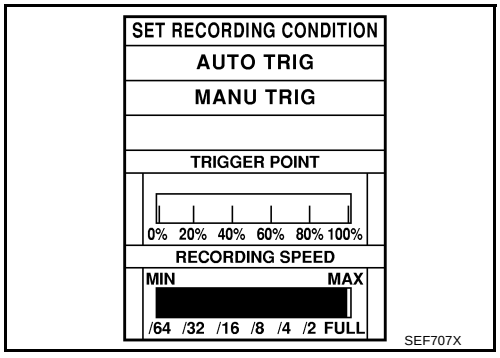
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

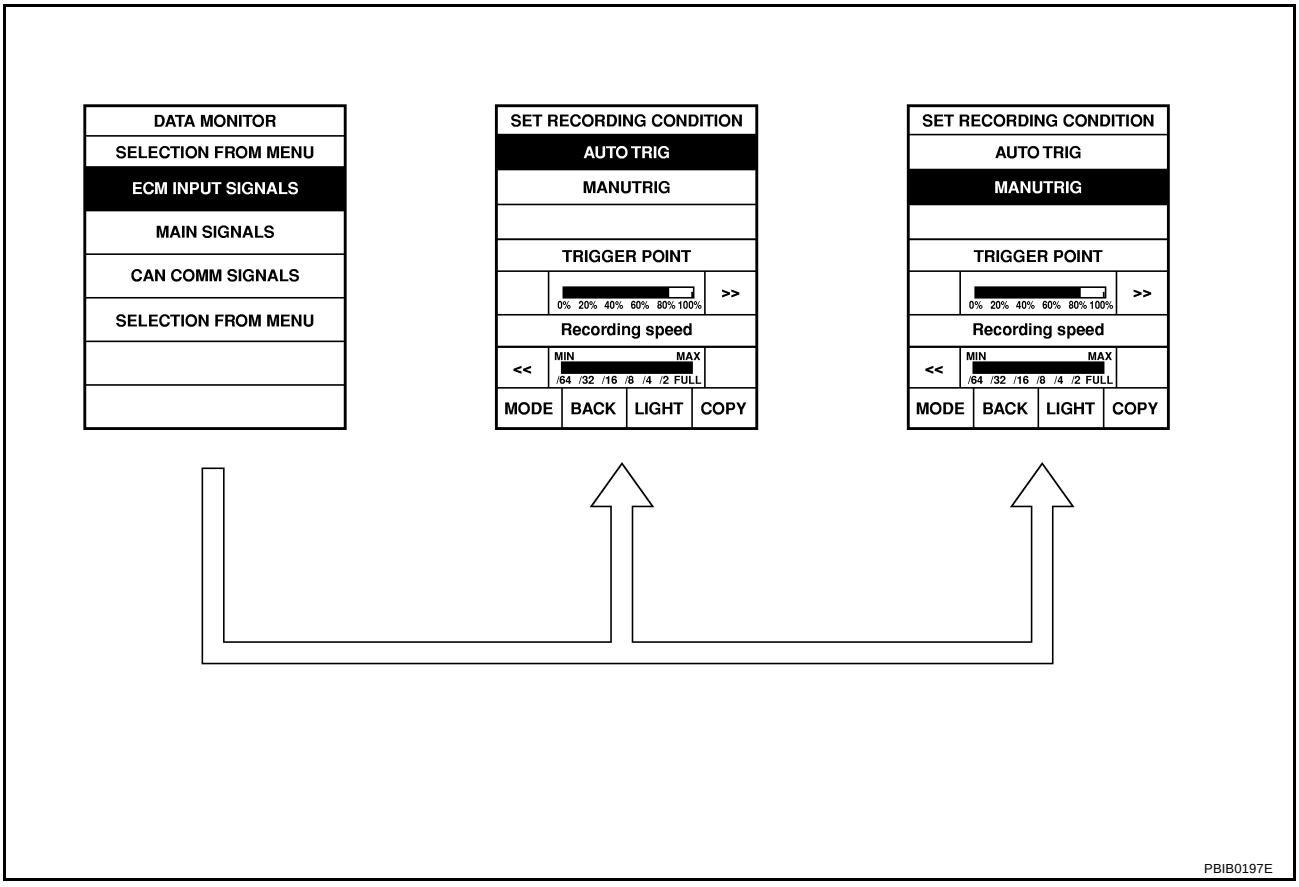
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.
2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.





Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “INCIDENT SIMULATION TESTS” in GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



CONSULT-II Reference Value in Data Monitor

GBS000V5

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	See EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd	ON
		Rear window defogger switch and lighting switch is OFF	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON

MONITOR ITEM	CONDITION		SPECIFICATION
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	13 - 18° BTDC
		2,000 rpm	25 - 45° BTDC
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%
VIAS S/V	● Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	● Engine speed: Above 3,600 rpm		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
I/P PULLY SPD	● Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the speedometer indication
VEHICLE SPEED	● Turn drive wheels and compare the CONSULT-II value with speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1) A/F S1 HTR (B2)	● Engine: After warming up, idle the engine		0 - 100%
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
SET VHCL SPD	● Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	● Ignition switch: ON	MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40km/h (25MPH) and 175km/h (109MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

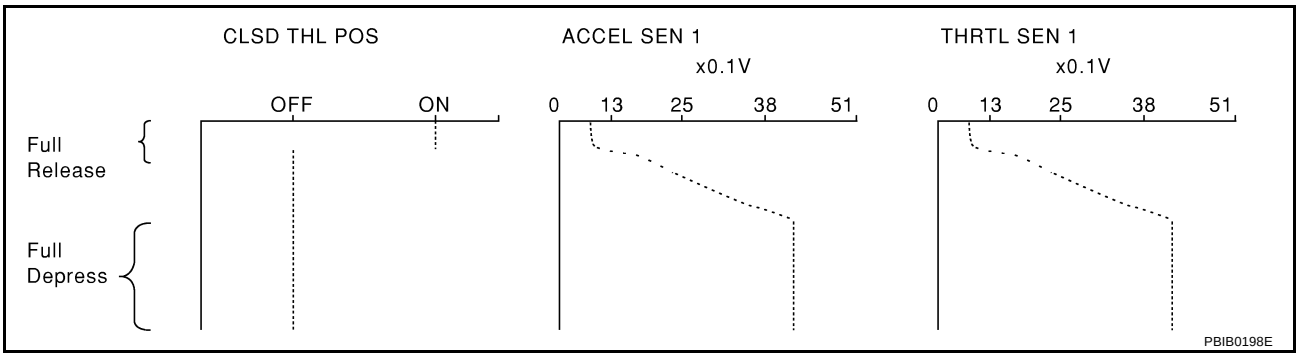
Major Sensor Reference Graph in Data Monitor Mode

GBS000V6

The following are the major sensor reference graphs in “DATA MONITOR” mode.

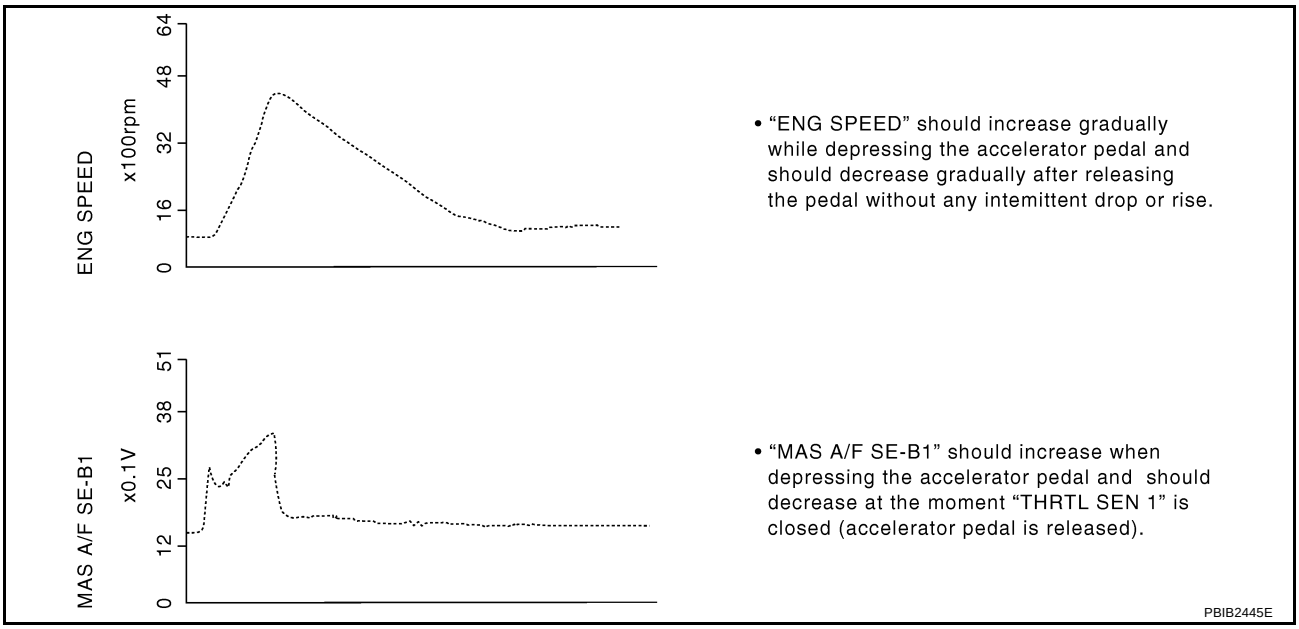
CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

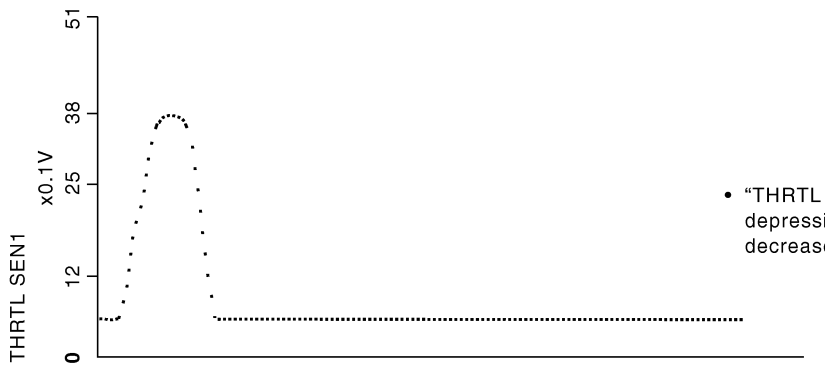
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T), 1st position (M/T).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.



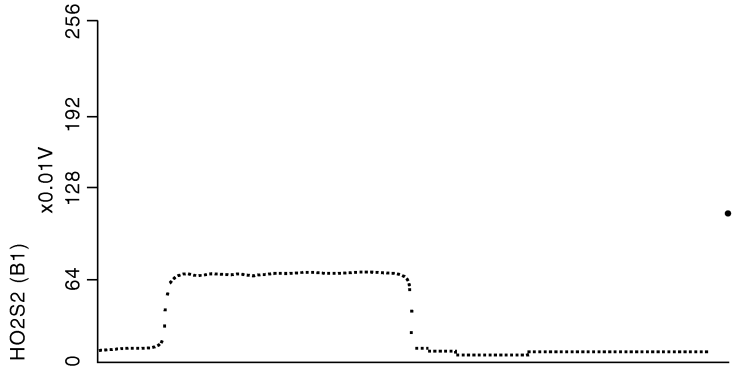
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

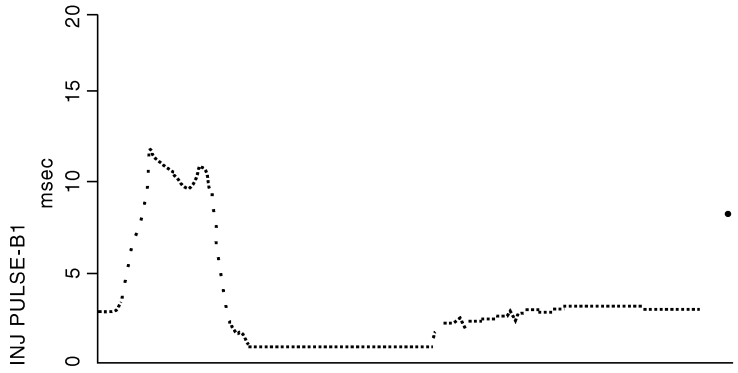




- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB2099E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

GBS000V7

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

GBS000V8

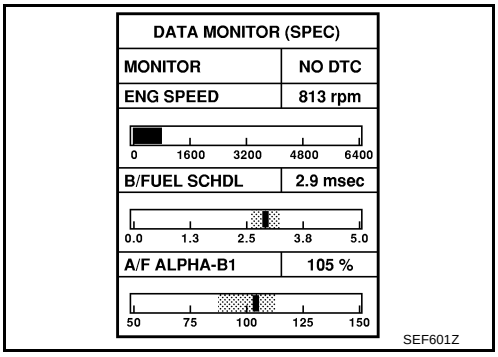
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
  - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

GBS000V9

NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

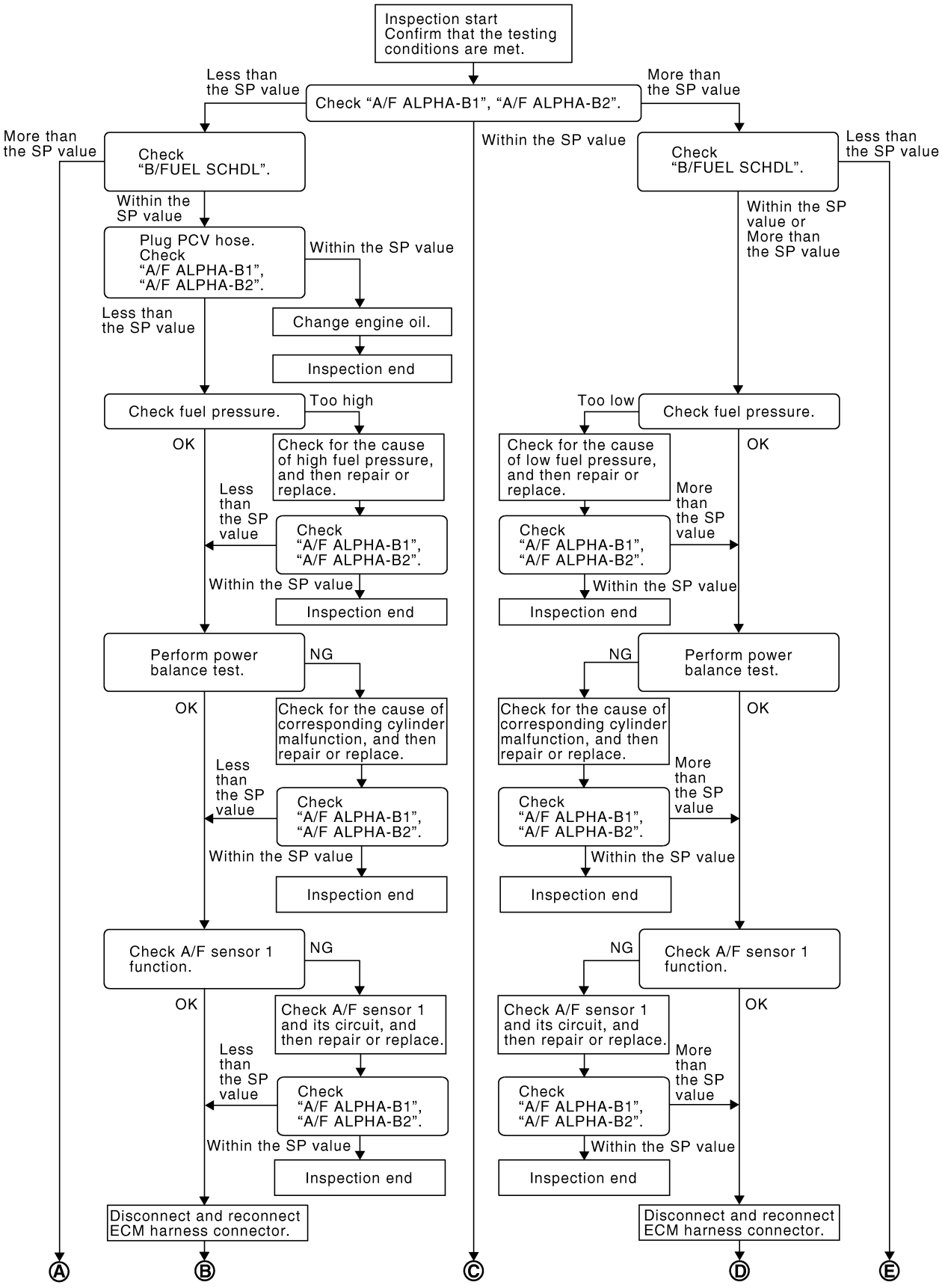
1. Perform EC-608, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-668, "Diagnostic Procedure" .



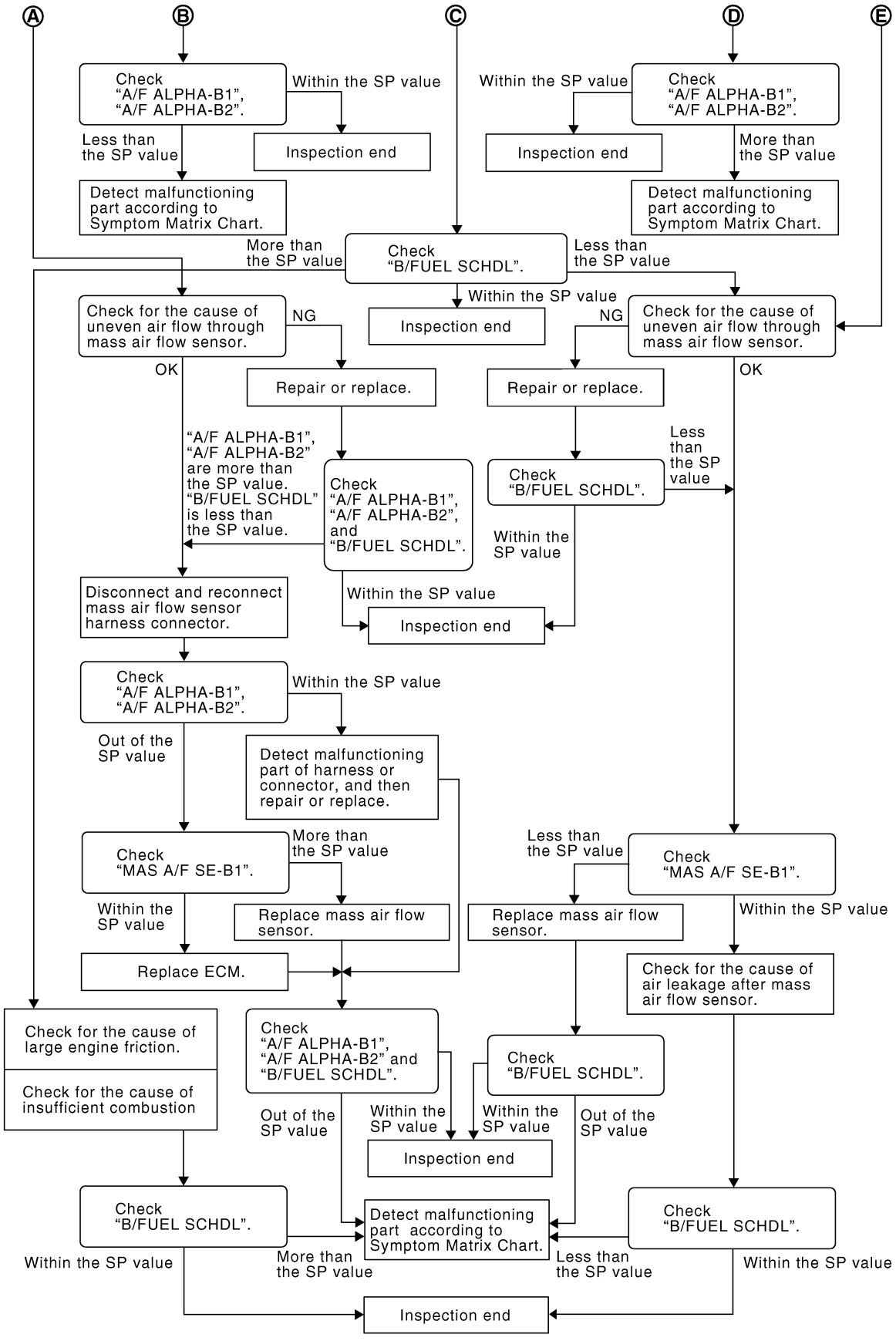
Diagnostic Procedure

GBS000VA

OVERALL SEQUENCE



PBIB2268E


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Less than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1", "A/F ALPHA-B2" are more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL".
Within the SP value
Inspection end
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Within the SP value
Replace mass air flow sensor.
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1", "A/F ALPHA-B2" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Inspection end
Within the SP value
Check "B/FUEL SCHDL".
Out of the SP value
Check "B/FUEL SCHDL".
Within the SP value
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end

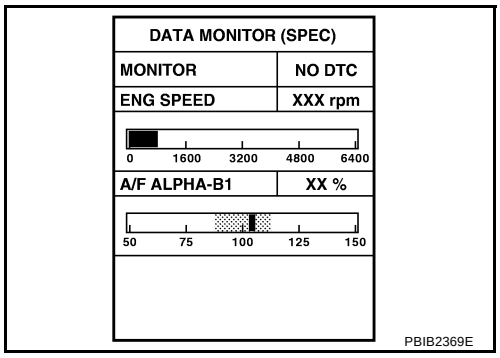
PBIB2548E

DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-667, "Testing Condition" .
3. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

   NOTE:
   Check “A/F ALPHA-B1”, “A/F ALPHA-B2” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

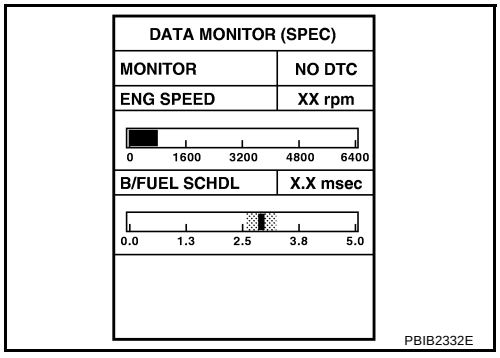


OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

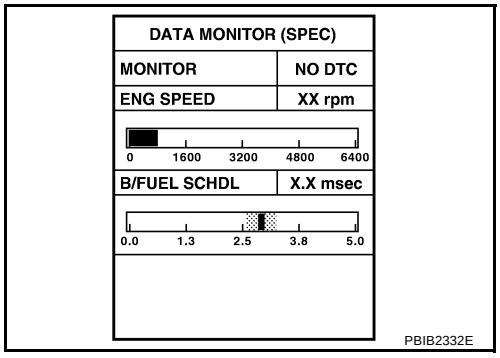


OK or NG

OK >> GO TO 4.
NG (More than the SP value)>>GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.



OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-617, "Fuel Pressure Check" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-617, "Fuel Pressure Check" . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.
- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-936 .)
2. If NG, repair or replace the malfunctioning part. (Refer to EC-617 .)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

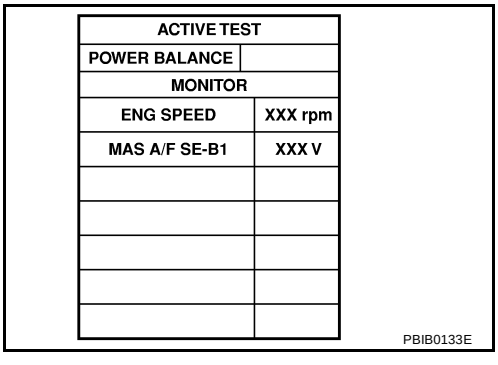
OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.



10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-964 .)
- Fuel injector and its circuit (Refer to EC-929 .)
- Intake air leakage
- Low compression pressure (Refer to EM-91, "CHECKING COMPRESSION PRESSURE" .)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P1271, P1281, refer to EC-810, "DTC Confirmation Procedure" .
- For DTC P1272, P1282, refer to EC-819, "DTC Confirmation Procedure" .
- For DTC P1276, P1286, refer to EC-828, "Overall Function Check" .

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

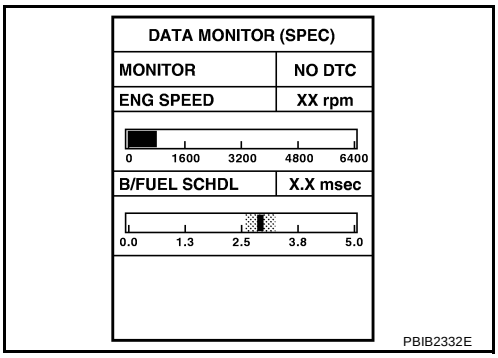
OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-628, "Symptom Matrix Chart" .

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.



18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.

2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1”, “A/F ALPHA-B2” are less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-694 .
2. GO TO 29.

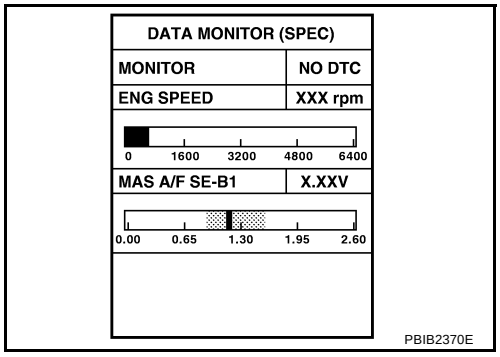
NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.
NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-614, "Accelerator Pedal Released Position Learning" .
4. Perform EC-614, "Throttle Valve Closed Position Learning" .
5. Perform EC-614, "Idle Air Volume Learning" .

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

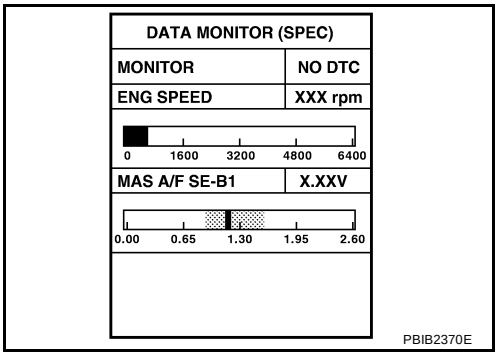
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-628, "Symptom Matrix Chart" .

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-628, "Symptom Matrix Chart" .

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

GBS000VB

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

GBS000VC

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-604, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-685, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" , "INCIDENT SIMULATION TESTS".

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

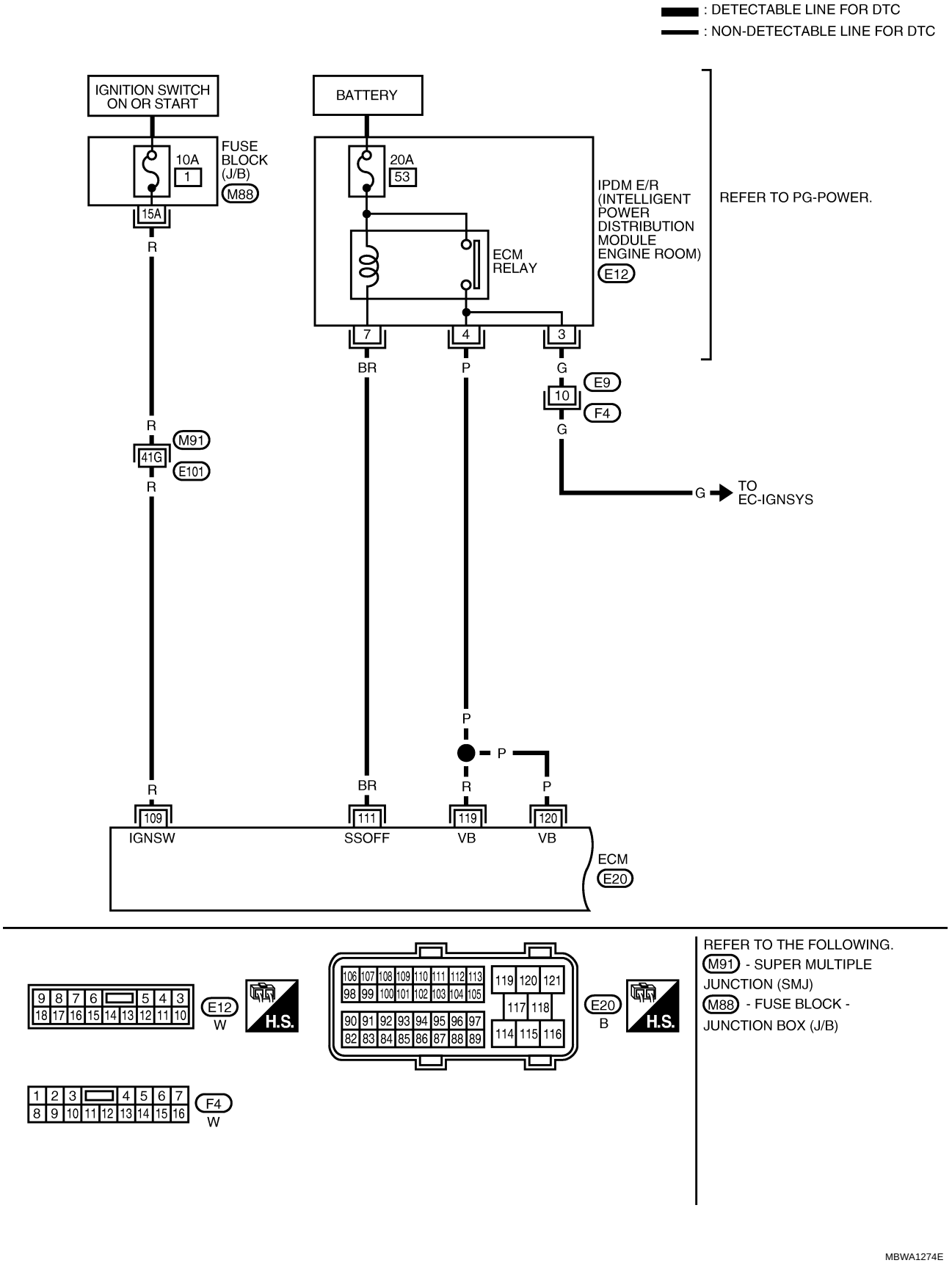
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

GBS000VD

EC-MAIN-01



MBWA1274E

Specification data are reference values and are measured between each terminal and ground.

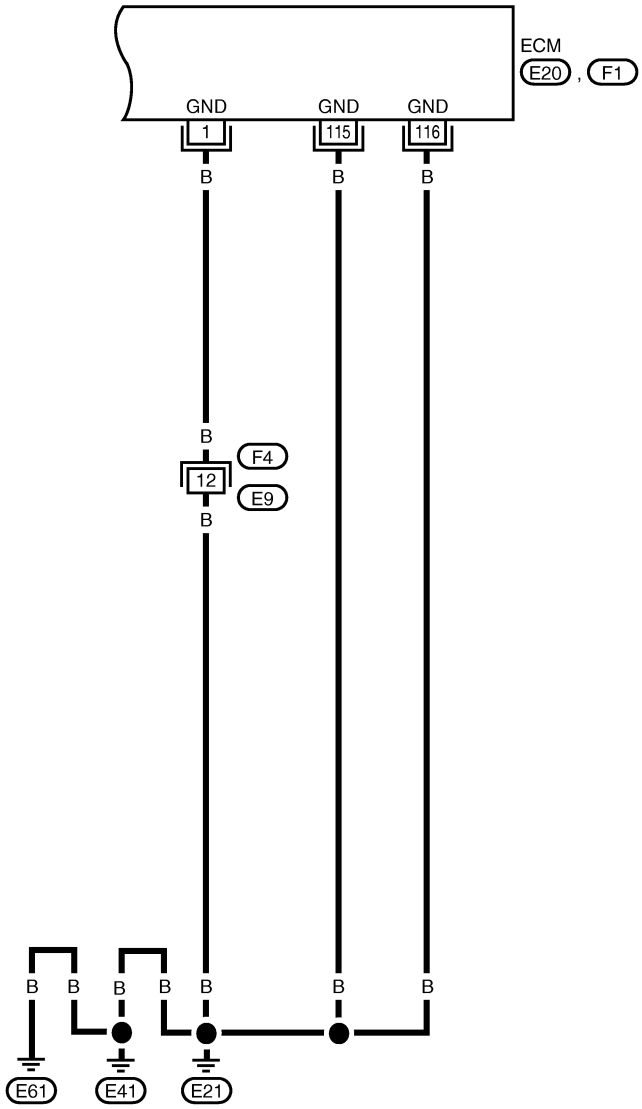
CAUTION:

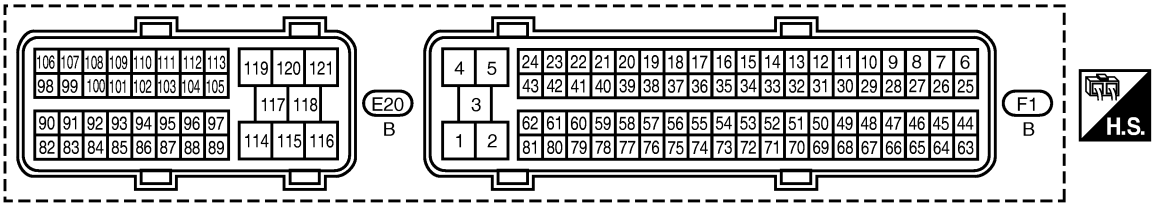
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

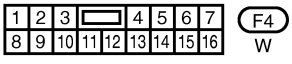
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-MAIN-02

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







MBWA1275E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground

Diagnostic Procedure

GBS000VE

1. INSPECTION START

Start engine.
Is engine running?

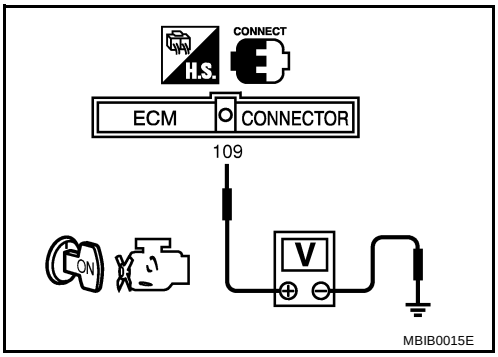
Yes or No

Yes >> GO TO 8.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

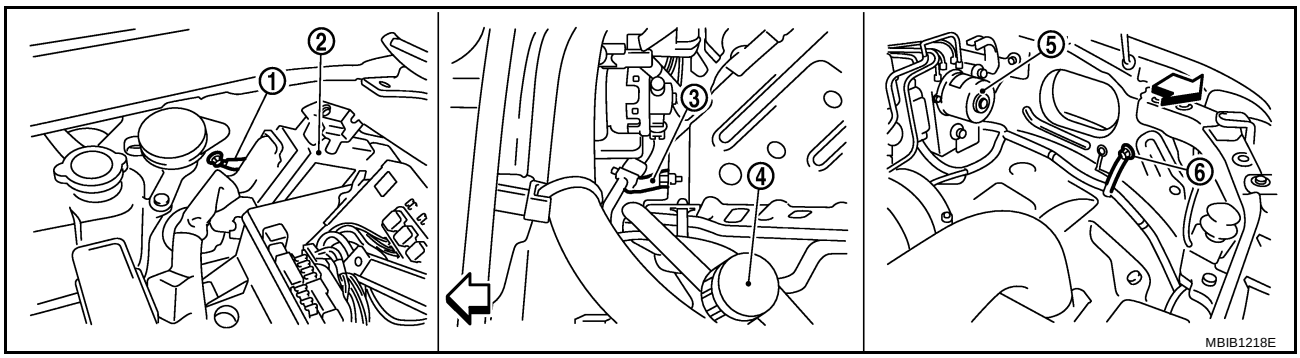
Check the following.

- Harness connectors M91, E101
- Fuse block (J/B) connector M88
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

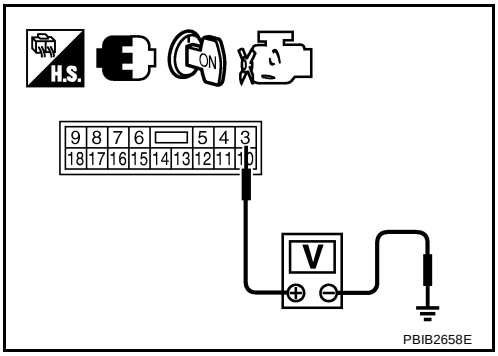
- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R connector E12 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



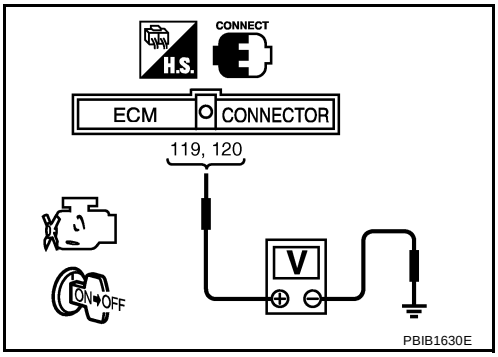
OK or NG

OK >> Go to EC-964, "IGNITION SIGNAL" .
NG >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.



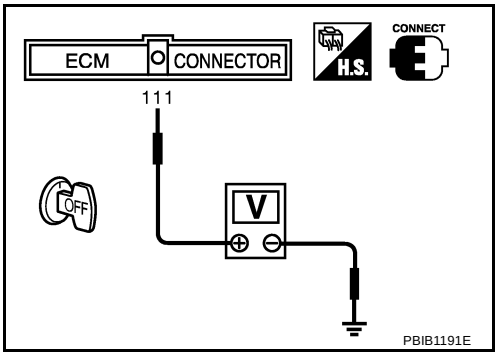
OK or NG

OK >> GO TO 13.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

Check voltage between ECM terminal 111 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 7.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

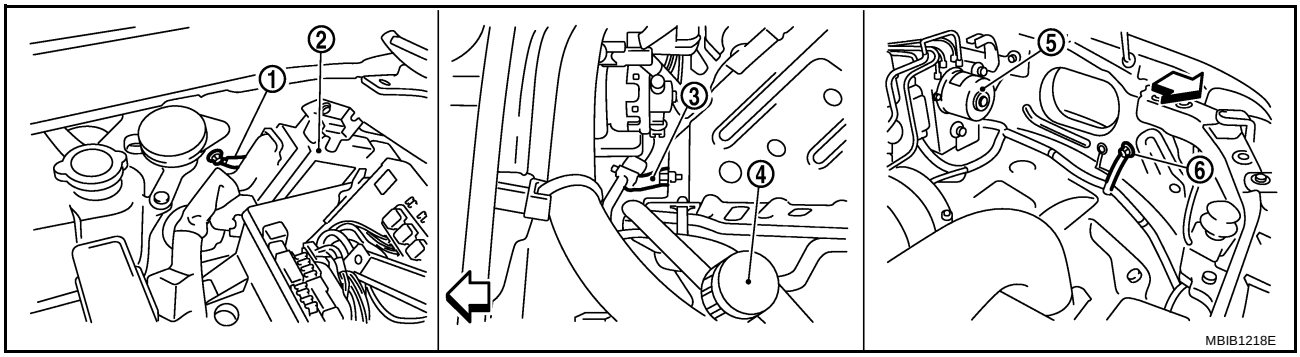
1. Disconnect 20 A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 16.
NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 14.
NG >> Repair or replace ground connections.

14. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

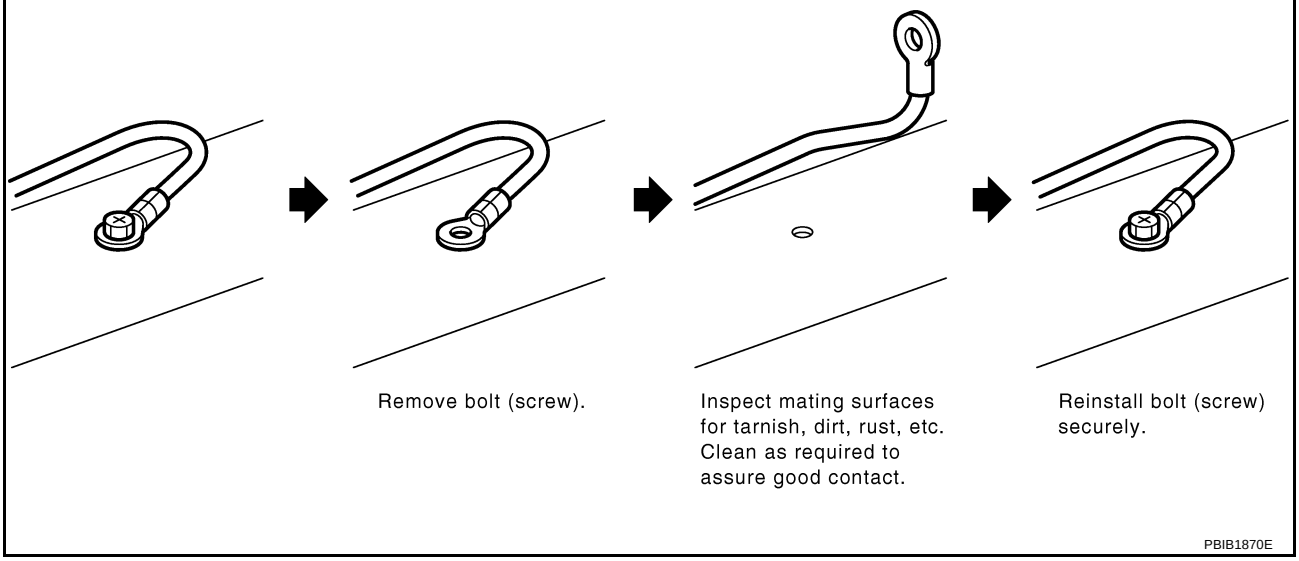
GBS000VF

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-27, "Ground Distribution" .

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

GBS000VG

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

GBS000VH

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000 U1001 1001	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

DTC Confirmation Procedure

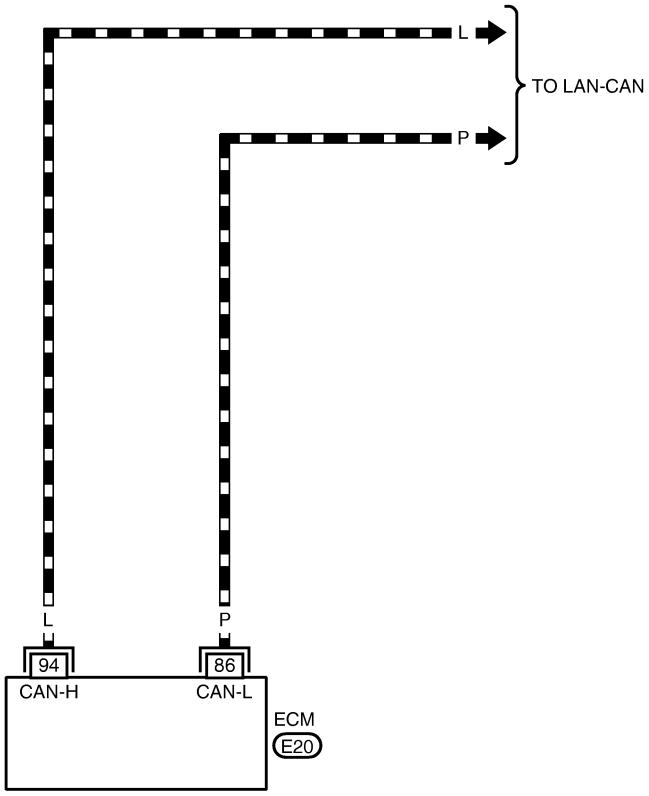
GBS000VI

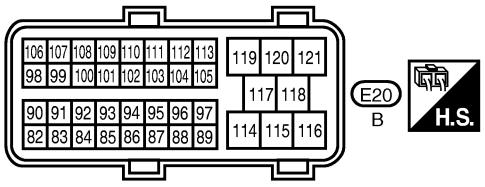
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-688, "Diagnostic Procedure" .

Wiring Diagram

GBS000VJ

EC-CAN-01





MBWA1276E

Diagnostic Procedure

GBS000VK

Go to LAN-3, "Precautions When Using CONSULT-II" .

DTC P0011, P0021 IVT CONTROL

PFP:23796

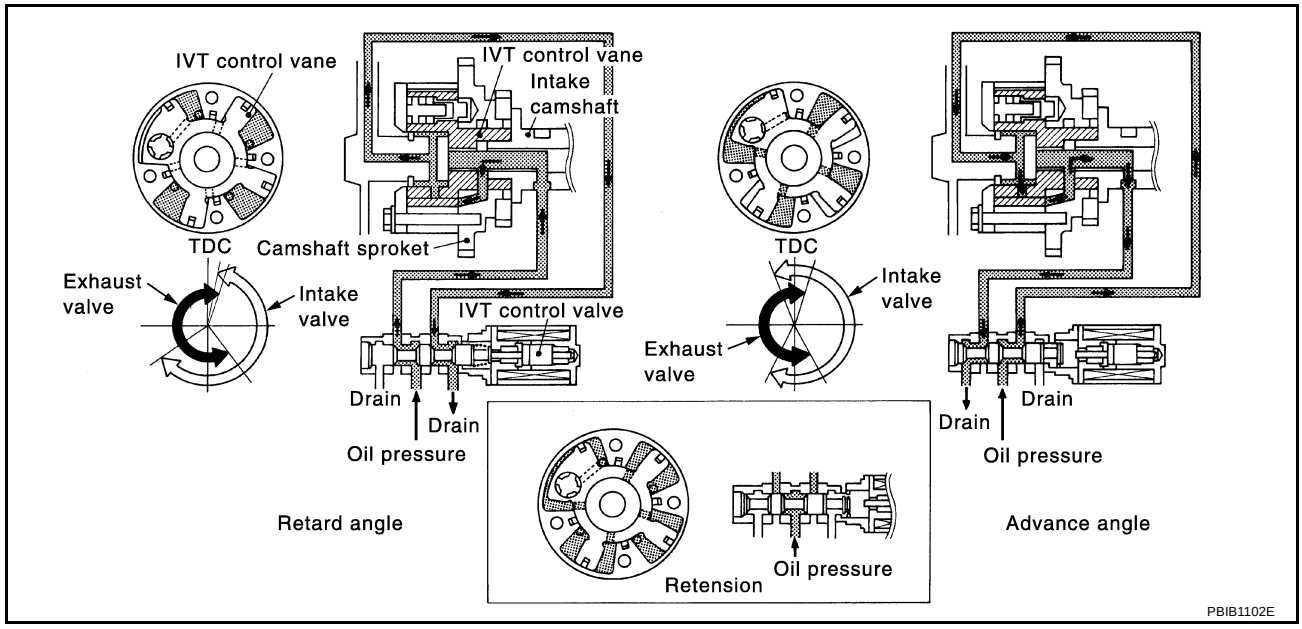
Description

GBS000VL

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

GBS000VM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	–5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

GBS000VN

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011 (Bank 1)	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Intake valve timing control solenoid valve ● Accumulation of debris to the signal pick-up portion of the camshaft ● Timing chain installation ● Foreign matter caught in the oil groove for intake valve timing control
P0021 0021 (Bank 2)			

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function.

DTC Confirmation Procedure

GBS000VO

CAUTION:
Always drive at a safe speed.

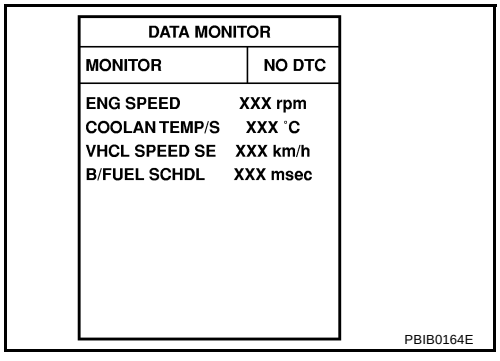
NOTE:

- **If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to EC-761 .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.



ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go toEC-691, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)

Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If the 1st trip DTC is detected, go to EC-691, "Diagnostic Procedure" .

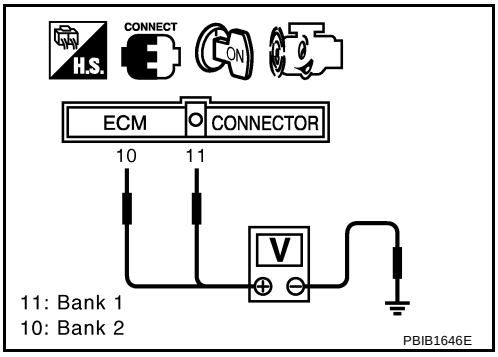
Overall Function Check

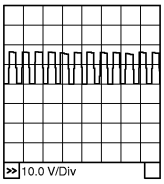
GBS000VP

Use this procedure to check the overall function of the intake valve timing control system. 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. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Set the tester probe between ECM terminal 11 [IVT control solenoid valve (bank 1) signal] or 10 [IVT control solenoid valve (bank 2) signal] and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.



Conditions	Voltage
At idle	BATTERY VOLTAGE (11 - 14V)
2,500 rpm	7V - 12V ★  PBIB1790E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

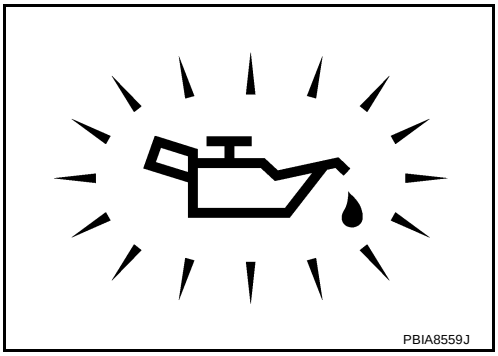
7. If NG, go to EC-691, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000VQ

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



OK or NG

OK >> GO TO 2.
KG >> Go to LU-7, "ENGINE OIL PRESSURE CHECK" .

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-692, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-731, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-740, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace camshaft position sensor (PHASE).

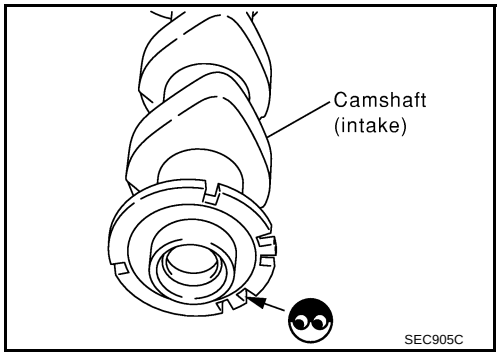
5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 6.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.
Are there any service records that may cause timing chain misaligned?

Yes or No

Yes >> Check timing chain installation. Refer to EM-53, "TIMING CHAIN" .
No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-82, "Inspection of Camshaft Sprocket (INT) Oil Groove" .

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-727 for CKP sensor (POS) and EC-734 for CMP sensor (PHASE).

>> **INSPECTION END**

Component Inspection

GBS000VR

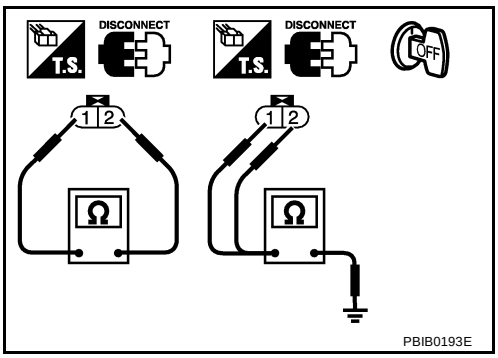
INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.

2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

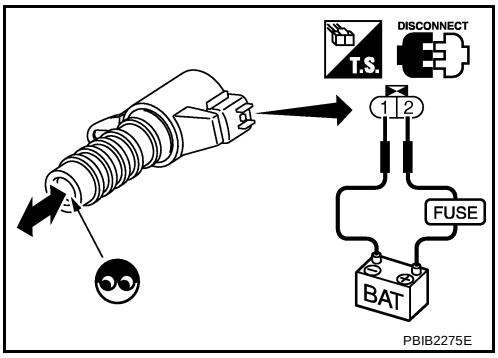


3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



GBS000VS

Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-53, "TIMING CHAIN" .

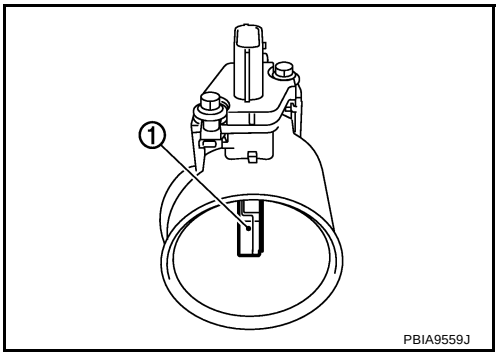
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

GBS000VT

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, electric current is supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

GBS000VU

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	See EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .	

On Board Diagnosis Logic

GBS000VV

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

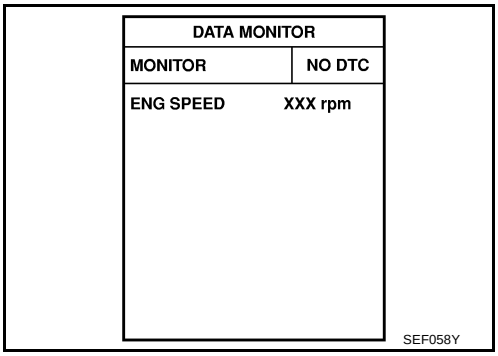
GBS000VW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-697, "Diagnostic Procedure" .



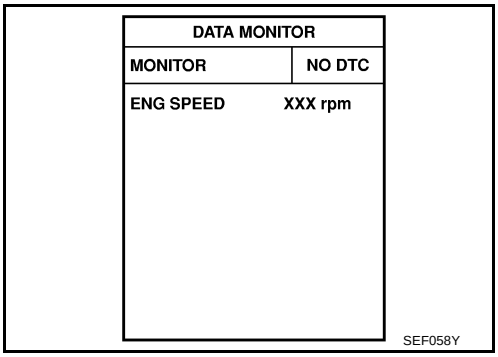
Without CONSULT-II

1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-697, "Diagnostic Procedure" .

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-697, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-697, "Diagnostic Procedure" .

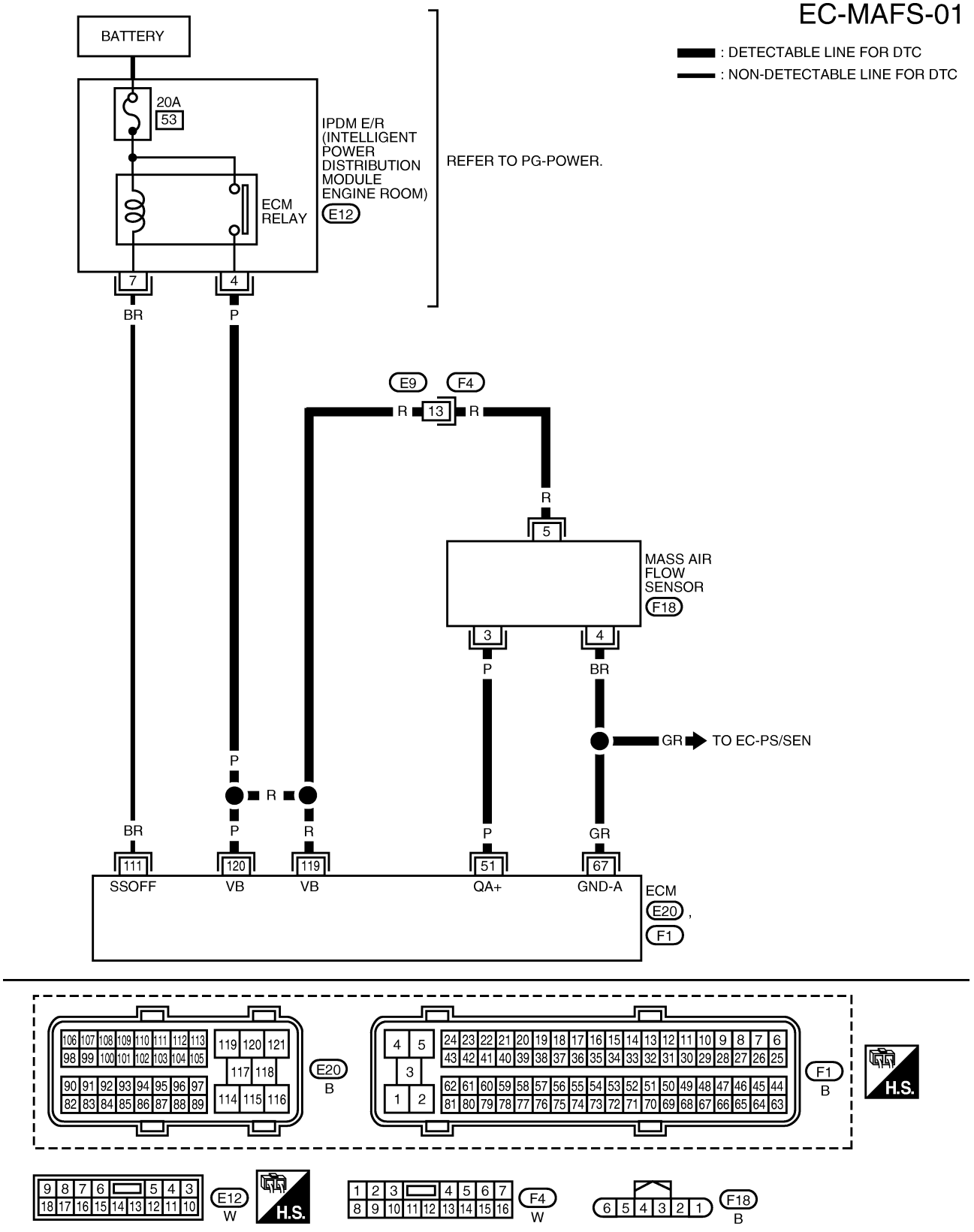


Without CONSULT-II

1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-697, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and wait at least 5 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to EC-697, "Diagnostic Procedure" .

Wiring Diagram

GBS000VX



MBWA1279E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	P	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to Approximately 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm)
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS000VY

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

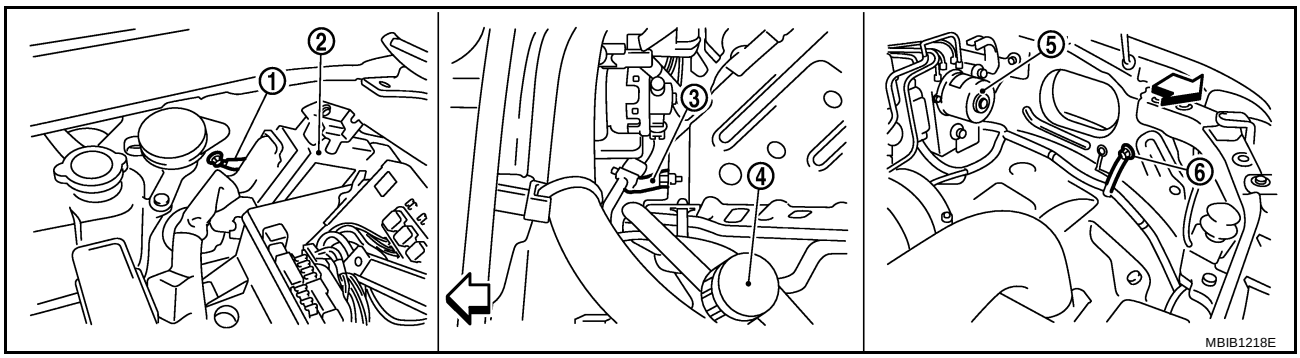
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

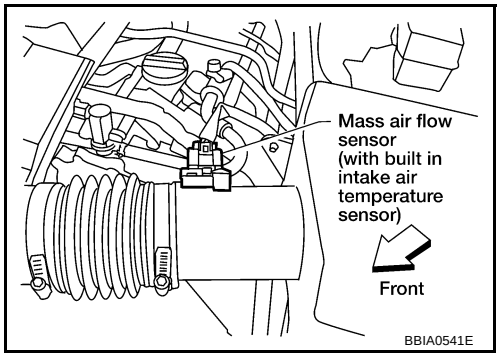
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

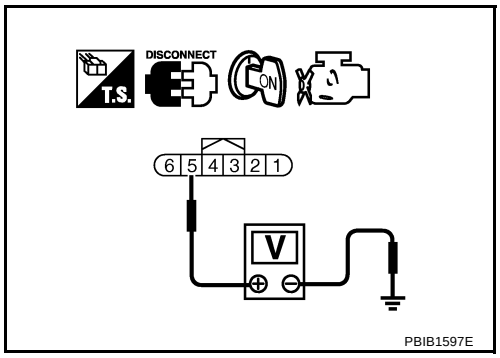
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 4 and ECM terminal 67.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 3 and ECM terminal 51.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-699, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

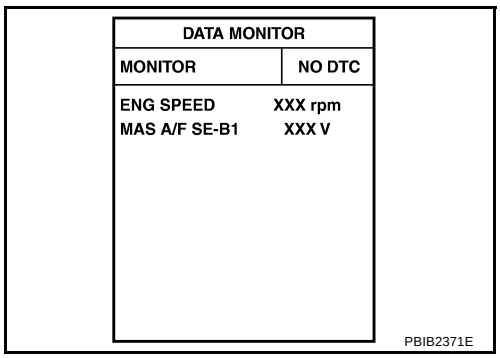
GBS000VZ

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.

4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

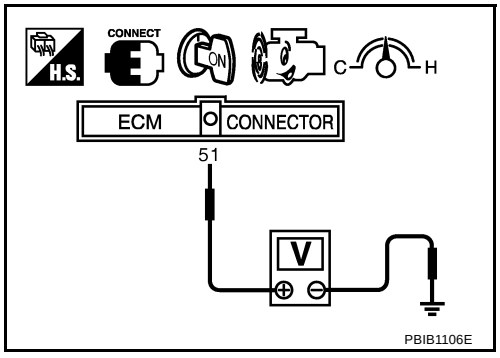
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

GBS000W0

MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

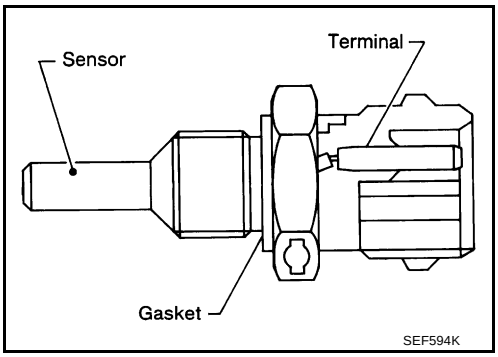
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

GBS000W1

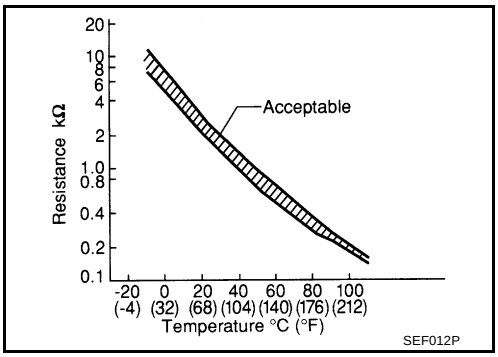
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

GBS000W2

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or START	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

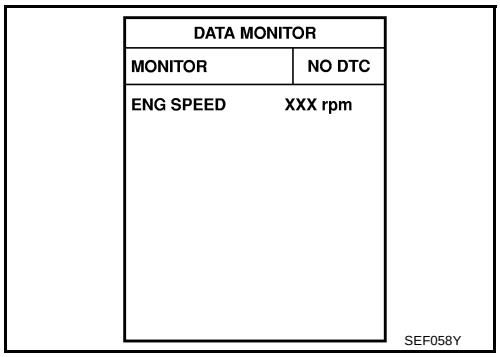
DTC Confirmation Procedure

GBS000W3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-704, "Diagnostic Procedure" .



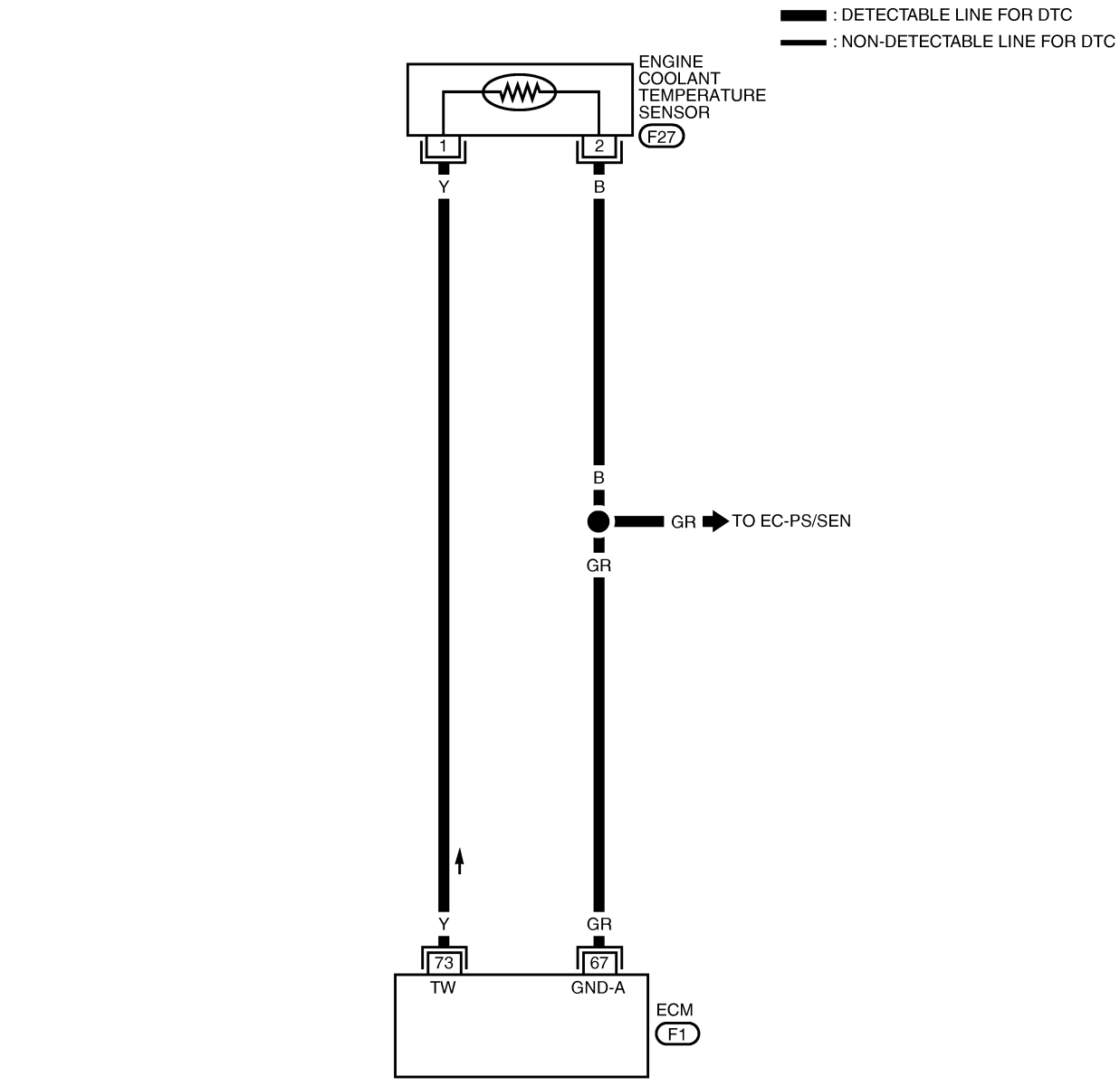
WITHOUT CONSULT-II

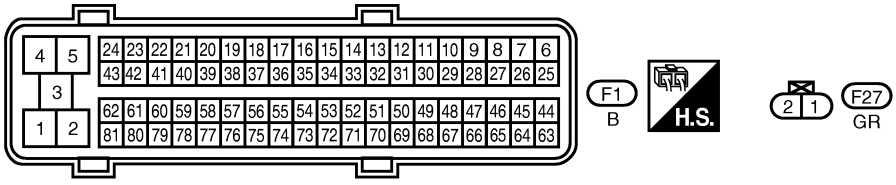
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-704, "Diagnostic Procedure" .

Wiring Diagram

GBS000W4

EC-ECTS-01





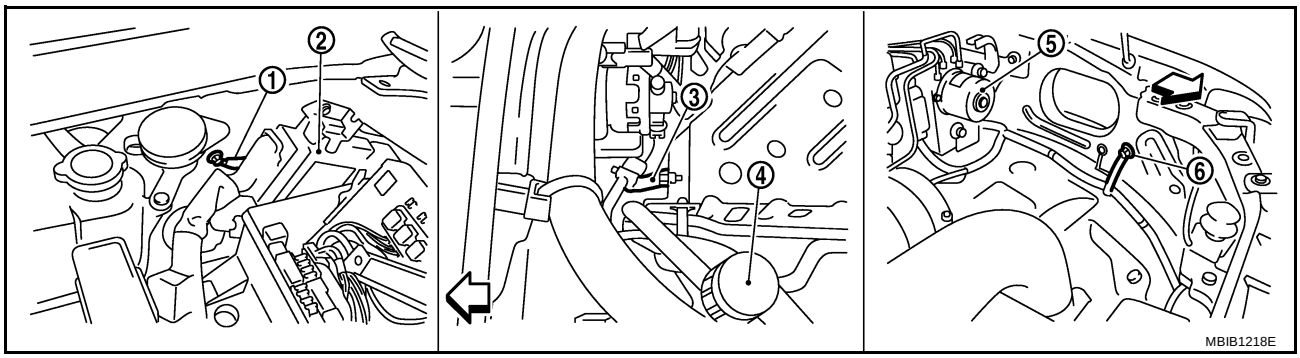
MBWA1281E

Diagnostic Procedure

GBS000W5

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

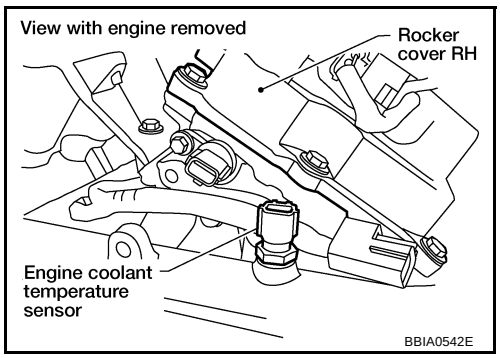
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

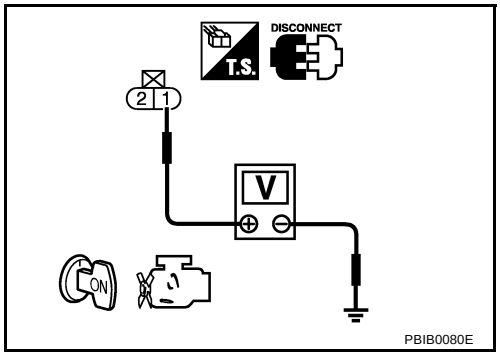
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-705, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

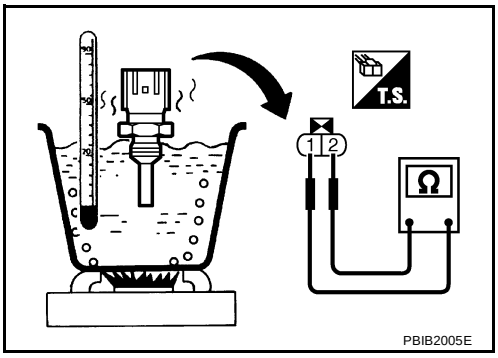
>> **INSPECTION END**

Component Inspection

GBS000W6

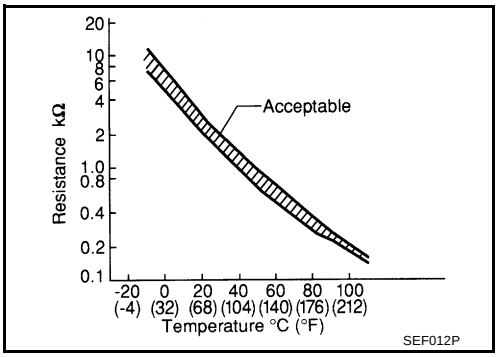
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

GBS000W7

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-29, "WATER OUTLET AND WATER PIPING" .

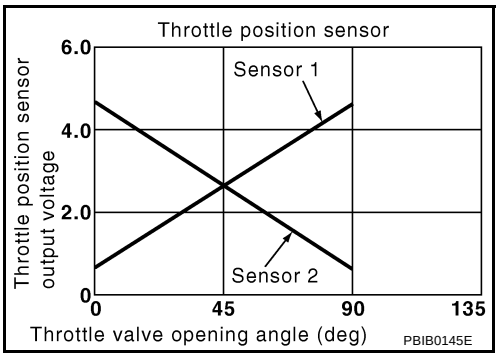
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

GBS000W8

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

GBS000W9

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS000WA

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) ● Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

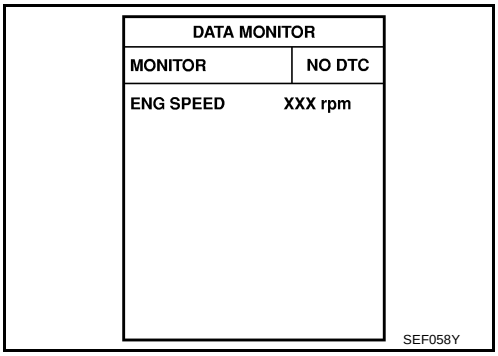
GBS000WB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-710, "Diagnostic Procedure" .



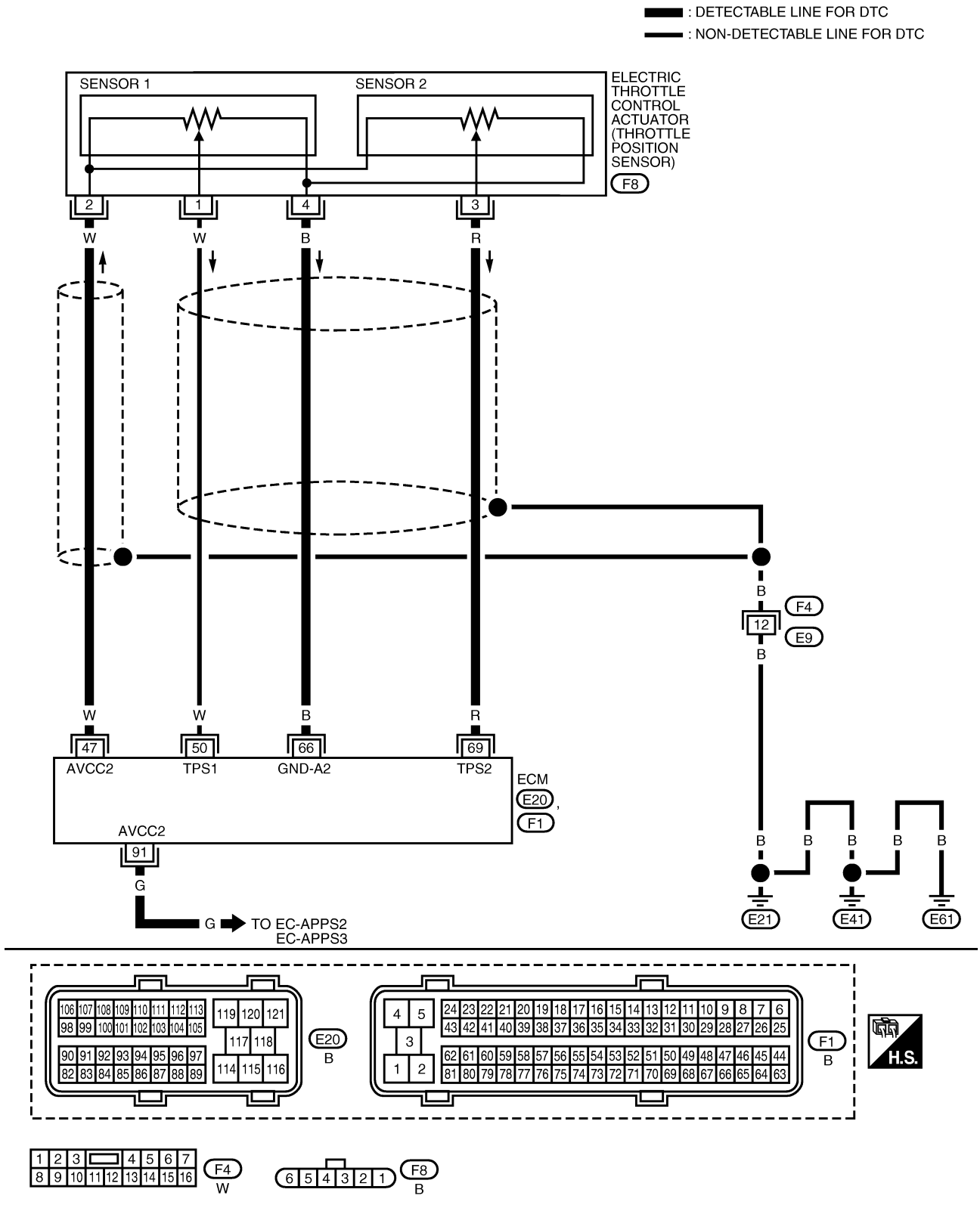
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-710, "Diagnostic Procedure" .

Wiring Diagram

GBS000WC

EC-TPS2-01



MBWA1282E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

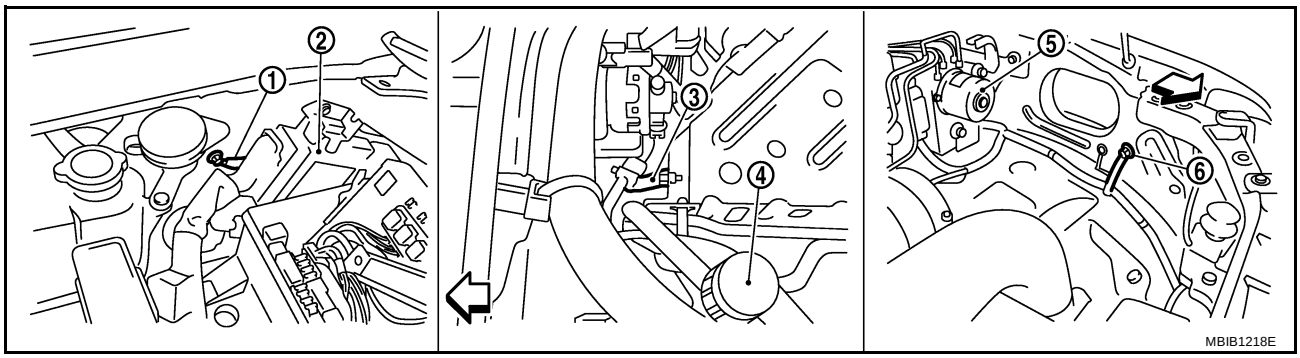
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

GBS000WD

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

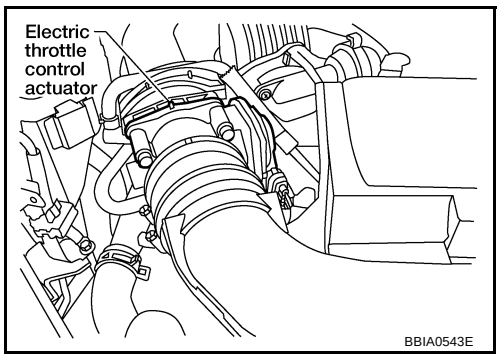
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

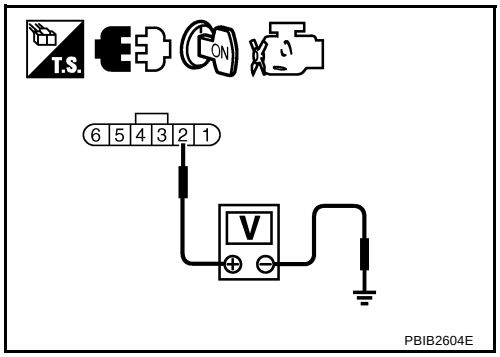
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-708
91	APP sensor terminal 1	EC-878

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-712, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

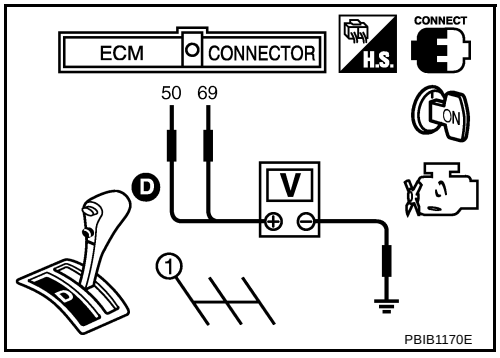
Component Inspection

GBS000WE

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-614, "Throttle Valve Closed Position Learning" .
8. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS000WF

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

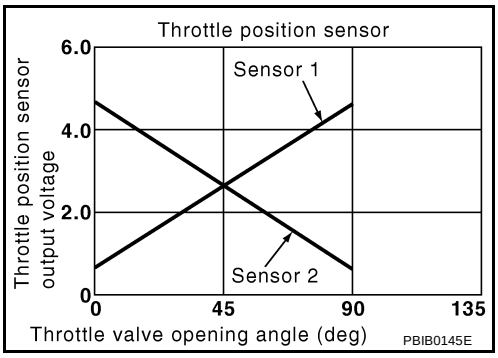
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

GBS000WG

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

GBS000WH

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS000WI

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor. (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

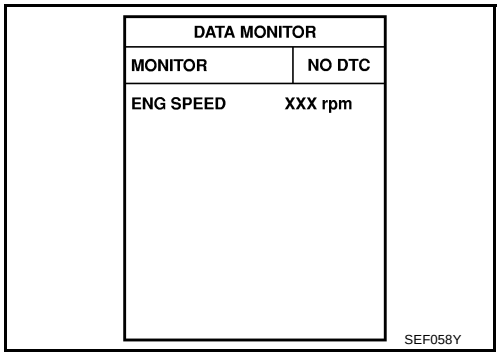
DTC Confirmation Procedure

GBS000WJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-717, "Diagnostic Procedure" .



WITHOUT CONSULT-II

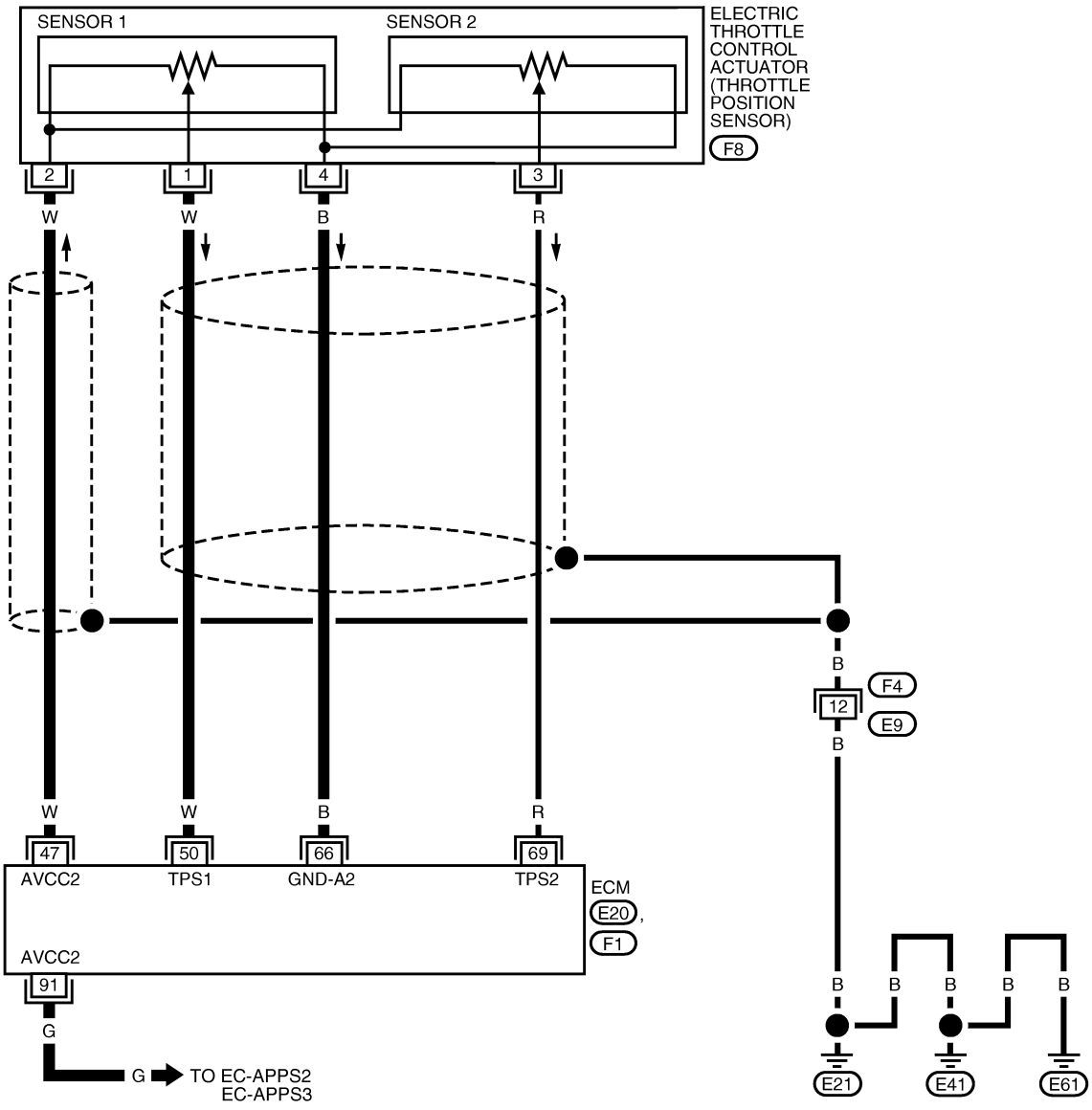
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-717, "Diagnostic Procedure" .

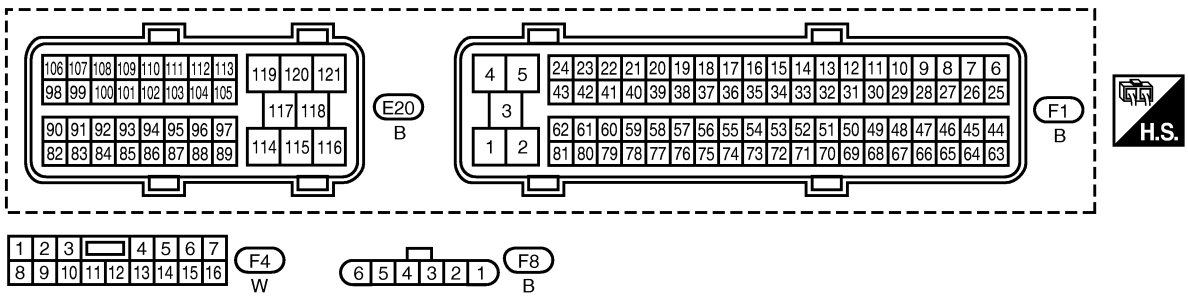
Wiring Diagram

GBS000WK

EC-TPS1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





MBWA1288E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

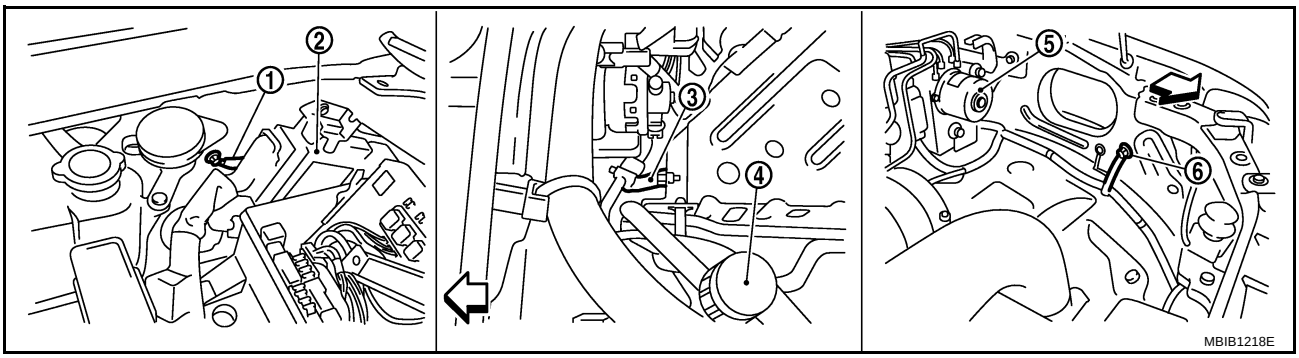
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

GBS000WL

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

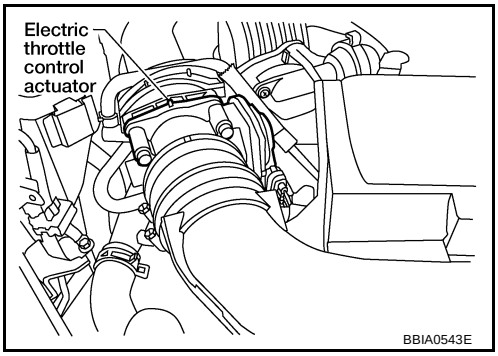
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

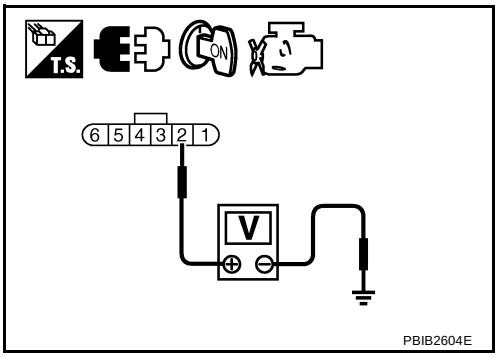
2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-715
91	APP sensor terminal 1	EC-878

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-719, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

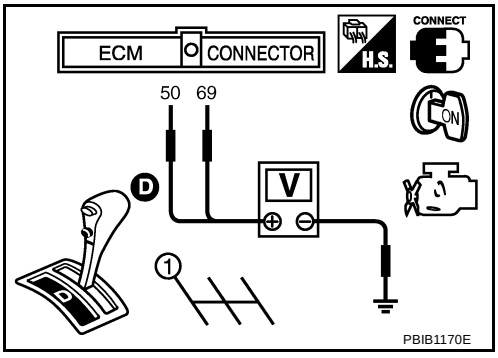
Component Inspection

GBS000WM

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-614, "Throttle Valve Closed Position Learning" .
8. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS000WN

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P0327, P0328, P0332, P0333 KS

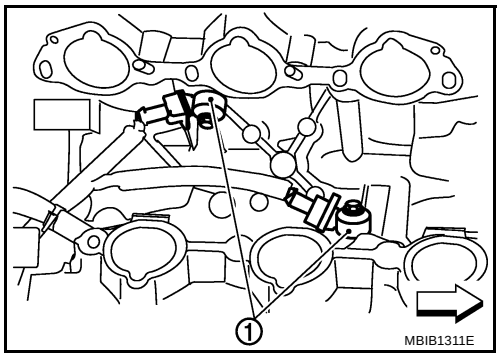
PFP:22060

Component Description

GBS000WO

The knock sensor (1) 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.

- ⇦: Vehicle front



On Board Diagnosis Logic

GBS000WP

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (bank 1) P0332 0332 (bank 2)	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328 (bank 1) P0333 0333 (bank 2)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

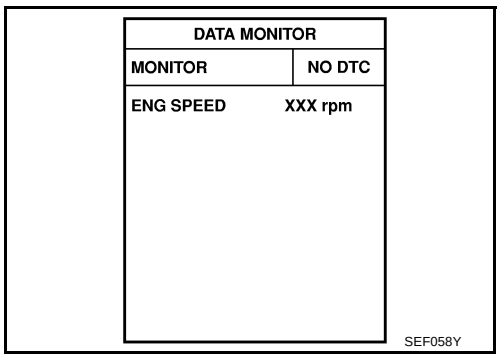
GBS000WQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-722, "Diagnostic Procedure" .



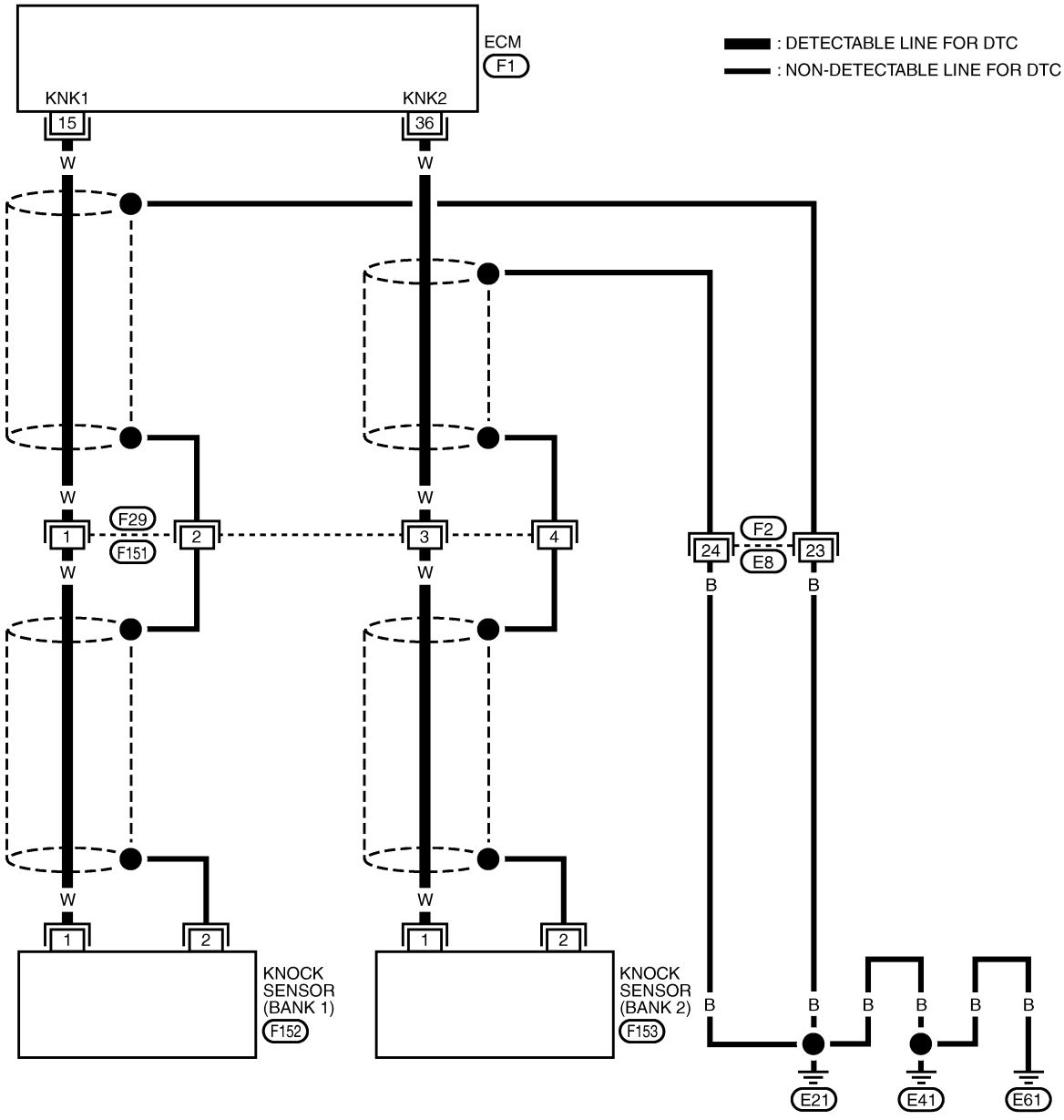
WITHOUT CONSULT-II

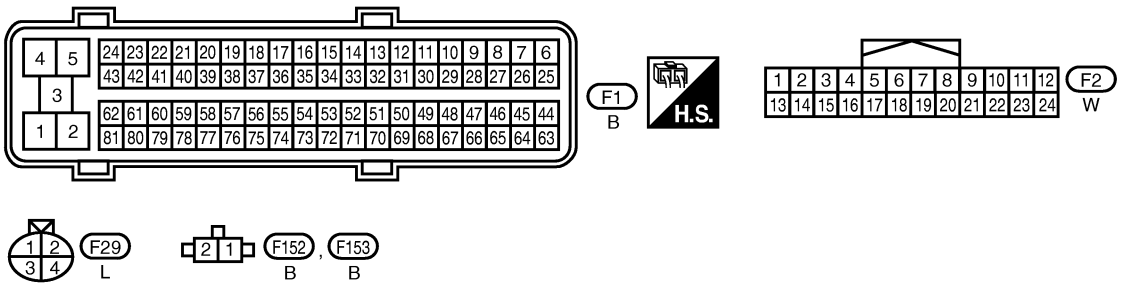
1. Start engine and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-722, "Diagnostic Procedure" .

Wiring Diagram

GBS000WR

EC-KS-01





MBWA1289E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W W	Knock sensor (Bank 1) Knock sensor (Bank 2)	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

GBS000WS

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

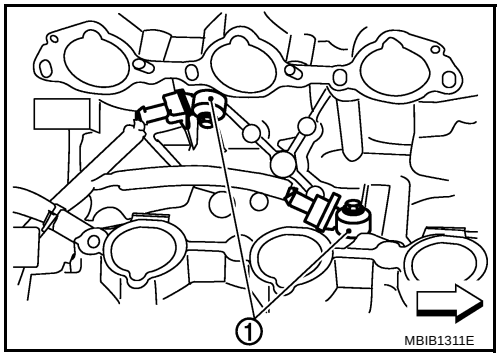
1. Disconnect knock sensor (1) harness connector.

– ⇦: Vehicle front

2. Check harness continuity between ECM terminal 15 and knock sensor (bank1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

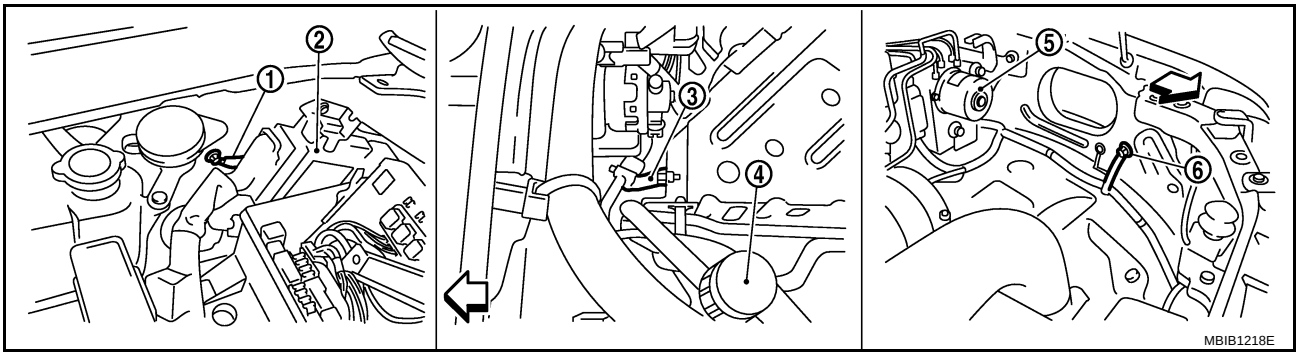
Refer to EC-724, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

5. CHECK GROUND CONNECTIONS

1. Loosen and retighten three ground screws on the body.
   Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check for short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F29, F151
- Harness connectors F2, E8
- Harness for open or short between knock sensor and ground

>> Repair open circuit or short power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS000WT

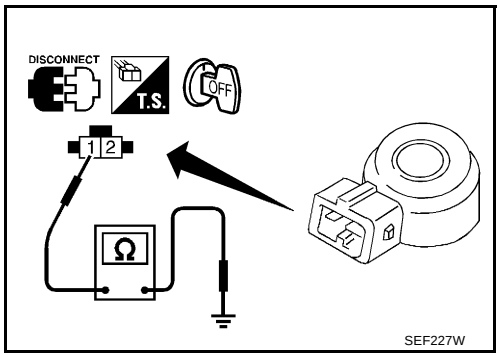
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

GBS000WU

KNOCK SENSOR

Refer to EM-107, "CYLINDER BLOCK" .

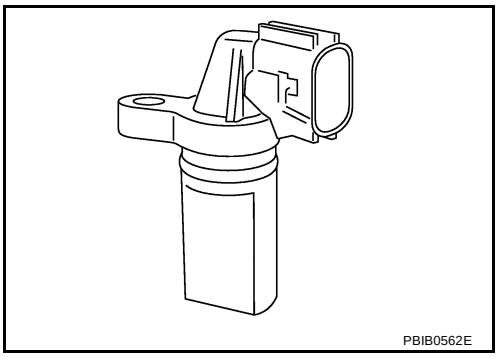
DTC P0335 CKP SENSOR (POS)

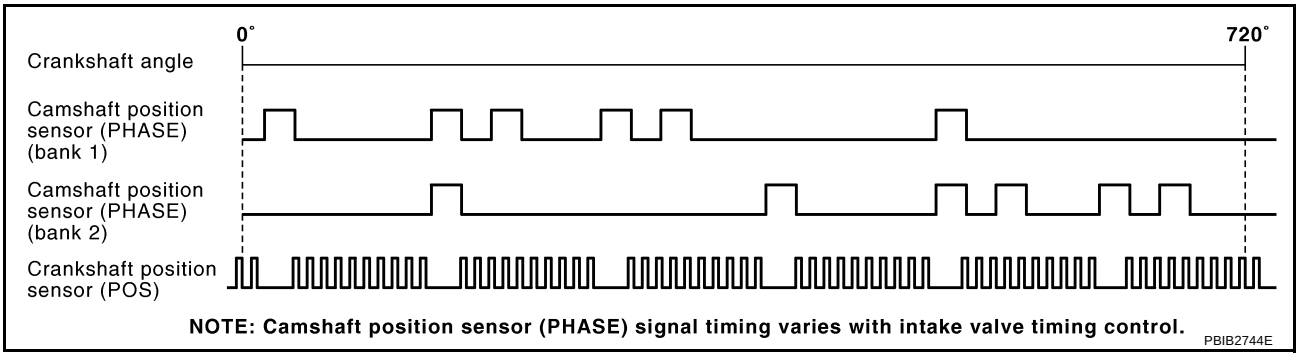
PFP:23731

Component Description

GBS000WV

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIB0562E



CONSULT-II Reference Value in Data Monitor Mode

GBS000WW

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

GBS000WX

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (POS) ● Signal plate

DTC Confirmation Procedure

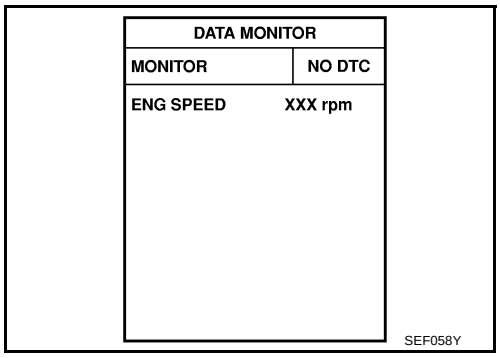
GBS000WY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-729, "Diagnostic Procedure" .

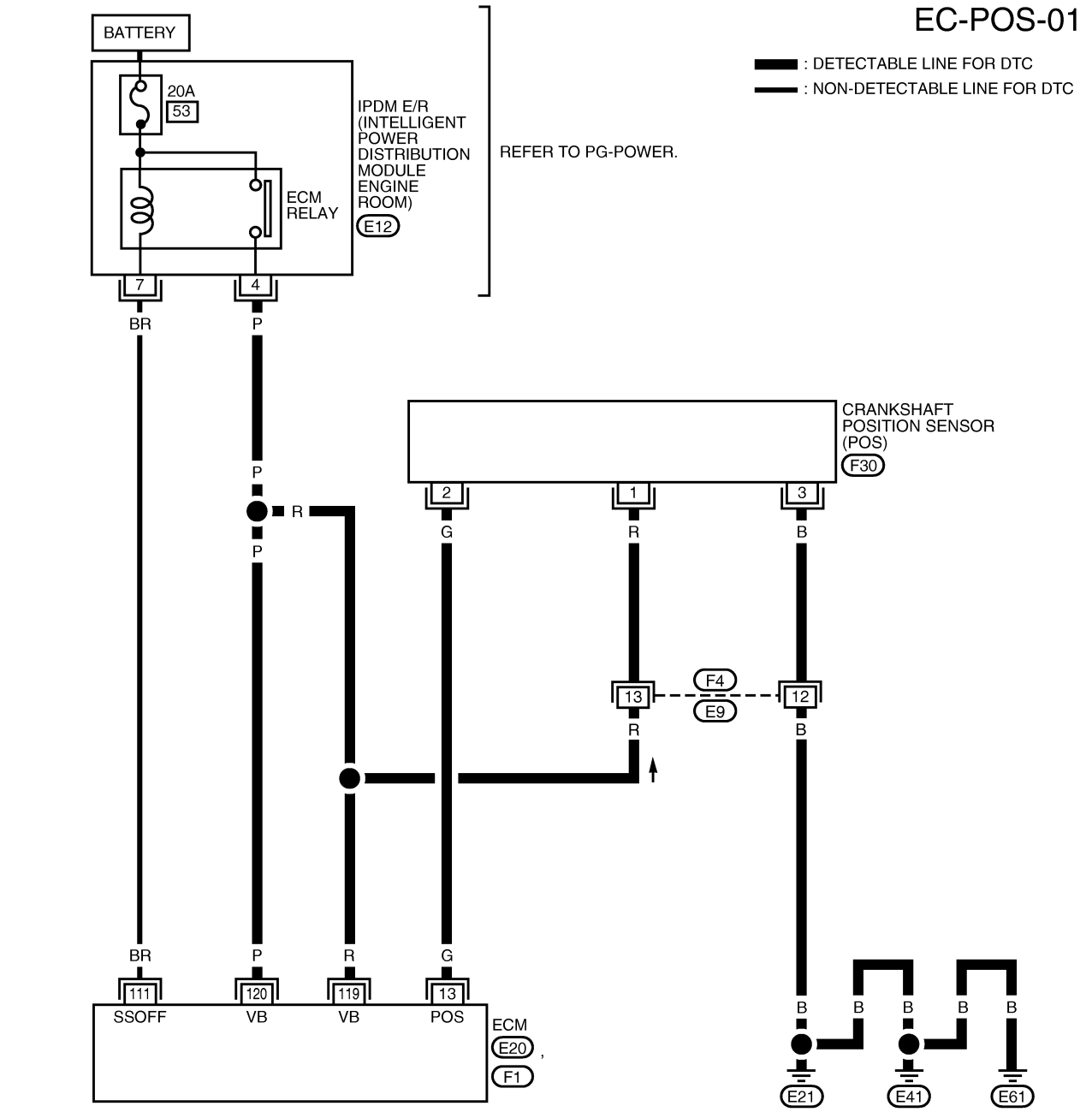


WITHOUT CONSULT-II

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-729, "Diagnostic Procedure" .

Wiring Diagram

GBS000WZ

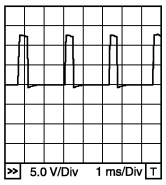
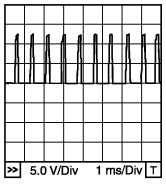


MBWA1290E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	G	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 10V★  PBIB1041E
			[Engine is running] ● Engine speed: 2,000 rpm	Approximately 10V★  PBIB1042E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

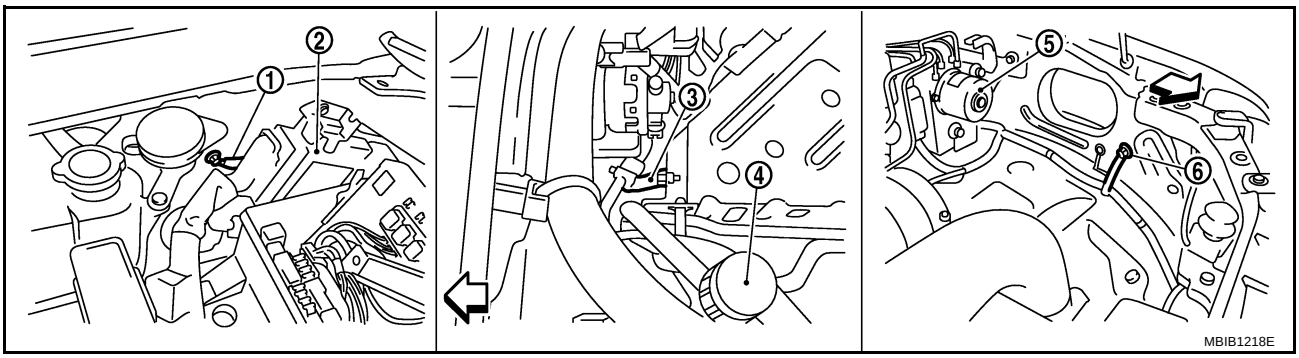
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000X0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

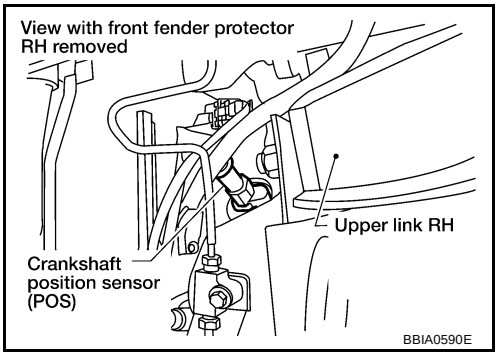
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

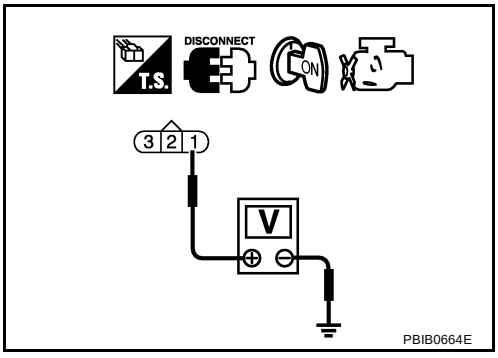
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between crankshaft position sensor (POS) and ground

>> Repair open circuit or short to power in harness or connectors.

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-731, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

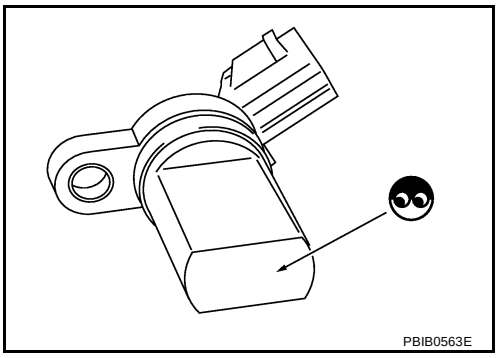
>> **INSPECTION END**

Component Inspection

GBS000X1

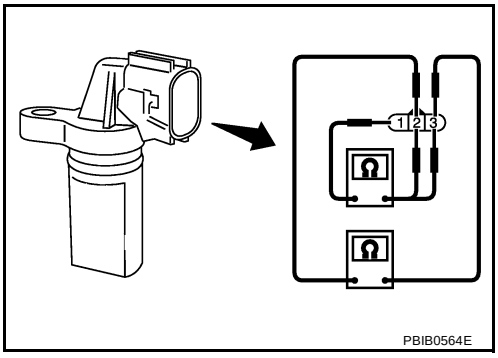
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


PBIB0563E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



PBIB0564E

Removal and Installation

GBS000X2

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-28, "OIL PAN AND OIL STRAINER" .

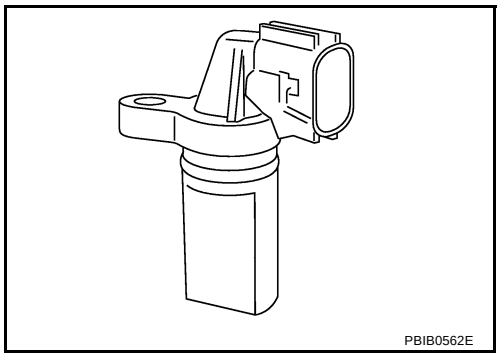
DTC P0340, P0345 CMP SENSOR (PHASE)

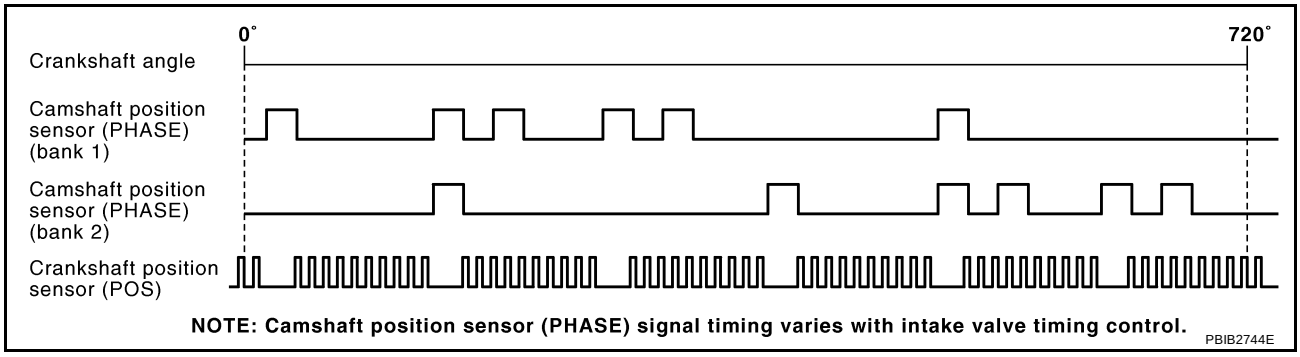
PFP:23731

Component Description

GBS000X3

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.


PBIB0562E



CONSULT-II Reference Value in Data Monitor Mode

GBS000X4

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

GBS000X5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1) P0345 0345 (Bank 2)	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not sent to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-30 .) ● Starting system circuit (Refer to SC-30 .) ● Dead (Weak) battery

DTC Confirmation Procedure

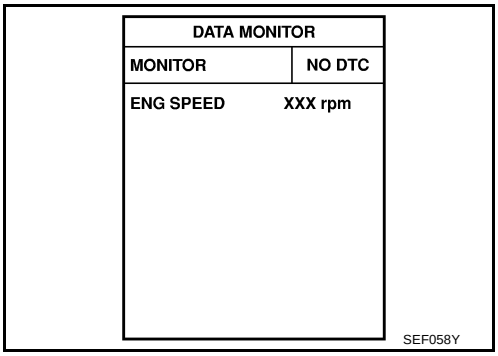
GBS000X6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-737, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-737, "Diagnostic Procedure" .



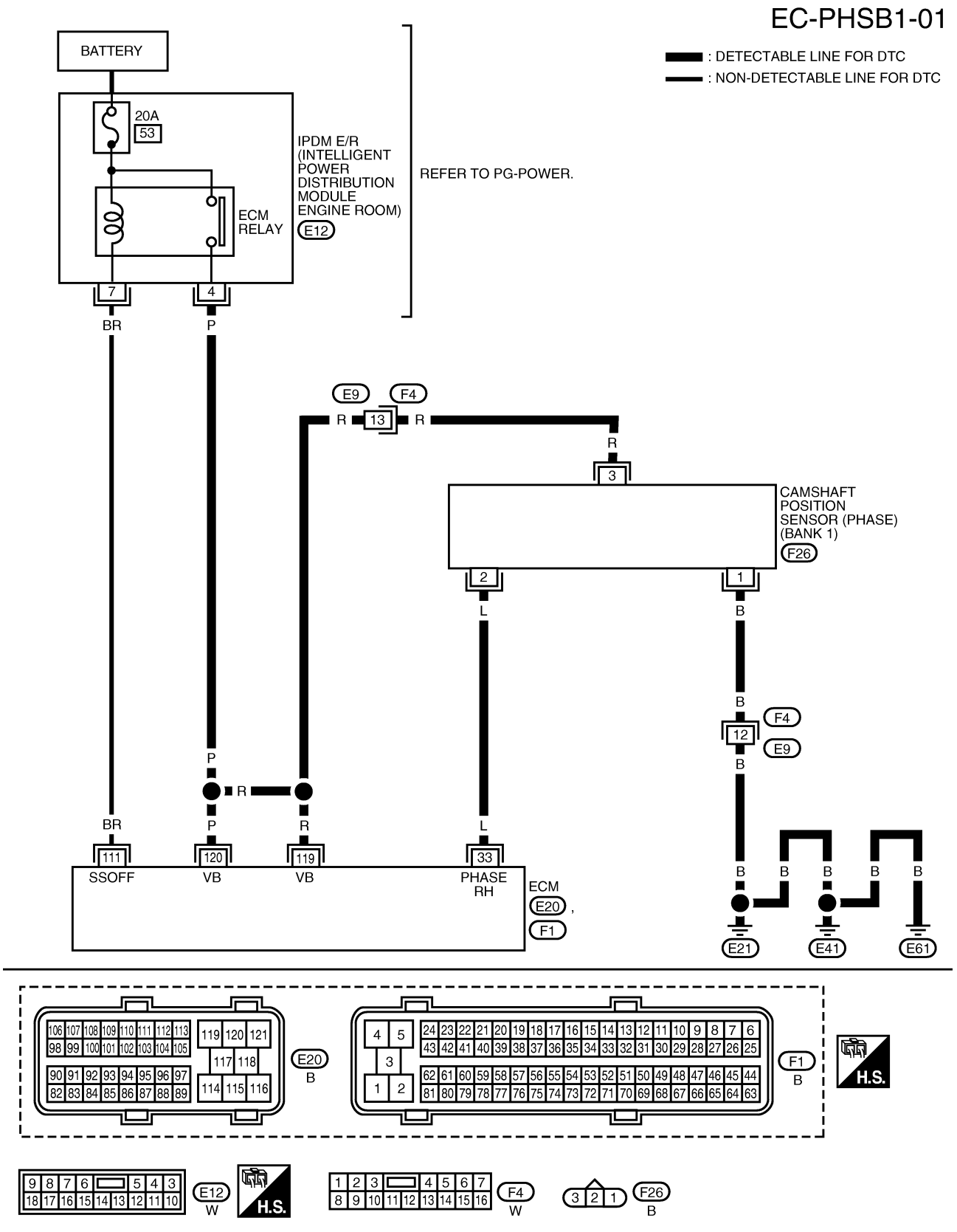
WITHOUT CONSULT-II

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-737, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Start engine and maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If 1st trip DTC is detected, go to EC-737, "Diagnostic Procedure" .

Wiring Diagram

GBS000X7

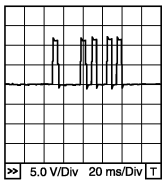
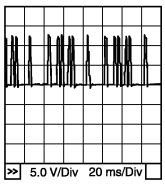
BANK 1



MBWA1291E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

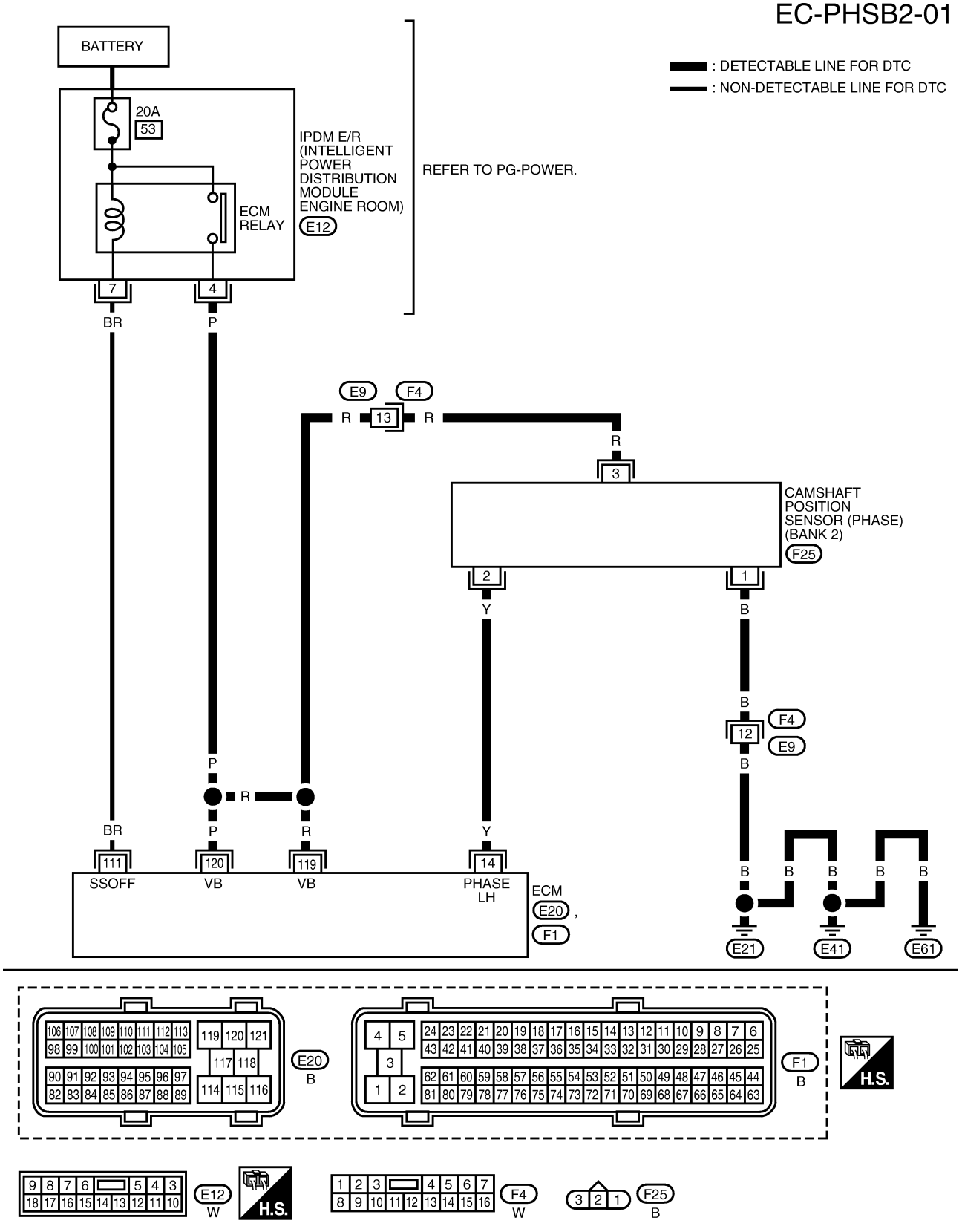
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	L	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

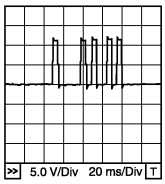
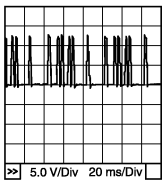
EC-PHSB2-01



MBWA1292E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB1039E
			[Engine is running] ● Engine speed: 2,000 rpm	1.0 - 4.0V★  PBIB1040E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000X8

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

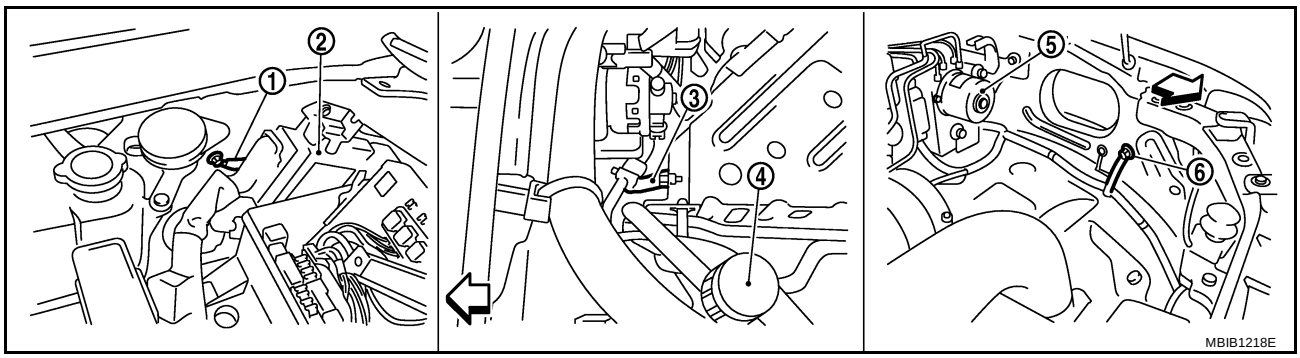
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-30, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

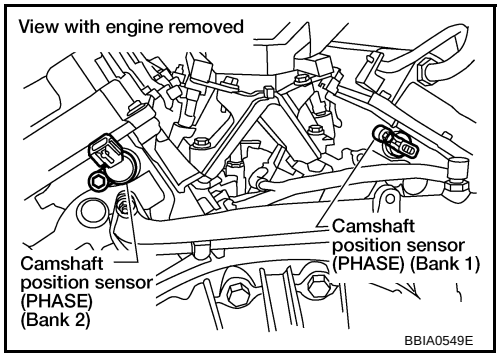
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

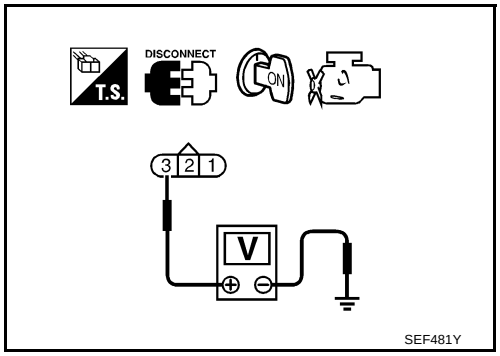
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between CMP sensor (PHASE) and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (bank 1) or 14 (bank 2) and CMP sensor (PHASE) terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-740, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

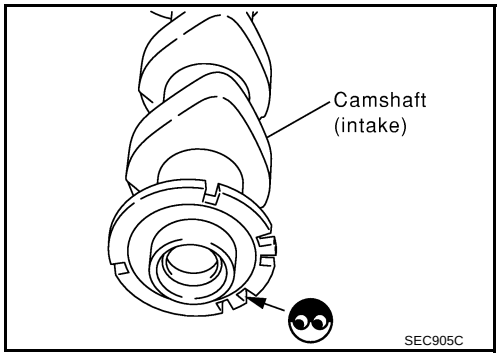
9. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

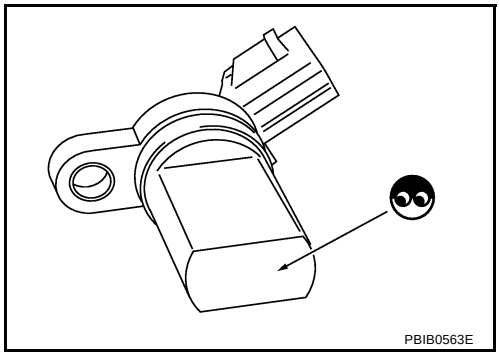
>> **INSPECTION END**

Component Inspection

GBS000X9

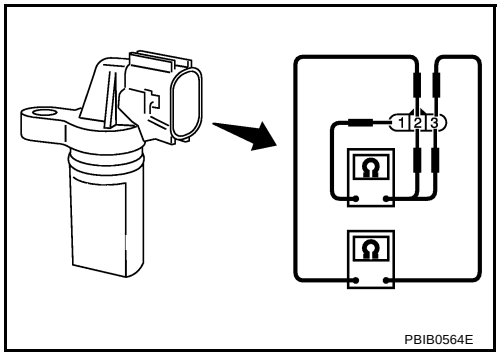
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

GBS000XA

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-73, "CAMSHAFT" .

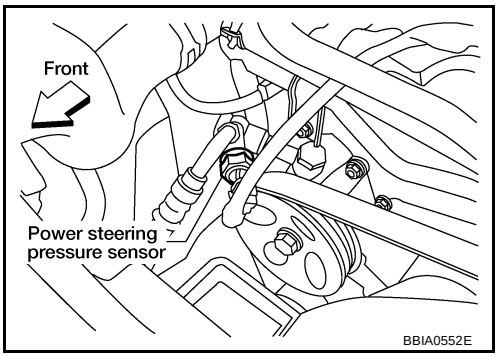
DTC P0550 PSP SENSOR

PFP:49763

Component Description

GBS000XB

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

GBS000XC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned.	OFF
		Steering wheel: Being turned.	ON

On Board Diagnosis Logic

GBS000XD

The MIL will not light up for this diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-803, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Power steering pressure sensor

DTC Confirmation Procedure

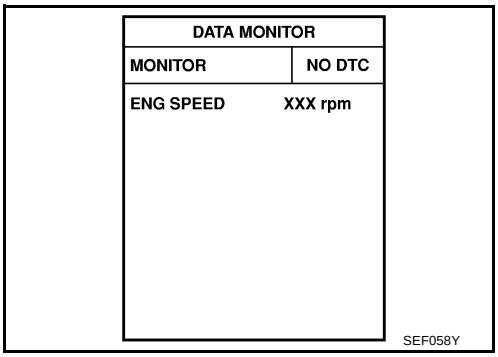
GBS000XE

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-743, "Diagnostic Procedure" .



WITHOUT CONSULT-II

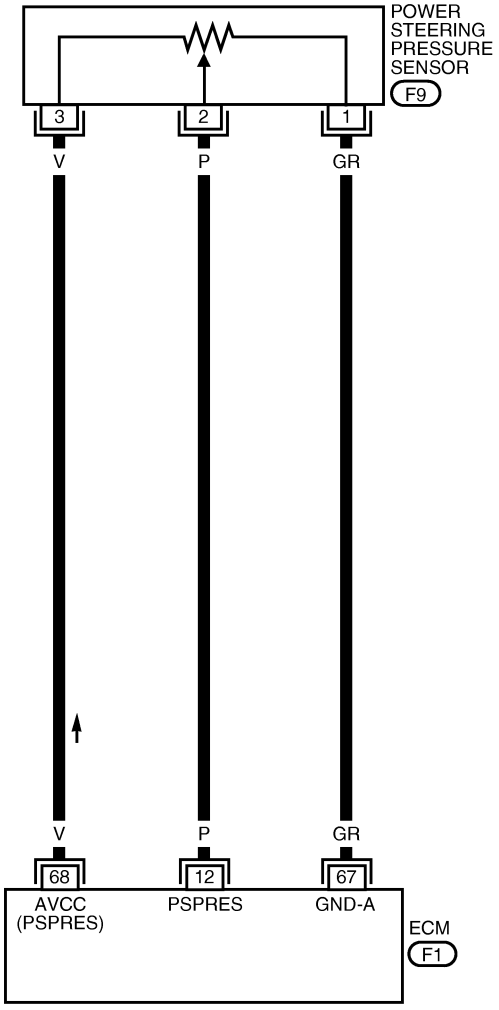
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-743, "Diagnostic Procedure" .

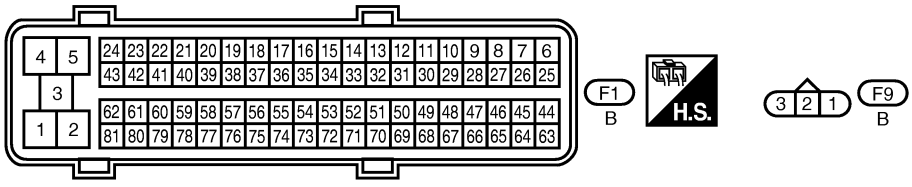
Wiring Diagram

GBS000XF

EC-PS/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





MBWA1296E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

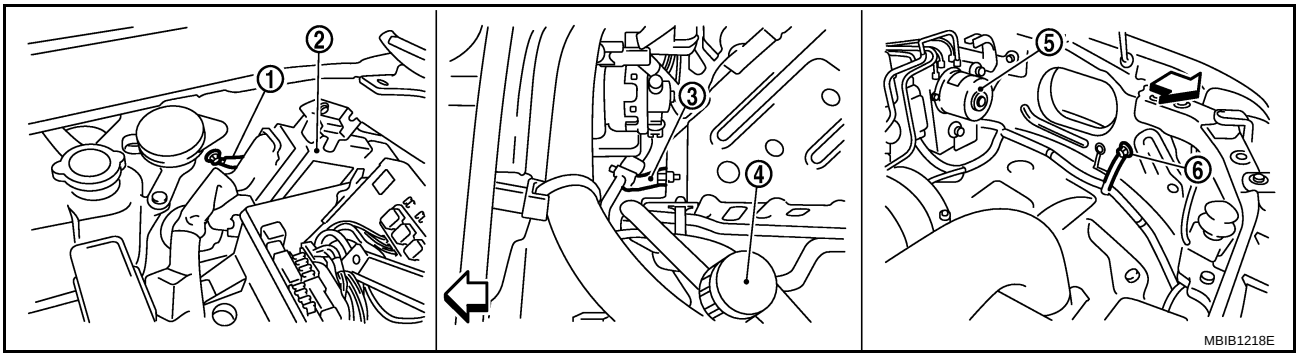
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel: Being turned	0.5 - 4.5V
			[Engine is running] ● Steering wheel: Not being turned	0.4 - 0.8V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

GBS000XG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

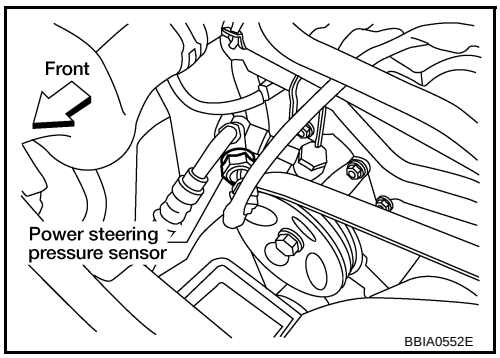
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

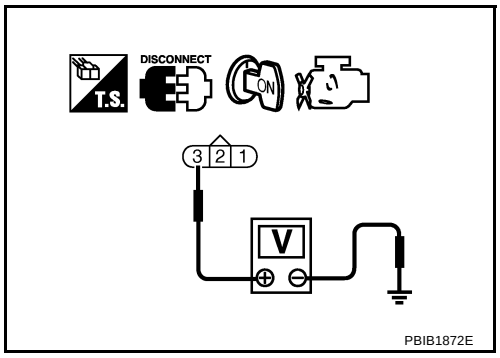
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-745, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

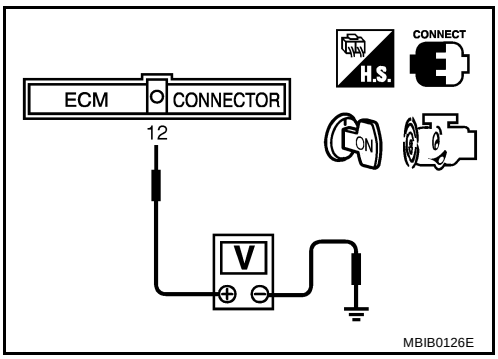
Component Inspection

GBS000XH

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned.	0.5 - 4.5V
Steering wheel: Not being turned.	0.4 - 0.8V



Removal and Installation

GBS000XI

POWER STEERING PRESSURE SENSOR

Refer to PS-33, "HYDRAULIC LINE" .

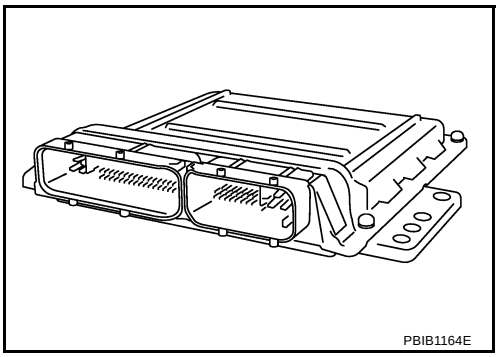
DTC P0605 ECM

PFP:23710

Component Description

GBS000XJ

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

GBS000XK

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

GBS000XL

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

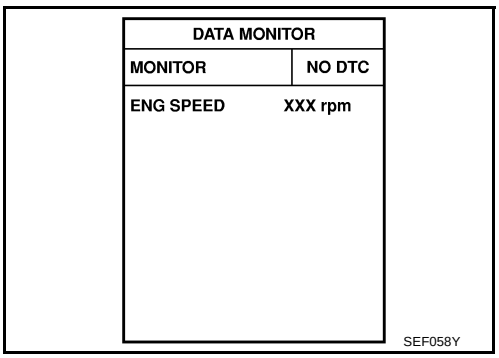
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure"
   .



SEF058Y

Without CONSULT-II

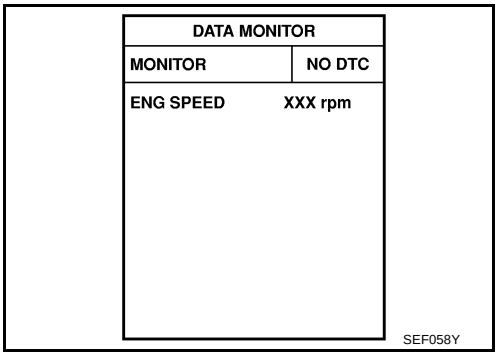
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .



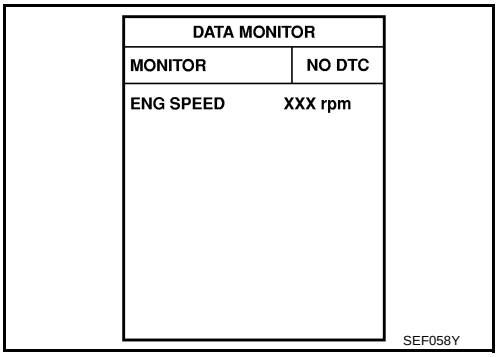
Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .



Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 to 2 for 32 times.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000XM

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-746, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
   Refer to EC-606, "DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS" .
3. **Perform DTC Confirmation Procedure.**
   See EC-746, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC 0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-614, "Accelerator Pedal Released Position Learning" .
4. Perform EC-614, "Throttle Valve Closed Position Learning" .
5. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

PFP:22693

Description

GBS000XN

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the air fuel ratio (A/F) sensor 1 heater corresponding to the engine operating condition to keep the temperature of air fuel ratio (A/F) sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

GBS000XO

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	● Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

GBS000XP

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1) P1051 1051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 heater
P1032 1032 (Bank 1) P1052 1052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is shorted.) ● Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

GBS000XQ

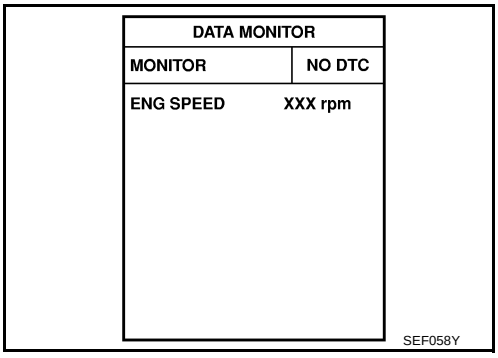
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and let it idle for at least 10 seconds.
3. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .



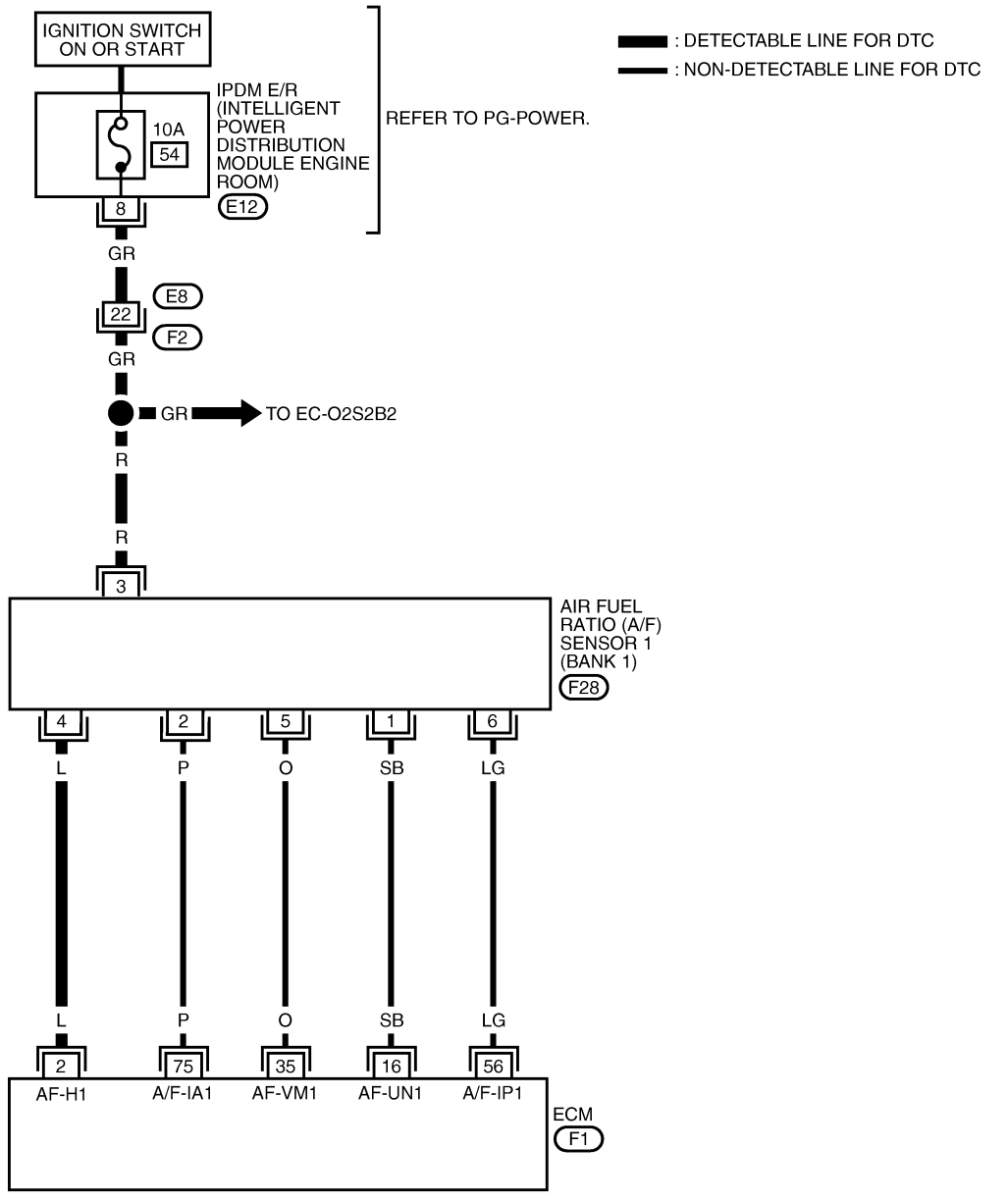
WITHOUT CONSULT-II

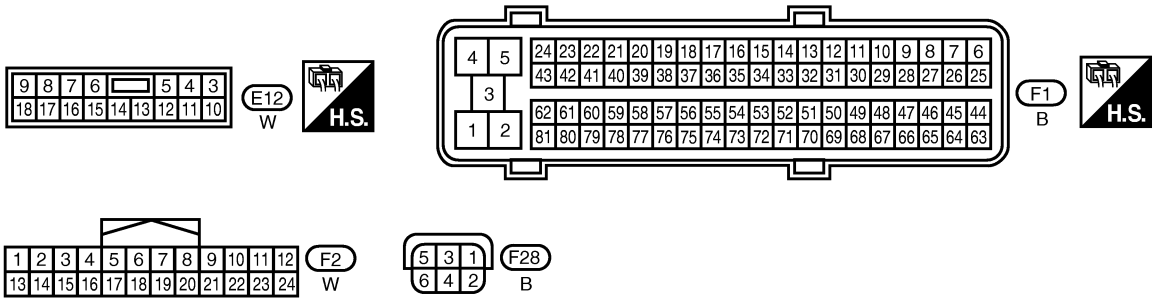
1. Start engine and let it idle for at least 10 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000XR

EC-AF1HB1-01



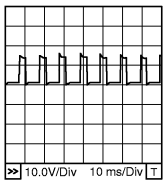


MBWA1297E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

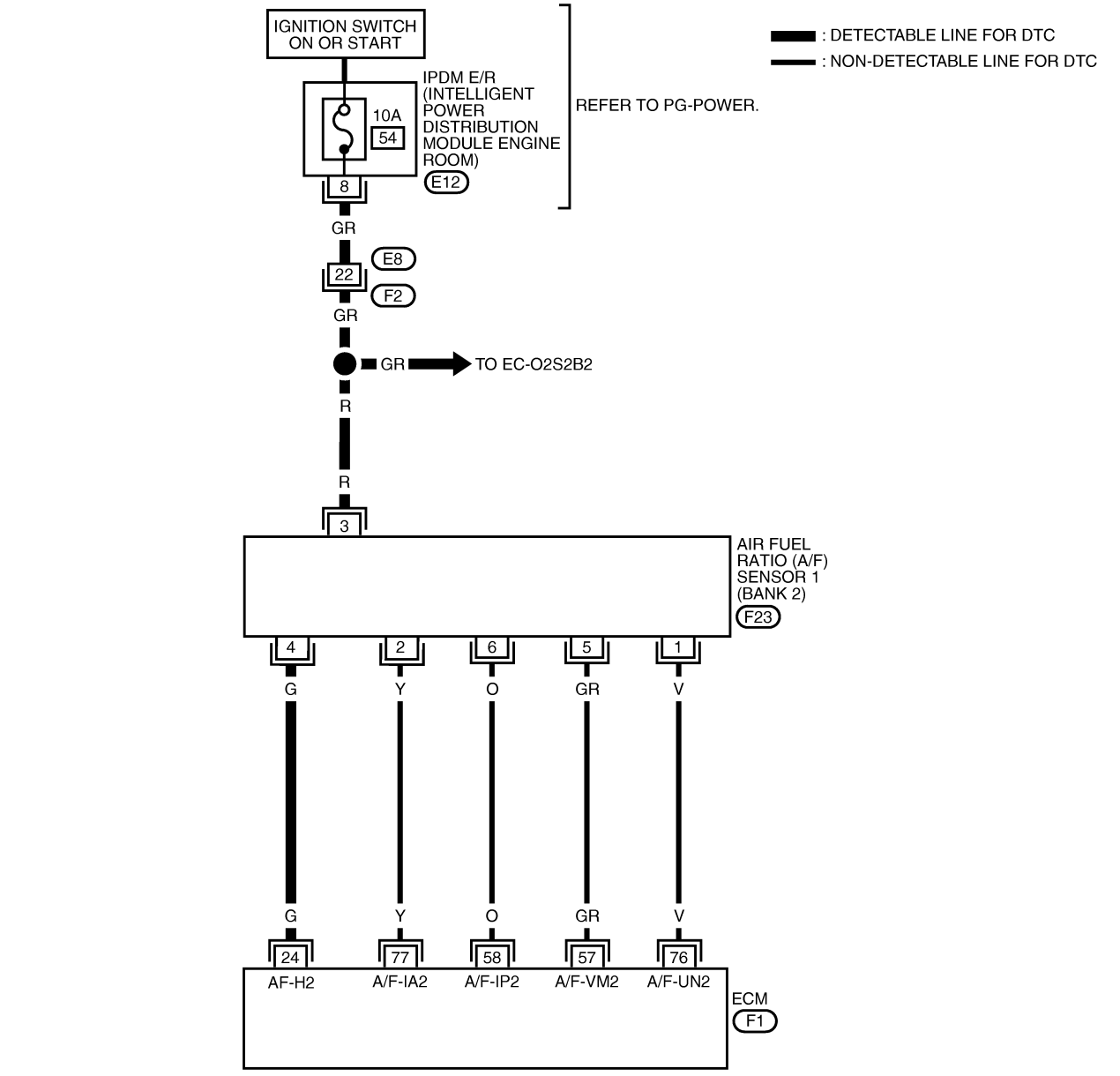
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

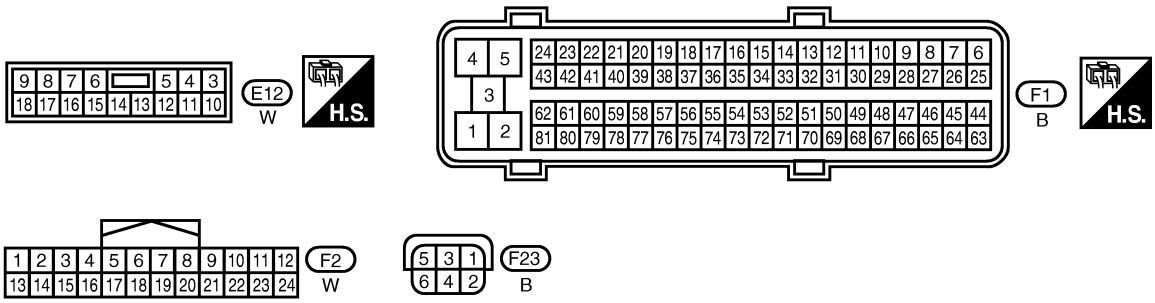
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-AF1HB2-01

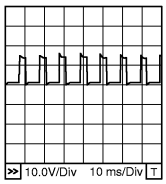




MBWA1298E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

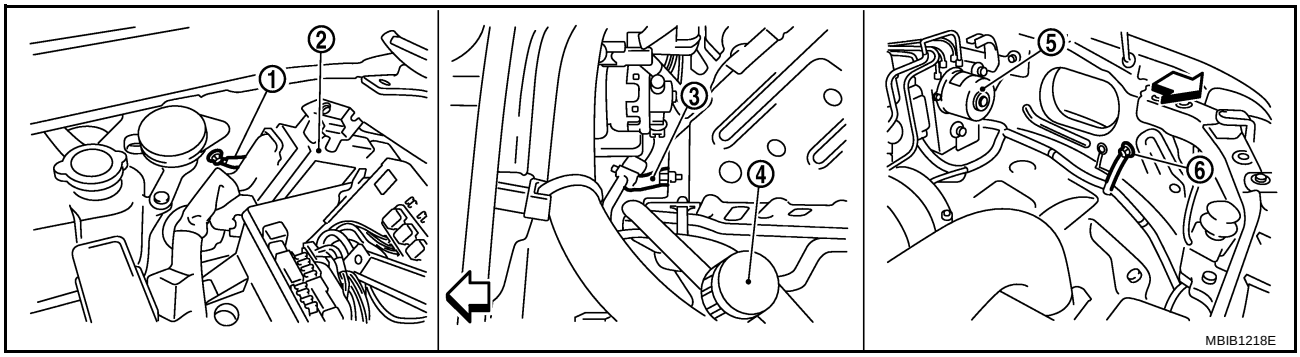
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000XS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

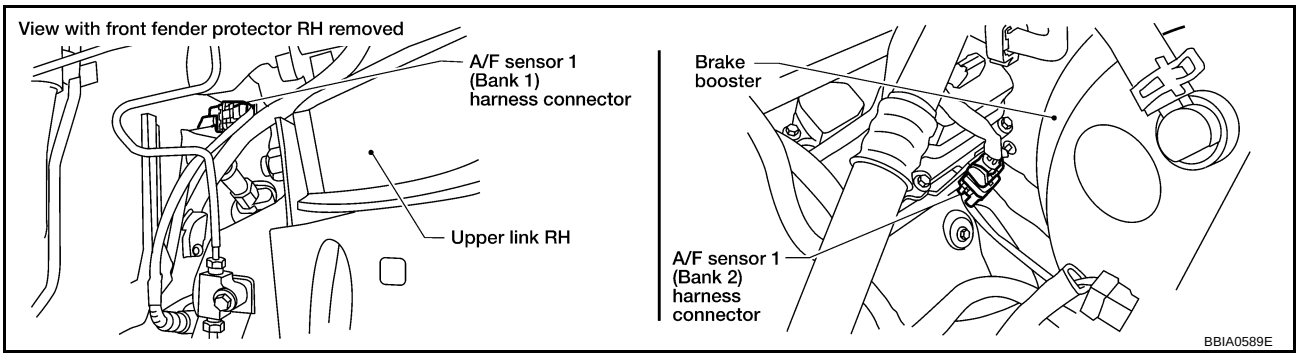
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or Replace ground connections.

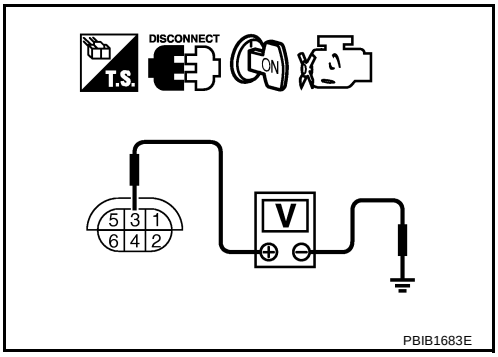
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R harness connector E12
- 10A fuse
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-756, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK INTERMITTENT INCIDENT

Perform EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Component Inspection

GBS000XT

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω [at 25°C (77°F)]

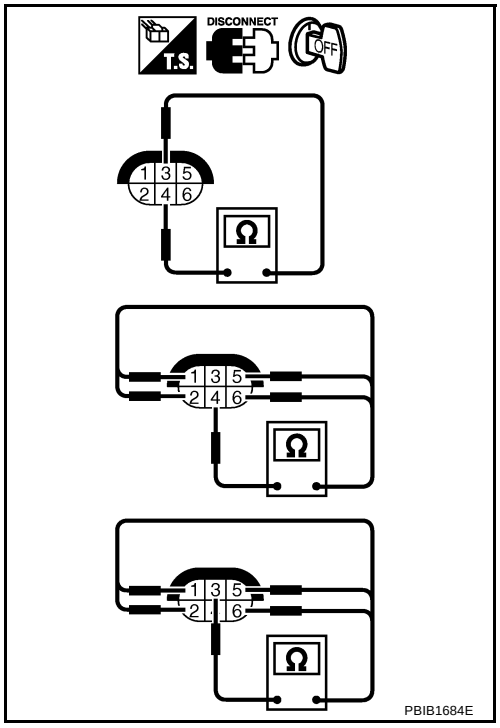
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**



Removal and Installation

GBS000XU

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

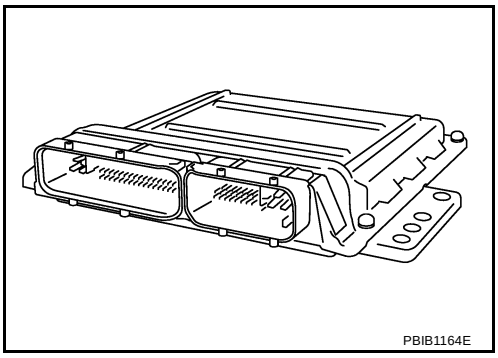
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

GBS000XV

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

GBS000XW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

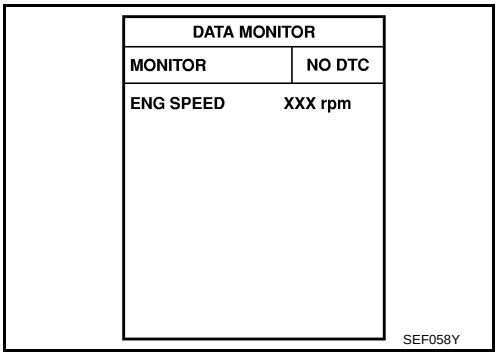
DTC Confirmation Procedure

GBS000XX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-759, "Diagnostic Procedure" .



SEF058Y

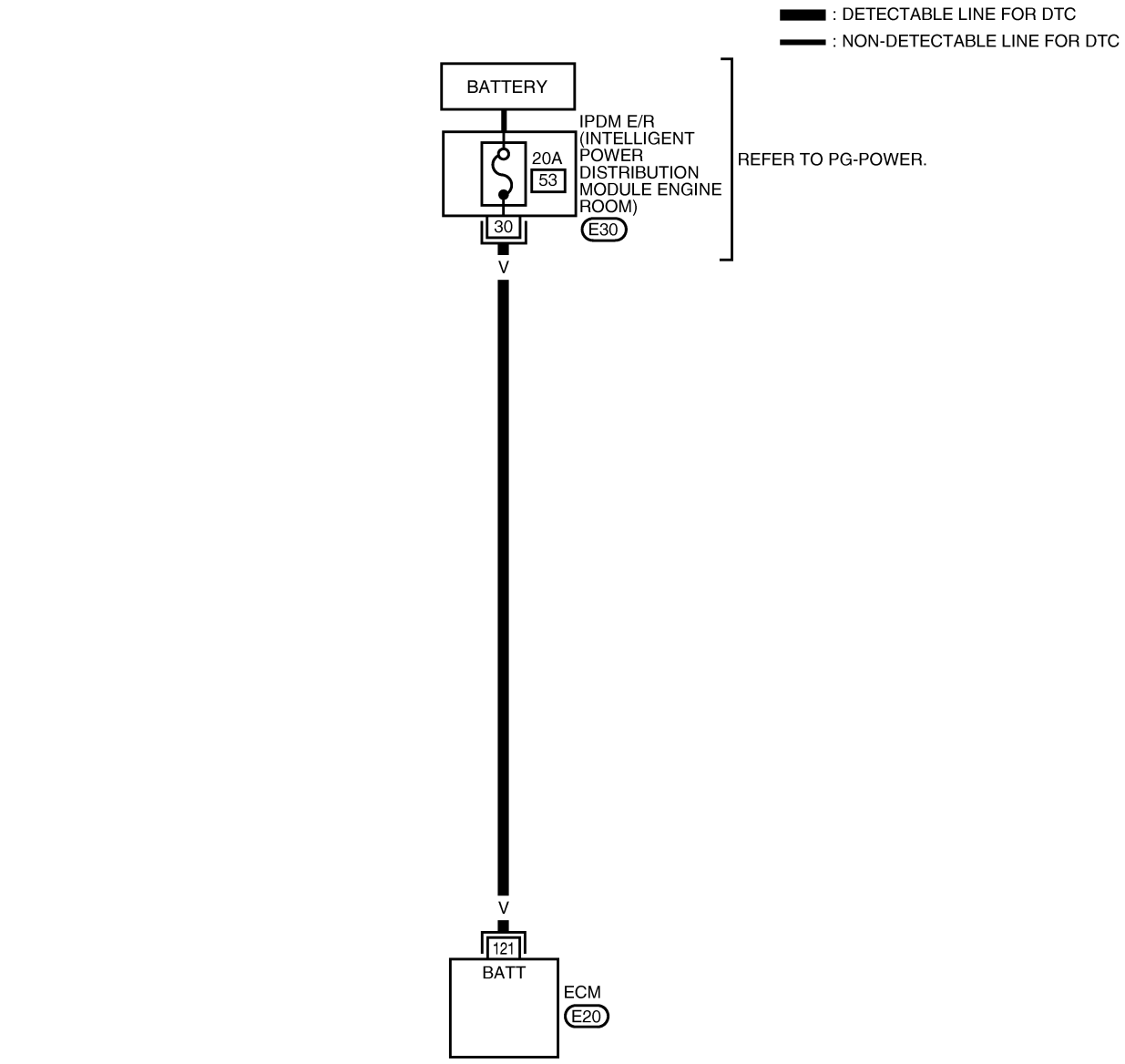
WITHOUT CONSULT-II

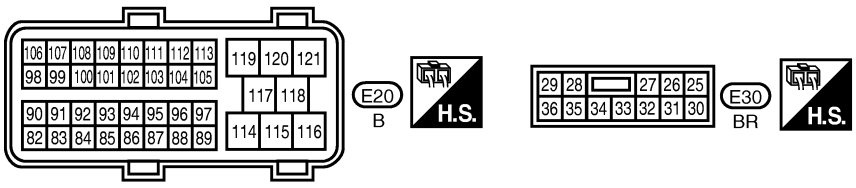
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat steps 1 to 2 for 4 times.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to EC-759, "Diagnostic Procedure" .

Wiring Diagram

GBS000XY

EC-ECM/PW-01





MBWA1299E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	V	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

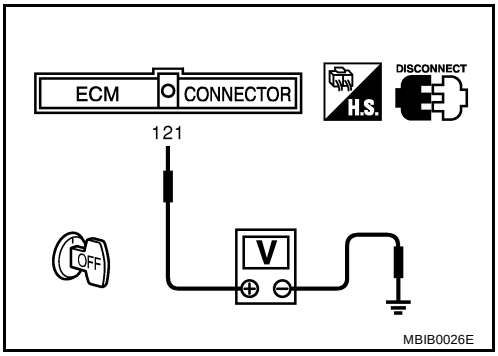
Diagnostic Procedure

GBS000XZ

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- IPDM E/R harness connector E30
- Harness for open or short between ECM and battery

>> Repair open circuit in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-757, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
   Refer to EC-606, "DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS"
3. **Perform DTC Confirmation Procedure.**
   See EC-757, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC 1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform EC-614, "Accelerator Pedal Released Position Learning" .
4. Perform EC-614, "Throttle Valve Closed Position Learning" .
5. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

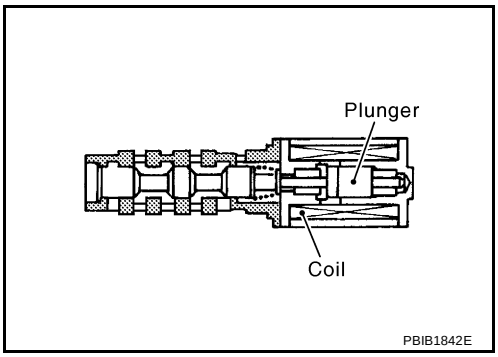
DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

GBS000Y0

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

GBS000Y1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%

On Board Diagnosis Logic

GBS000Y2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111 (Bank 1) P1136 1136 (Bank 2)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

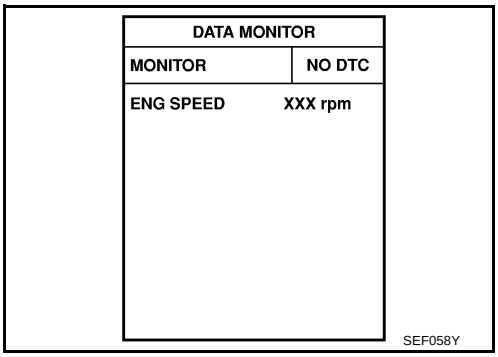
DTC Confirmation Procedure

GBS000Y3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-767, "Diagnostic Procedure"
.



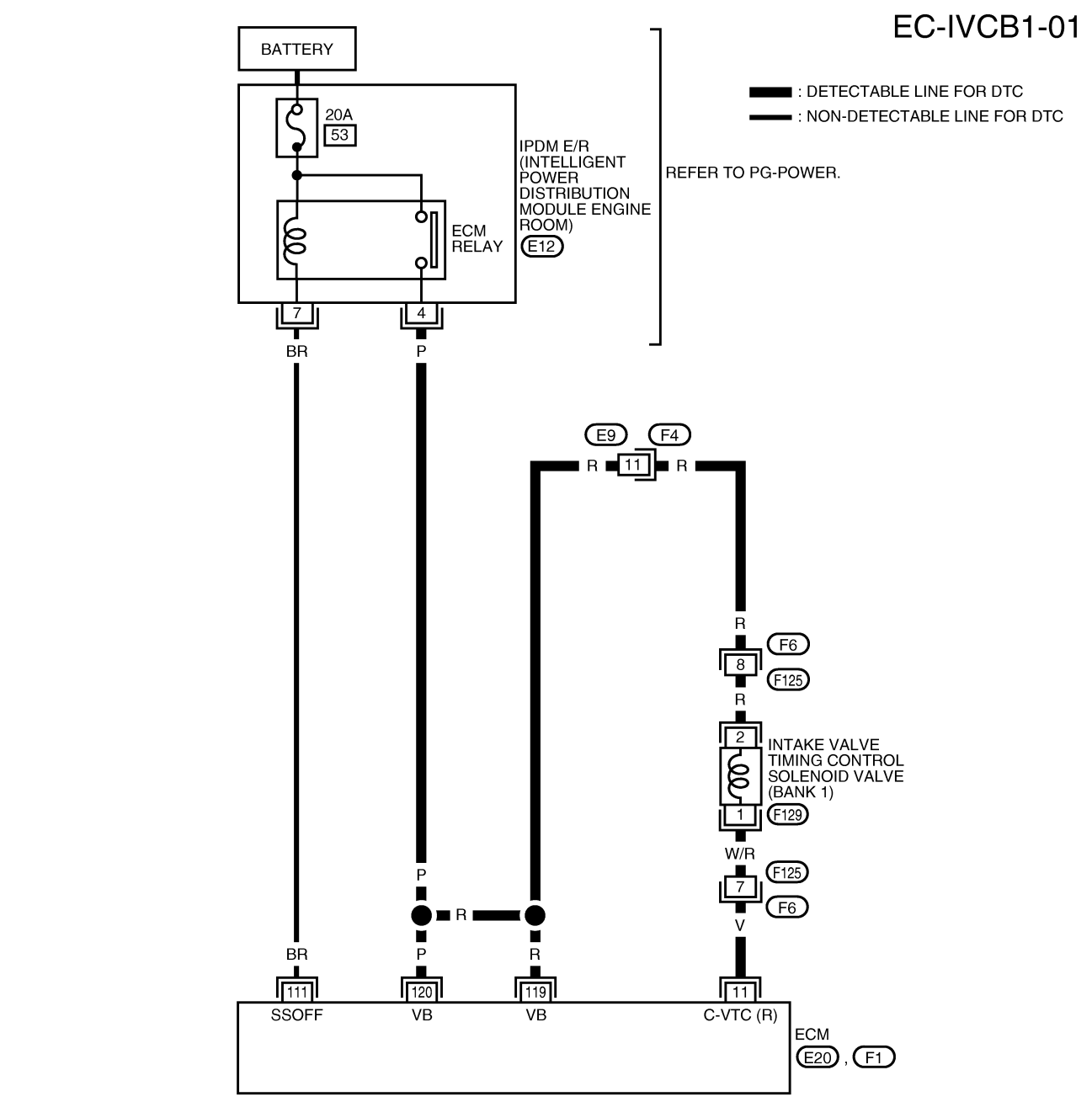
WITHOUT CONSULT-II

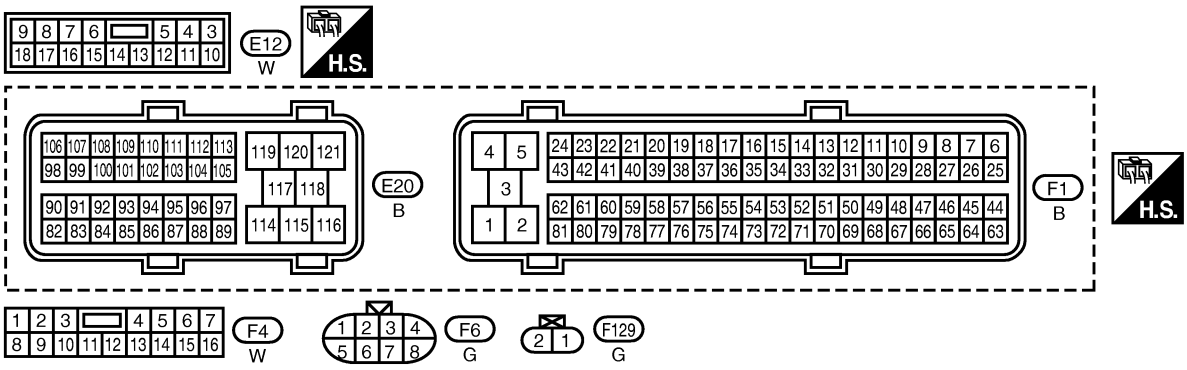
1. Start engine and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

4. If 1st trip DTC is detected, go to EC-767, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000Y4



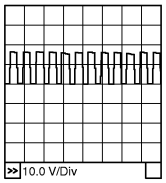


MBWA1300E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

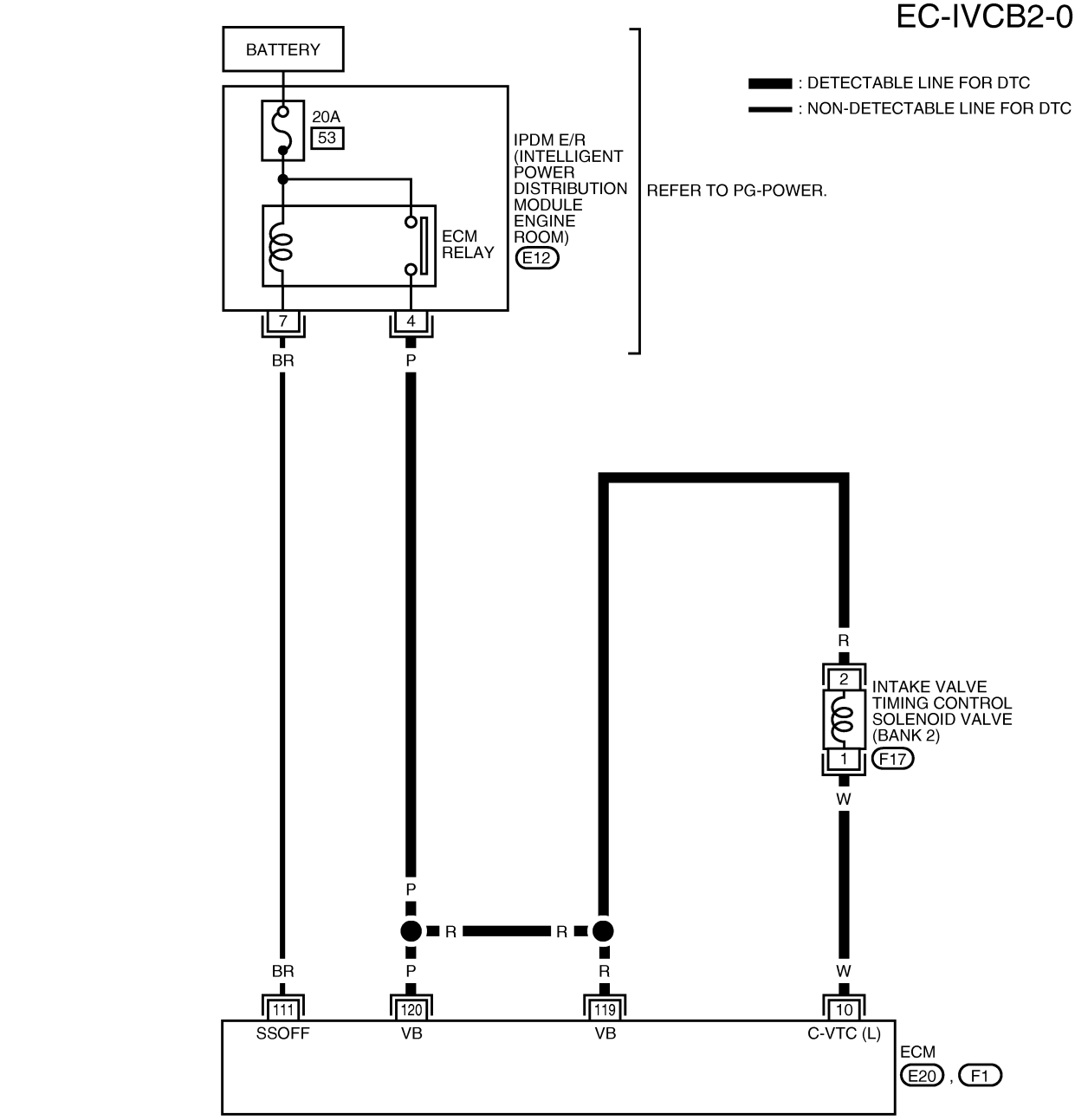
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

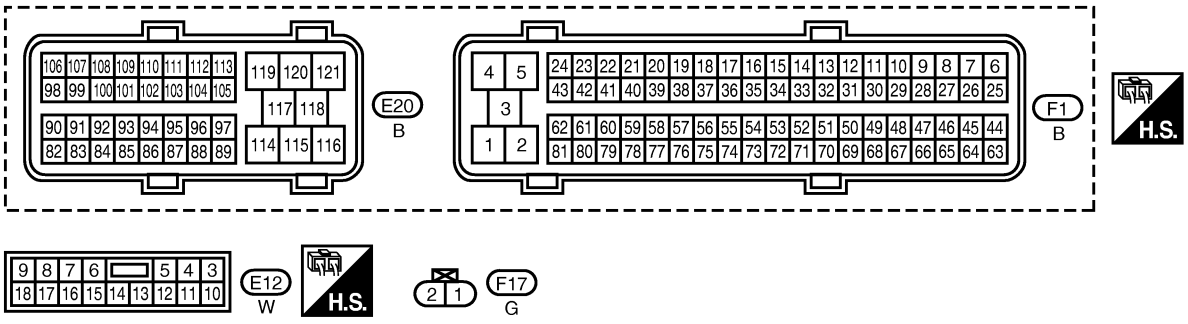
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	V	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-IVCB2-01



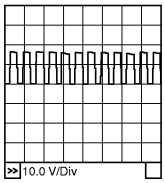


MBWA1301E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10	W	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	7 - 12V★  PBIB1790E
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

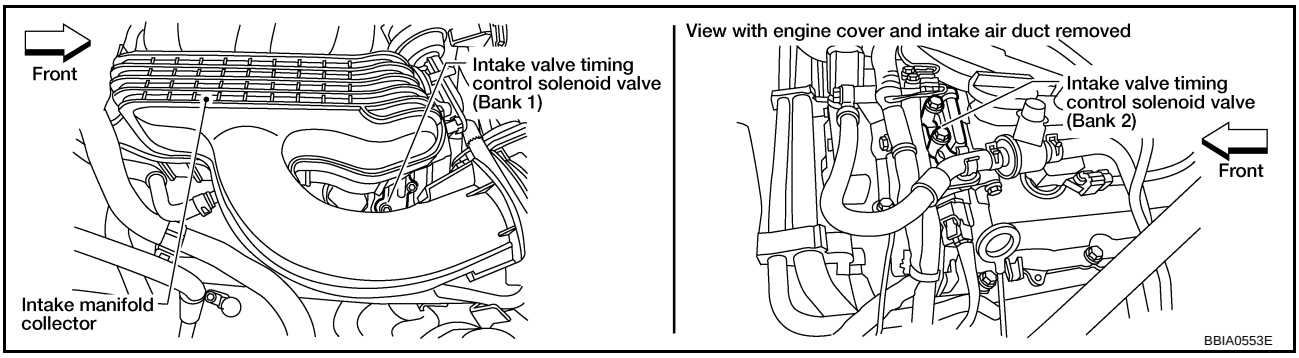
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000Y5

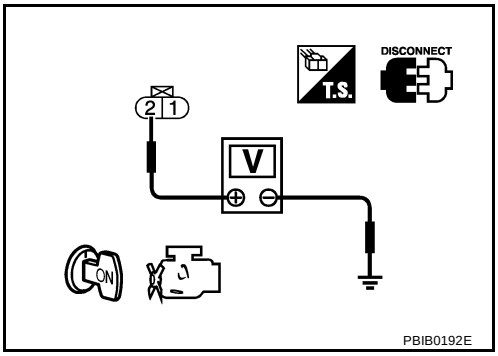
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.



3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4 (bank 1)
- Harness connectors F6, F125 (bank 1)
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R
- Harness for open or short between intake valve timing control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6 (bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-768, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace intake valve timing control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

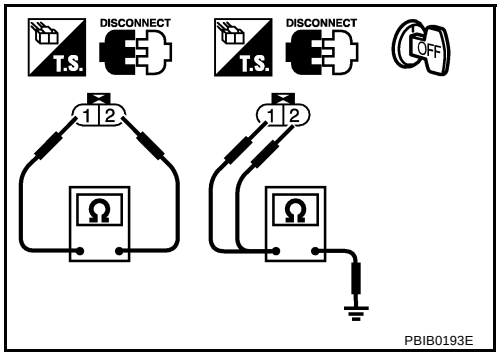
GBS000Y6

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

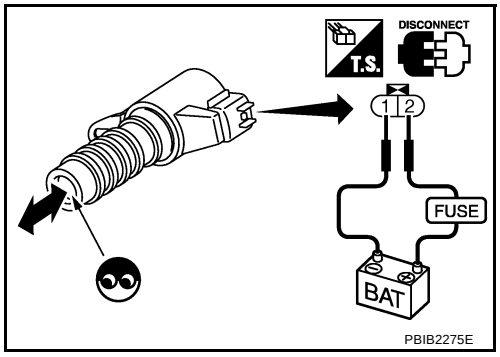
If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.



3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

GBS000Y7

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-53, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

GBS000Y8

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

GBS000Y9

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), Neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

GBS000YA

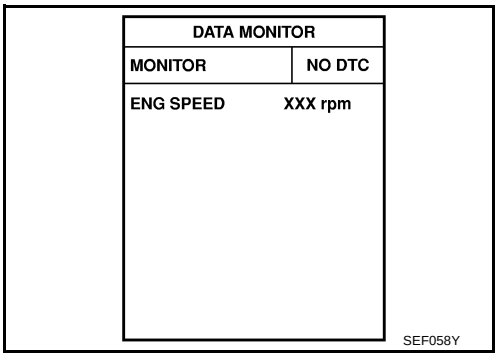
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Set shift lever to P position (A/T) or neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
8. Set shift lever to P position (A/T) or neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10. If DTC is detected, go to EC-770, "Diagnostic Procedure" .



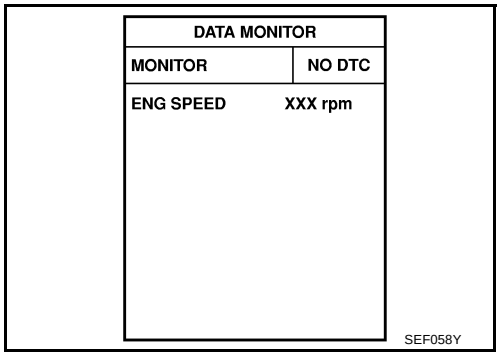
Without CONSULT-II

1. Turn ignition witch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P position (A/T) or neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
7. Set shift lever to P position (A/T) or neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
10. If DTC is detected, go to EC-770, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Set shift lever to P or N position (A/T) or neutral position (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-770, "Diagnostic Procedure" .



Without CONSULT-II

1. Turn ignition witch ON and wait at least 1 second.
2. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
3. Set shift lever to P or N position (A/T) or neutral position (M/T).
4. Start engine and let it idle for 3 seconds.
5. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
6. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
7. If DTC is detected, go to EC-770, "Diagnostic Procedure" .

Diagnostic Procedure

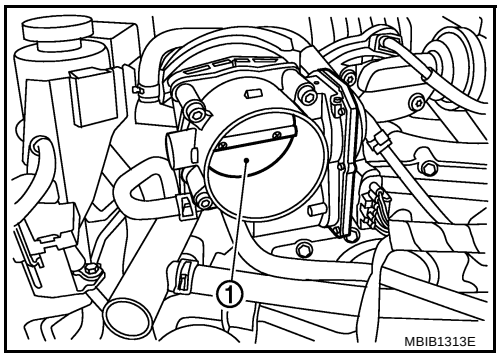
GBS000YB

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

GBS000YC

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-769 or EC-778 .
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

GBS000YD

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

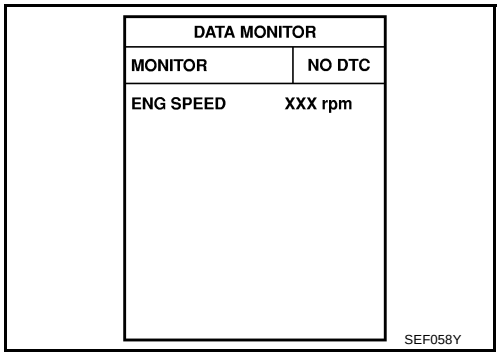
DTC Confirmation Procedure

GBS000YE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when the engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-774, "Diagnostic Procedure" .

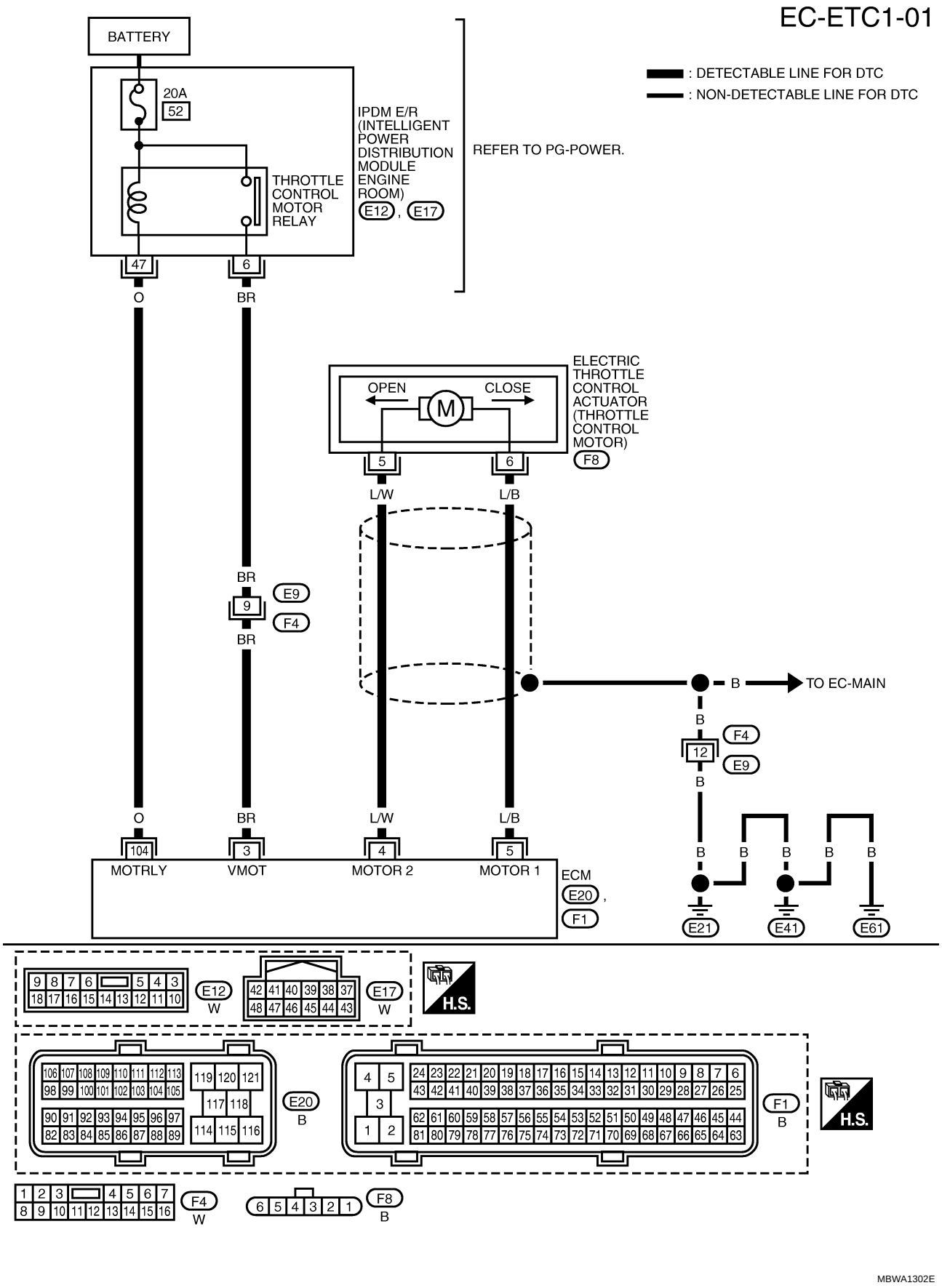


WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-774, "Diagnostic Procedure" .

Wiring Diagram

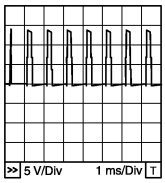
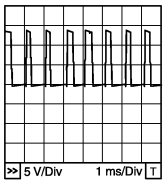
GBS000YF



MBWA1302E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

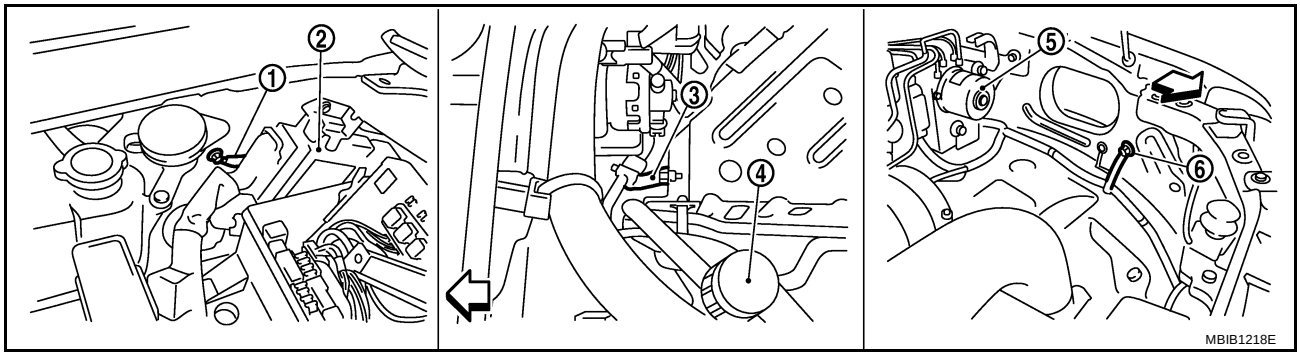
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000YG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C hi-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

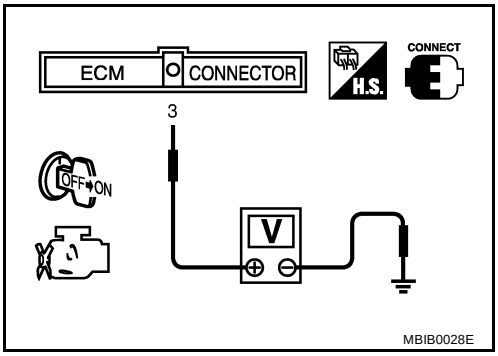
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



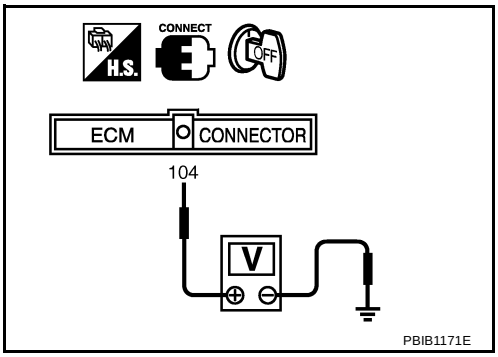
OK or NG

OK >> GO TO 9.
NG >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

OK or NG

OK >> GO TO 8.
NG >> Replace 20A fuse.

6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

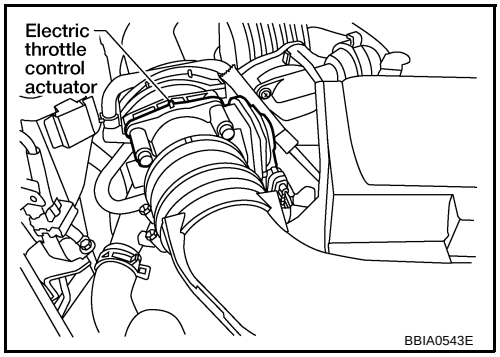
Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

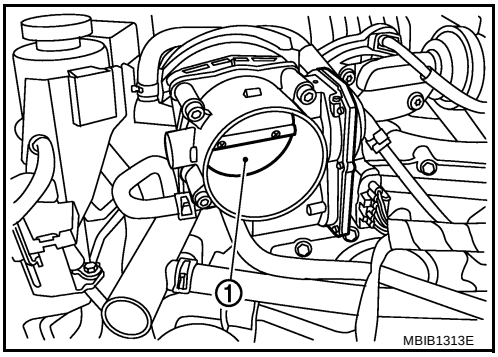
OK >> GO TO 10.
NG >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

OK or NG

OK >> GO TO 11.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-777, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

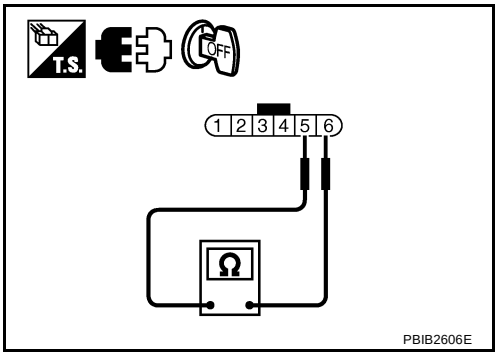
GBS000YH

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-614, "Throttle Valve Closed Position Learning" .
5. Perform EC-614, "Idle Air Volume Learning" .



Removal and Installation

GBS000YI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

GBS000YJ

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

GBS000YK

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

GBS000YL

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

GBS000YM

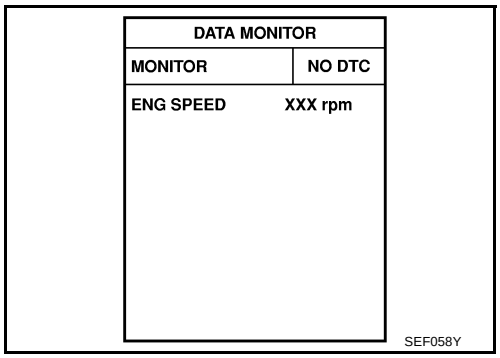
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-781, "Diagnostic Procedure" .



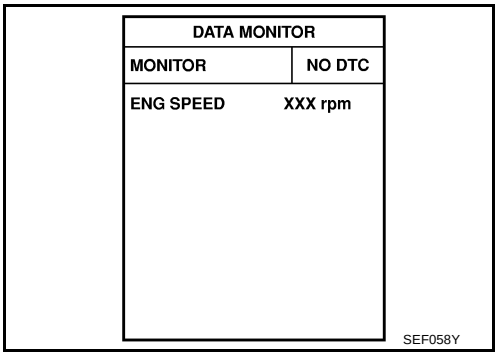
Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-781, "Diagnostic Procedure" .

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR””mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-781, "Diagnostic Procedure" .

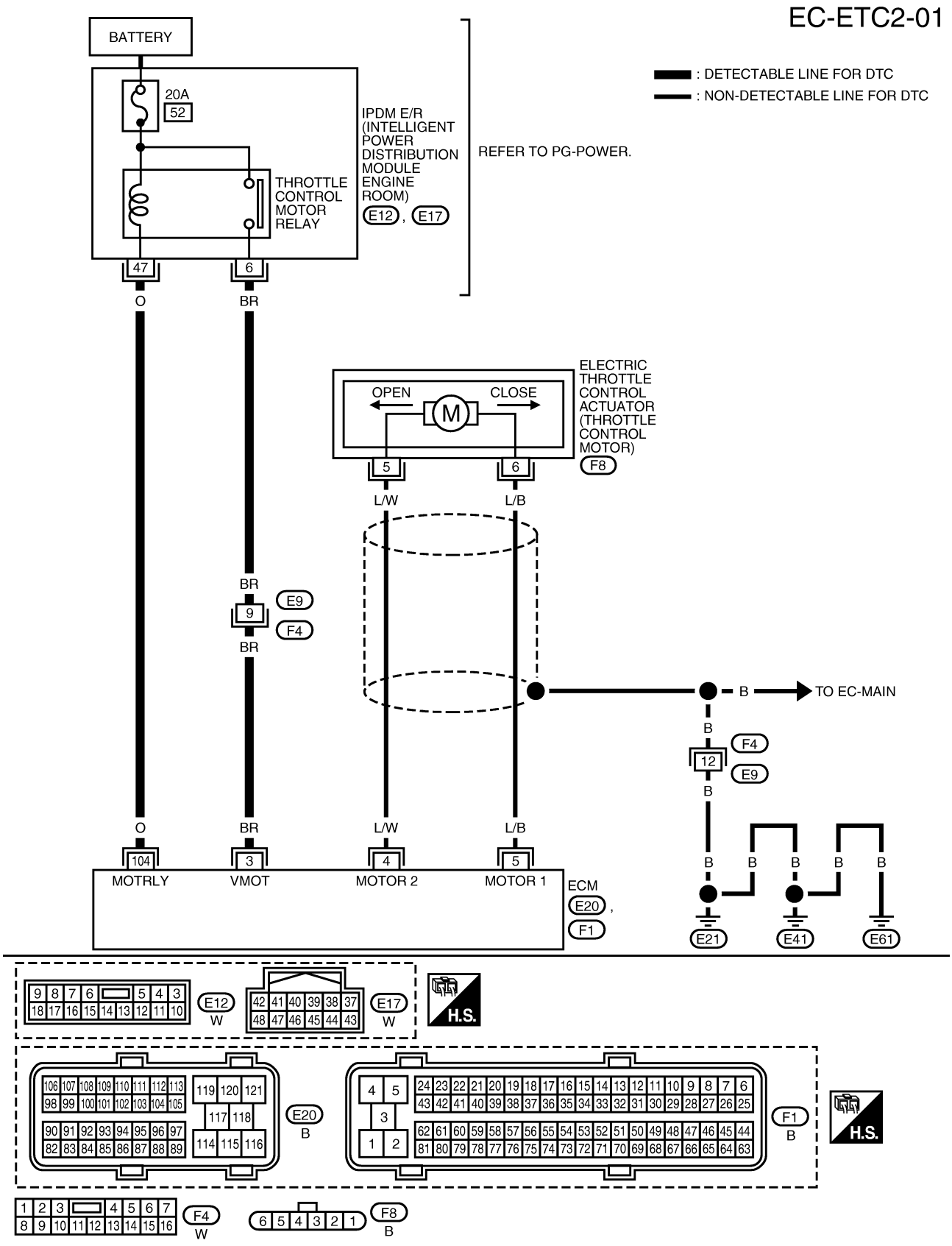


Without CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-781, "Diagnostic Procedure" .

Wiring Diagram

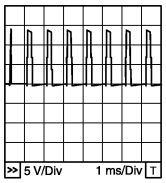
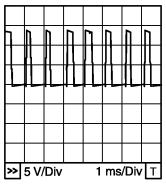
GBS000YN



MBWA1303E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

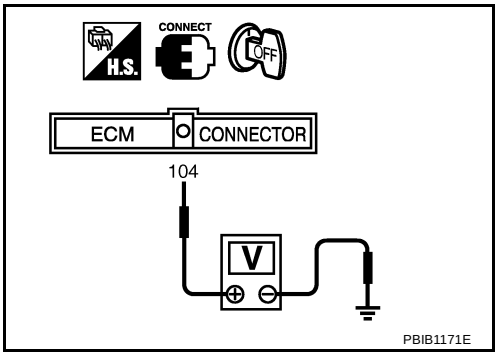
Diagnostic Procedure

GBS000YO

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

Voltage: Battery voltage



PBIB1171E

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E17.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.

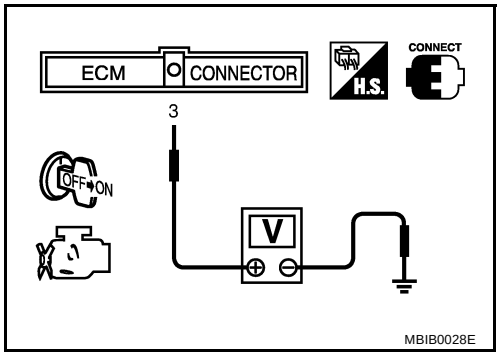
OK or NG

OK >> GO TO 7.
NG >> Replace 20A fuse.

4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .

NG >> Repair or replace harness or connectors.

DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

GBS000YP

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

GBS000YQ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

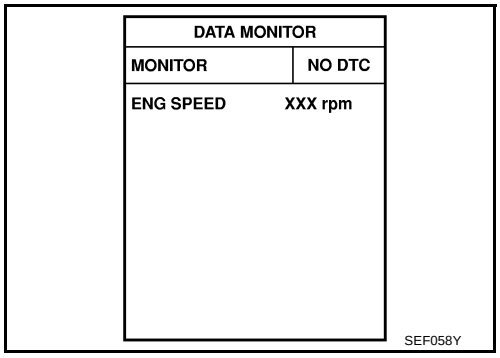
DTC Confirmation Procedure

GBS000YR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-786, "Diagnostic Procedure" .

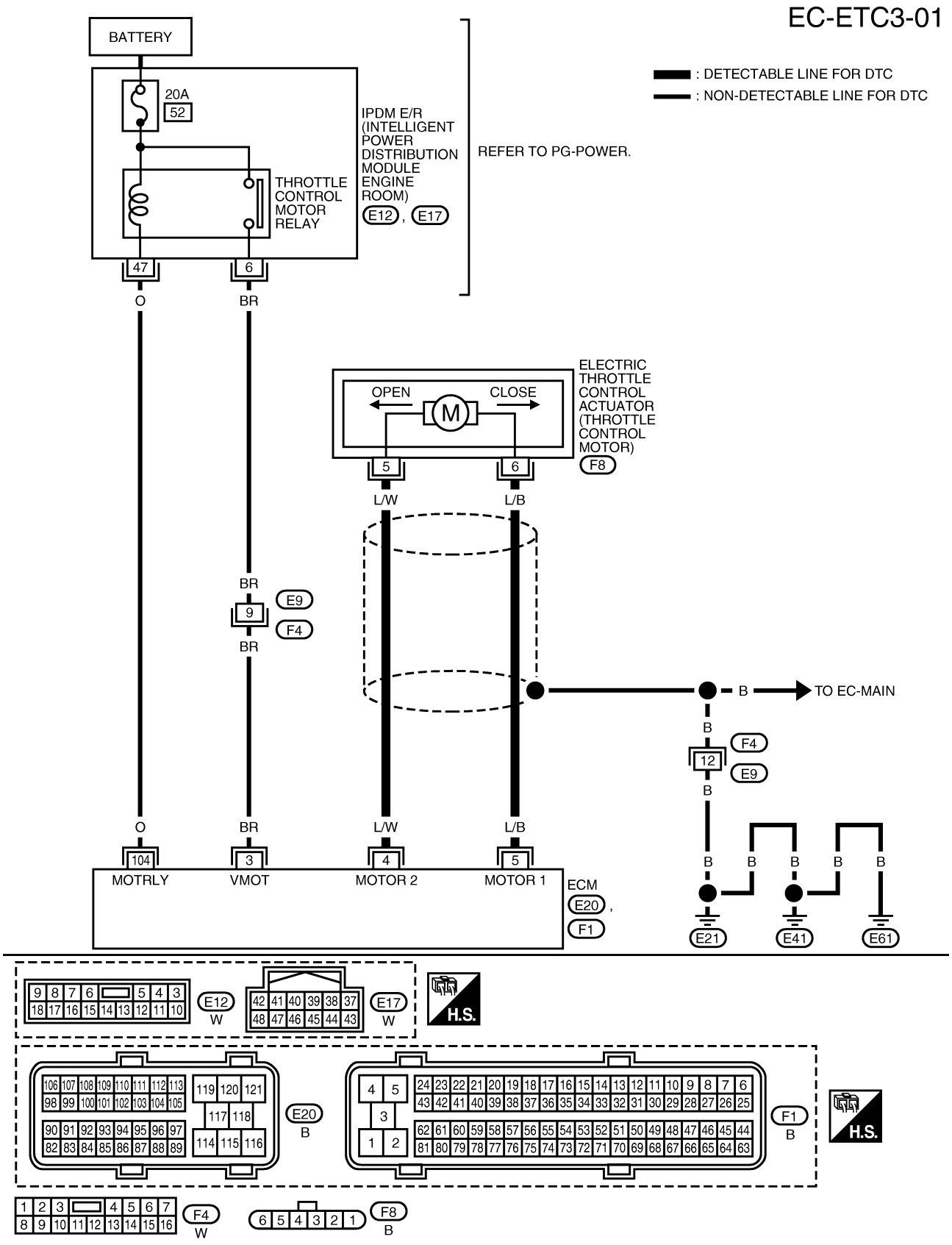


WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-786, "Diagnostic Procedure" .

Wiring Diagram

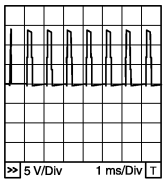
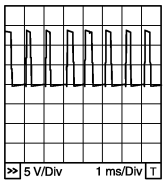
GBS000YS



MBWA1304E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	BR	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	L/W	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	L/B	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

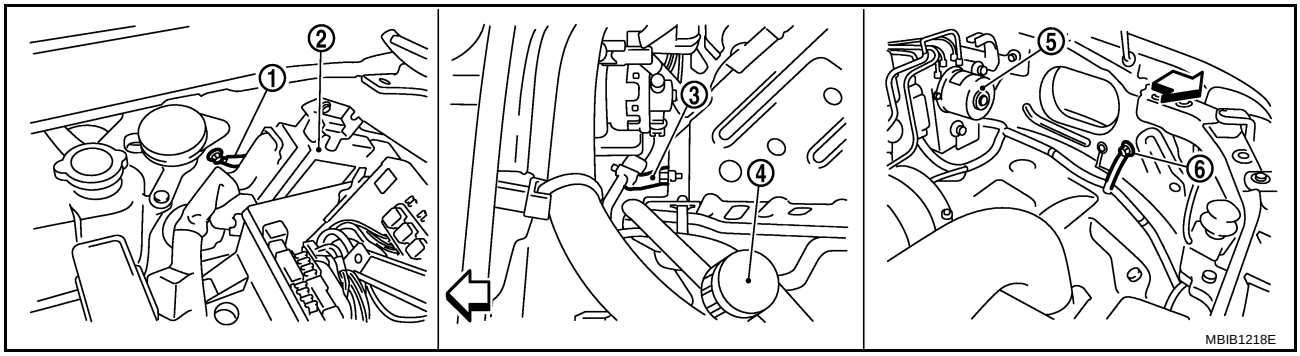
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000YT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

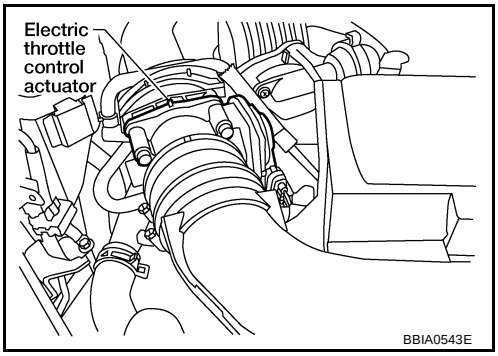
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C hi-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-787, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

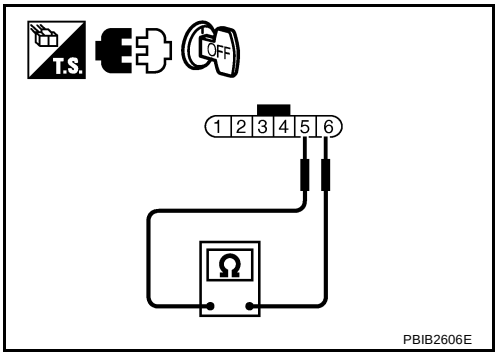
Component Inspection

GBS000YU

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-614, "Throttle Valve Closed Position Learning" .
5. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS000YV

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

Description

GBS000Z4

SYSTEM DESCRIPTION

NOTE:
If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

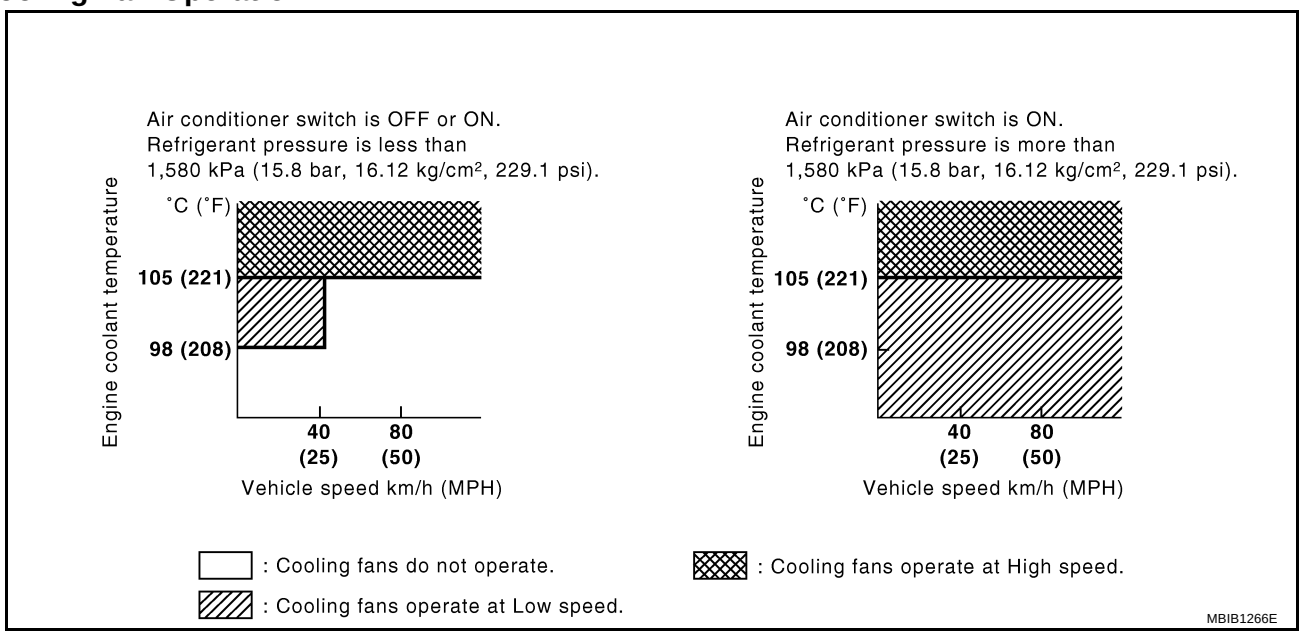
Cooling Fan Control

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage*1		
Wheel sensor	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low (LOW)	1	3
High (HI)	2	3

CONSULT-II Reference Value in Data Monitor Mode

GBS000Z5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

On Board Diagnosis Logic

GBS000Z6

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant level was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● IPDM E/R ● Cooling fan ● Cooling fan (Crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Reservoir tank ● Reservoir tank cap ● Water pump ● Thermostat For more information, refer to EC-797, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-17, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-20, "Changing 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-15, "Engine Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

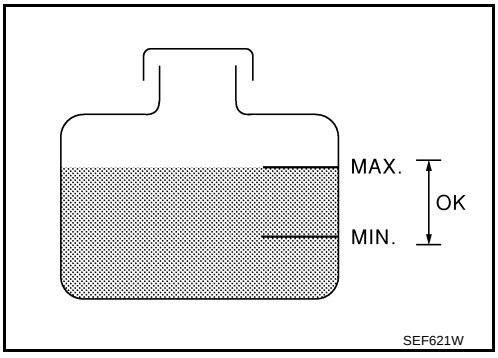
GBS000Z7

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:
Never remove a radiator cap and/or a reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-795, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-795, "Diagnostic Procedure" .
3. Turn ignition switch ON.



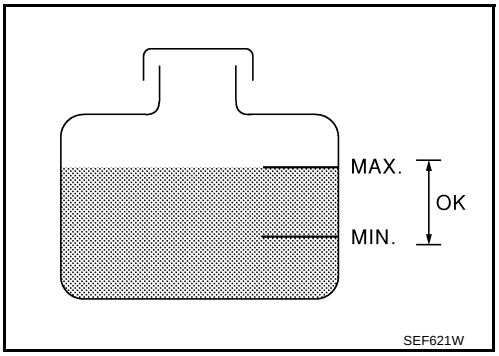
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-795, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

WITHOUT CONSULT-II

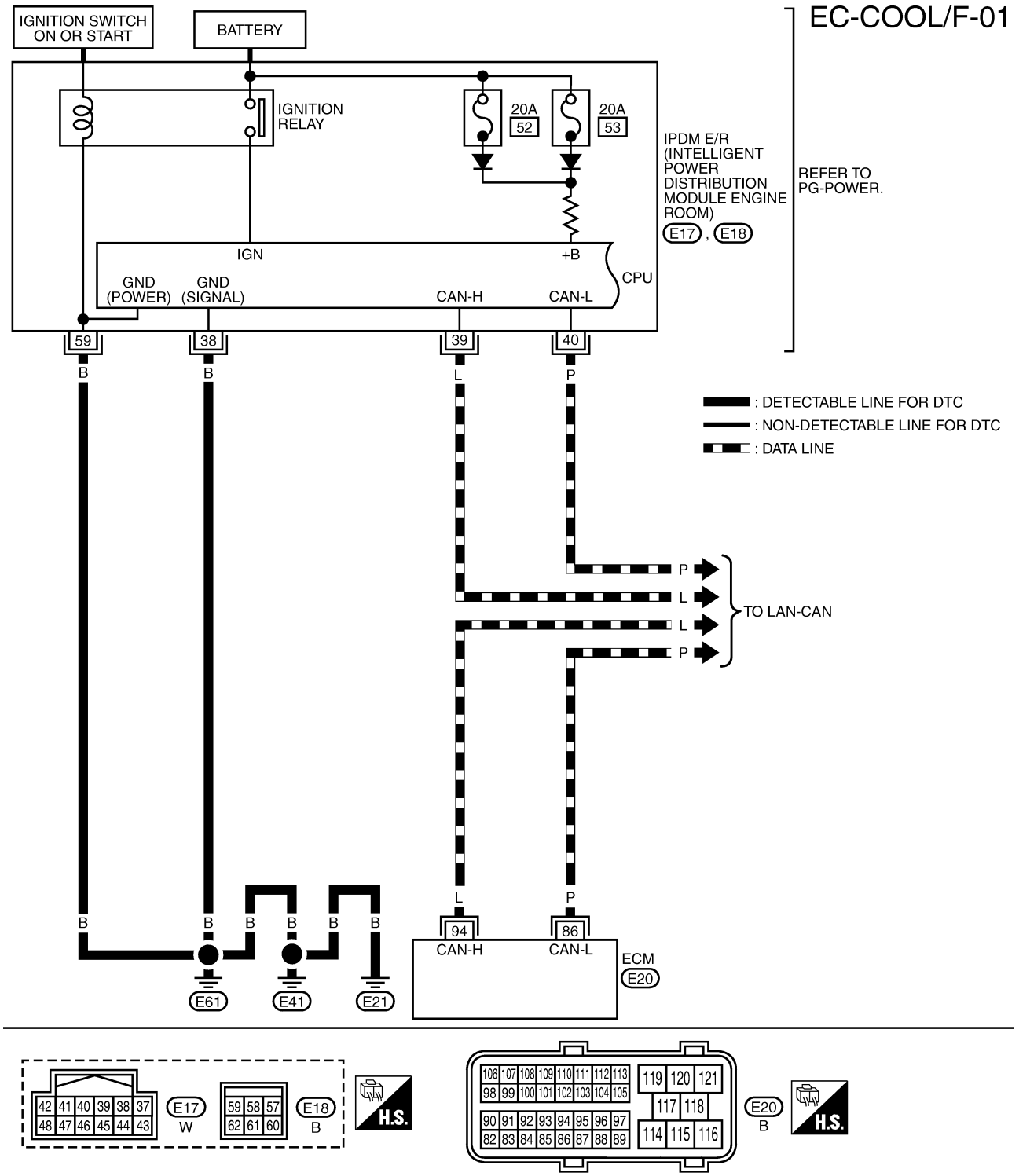
1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-795, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-795, "Diagnostic Procedure" .
3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-19, "Auto Active Test" .
4. If NG, go to EC-795, "Diagnostic Procedure" .



SEF621W

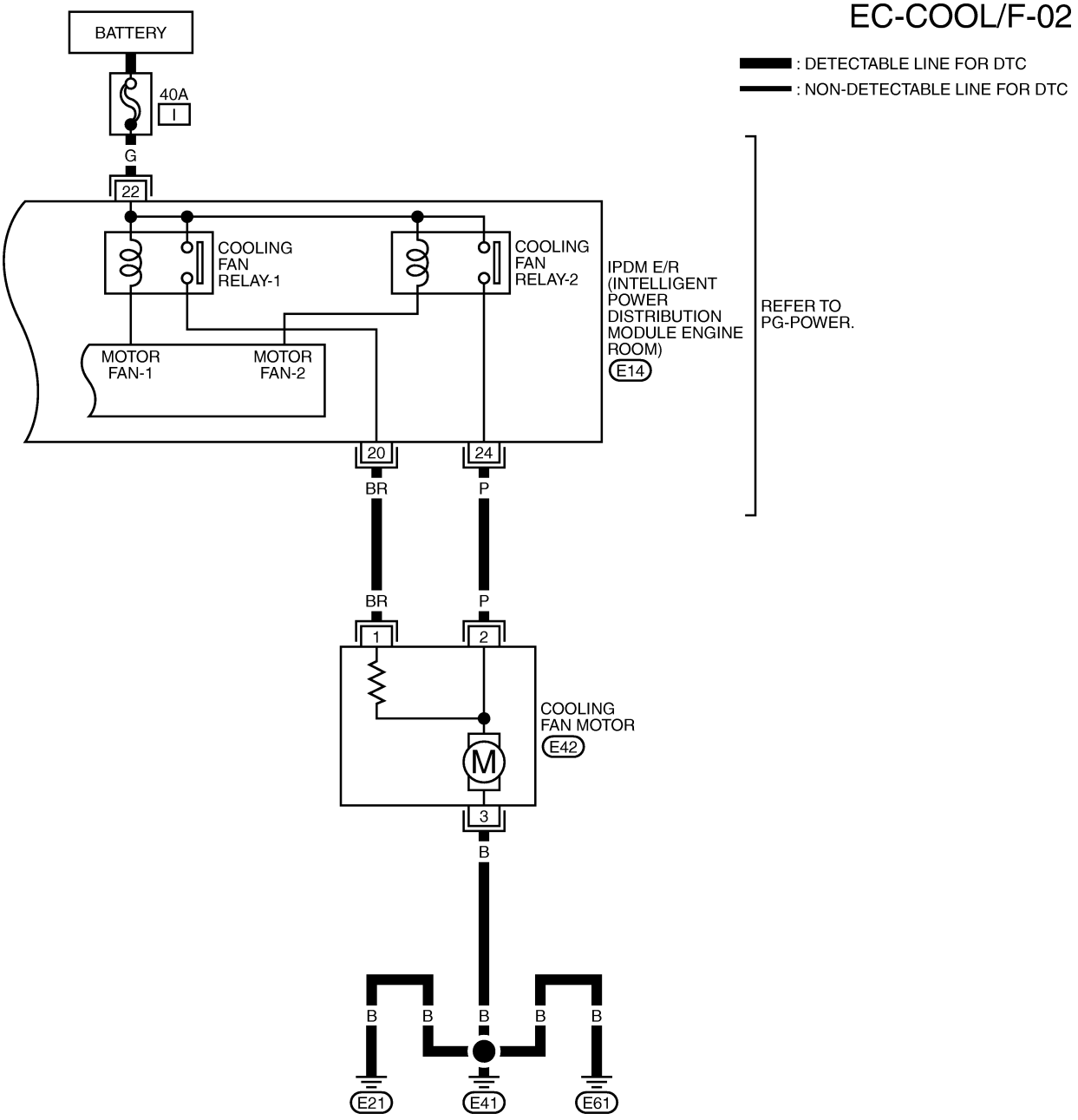
Wiring Diagram

GBS000Z8



MBWA1305E

EC-COOL/F-02



MBWA1384E

Diagnostic Procedure

GBS000Z9

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

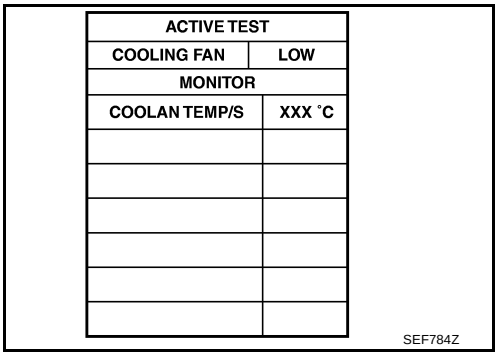
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Check cooling fan (crankshaft driven). Refer to CO-21, "Removal and Installation (Crankshaft Driven Type)" .

2. CHECK COOLING FAN OPERATION

With CONSULT-II

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that cooling fan operate at each speed (LOW/HI).



OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-796, "PROCEDURE A" .)

3. CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PG-19, "Auto Active Test" .
2. Make sure that cooling fan operate at each speed (Low/High).

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-796, "PROCEDURE A" .)

4. CHECK COOLING SYSTEM FOR LEAK

Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

5. CHECK RESERVOIR TANK CAP

Refer to CO-15, "Checking Reservoir Tank Cap" .

OK or NG

OK >> GO TO 6.
NG >> Replace reservoir tank cap.

6. CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to CO-27, "WATER INLET AND THERMOSTAT ASSEMBLY" .
- Engine coolant temperature sensor. Refer to EC-705, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-797, "Main 12 Causes of Overheating" .

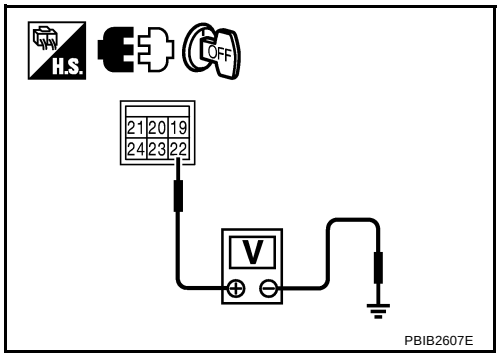
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLILNG FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E14.
3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 40A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK IPDM E/R GROUND CIRCUIT

1. Disconnect IPDM E/R harness connectors E17, E18.
2. Check harness continuity between IPDM E/R terminal 38, 59 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

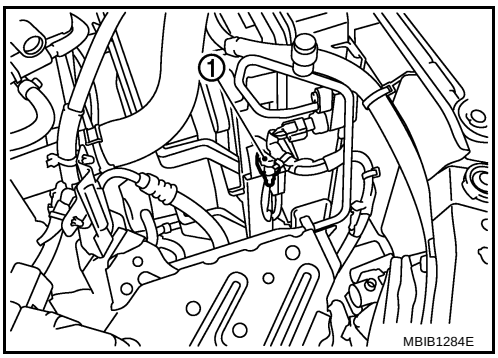
OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector (1).
2. Check harness continuity between the following;
   cooling fan motor terminal 1 and IPDM E/R terminal 20,
   cooling fan motor terminal 2 and IPDM E/R terminal 24.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COOLING FAN MOTER GROUND CIRCUIT FOR OPEN OR SHORT

1. Check harness continuity between cooling fan motor terminal 3 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK COOLING FAN MOTOR

Refer to EC-798, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motors.

7. CHECK INTERMITTENT INCIDENT

Perform EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connector.

Main 12 Causes of Overheating

GBS000ZA

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	MA-15
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-17
	4	● Reservoir tank cap	● Pressure tester	59 - 117.8 kPa (0.59 - 1.18 bar, 0.6 - 1.2 kg/cm^2 , 9 - 17 psi) (Limit)	CO-15
ON*2	5	● Coolant leaks	● Visual	No leaks	CO-10

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	CO-27
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-789).
ON*2	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	See CO-21 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	MA-17
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	MA-17
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-93
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	EM-107

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-6, "OVERHEATING CAUSE ANALYSIS" .

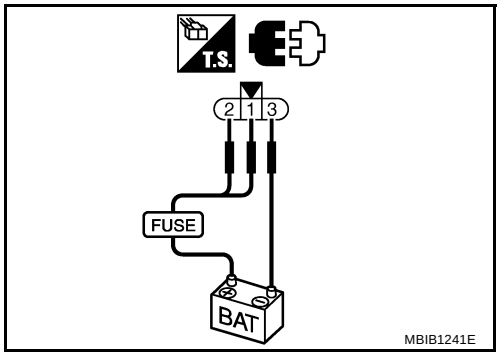
Component Inspection

GBS000ZB

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low	1	3
High	2	3



Cooling fan motor should operate.
If NG, replace cooling fan motor.

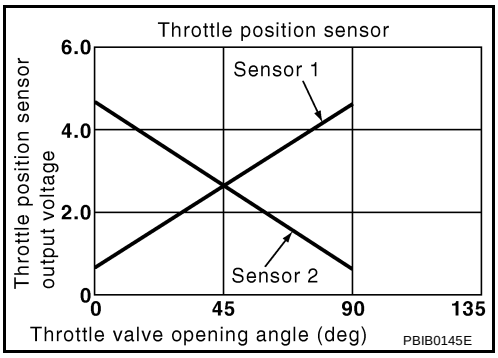
DTC P1225 TP SENSOR

PFP:16119

Component Description

GBS000ZC

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

GBS000ZD

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

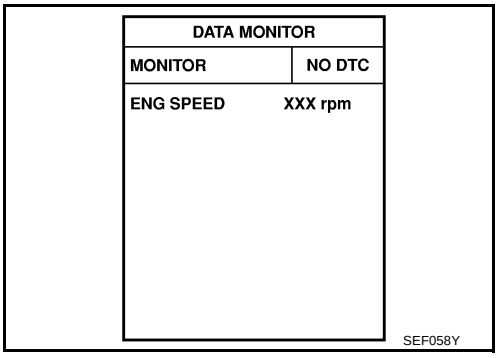
DTC Confirmation Procedure

GBS000ZE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-800, "Diagnostic Procedure" .



WITHOUT CONSULT-II

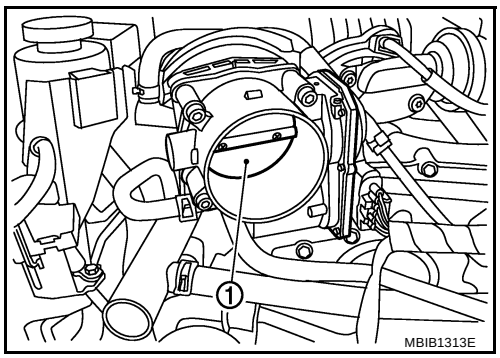
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-800, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000ZF

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

GBS000ZG

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

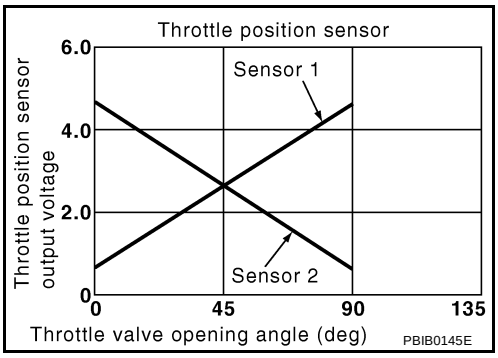
DTC P1226 TP SENSOR

PFP:16119

Component Description

GBS000ZH

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

GBS000ZI

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

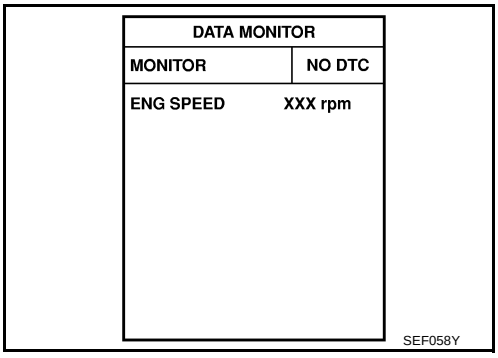
DTC Confirmation Procedure

GBS000ZJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-802, "Diagnostic Procedure" .



WITHOUT CONSULT-II

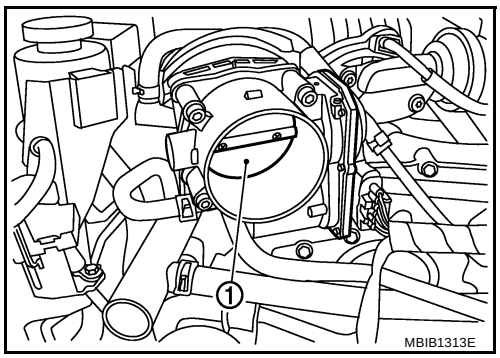
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If 1st trip DTC is detected, go to EC-802, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000ZK

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

GBS000ZL

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

GBS000ZM

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1) ● EVAP control system pressure sensor ● Power steering pressure sensor ● Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

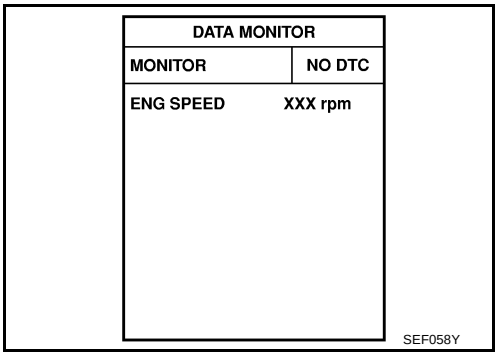
GBS000ZN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-807, "Diagnostic Procedure" .



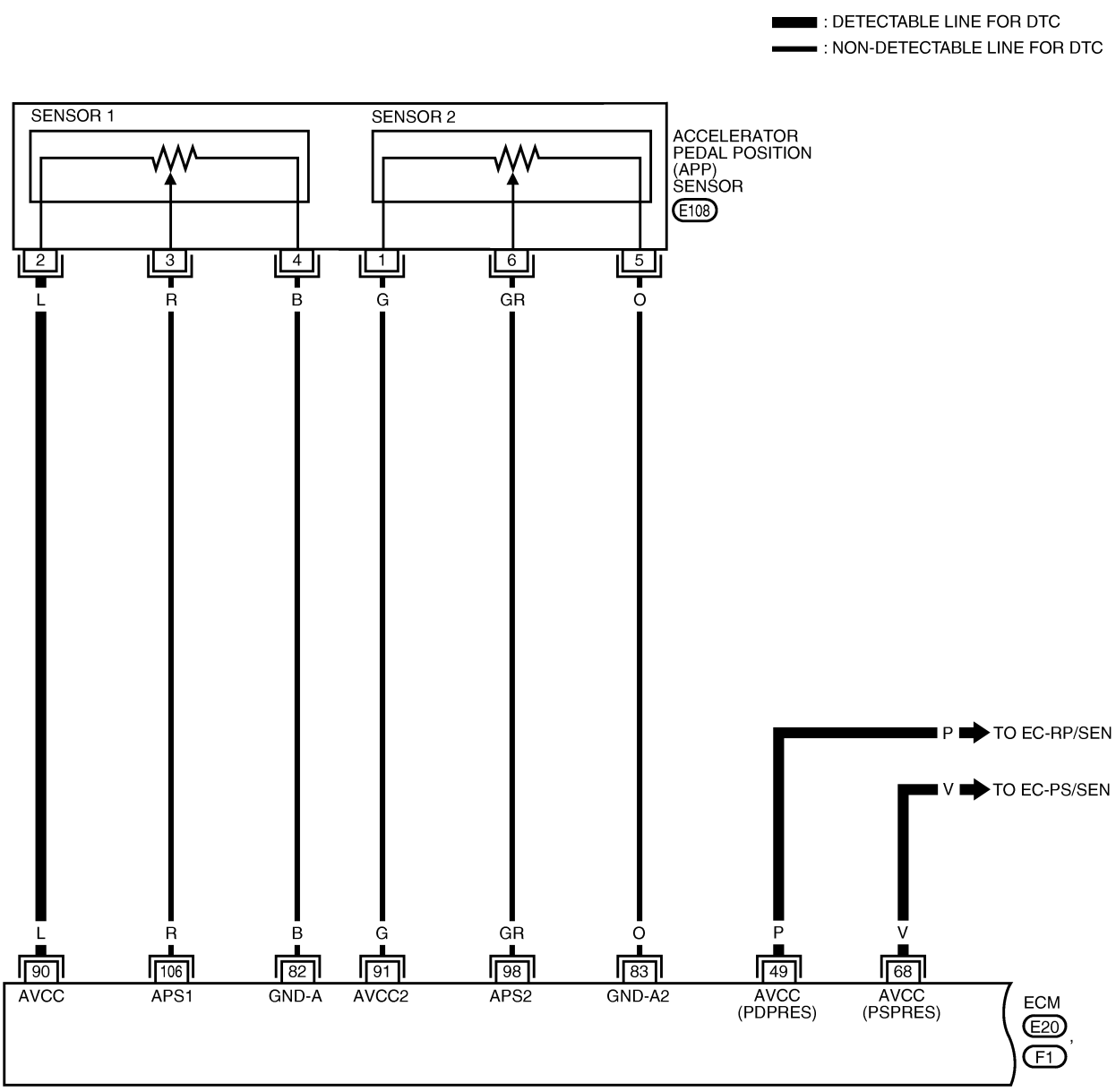
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-807, "Diagnostic Procedure" .

Wiring Diagram

GBS000ZO

EC-SEN/PW-01



MBWA1307E

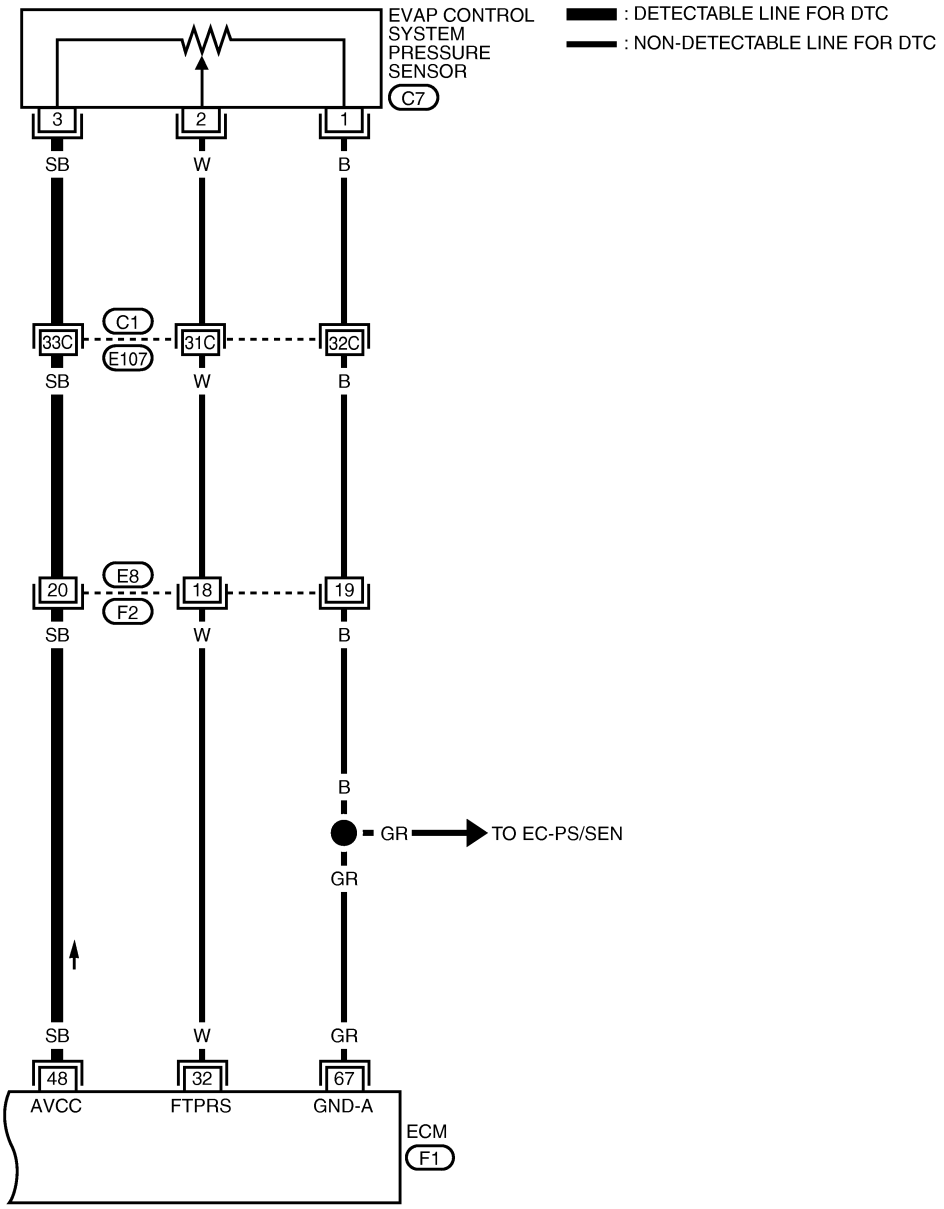
Specification data are reference values and are measured between each terminal and ground.

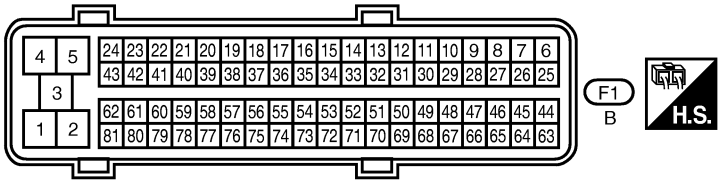
CAUTION:

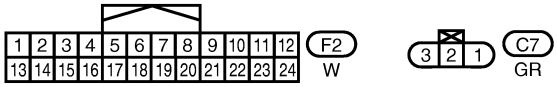
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
68	V	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

EC-SEN/PW-02







REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1295E

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 ECMs transistor. Use a ground other than ECM terminals, such as the ground.

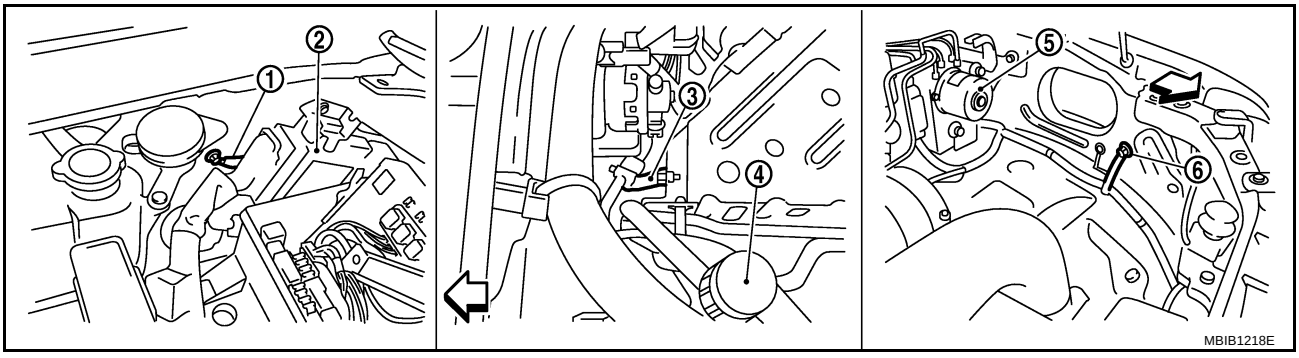
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	W	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	SB	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

GBS000ZP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground three screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

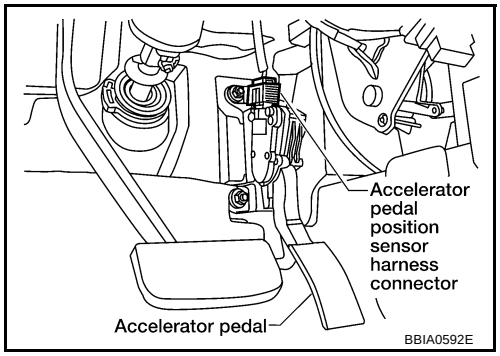
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

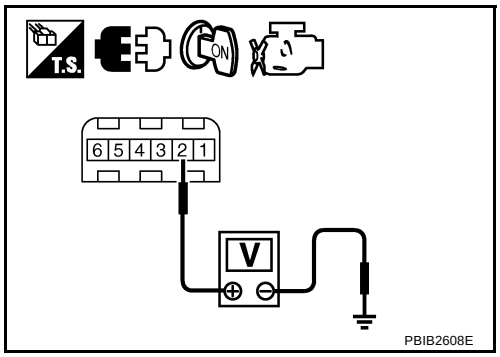
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-804
48	EVAP control system pressure sensor terminal 3	EC-804
49	Refrigerant pressure sensor terminal 3	EC-978
68	PSP sensor terminal 3	EC-742

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

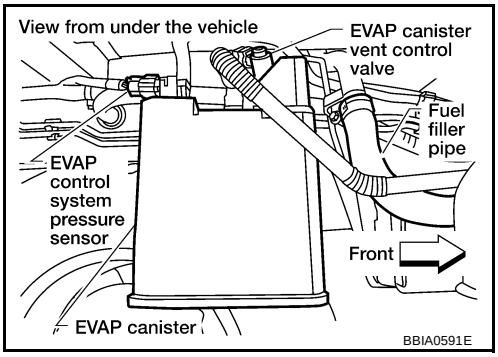
- Refrigerant pressure sensor (Refer to MTC-77, "COMPONENT INSPECTION" .)
- Power steering pressure sensor (Refer to EC-745, "Component Inspection" .)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

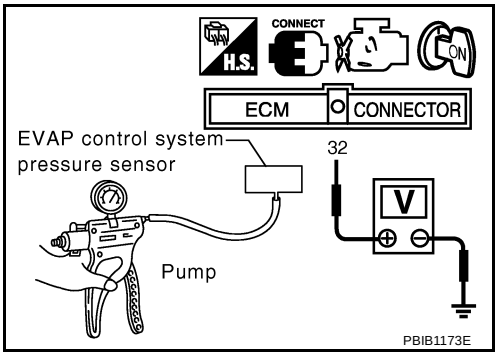
5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**



2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mbar, mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-267, -200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-933 mbar, -700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (1013 mbar, 760 mmHg, 29.92 inHg).**

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

6. CHECK APP SENSOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1271, P1281 A/F SENSOR 1

PFP:22693

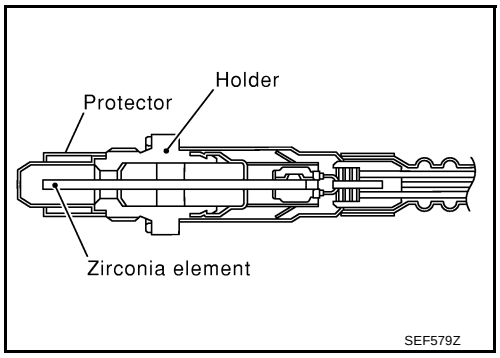
Component Description

GBS000ZQ

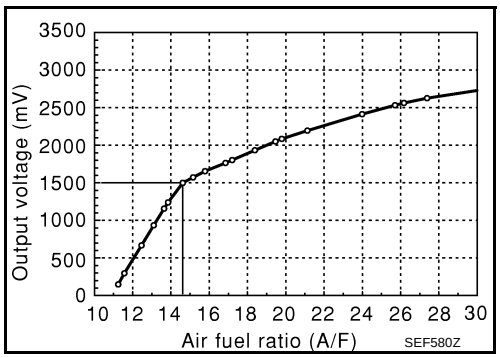
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000ZR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS000ZS

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 0V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1
P1281 1281 (Bank 2)			

DTC Confirmation Procedure

GBS000ZT

CAUTION:

Always drive vechicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

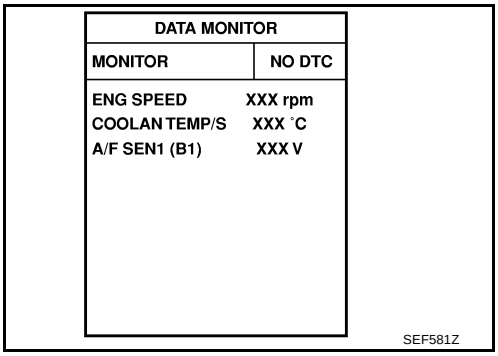
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 0V, go to EC-815, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-815, "Diagnostic Procedure" .

Overall Function Check

GBS000ZU

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Shift lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

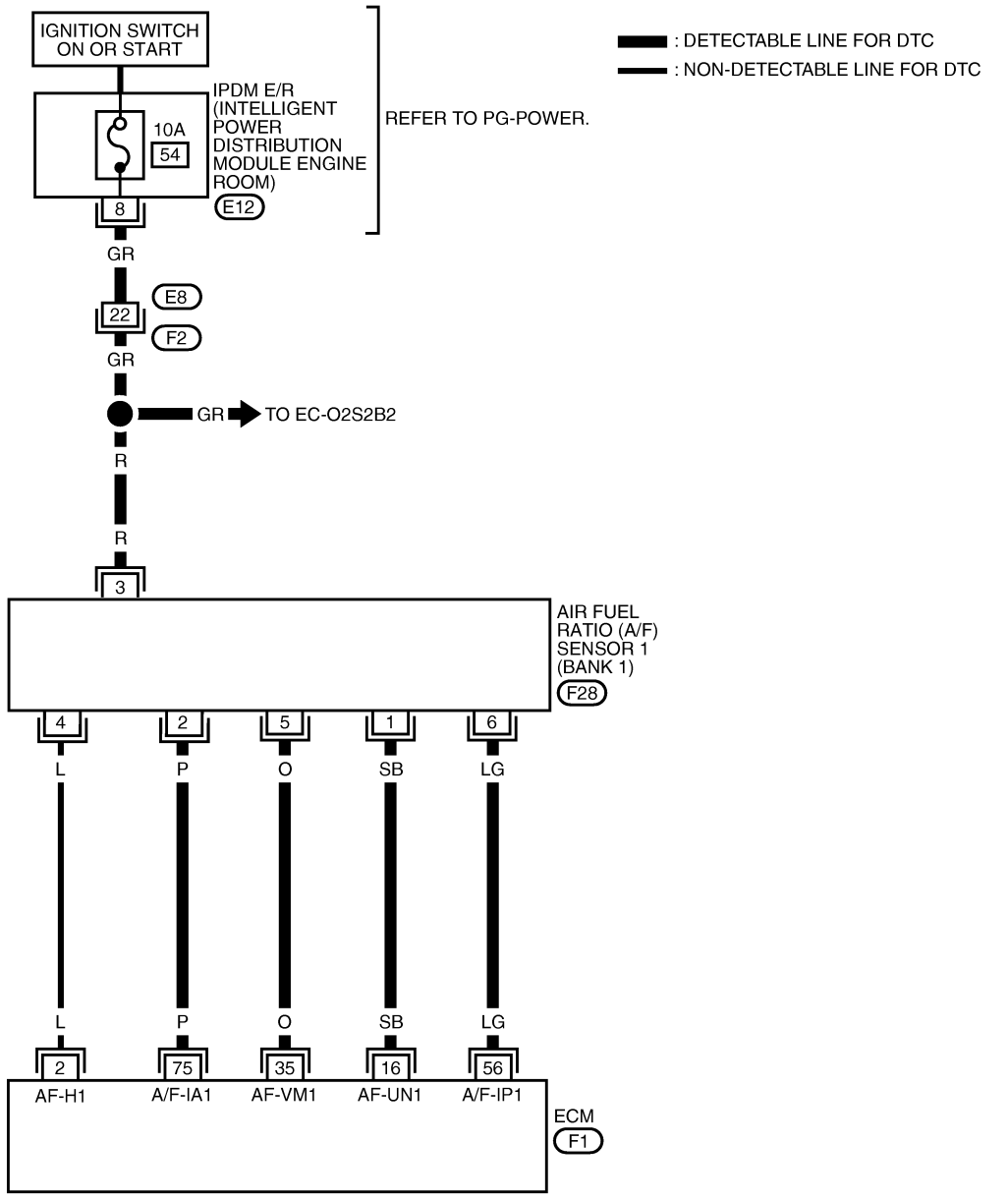
NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.**

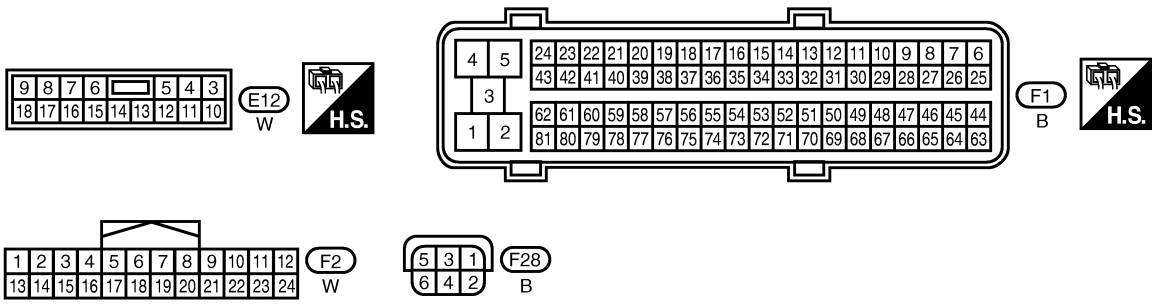
5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. Make sure that no DTC is detected.
   If 1st trip DTC is displayed, go to EC-815, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS000ZV

EC-AF1B1-01



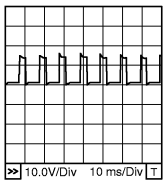


MBWA1336E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

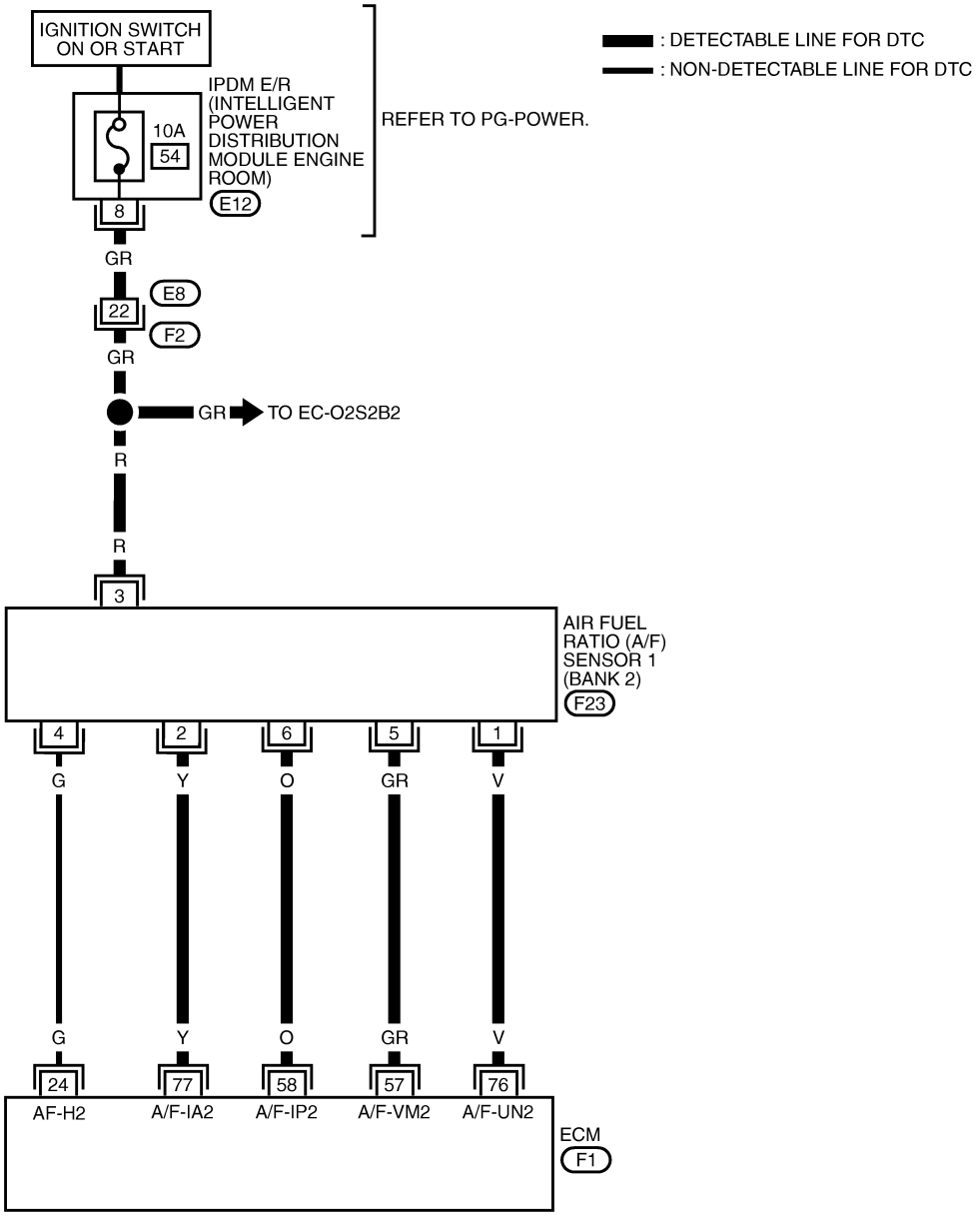
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

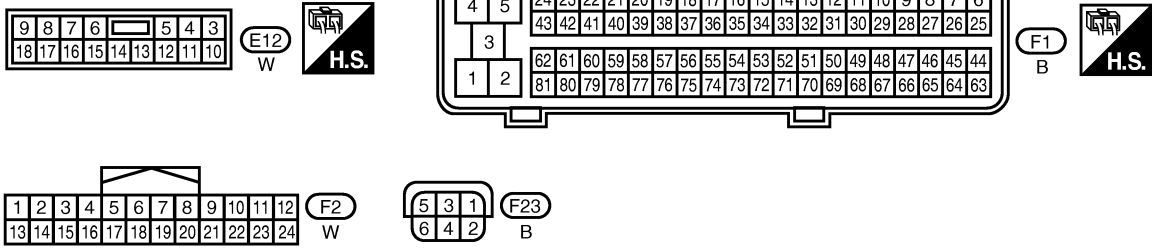
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-AF1B2-01



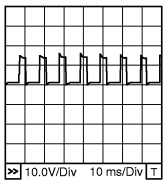


MBWA1337E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

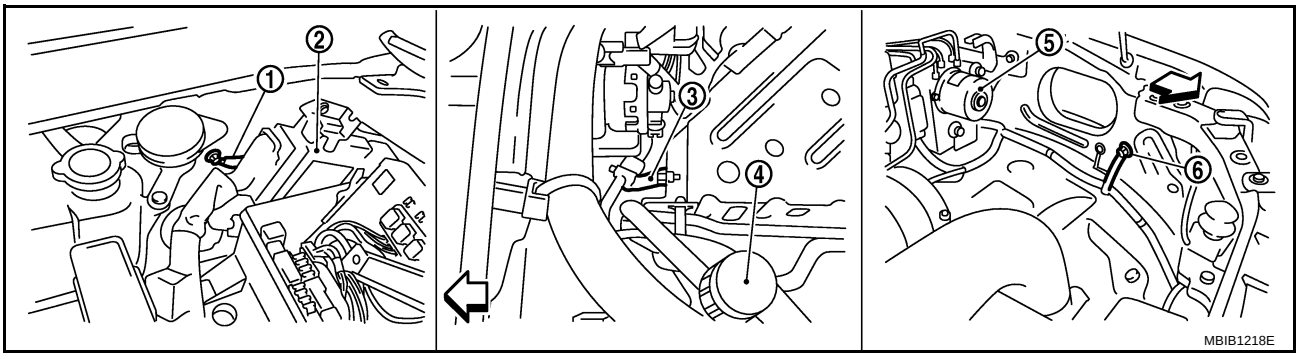
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS000ZW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

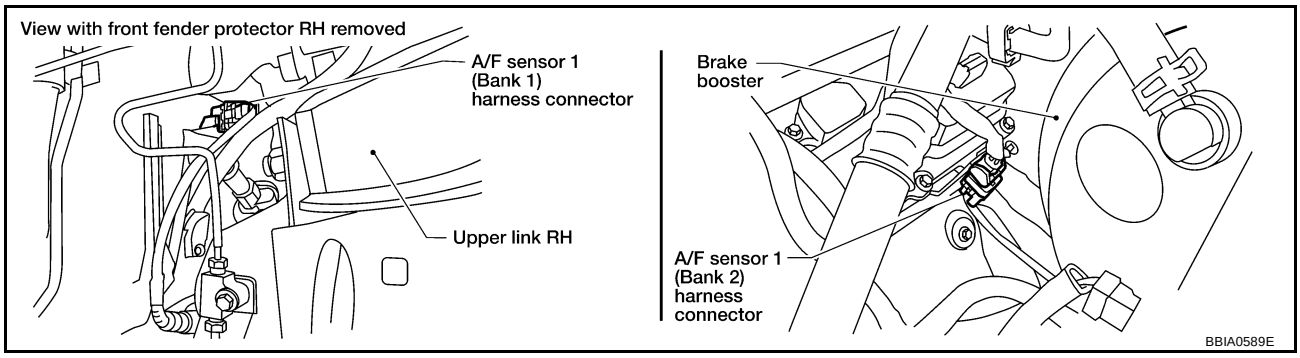
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

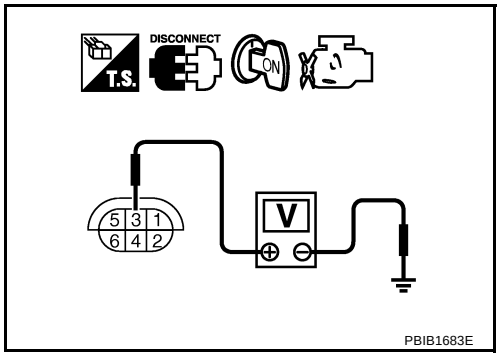
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS000ZX

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1272, P1282 A/F SENSOR 1

PFP:22693

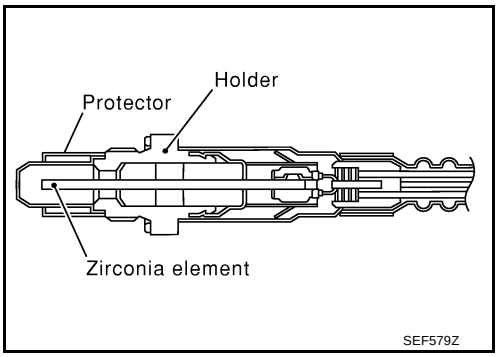
Component Description

GBS000ZY

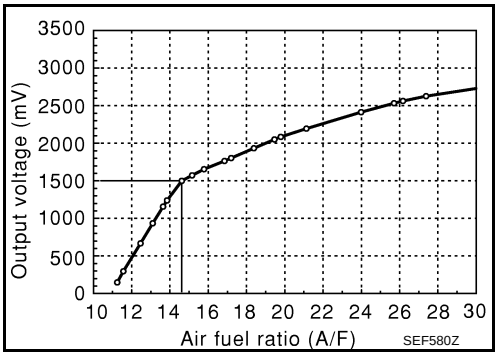
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS000ZZ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS00100

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272 (Bank 1) P1282 1282 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 5V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

GBS00101

CAUTION:
Always drive vechicle at a safe speed.

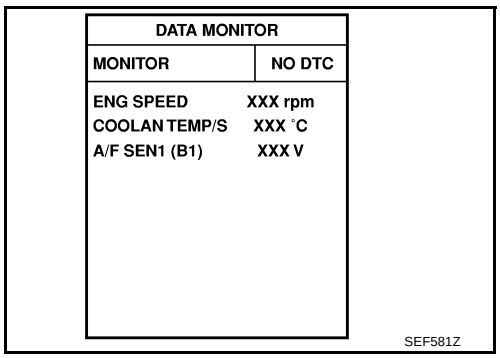
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 5V, go to EC-824, "Diagnostic Procedure" .
   If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-824, "Diagnostic Procedure" .

Overall Function Check

GBS00102

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Shift lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

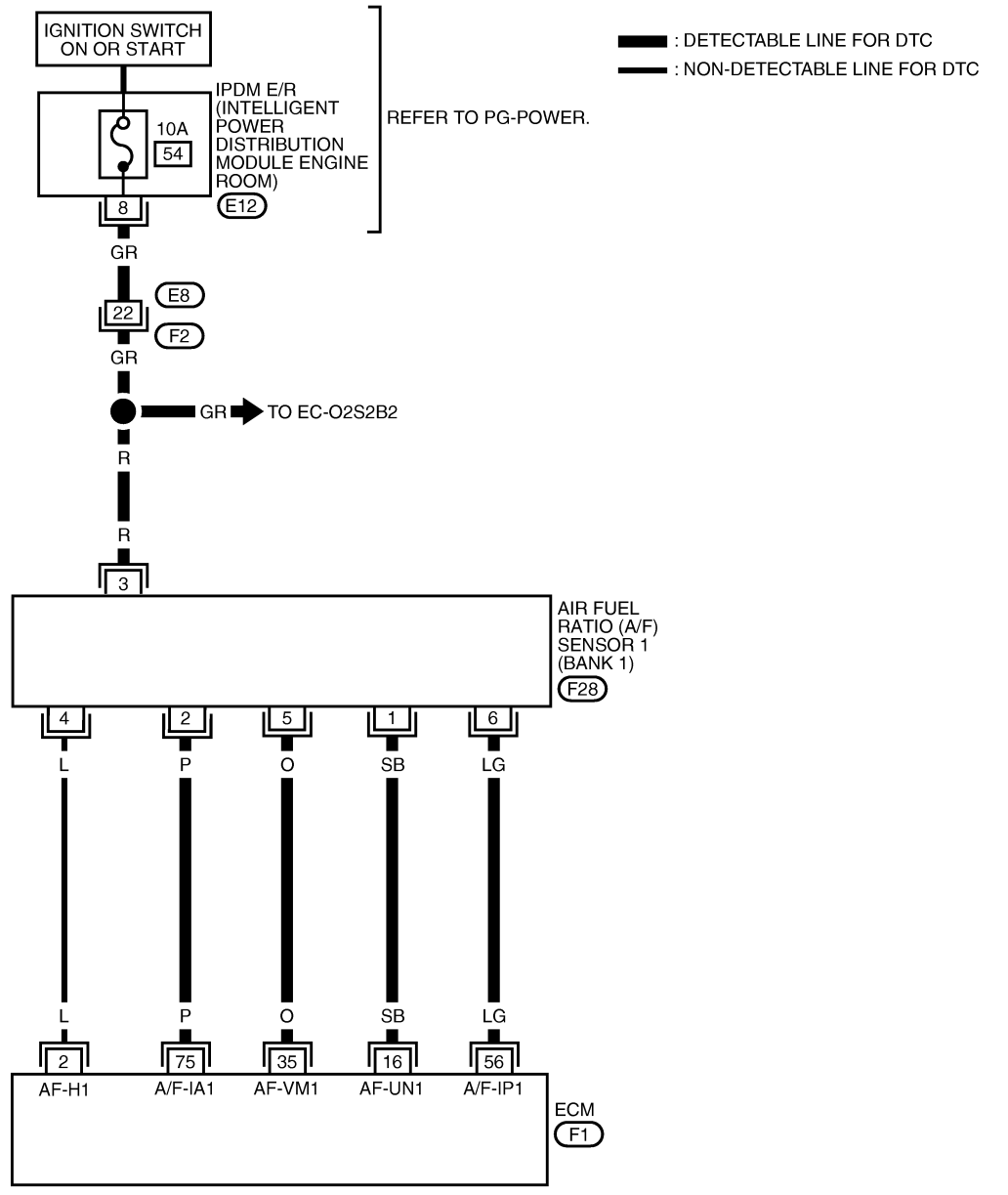
NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.**

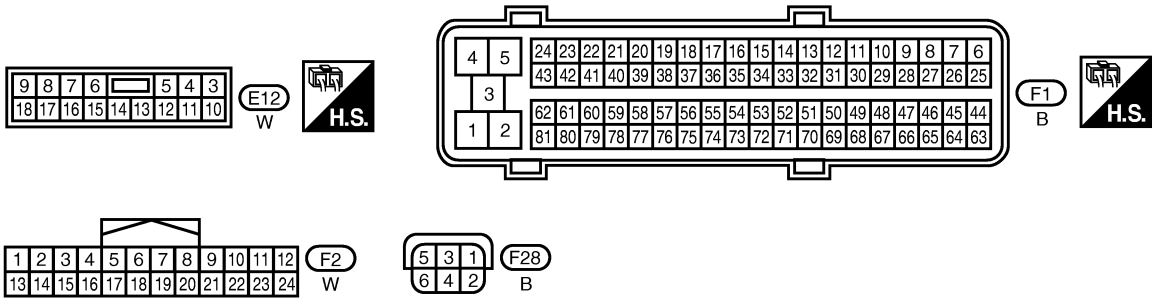
5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. Make sure that no DTC is detected.
   If 1st trip DTC is displayed, go to EC-824, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS00103

EC-AF1B1-01



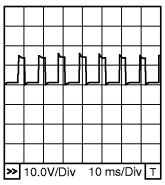


MBWA1336E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

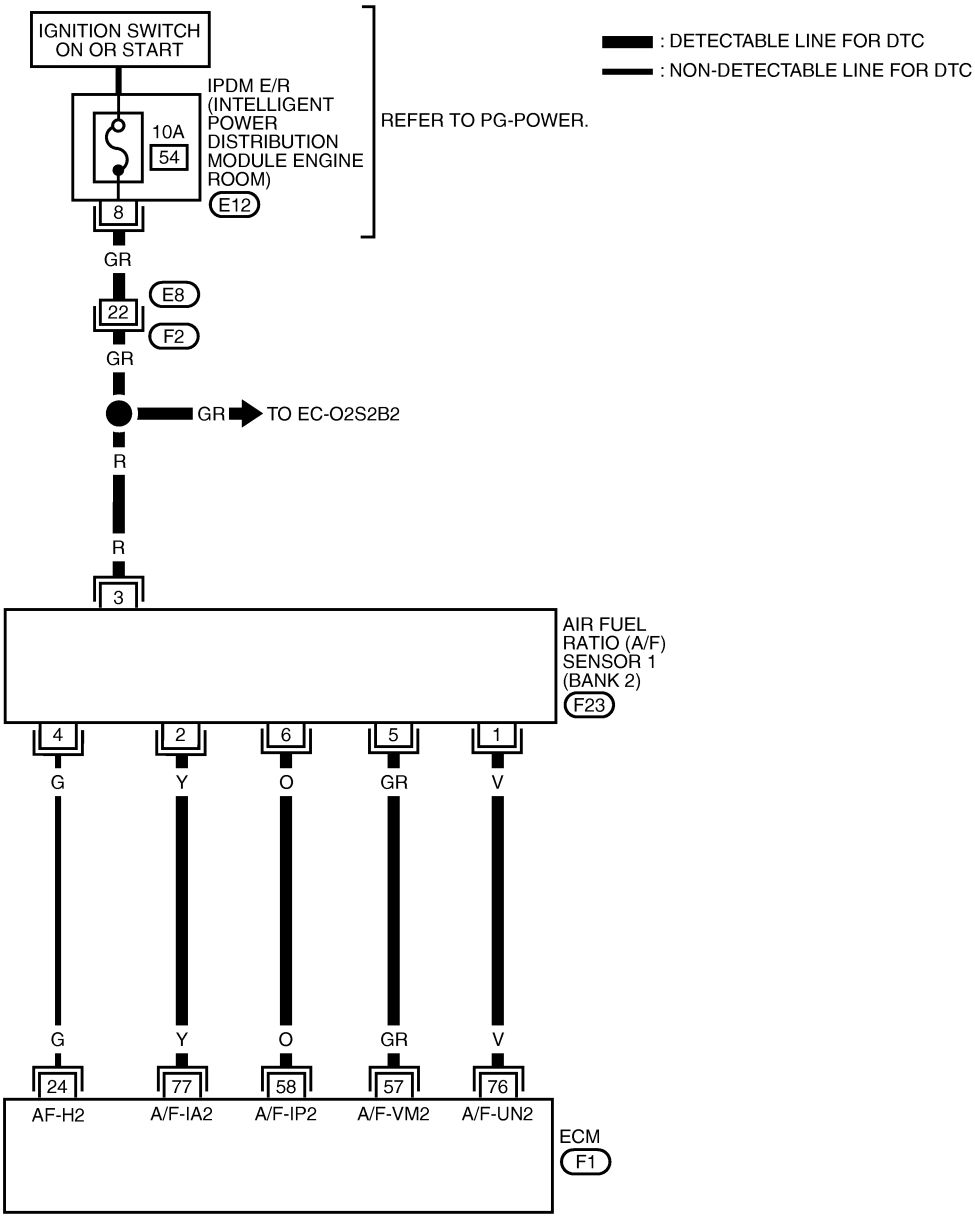
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

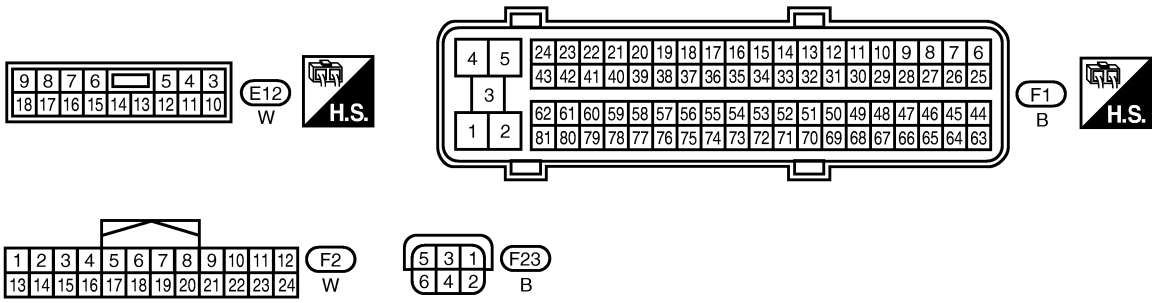
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-AF1B2-01



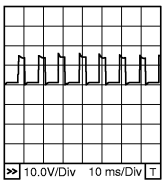


MBWA1337E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

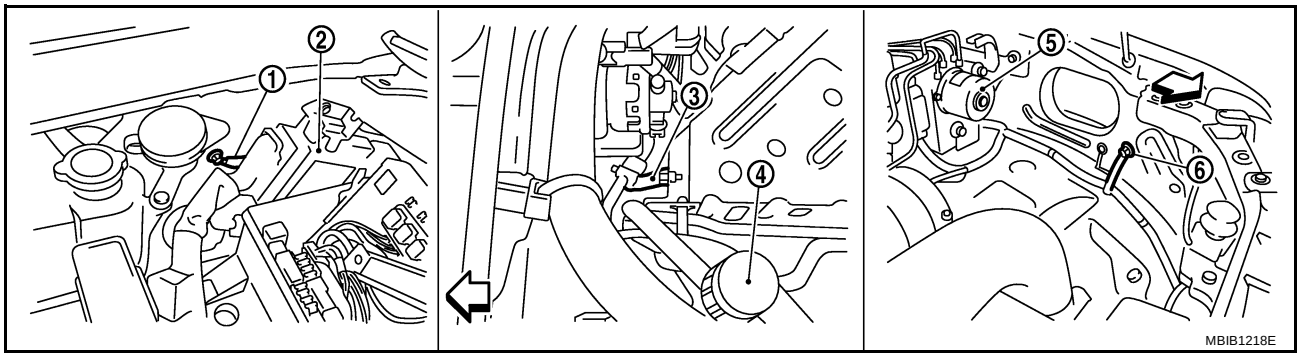
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS00104

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws.Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

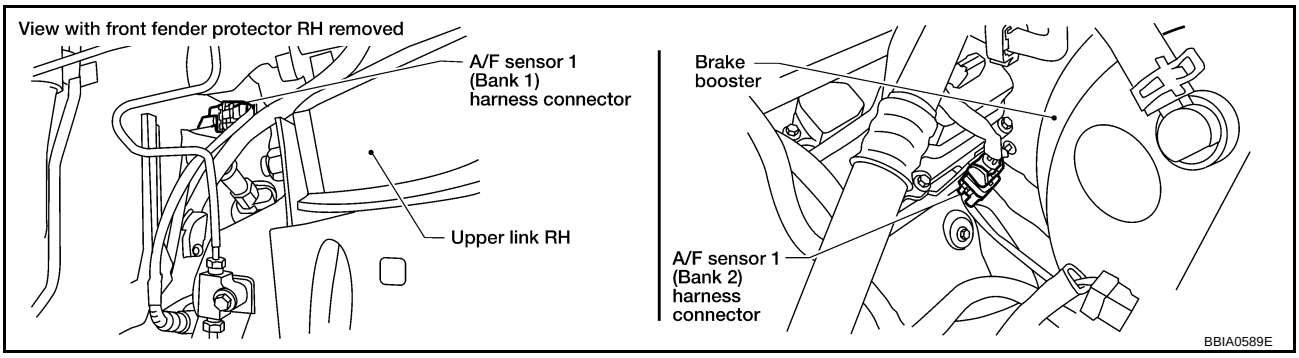
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

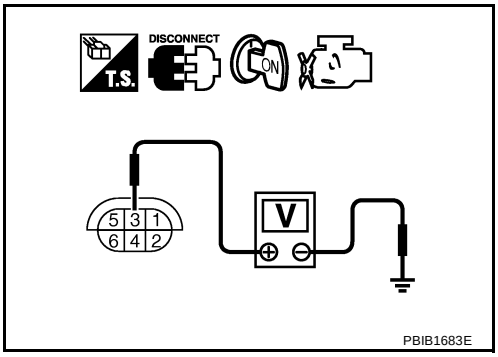
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS00105

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1276, P1286 A/F SENSOR 1

PFP:22693

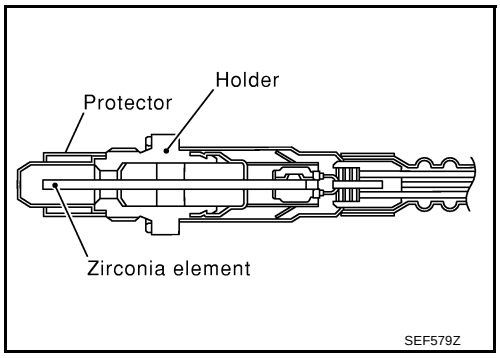
Component Description

GBS00106

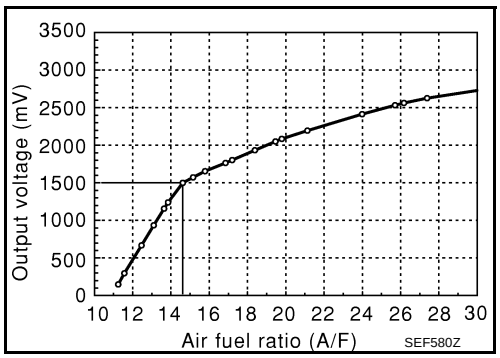
The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

GBS00107

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

GBS00108

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276 (Bank 1) P1286 1286 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit high voltage	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 1.5V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

Overall Function Check

GBS00109

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

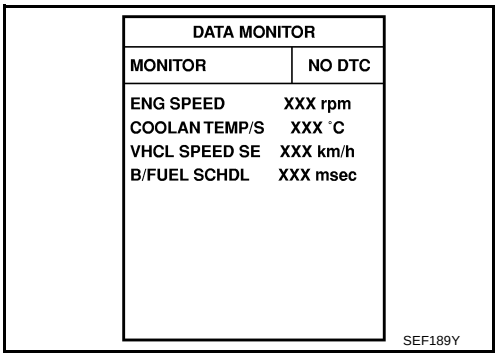
CAUTION:
Always drive vehicle at a safe speed.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-833, "Diagnostic Procedure" .
   If the indication fluctuates around 1.5V, go to next step.

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and warm it up to normal operating temperature.
6. Select “DATA MONITOR” mode with CONSULT-II.
7. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
8. Set selector lever to D position with “OD” OFF (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
9. Repeat steps 7 to 8 for five times.
10. Stop the vehicle and turn ignition switch OFF.
11. Wait at least 10 seconds and restart engine.
12. Repeat steps 7 to 8 for five times.
13. Make sure that no DTC is detected.
    If the 1st trip DTC is detected, go to EC-833, "Diagnostic Procedure" .



WITHOUT CONSULT-II

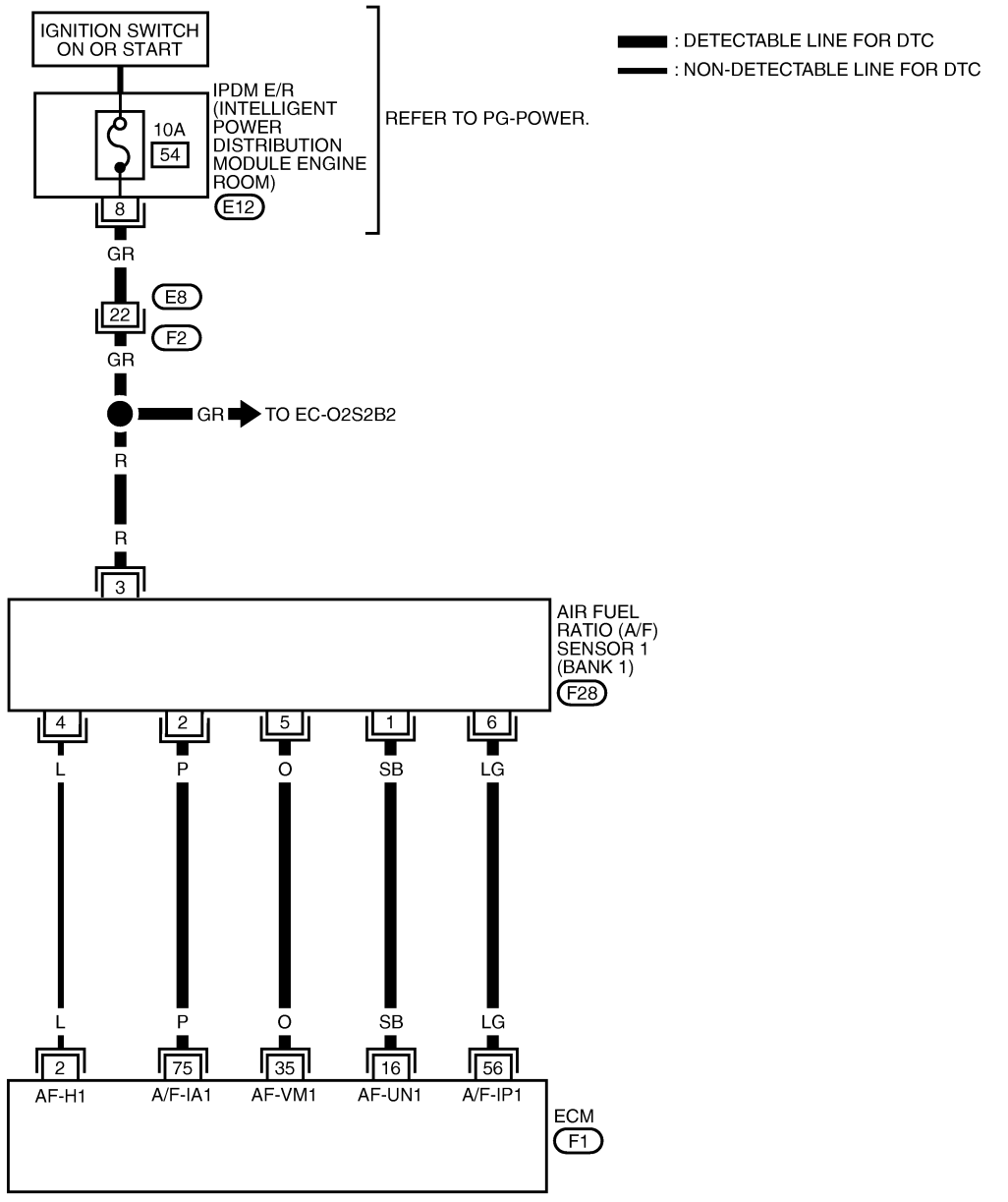
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set selector lever to D position with “OD” OFF (A/T) or 5th position (M/T) then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

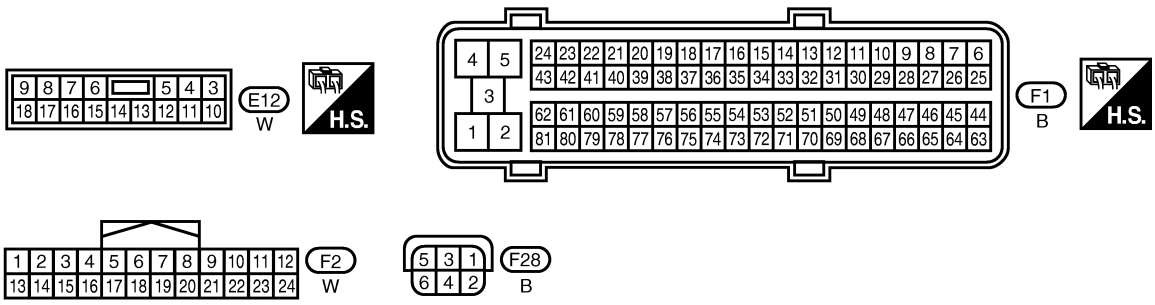
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle.
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
11. Make sure that no DTC is detected.
    If the 1st trip DTC is detected, go to EC-833, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

GBS0010A

EC-AF1B1-01



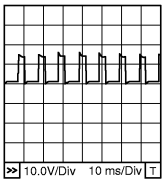


MBWA1336E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

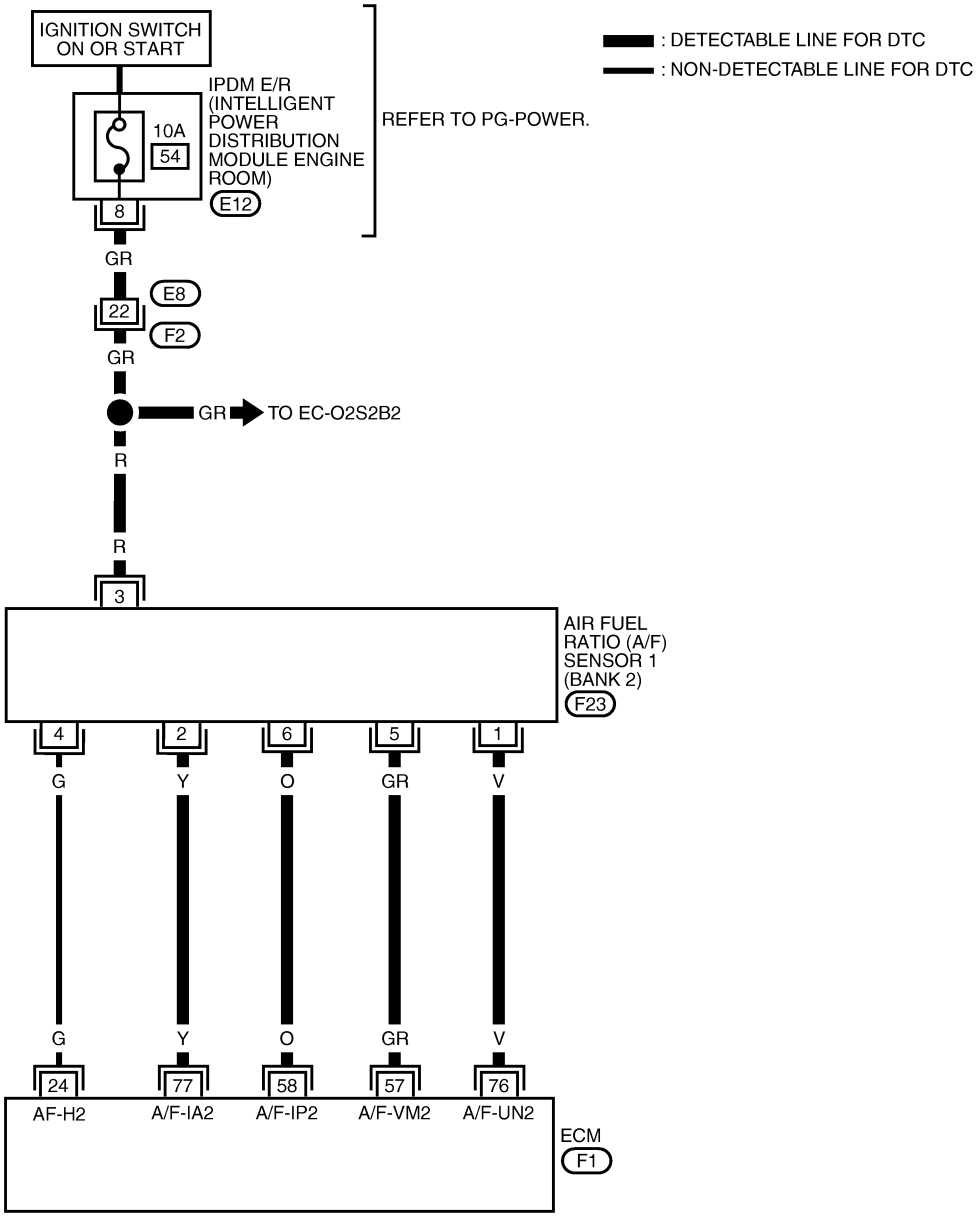
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

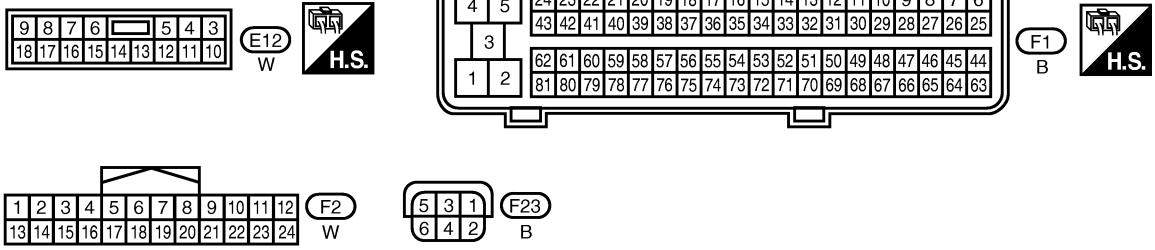
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	L	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
16	SB	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	O			Approximately 2.6V
56	LG			Approximately 2.3V
75	P			Approximately 2.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-AF1B2-01



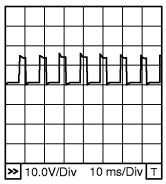


MBWA1337E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V
58	O			Approximately 2.3V
76	V			Approximately 3.1V
77	Y			Approximately 2.3V

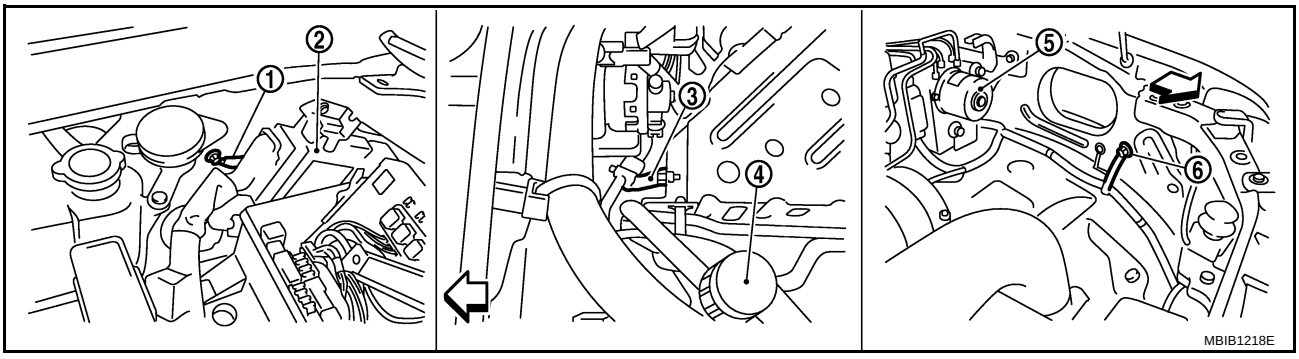
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS0010B

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



MBIB1218E

⇦ : Vehicle front

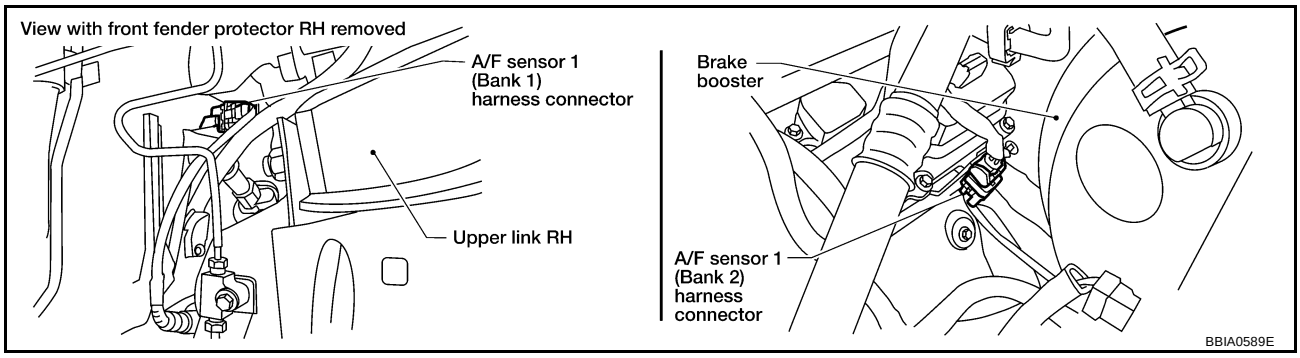
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

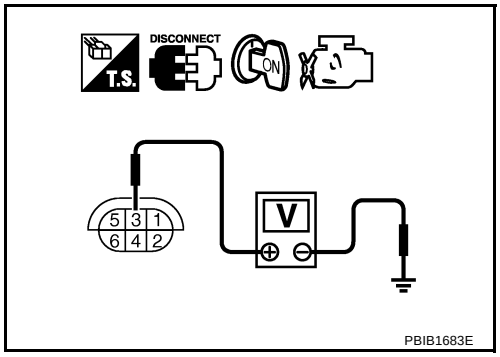
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio (A/F) sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between air fuel ratio (A/F) sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

5. 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 INTERMITTENT INCIDENT

Perform EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

GBS0010C

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

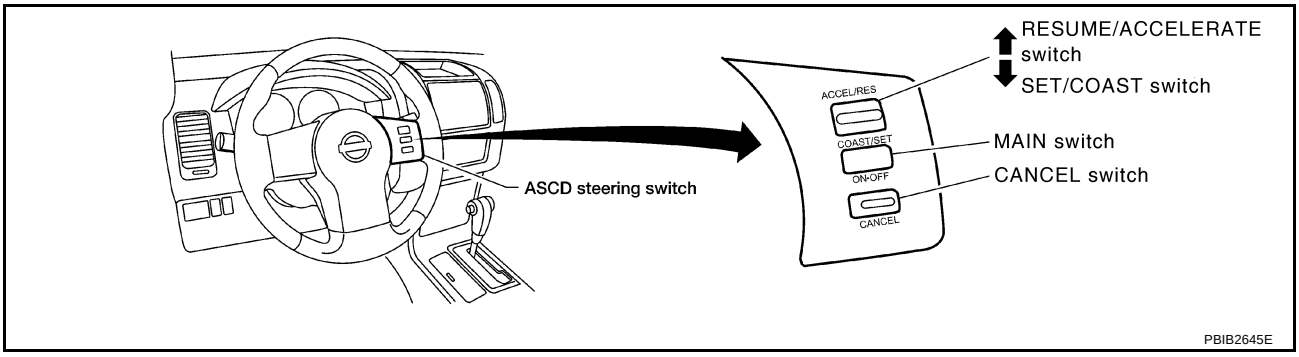
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

GBS0010D

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to EC-591, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

GBS0010E

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

GBS0010F

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-746.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

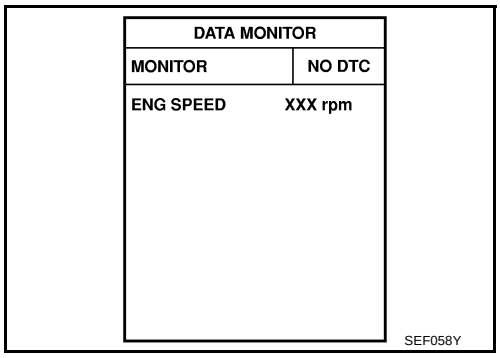
DTC Confirmation Procedure

GBS0010G

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-840, "Diagnostic Procedure" .



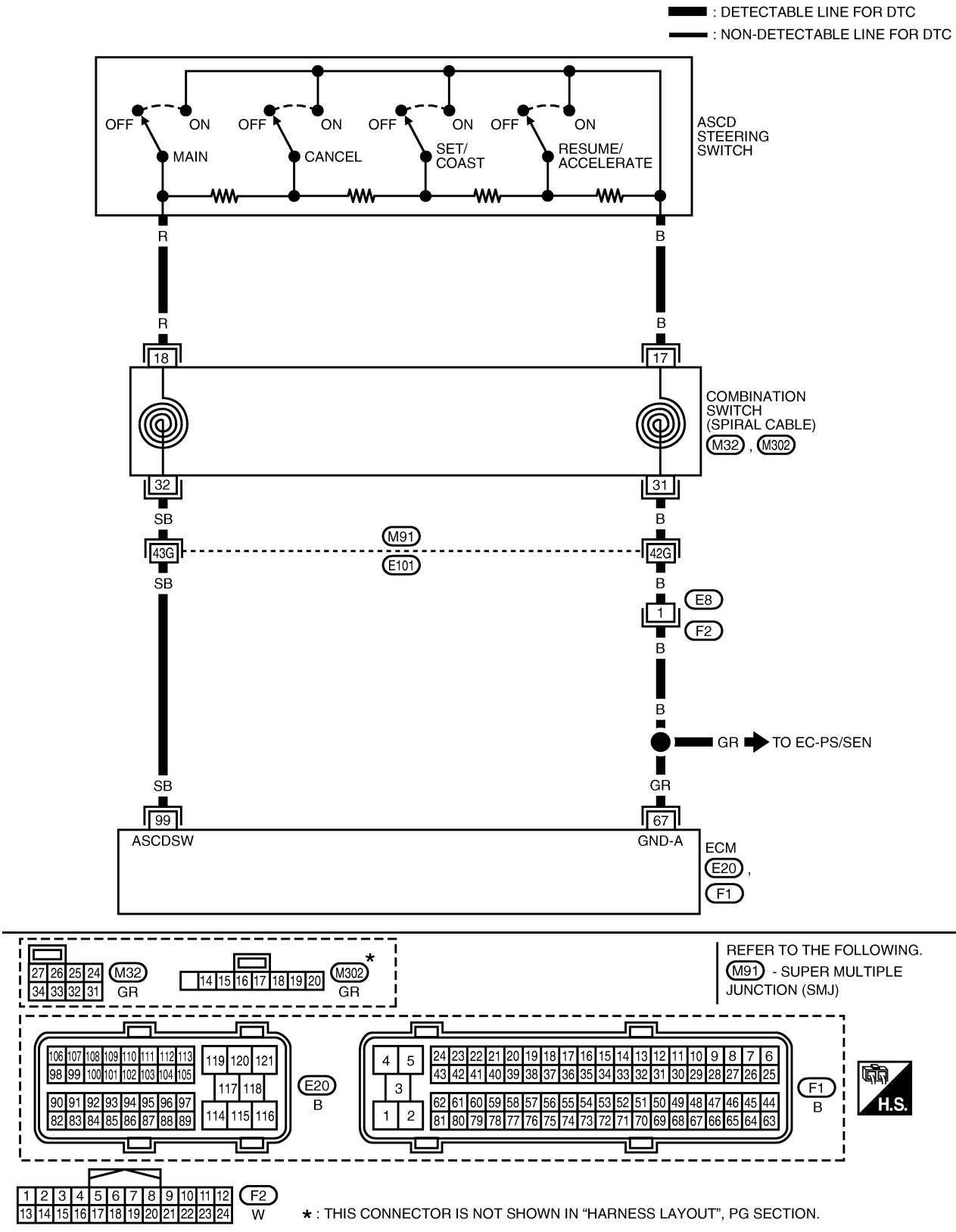
WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If DTC is detected, go to EC-840, "Diagnostic Procedure" .

Wiring Diagram

GBS0010H

EC-ASC/SW-01



MBWA1339E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

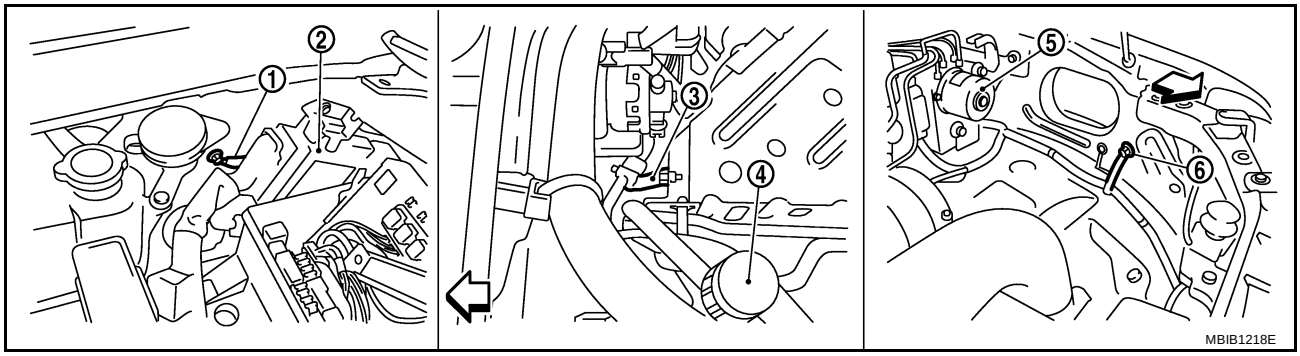
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	SB	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4.0V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

Diagnostic Procedure

GBS0010I

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

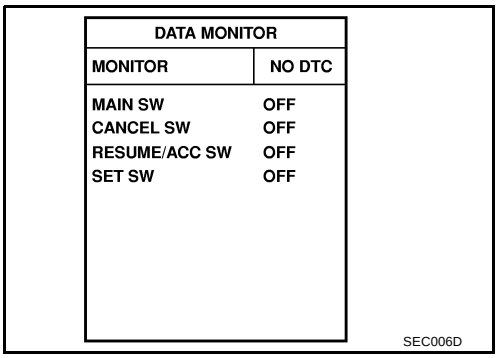
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

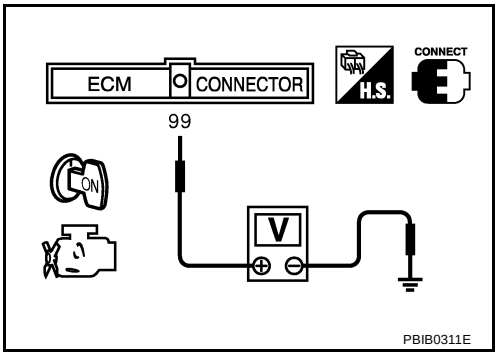
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 17 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and combination switch terminal 18. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-843, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

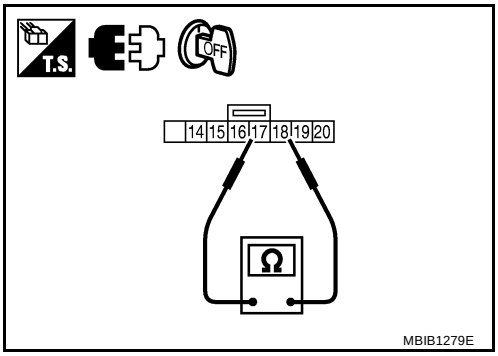
Component Inspection

GBS0010J

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M302.
2. Check continuity between combination switch (spiral cable) terminals 17 and 18 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



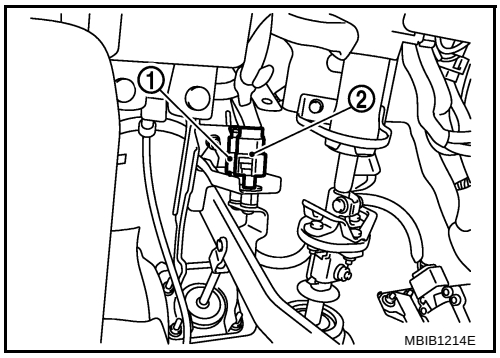
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

GBS0010K

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-591, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

GBS0010L

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

GBS0010M

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-746**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.) ● Stop lamp switch ● ASCD brake switch ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

GBS0010N

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

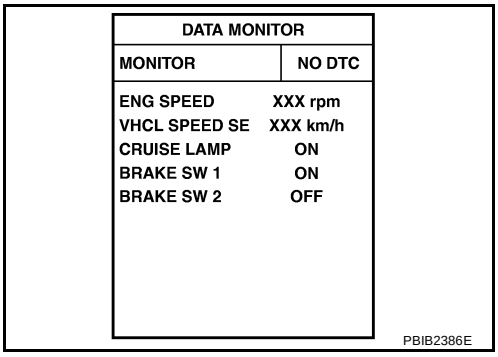
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:
Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position



If 1st trip DTC is detected, go to EC-848, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the following step.

5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

6. If 1st trip DTC is detected, go to EC-848, "Diagnostic Procedure" .

Overall Function Check

GBS0010O

Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a 1st trip DTC might not be confirmed.

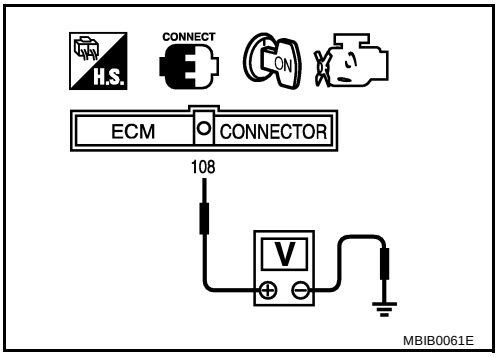
WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 (ASCD brake switch signal) and ground under the following conditions.
   A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

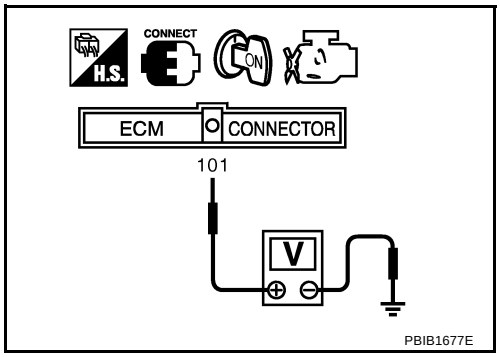


3. If NG, go to EC-848, "Diagnostic Procedure" .
   If OK, go to next step.

4. Check voltage between ECM terminal 101 (stop lamp switch signal) and ground under the following conditions.

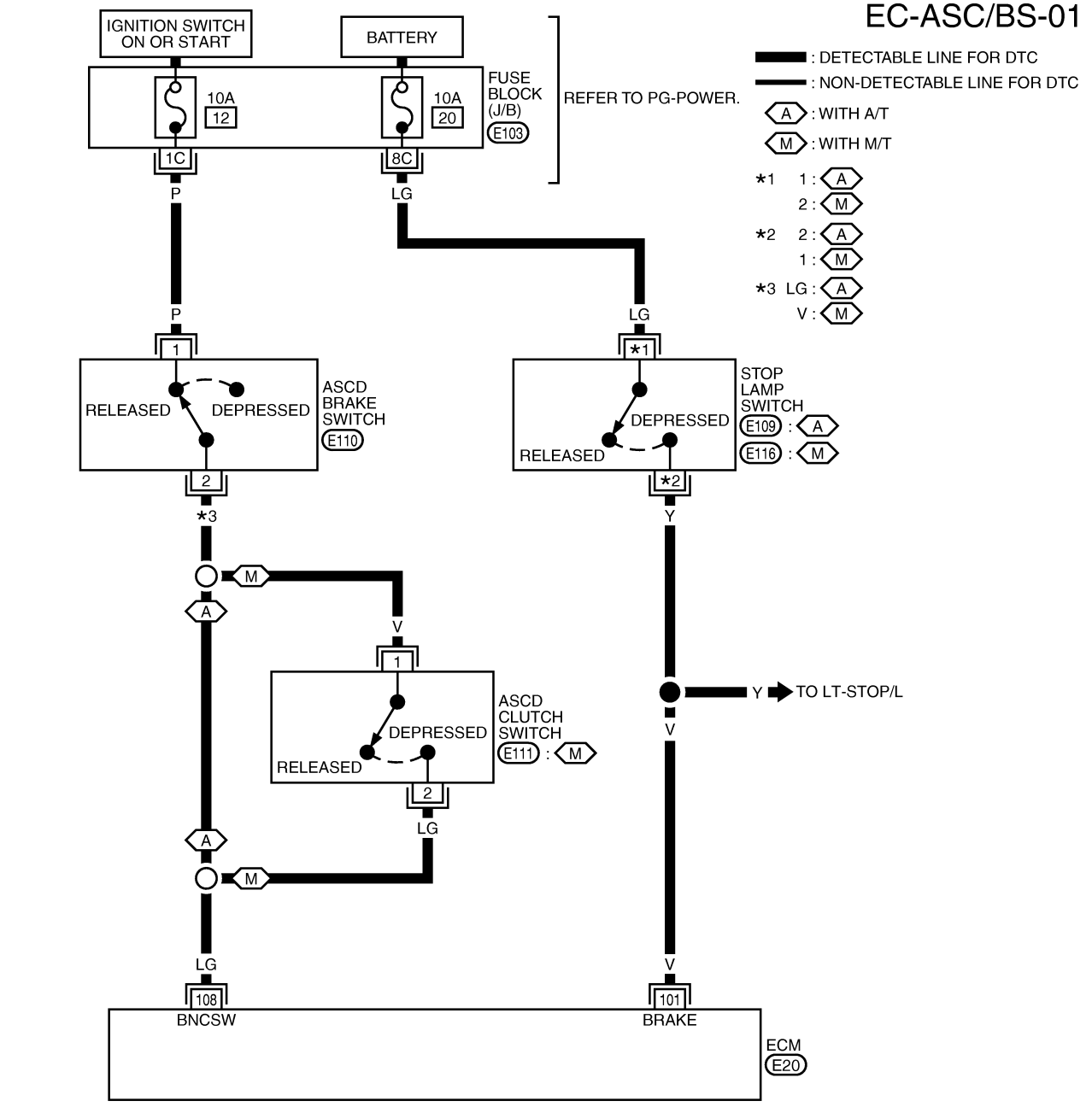
CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

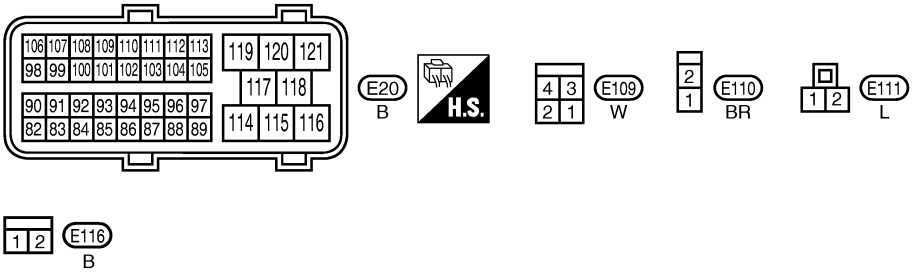
5. If NG, go to EC-848, "Diagnostic Procedure" .



Wiring Diagram

GBS0010P





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1419E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS0010Q

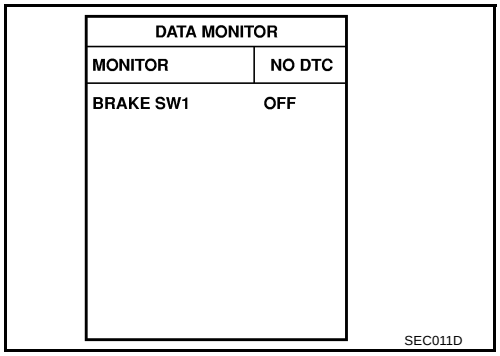
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

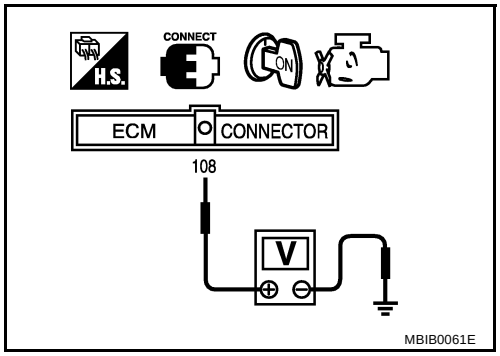
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

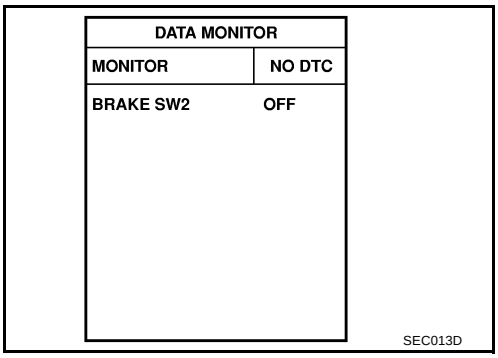
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

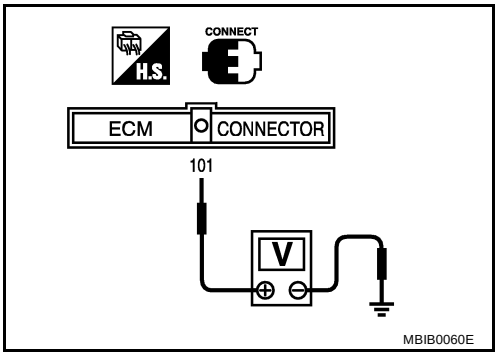
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

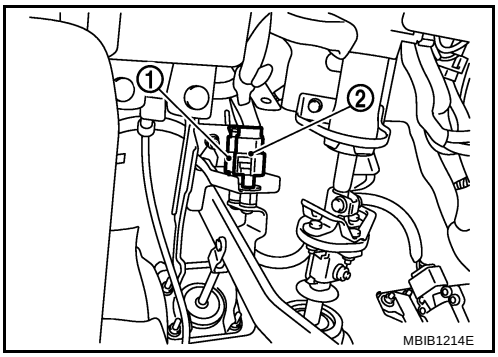


OK or NG

OK >> GO TO 11.
NG >> GO TO 7.

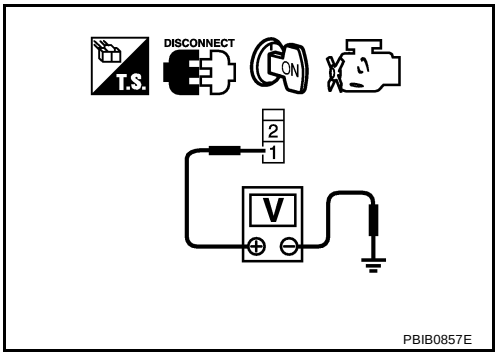
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
   - Stop lamp switch (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-856, "Component Inspection"

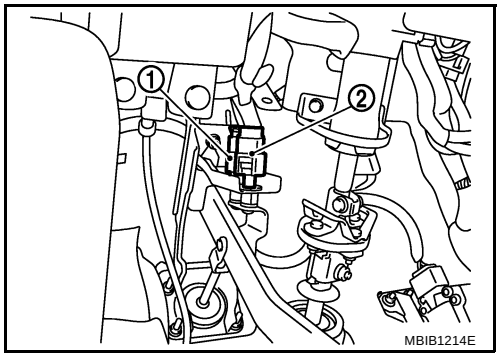
OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.

– ASCD brake switch (1)

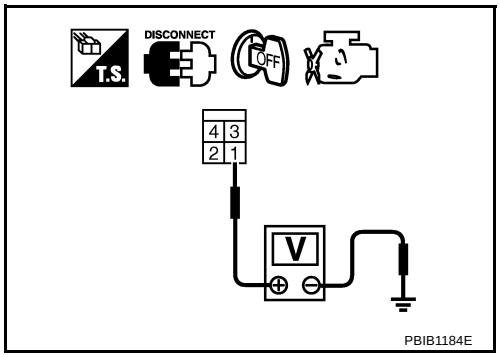


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-856, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

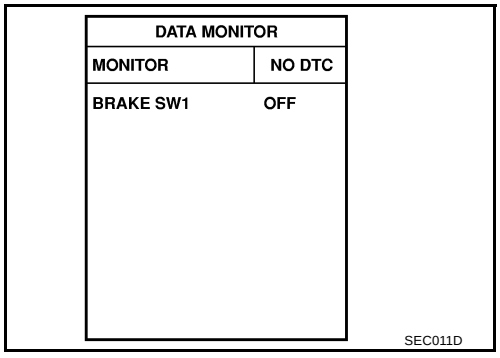
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

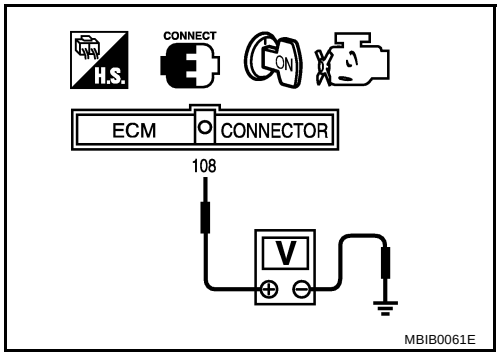
CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

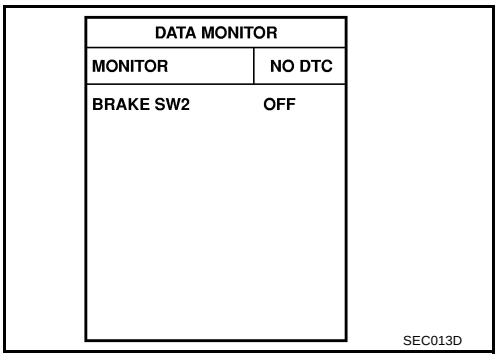
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

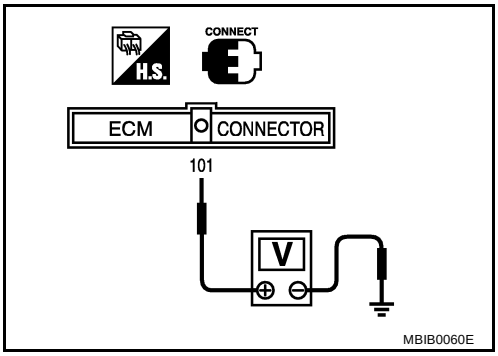
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

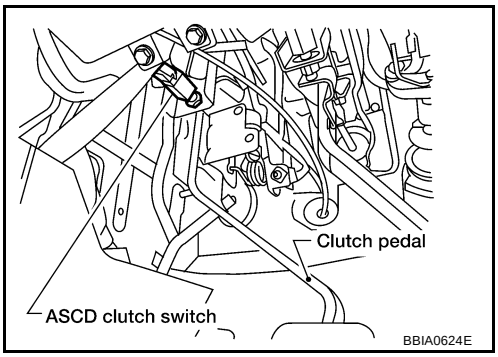


OK or NG

OK >> GO TO 14.
NG >> GO TO 10.

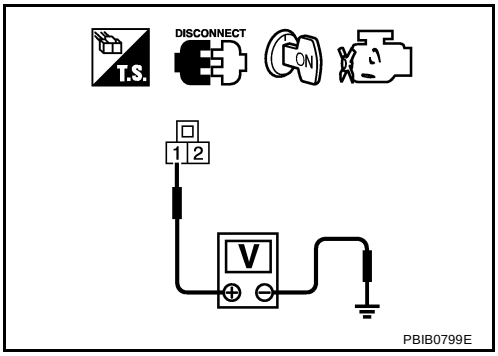
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

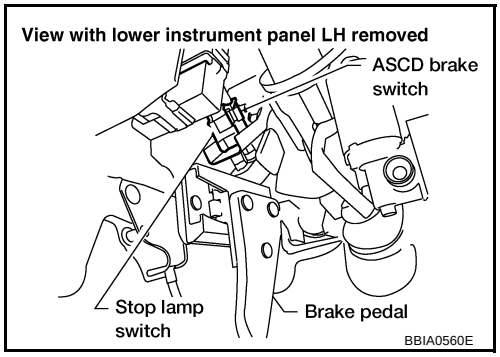


OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

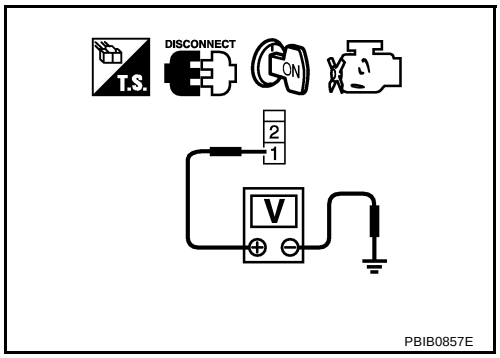
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-856, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

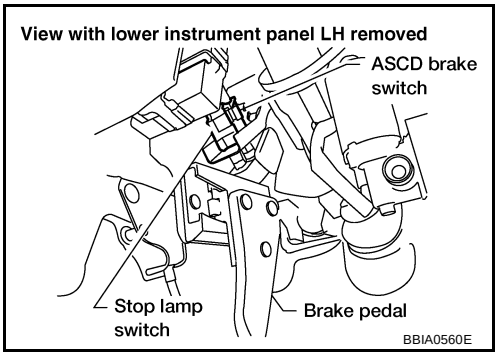
Refer to EC-856, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

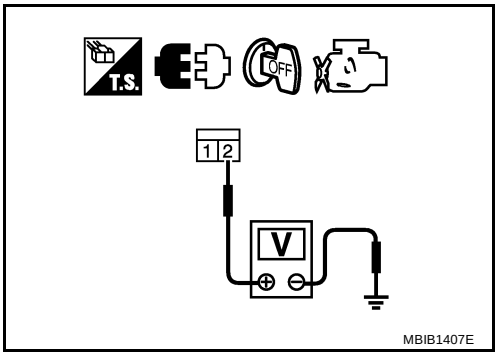
10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-856, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

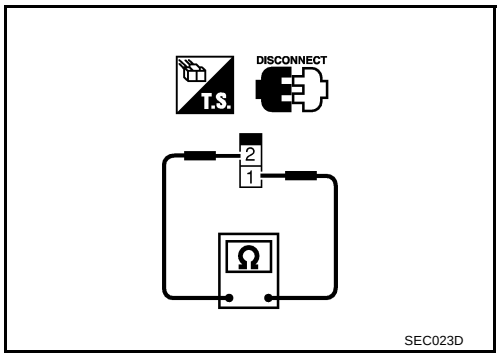
GBS0010R

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

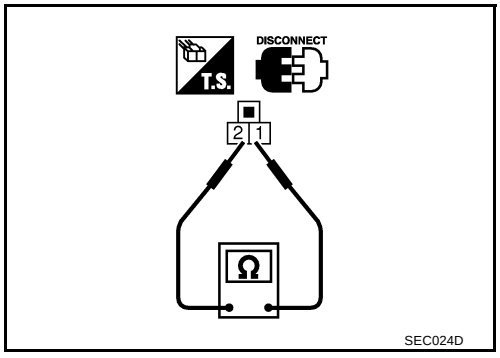


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

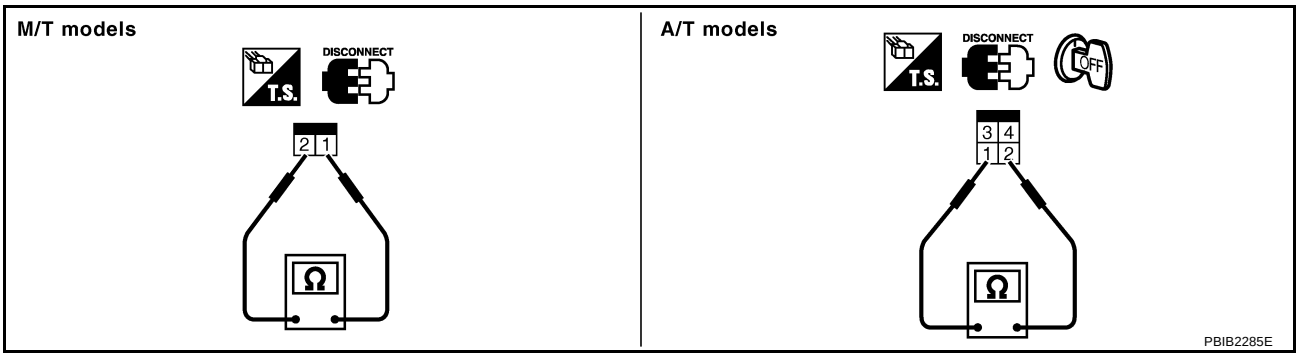
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

DTC P1706 PNP SWITCH

PFP:32006

Component Description

GBS0010S

When the selector lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

GBS0010T

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

GBS0010U

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch ● Combination meter ● TCM (A/T models)

Overall Function Check

GBS0010V

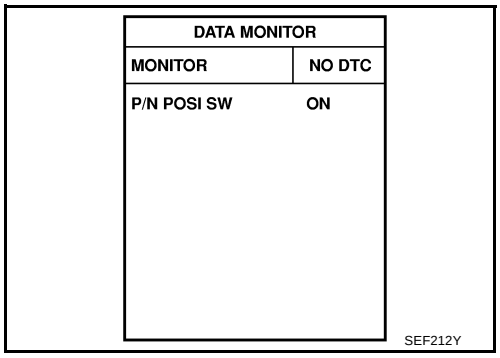
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

Position (Selector lever)	Known-good signal
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF

If NG, go to EC-860, "Diagnostic Procedure" .

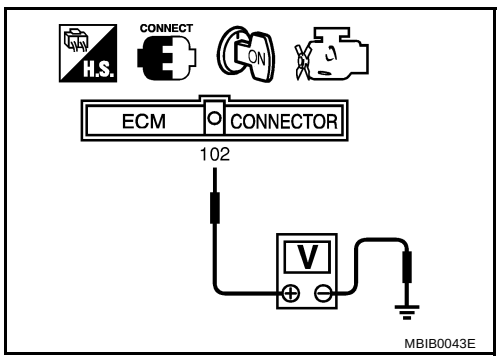


WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

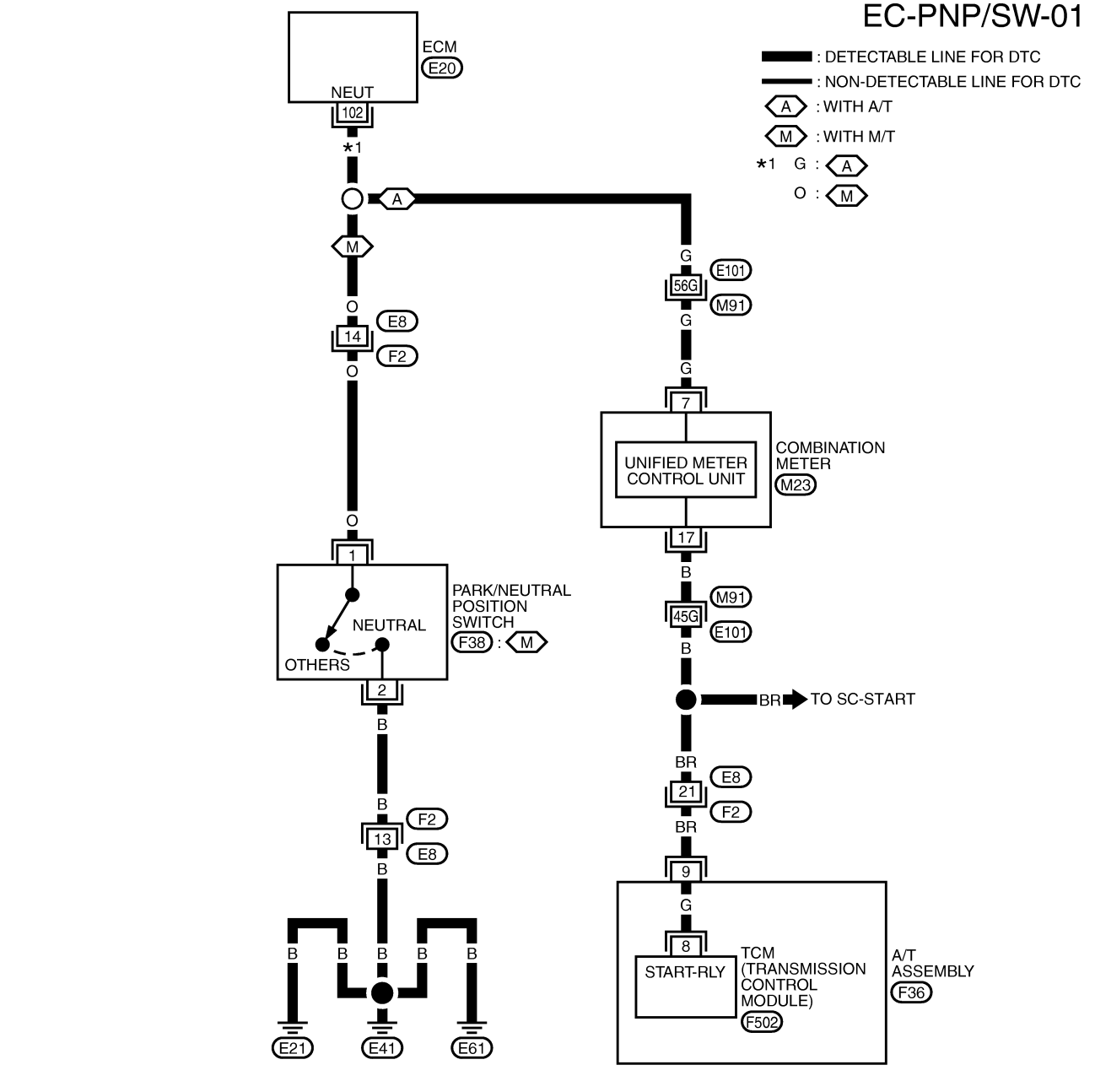
Condition (Selector lever)	Voltage (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0V
Except above position	BATTERY VOLTAGE (11 - 14V)

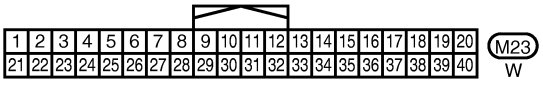
3. If NG, go to EC-860, "Diagnostic Procedure" .



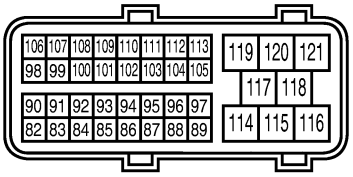
Wiring Diagram

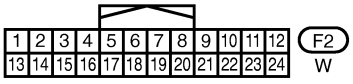
GBS0010W

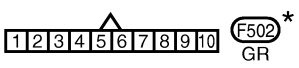




REFER TO THE FOLLOWING.
M91 -SUPER MULTIPLE JUNCTION (SMJ)







* : THIS CONNECTOR IS NOT SHOWN IN “HARNESS LAYOUT”, PG SECTION.

MBWA1310E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G (A/T) O (M/T)	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS0010X

A/T MODELS

1. CHECK DTC WITH TCM

Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

Yes or No

Yes >> GO TO 3.
No >> Refer to SC-30, "STARTING SYSTEM" .

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 17. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Harness for open or short between A/T assembly and combination meter.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E101, M91
- Harness for open or short between ECM and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8. Refer to AT-99, "DTC P0615 START SIGNAL CIRCUIT" .

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace.

9. REPLACE COMBINATION METER

Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

M/T MODELS

1. CHECK PNP SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F2, E8
- Harness for open or short between PNP switch and ground

>> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between PNP switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PNP SWITCH

Refer to MT-12, "PARK/NEUTRAL POSITION (PNP) SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR)

PFP:31935

Description

GBS0010Y

ECM receives turbine revolution sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT-II Reference Value in Data Monitor Mode

GBS0010Z

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	● Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

GBS00110

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-746, "DTC P0605 ECM" .**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-725, "DTC P0335 CKP SENSOR (POS)" .**
- **If DTC P1715 is displayed with DTC P0340, P0345 first perform the trouble diagnosis for DTC P0340, P0345. Refer to EC-732, "DTC P0340, P0345 CMP SENSOR (PHASE)" .**

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Turbine revolution sensor) (TCM output)	Turbine revolution sensor signal is different from the theoretical value calculated by ECM from revolution sensor signal and engine rpm signal.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Turbine revolution sensor circuit is open or shorted) ● TCM

Diagnostic Procedure

GBS00111

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. REPLACE TCM

Replace TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

GBS00112

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

GBS00113

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

GBS00114

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL light up.

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

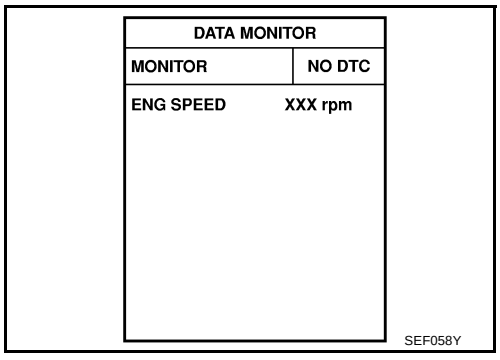
DTC Confirmation Procedure

GBS00115

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-867, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.

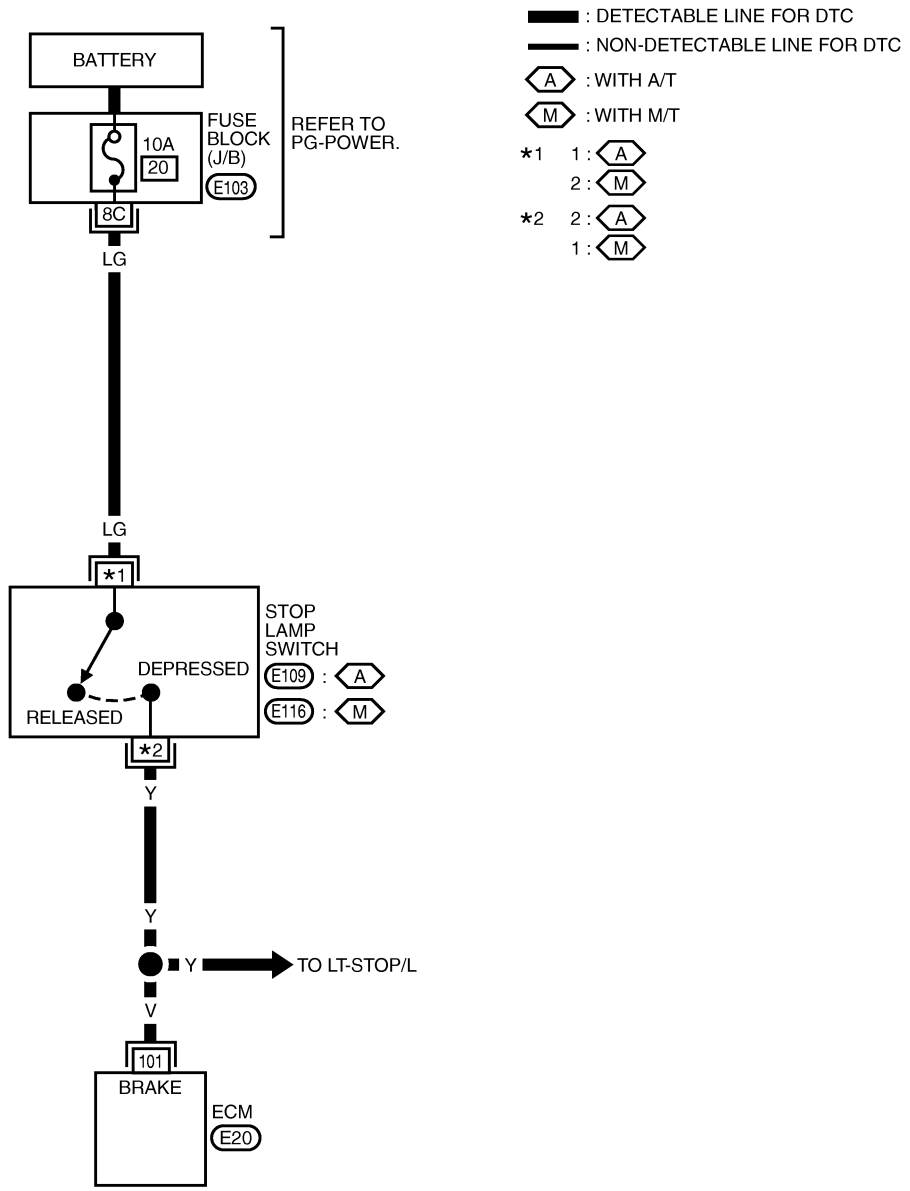
Refer to EC-606, "DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS" .

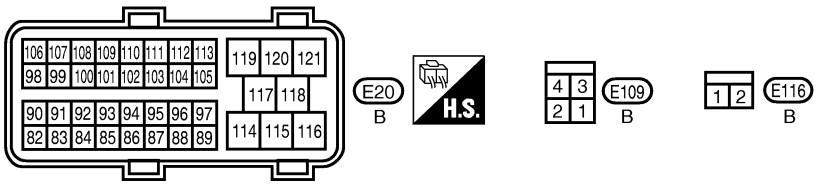
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to EC-867, "Diagnostic Procedure" .

Wiring Diagram

GBS00116

EC-BRK/SW-01





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1420E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS00117

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

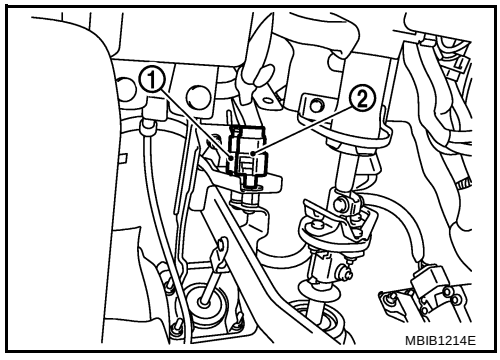
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

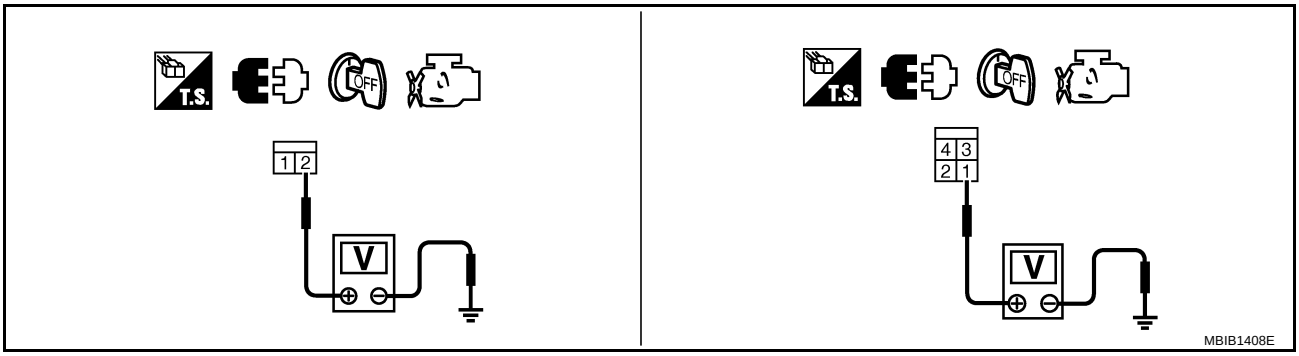
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (2) harness connector.
– ASCD brake switch (1)



2. Check voltage between stop lamp switch terminal 1 (A/T) or 2 (M/T) and ground with CONSULT-II or tester.



M/T models **A/T models**

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E103
- Harness for open and short between stop lamp switch and battery

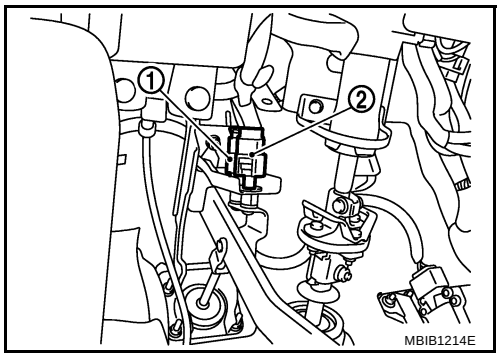
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch (2) harness connector.
   – ASCD brake switch (1)
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2 (A/T) or 1 (M/T).
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-869, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

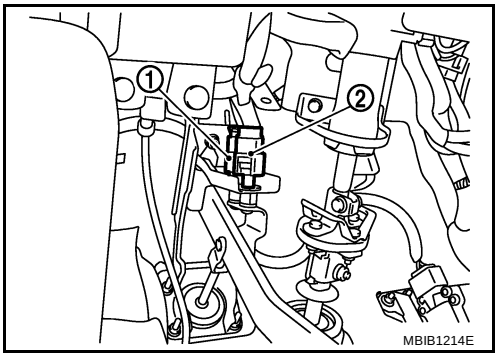
>> **INSPECTION END**

Component Inspection

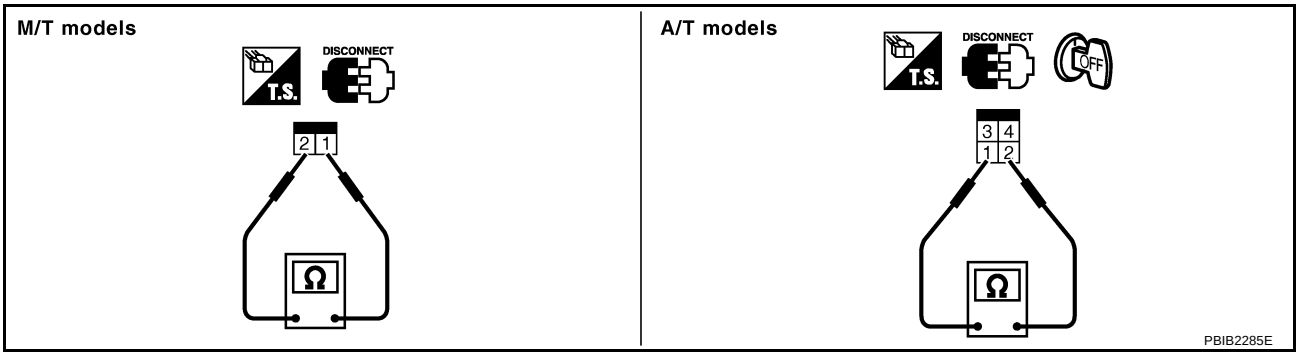
GBS00118

STOP LAMP SWITCH

1. Disconnect stop lamp switch (2) harness connector.
   - ASCD brake switch (1)



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

3. If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 2 again.

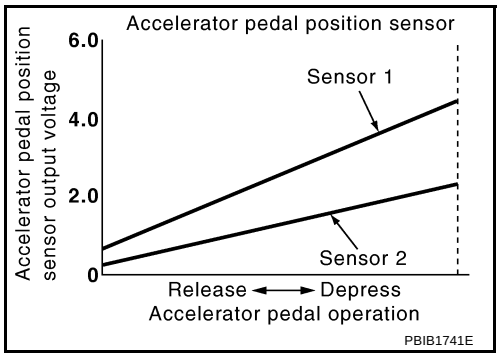
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

GBS00119

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

GBS0011A

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS0011B

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-803, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

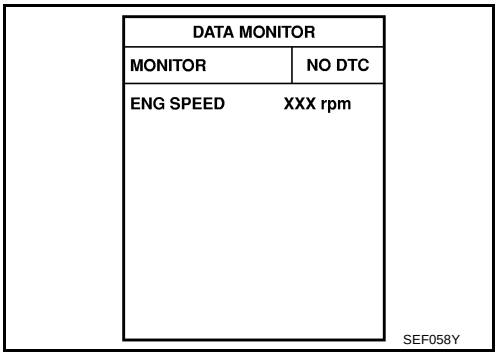
GBS0011C

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-873, "Diagnostic Procedure" .



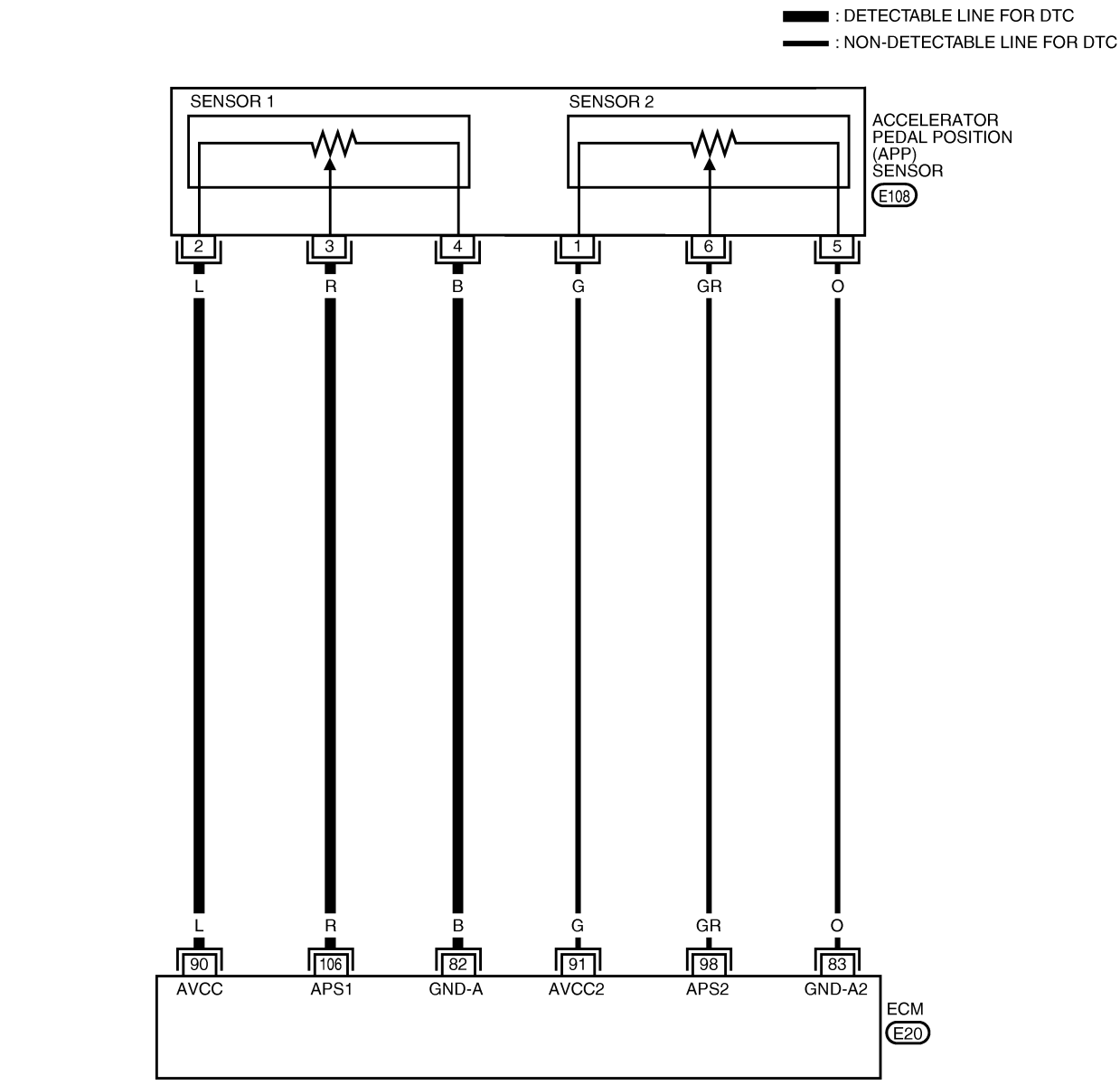
WITHOUT CONSULT-II

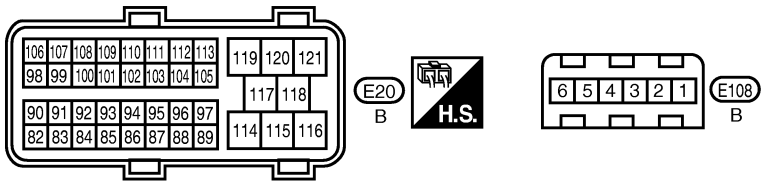
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-873, "Diagnostic Procedure" .

Wiring Diagram

GBS0011D

EC-APPS1-01





MBWA1313E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

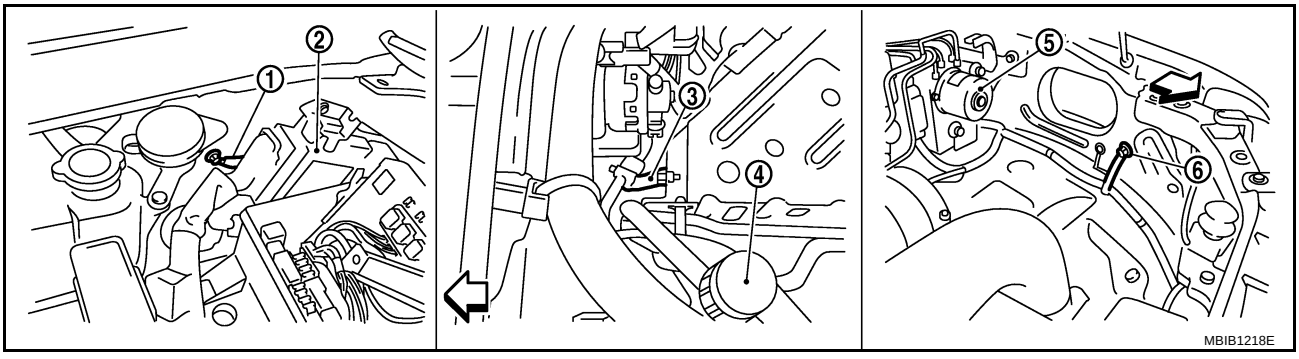
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS0011E

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

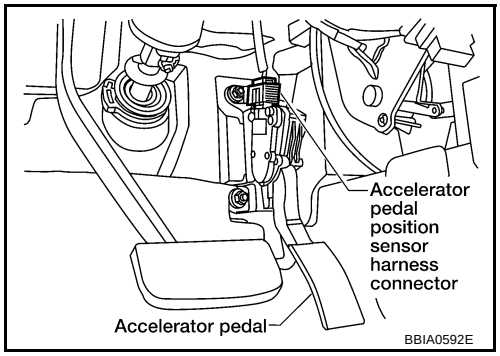
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

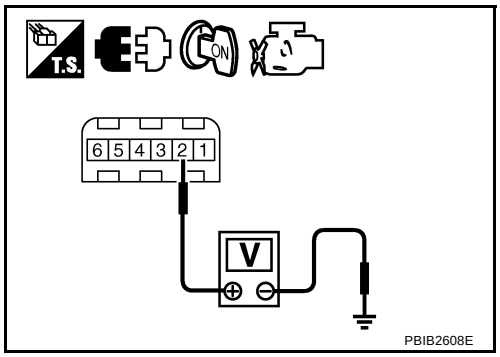
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-875, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

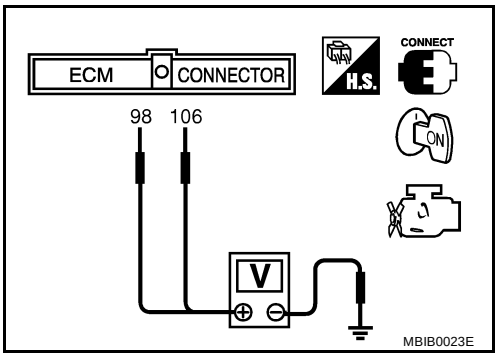
Component Inspection

GBS0011F

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-614, "Accelerator Pedal Released Position Learning" .
6. Perform EC-614, "Throttle Valve Closed Position Learning" .
7. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS0011G

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

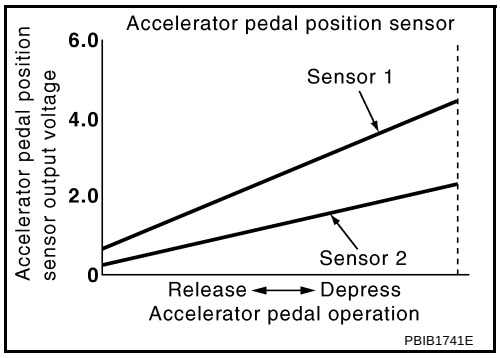
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

GBS0011H

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

GBS0011I

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS0011J

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit shorted.) ● Accelerator pedal position sensor (APP sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

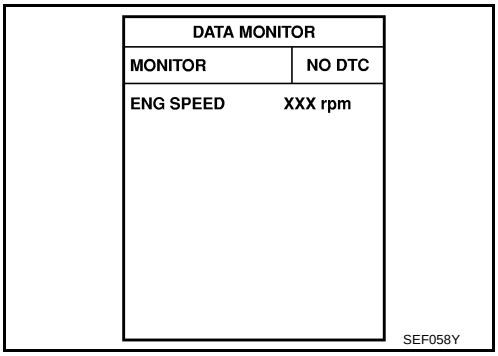
DTC Confirmation Procedure

GBS0011K

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-880, "Diagnostic Procedure" .



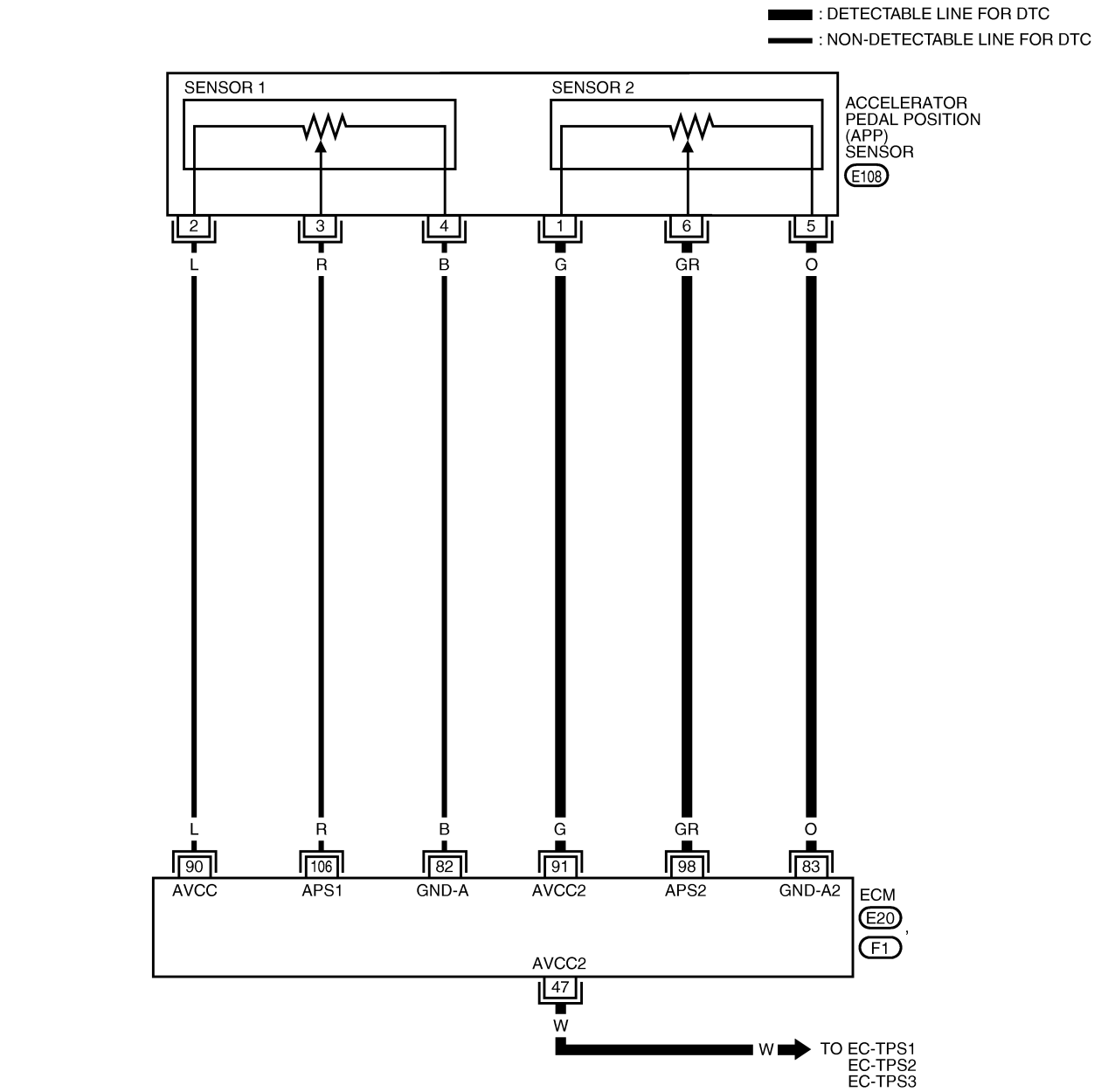
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-880, "Diagnostic Procedure" .

Wiring Diagram

GBS0011L

EC-APPS2-01



MBWA1314E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

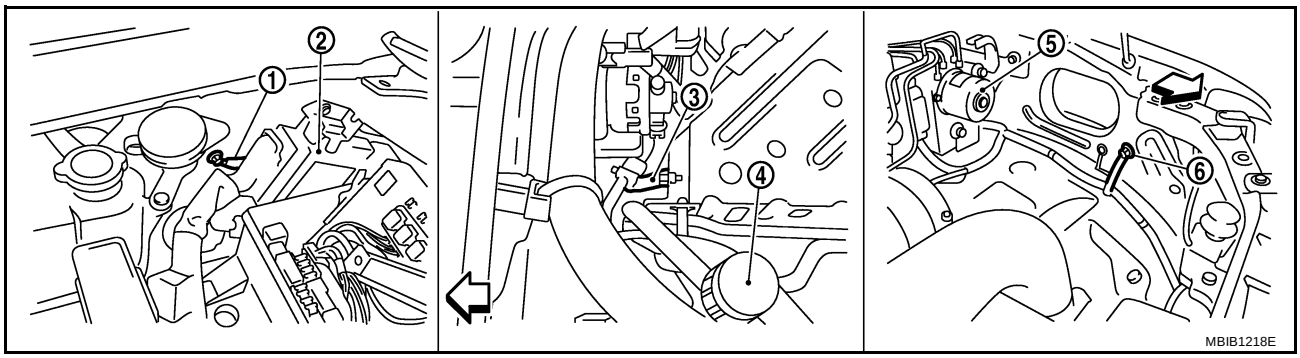
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS0011M

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body, Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

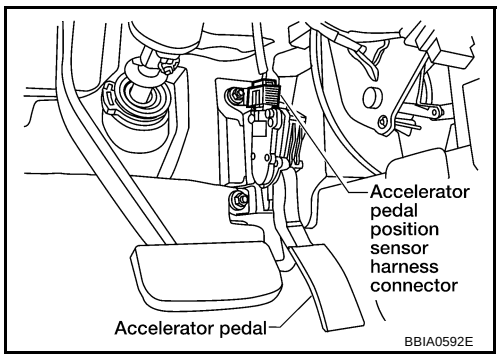
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

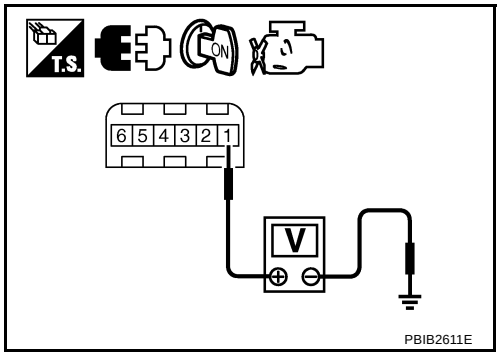
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91.
   Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-878
47	Electric throttle control actuator terminal 2	EC-885

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-889, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

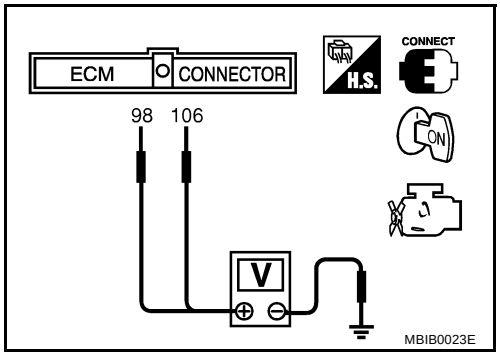
Component Inspection

GBS0011N

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-614, "Accelerator Pedal Released Position Learning" .
6. Perform EC-614, "Throttle Valve Closed Position Learning" .
7. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS0011O

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

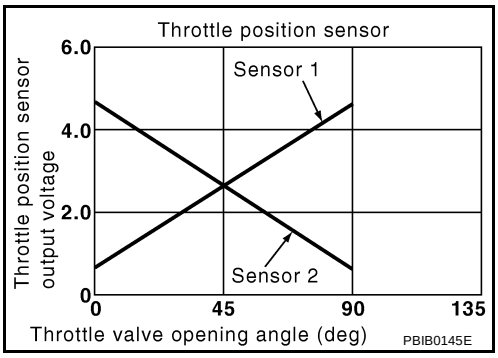
DTC P2135 TP SENSOR

PFP:16119

Component Description

GBS0011P

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

GBS0011Q

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

GBS0011R

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted). ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

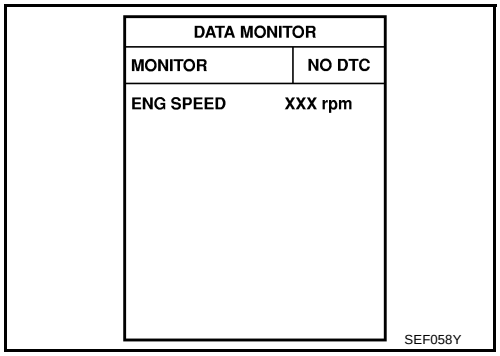
DTC Confirmation Procedure

GBS0011S

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-887, "Diagnostic Procedure" .



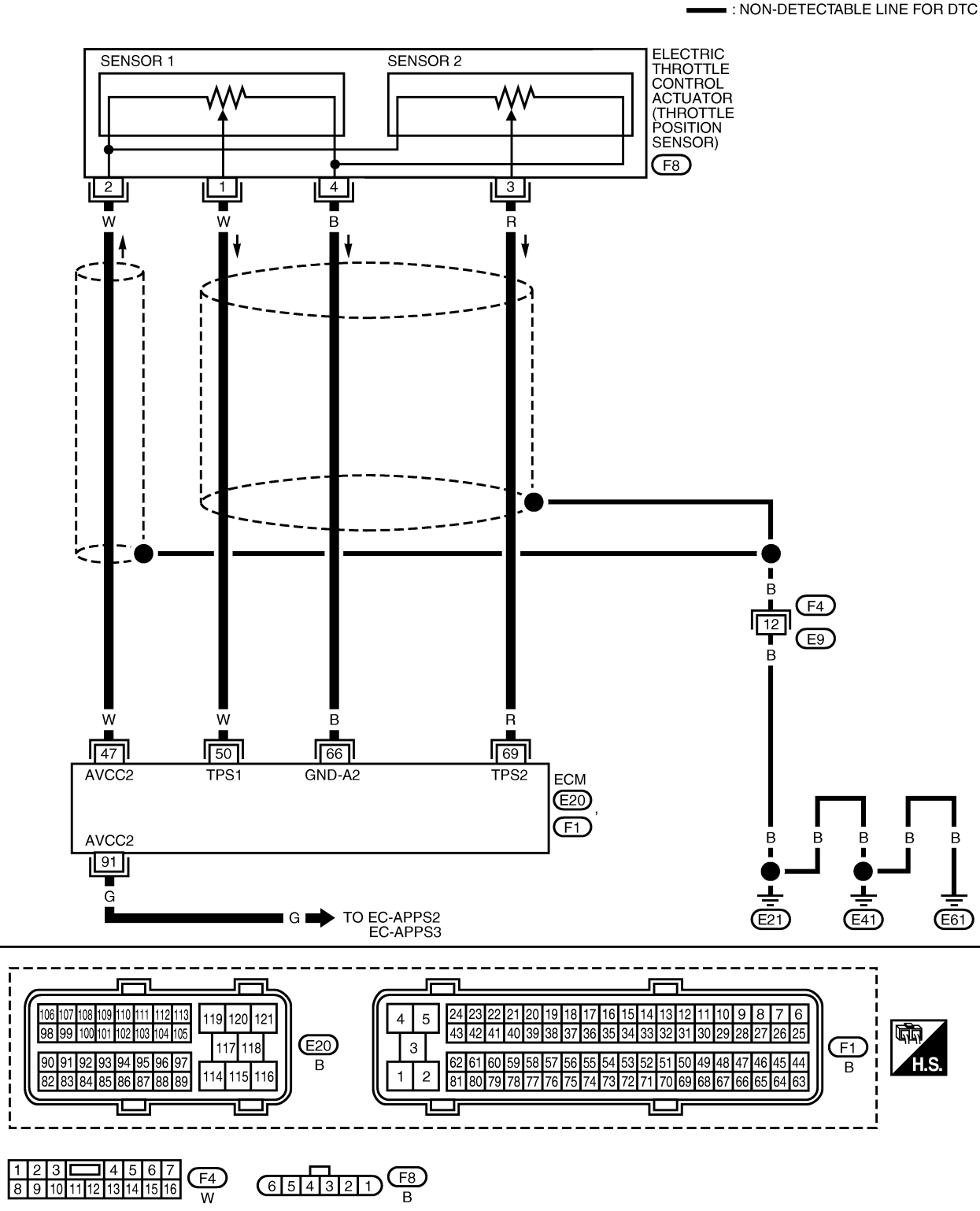
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-887, "Diagnostic Procedure" .

Wiring Diagram

GBS0011T

EC-TPS3-01



MBWA1315E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

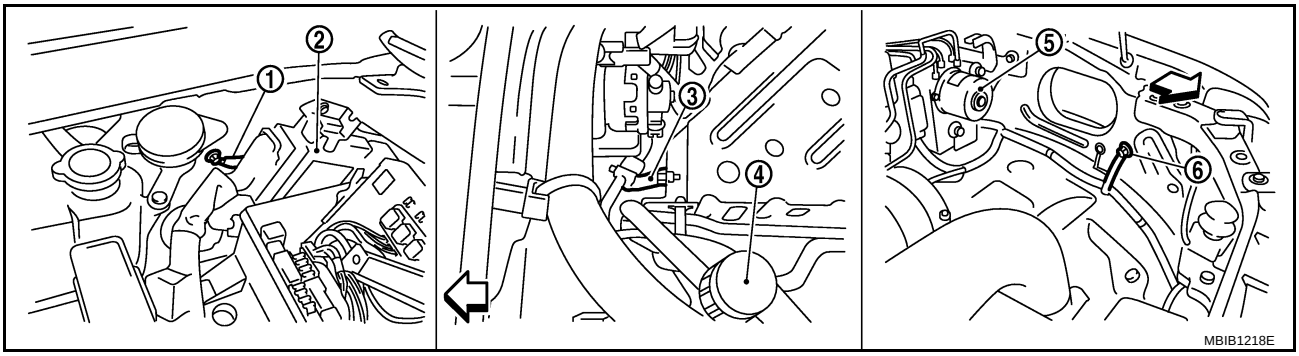
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine: Stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

GBS0011U

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

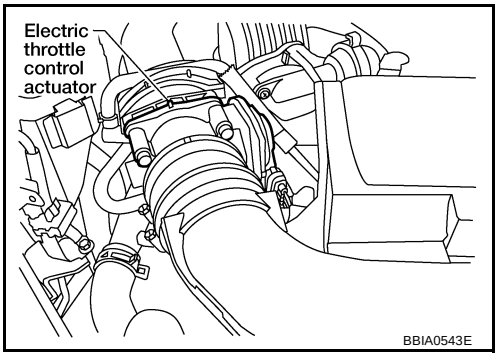
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

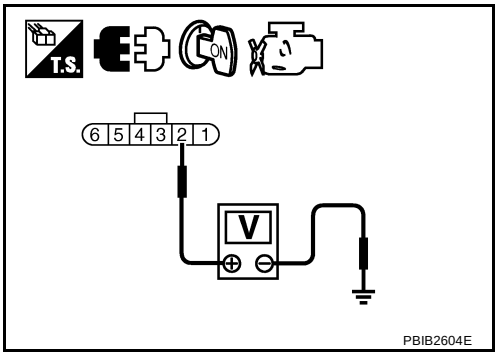
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 2	EC-885
91	APP sensor terminal 1	EC-878

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 and electric throttle control actuator terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-889, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

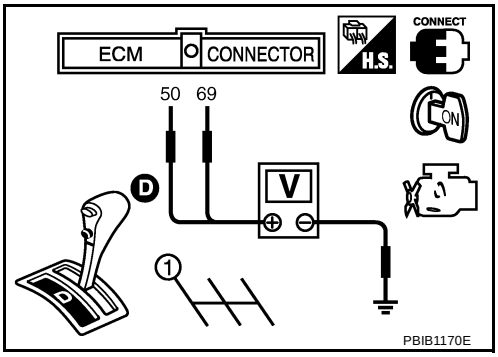
Component Inspection

GBS0011V

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-614, "Throttle Valve Closed Position Learning" .
8. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS0011W

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

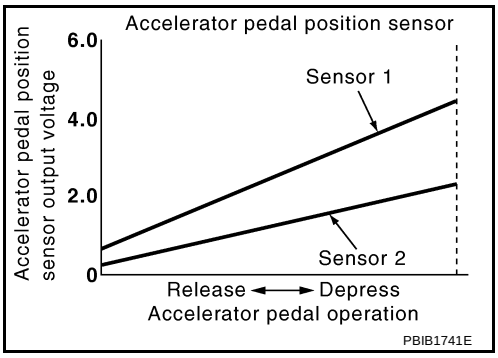
DTC P2138 APP SENSOR

PFP:18002

Component Description

GBS0011X

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

GBS0011Y

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.95V
		Accelerator pedal: Fully depressed	Less than 4.75V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

GBS0011Z

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-803, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (The TP sensor circuit is shorted.) ● Accelerator pedal position sensor 1 and 2 ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

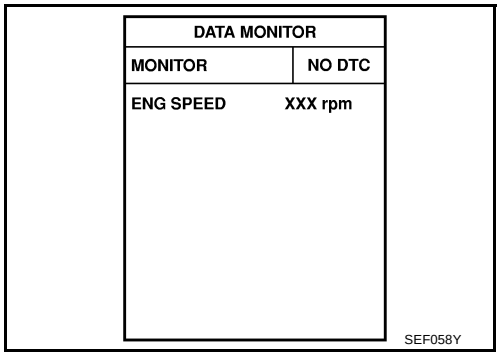
DTC Confirmation Procedure

GBS00120

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-895, "Diagnostic Procedure" .

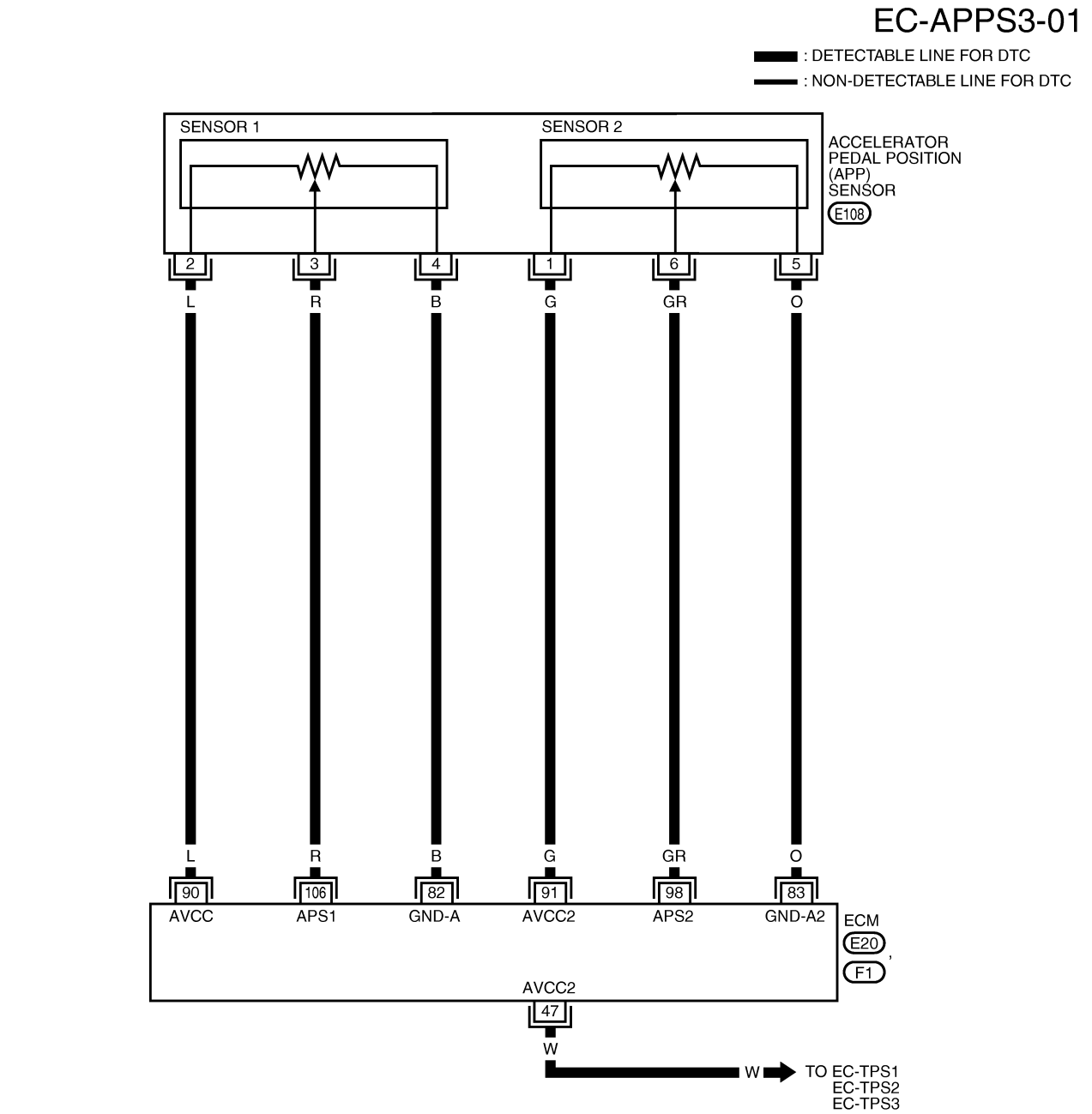


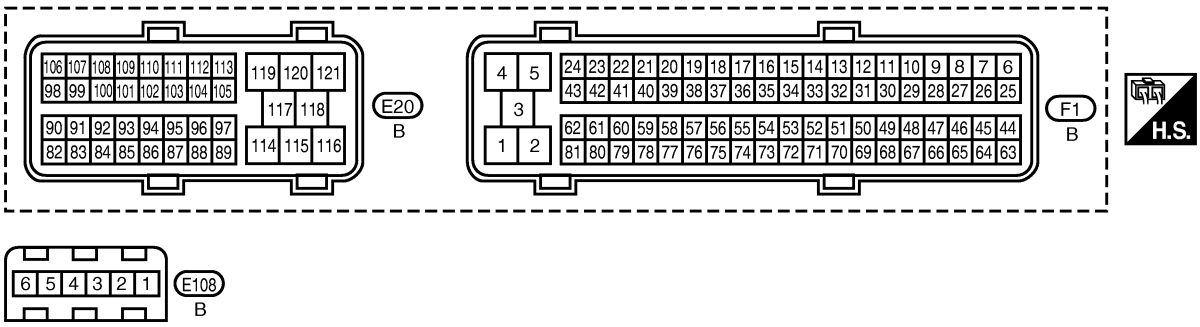
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-895, "Diagnostic Procedure" .

Wiring Diagram

GBS00121





MBWA1316E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

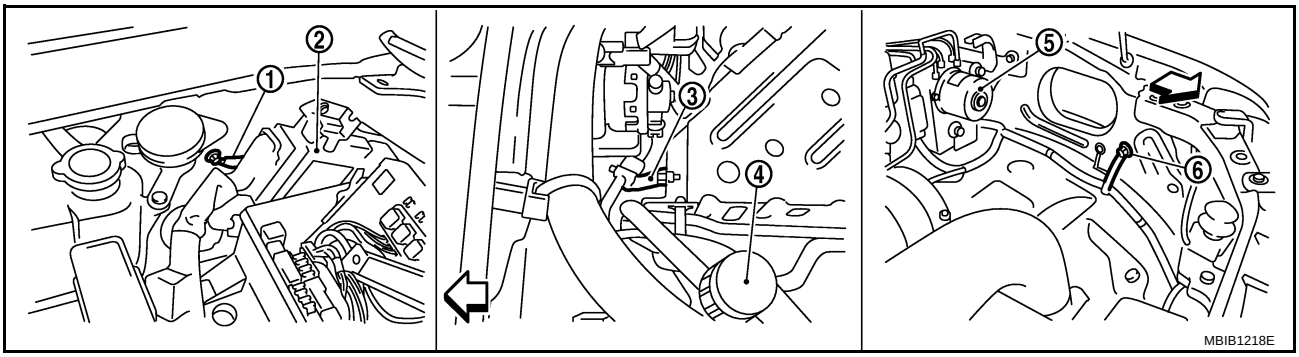
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	W	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	O	Sensor ground (APP sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.3 - 0.45V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 2.4V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.6 - 0.95V
			[Ignition switch: ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	Less than 4.75V

Diagnostic Procedure

GBS00122

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

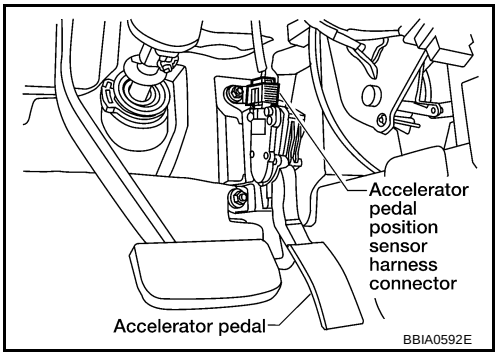
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

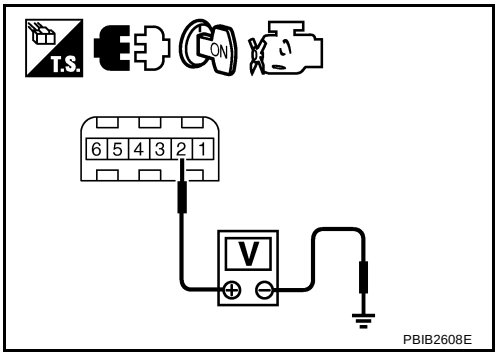
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



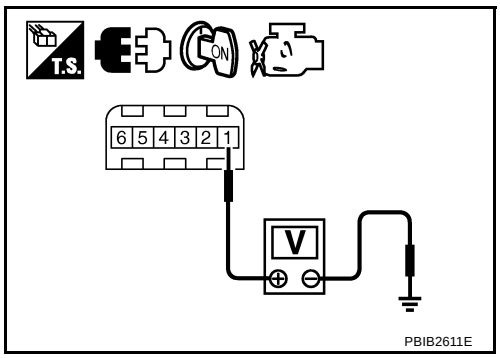
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-893
47	Electric throttle control actuator terminal 2	EC-885

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-889, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-614, "Throttle Valve Closed Position Learning" .
3. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR

Refer to EC-897, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-614, "Accelerator Pedal Released Position Learning" .
3. Perform EC-614, "Throttle Valve Closed Position Learning" .
4. Perform EC-614, "Idle Air Volume Learning" .

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

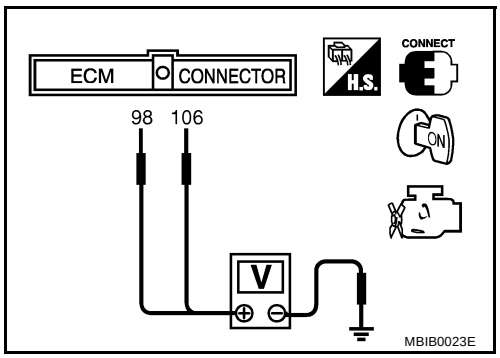
GBS00123

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.95V
	Fully depressed	Less than 4.75V
98 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.45V
	Fully depressed	Less than 2.4V



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-614, "Accelerator Pedal Released Position Learning" .
6. Perform EC-614, "Throttle Valve Closed Position Learning" .
7. Perform EC-614, "Idle Air Volume Learning" .

Removal and Installation

GBS00124

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

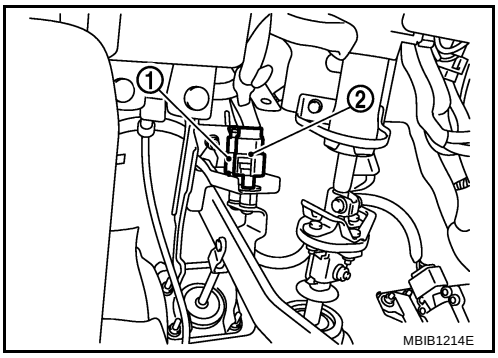
ASCD BRAKE SWITCH

PFP:25320

Component Description

GBS00125

When the brake pedal is depressed, ASCD brake switch (1) is turned OFF and stop lamp switch (2) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-591, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

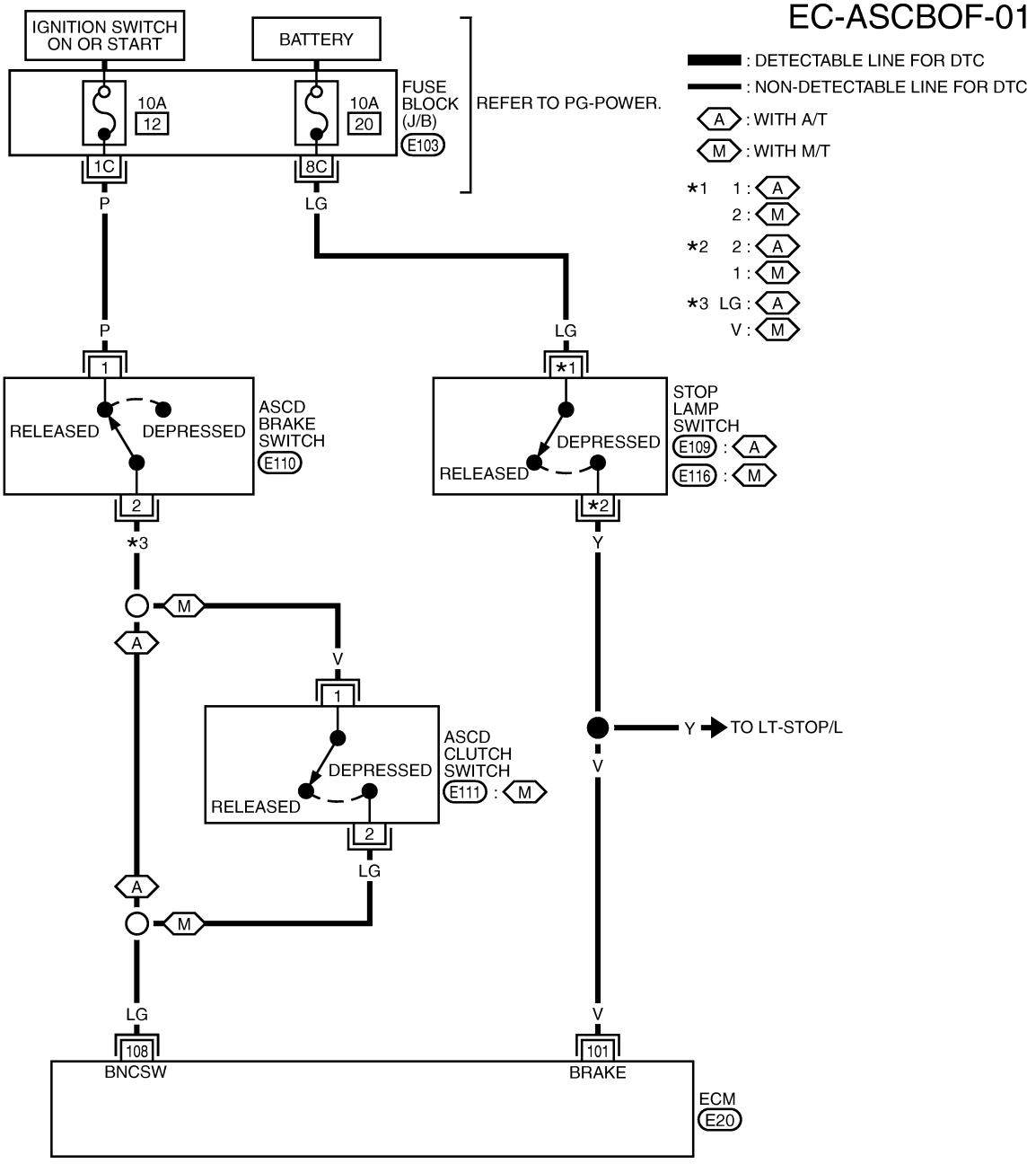
GBS00126

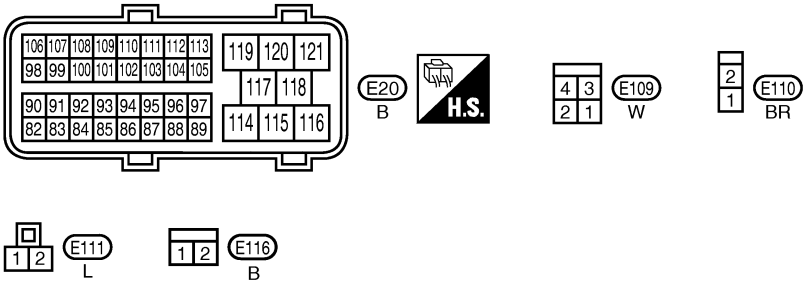
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	● Ignition switch: ON	Brake pedal: Fully released (A/T) Clutch pedal and brake pedal: Fully released (M/T)	ON
		Brake pedal: Slightly depressed (A/T) Clutch pedal and/or brake pedal: Slightly depressed (M/T)	OFF
BRAKE SW 2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

GBS00127





REFER TO THE FOLLOWING.
E103 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1421E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	LG	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS00128

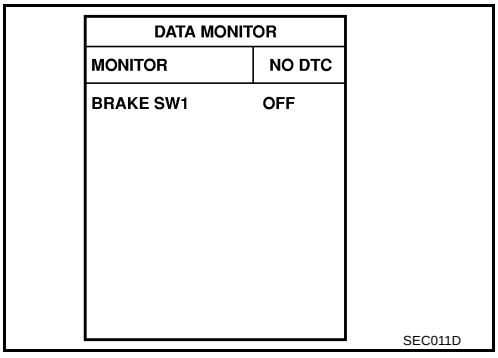
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

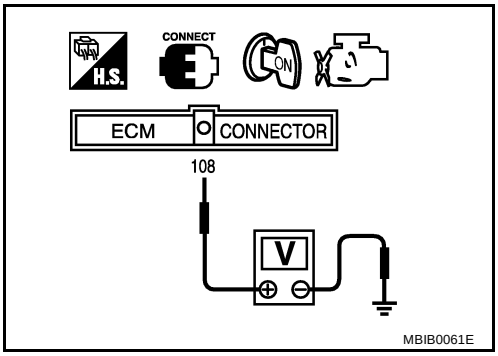
CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

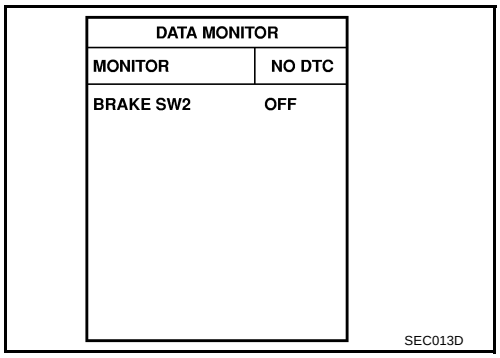
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

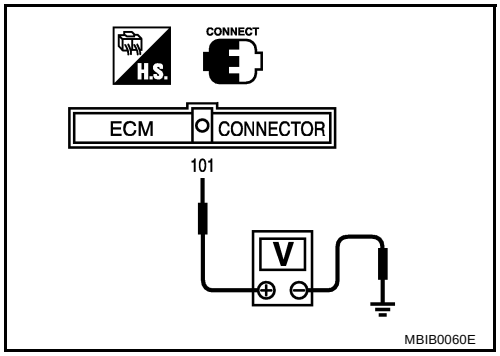
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



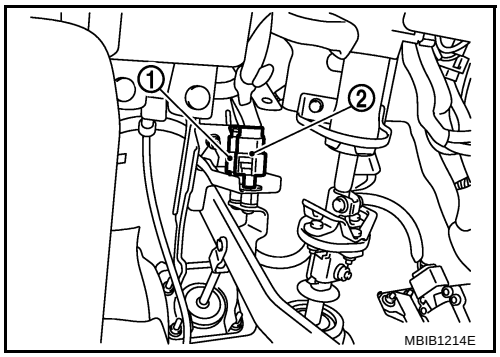
OK or NG

OK >> **INSPECTION END**

NG >> GO TO 7.

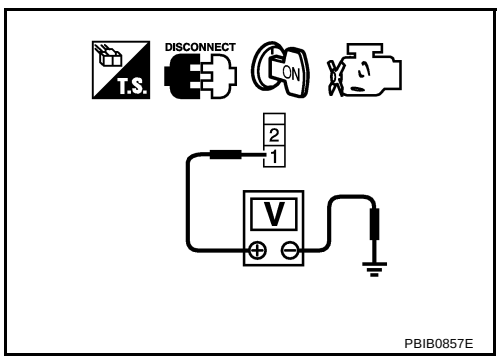
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (1) harness connector.
   - Stop lamp switch (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-910, "Component Inspection"

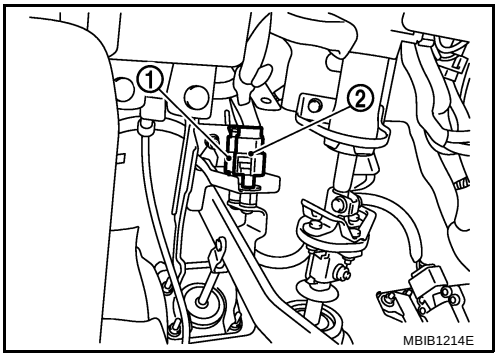
OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

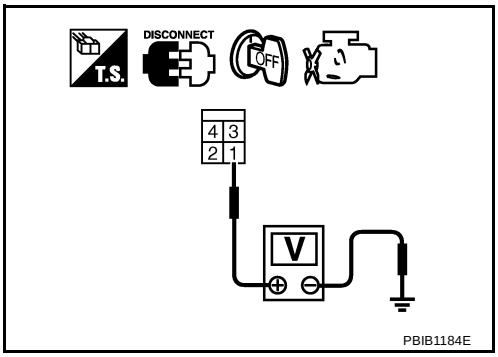
1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.

– ASCD brake switch (1)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-910, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

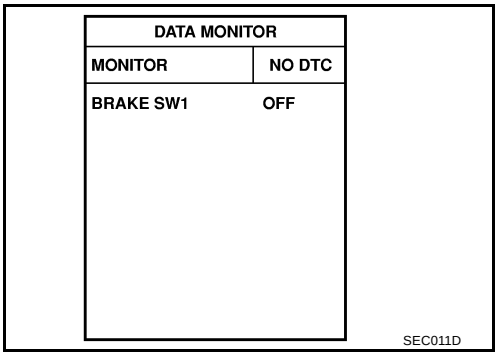
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

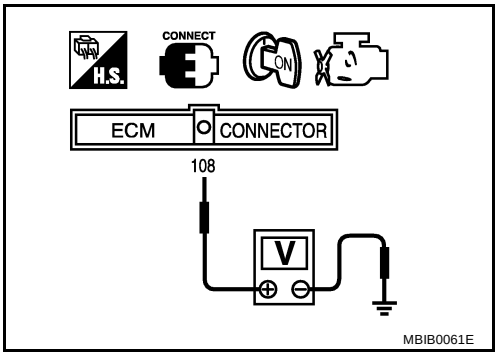
CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

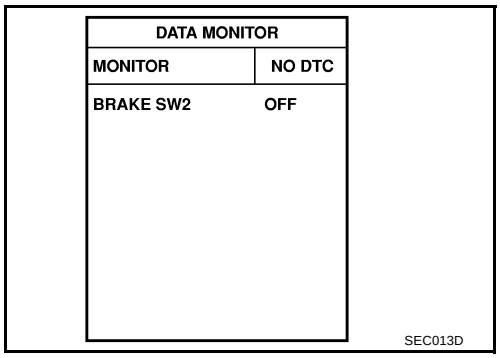
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

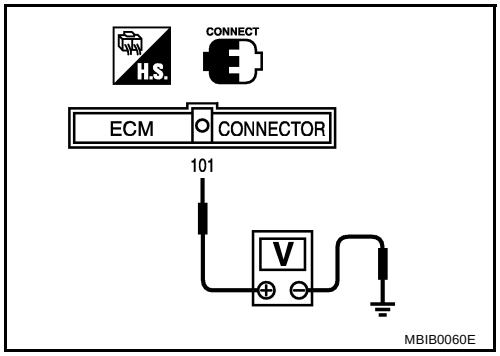
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



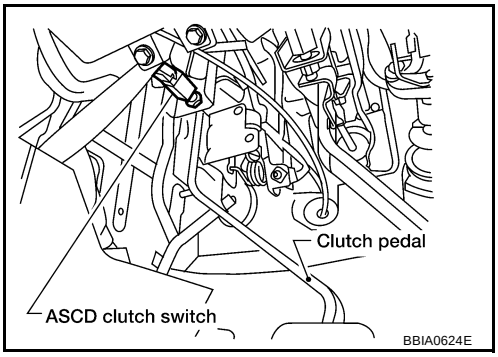
OK or NG

OK >> **INSPECTION END**

NG >> GO TO 10.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

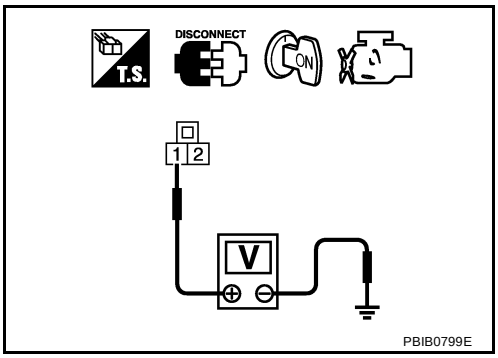


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

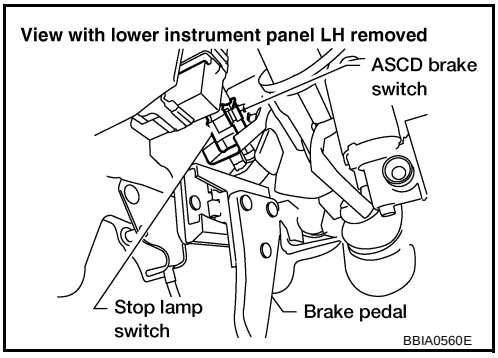
OK or NG

OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

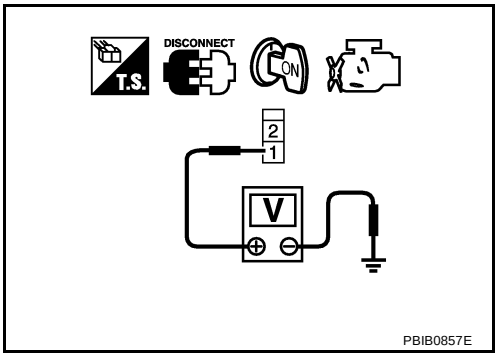


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-910, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

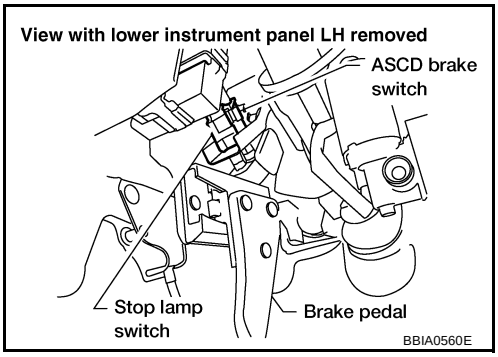
Refer to EC-910, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

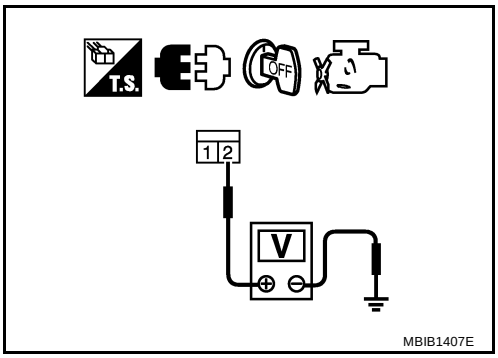


3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT -II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-910, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

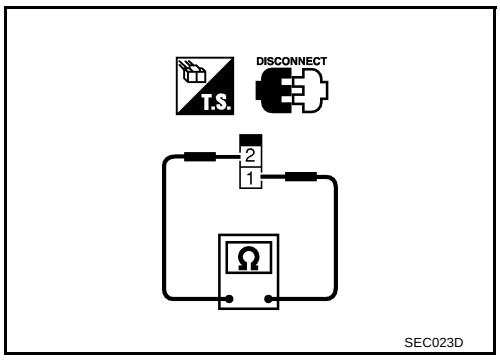
GBS00129

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

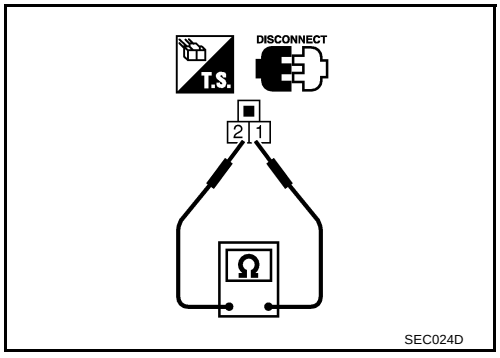


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

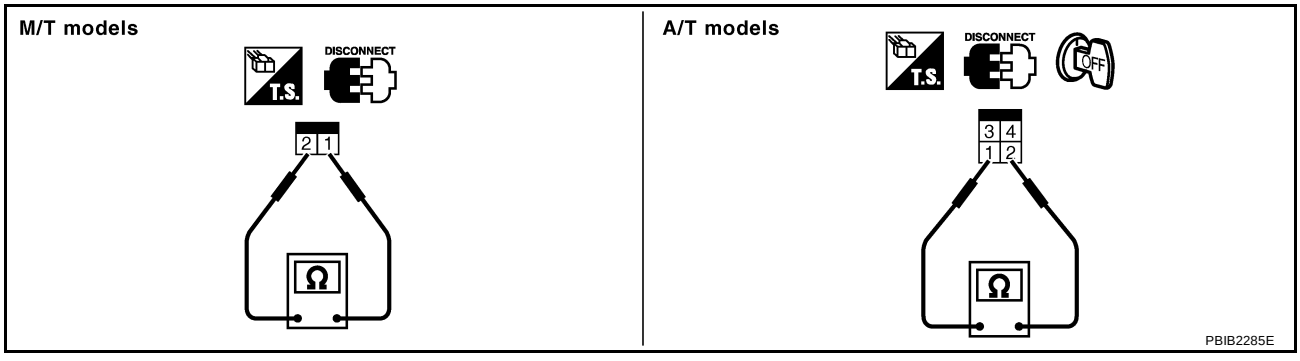
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

GBS0012A

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-591, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

GBS0012B

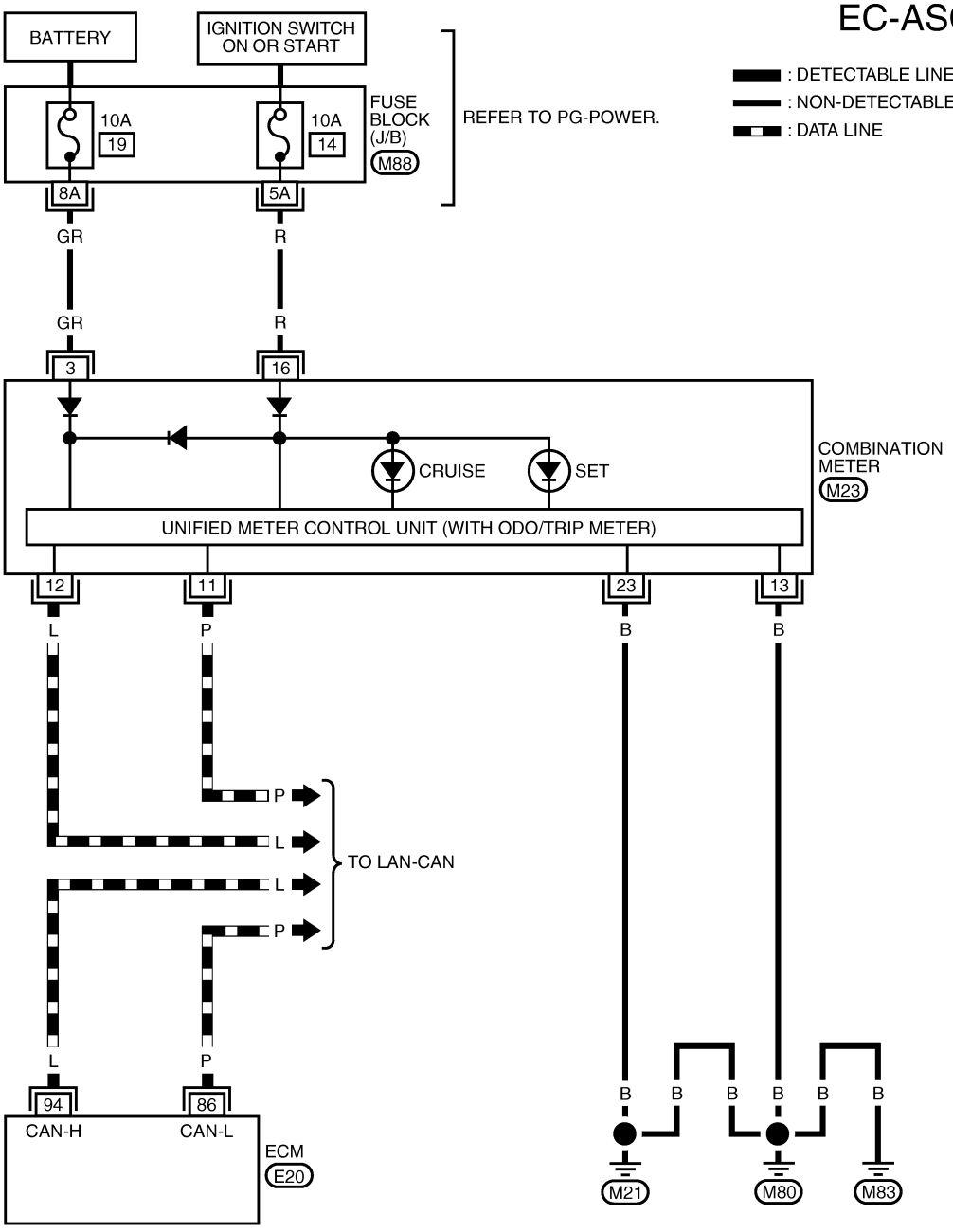
Specification data are reference value.

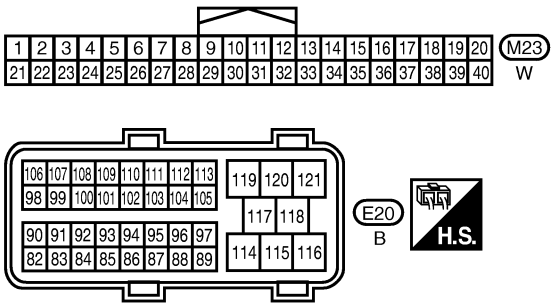
MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

Wiring Diagram

GBS0012C

EC-ASCIND-01





REFER TO THE FOLLOWING.
M91 - SUPER MULTIPLE JUNCTION (SMJ)
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1325E

Diagnostic Procedure

GBS0012D

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 175 km/h (109 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-686, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

3. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

OK or NG

OK >> GO TO 4.
NG >> Go to DI-4, "COMBINATION METERS" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

GBS0012E

The electrical load signal (Headlamp switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

CONSULT-II Reference Value in Data Monitor Mode

GBS0012F

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch ON and/ or lighting switch is in 2nd.	ON
		Rear window defogger switch and lighting switch are OFF.	OFF
HEATER FAN SW	● Engine: After warning up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF

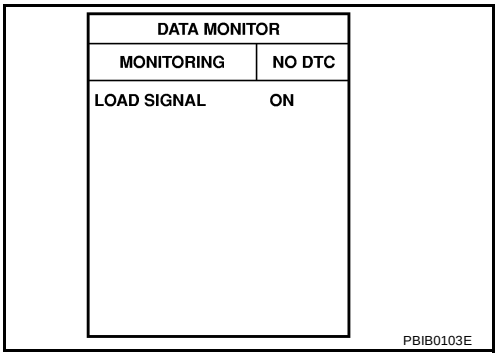
Diagnostic Procedure

GBS0012G

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Connect CONSULT-II and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



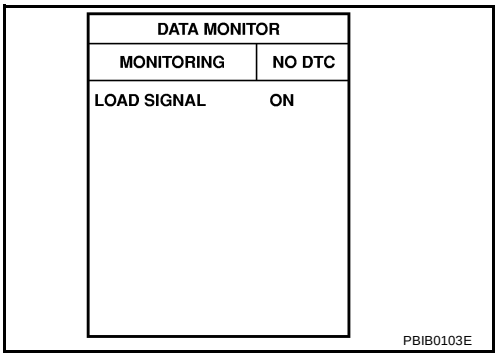
OK or NG

OK >> GO TO 2.
NG >> GO TO 4.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF



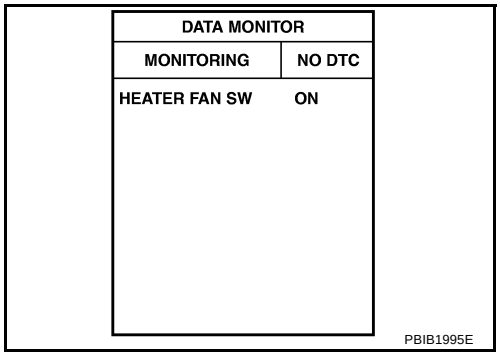
OK or NG

OK >> GO TO 3.
NG >> GO TO 5.

3. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-45, "REAR WINDOW DEFOGGER" .

>> **INSPECTION END**

5. CHECK HEADLAMP SYSTEM

Refer to LT-4, "HEADLAMP" or LT-31, "HEADLAMP AIMING CONTROL (MANUAL)" .

>> **INSPECTION END**

6. CHECK HEATER FAN CONTROL SYSTEM

Refer to MTC-32, "TROUBLE DIAGNOSIS" .

>> **INSPECTION END**

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

GBS0012H

SYSTEM DESCRIPTION

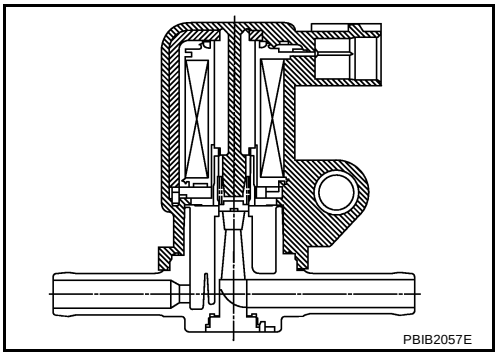
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Wheel sensor	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.


PBIB2057E

CONSULT-II Reference Value in Data Monitor Mode

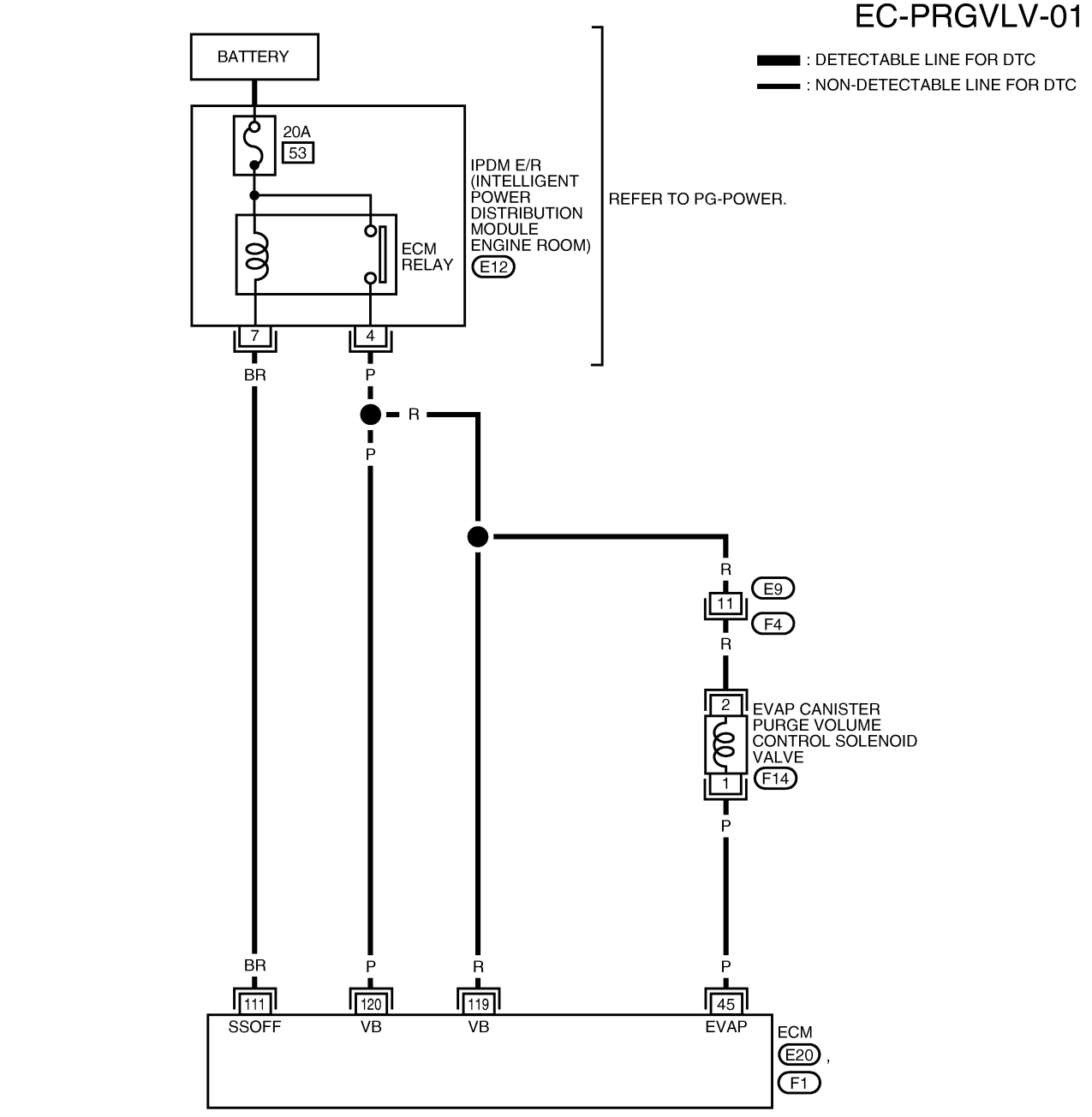
GBS0012I

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0%
		2,000 rpm	—

Wiring Diagram

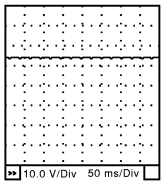
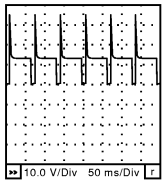
GBS0012J



MBWA1335E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEC991C
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

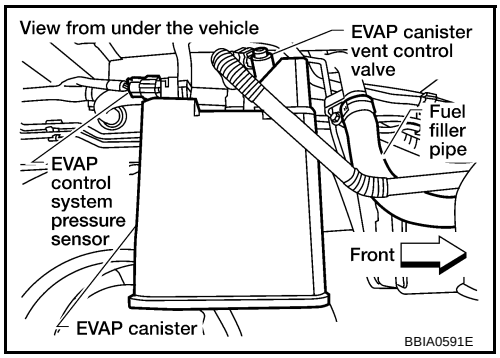
Diagnostic Procedure

GBS0012K

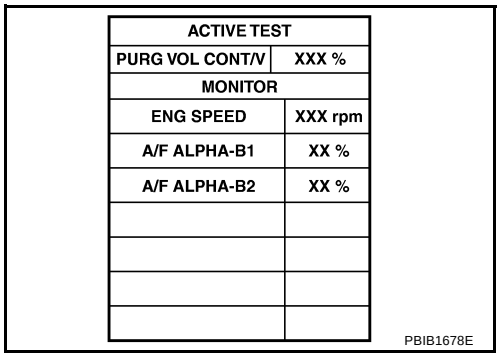
1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Turn ignition switch ON.



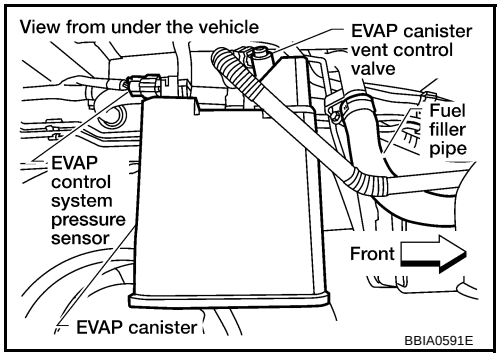
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Start engine and let it idle.
6. Change the valve opening percentage with touching “Qu” or “Qd” on CONSULT-II screen, and check for vacuum existence at the EVAP purge hose under the following conditions.



Conditions (PURG VOL CONT/V)	Vacuum
0%	Should not exist.
100%	Should exist.

Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Start engine and let it idle for at least 100 seconds.
4. Check for vacuum existence at the EVAP purge hose under the following conditions.



Conditions	Vacuum
At idle	Should not exist.
Engine speed: About 2,000 rpm.	Should exist.

OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK EVAP CANISTER

Refer to EC-597, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace EVAP canister.

3. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-595, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

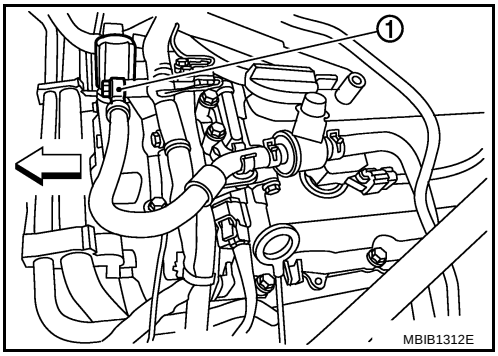
OK >> GO TO 4.
NG >> Repair or reconnect the hose.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.

– ⇦: Vehicle front

3. Turn ignition switch ON.

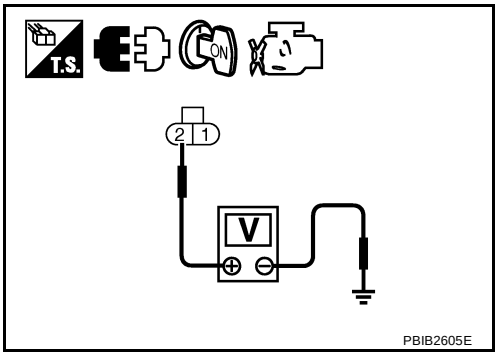


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

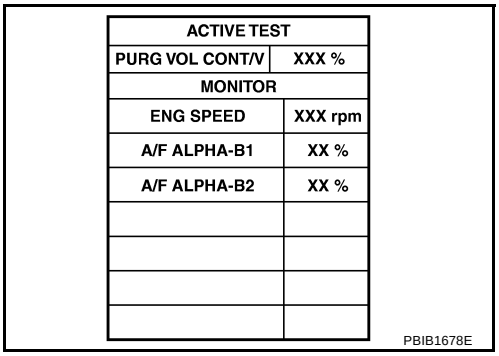
OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-923, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

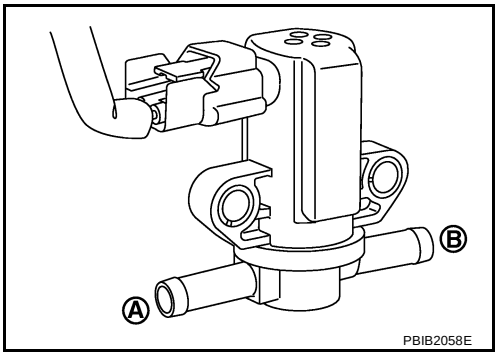
GBS0012L

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve using “ACTIVE TEST” mode with CONSULT-II under the following conditions.

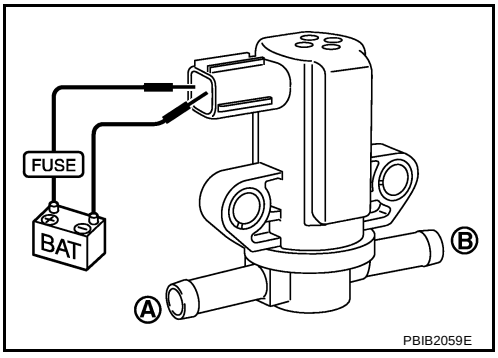
Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

GBS0012M

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .

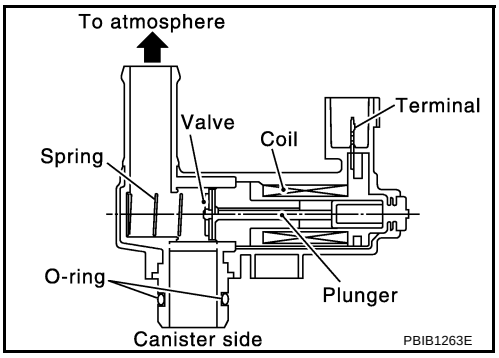
EVAP CANISTER VENT CONTROL VALVE

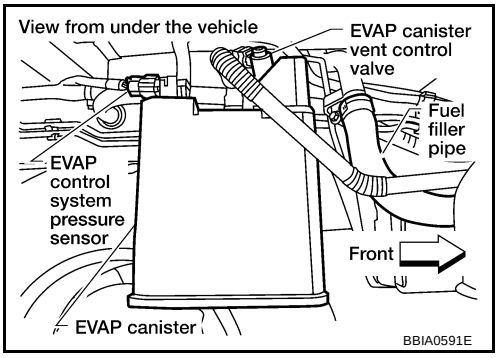
PFP:14935

Component Description

GBS0012N

The EVAP canister vent control valve is located on the EVAP canister.
This solenoid valve is not used for engine control, and always remains open.
If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressured and EVAP canister may be damaged.

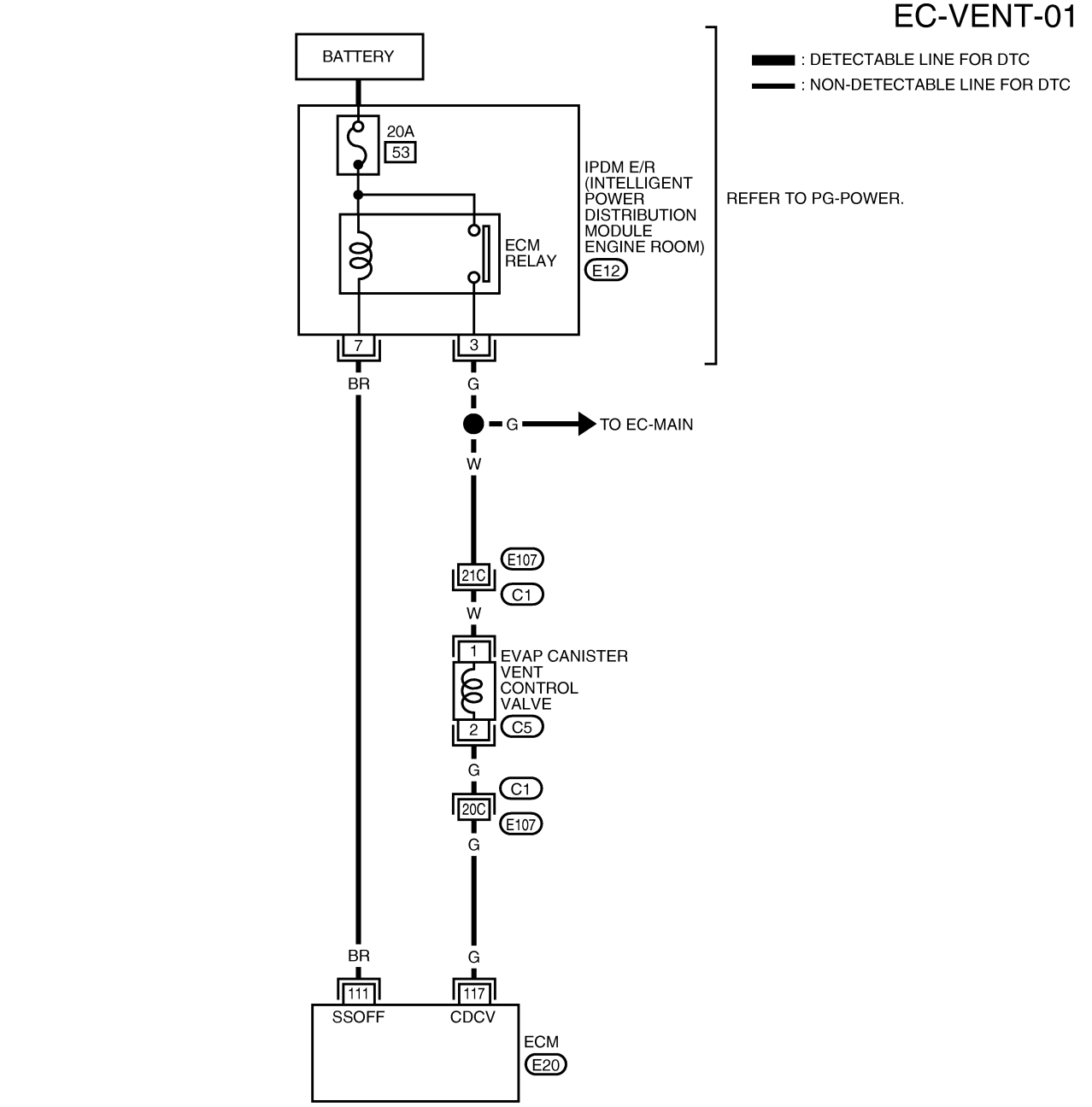


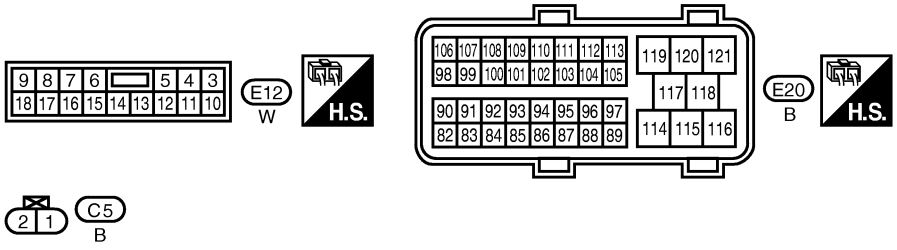


Wiring Diagram

GBS0012O

EC-VENT-01





REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1294E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

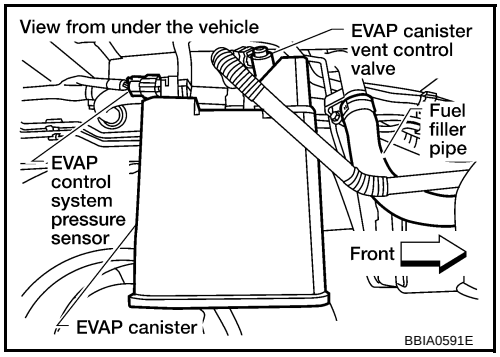
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS0012P

1. CHECK OVERALL FUNCTION

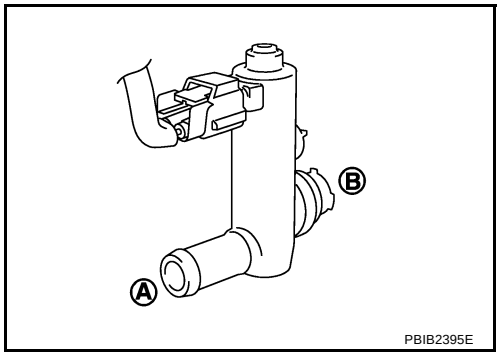
1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
3. Start engine.



4. Blow air into port **A** and check that it flows freely out of port **B** .

OK or NG

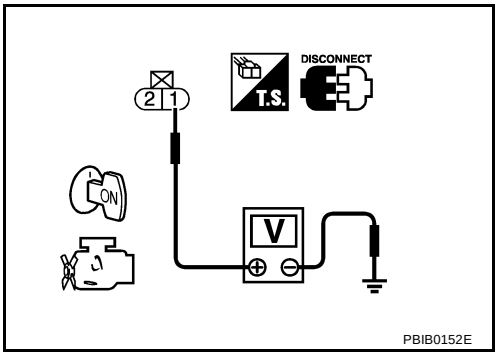
OK >> **INSPECTION END**
NG >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch ON.
3. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E107, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-928, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister vent control valve.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

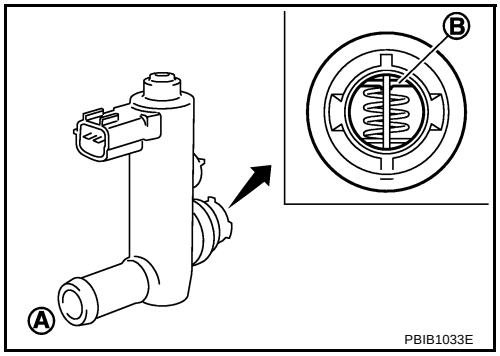
>> **INSPECTION END**

Component Inspection

GBS0012Q

EVAP CANISTER VENT CONTROL VALVE

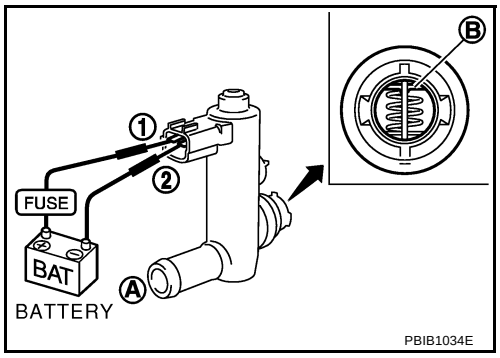
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

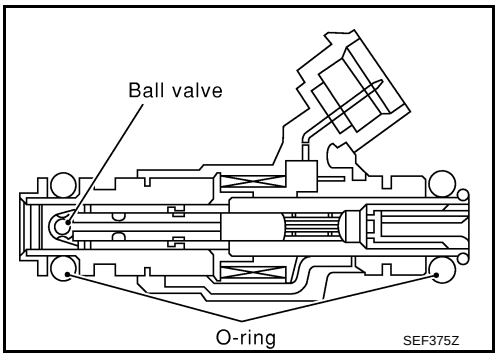
FUEL INJECTOR

PFP:16600

Component Description

GBS0012R

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

GBS0012S

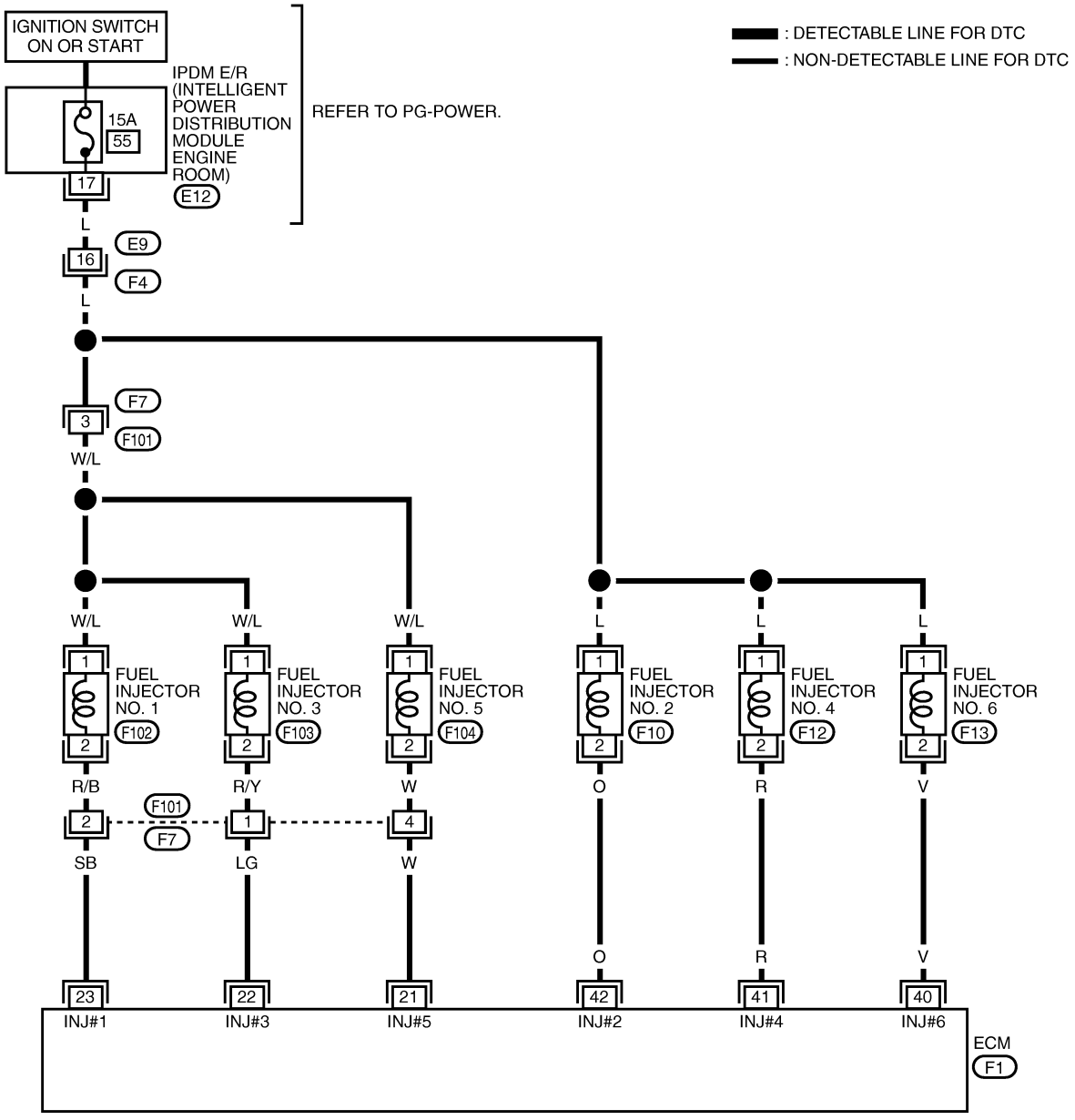
Specification data are reference values.

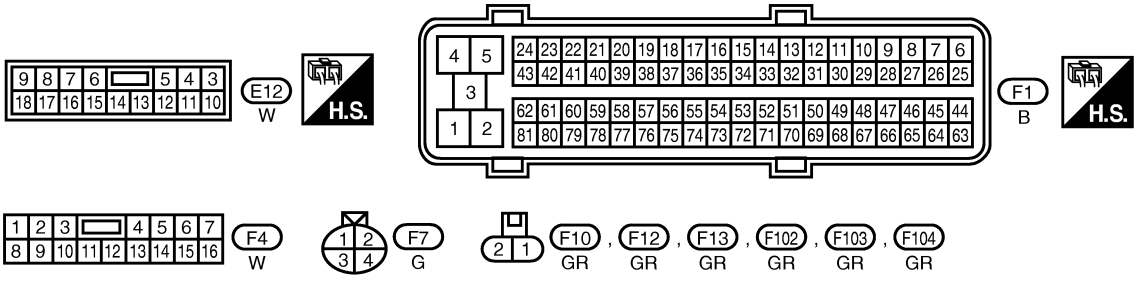
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-667, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

GBS0012T

EC-INJECT-01

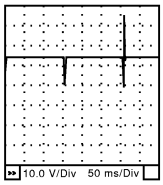
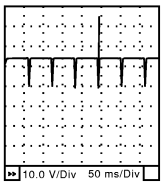




MBWA1321E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 40 41 42	W LG SB V R O	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEC985C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS0012U

1. INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

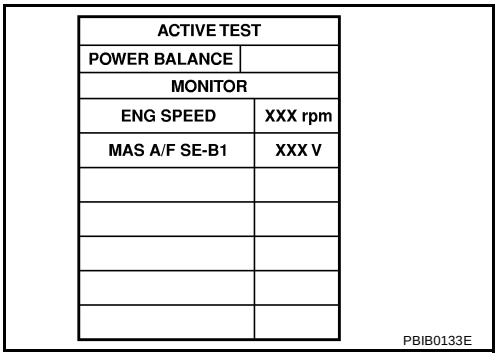
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 7.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



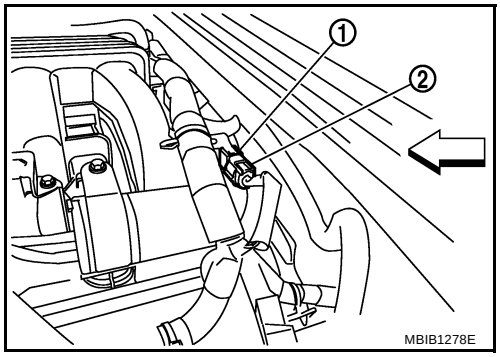
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

3. CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-II

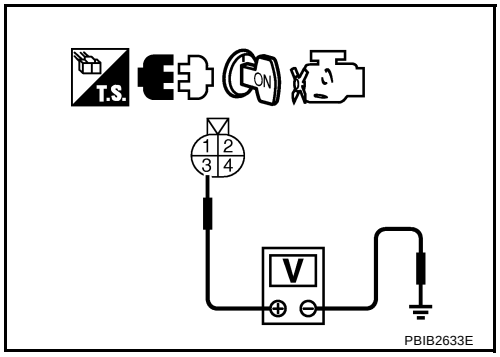
1. Stop engine.
2. Disconnect harness connector F101 (1), F7 (2).
   - ⇦: Vehicle front
3. Turn ignition switch ON.



4. Check voltage between harness connector F7 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F7 and ECM as follows.
   Refer to Wiring Diagram.



Cylinder	Harness connector F7 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

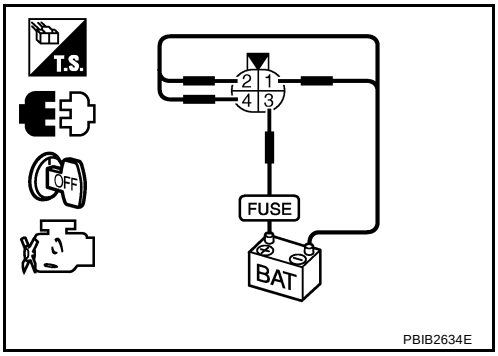
- Harness connectors E9, F4
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between harness connector F7 and fuse
- Harness for open or short between harness connector F7 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F101 as follows and then interrupt it. Listen to each fuel injector operating sound.

Cylinder	Harness connector F101 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4



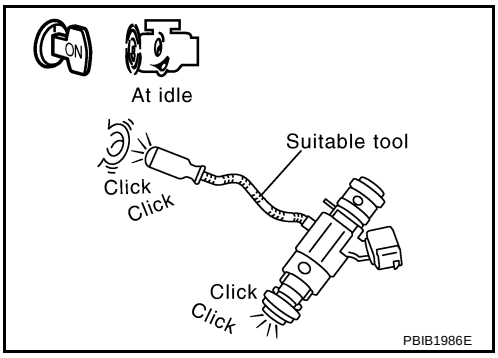
Operating sound should exist.

OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK FUNCTION OF FUEL INJECTOR-III

1. Reconnect all harness connector disconnected.
2. Start engine.
3. Listen to fuel injectors No. 2, No. 4, No.6 operating sound.



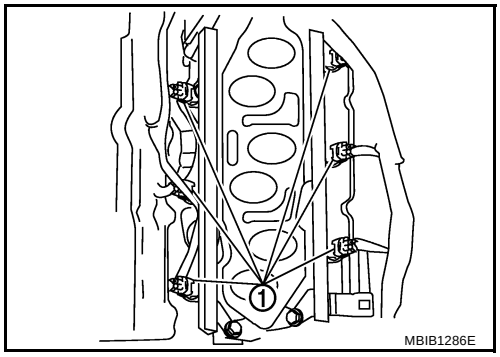
Clicking noise should exist.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector (1).

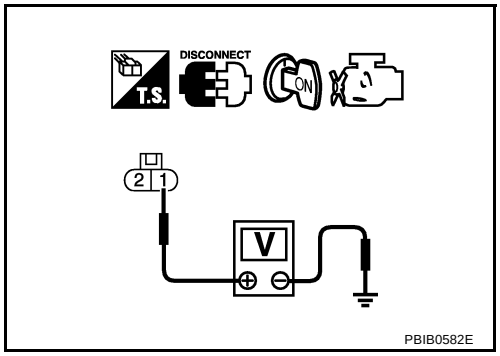


3. Turn ignition switch ON.
4. Check voltage between fuel injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness connectors F7, F101
- IPDM E/R harness connector E12
- 15A fuse
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

9. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F101, F7 (bank 1)
- Harness for open or short between fuel injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK FUEL INJECTOR

Refer to EC-935, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel injector.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

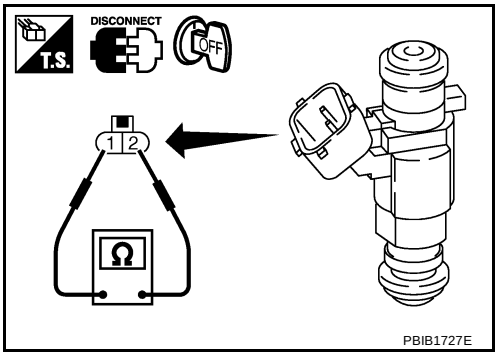
Component Inspection

GBS0012V

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



Removal and Installation

GBS0012W

FUEL INJECTOR

Refer to EM-36, "FUEL INJECTOR AND FUEL TUBE" .

FUEL PUMP

PFP:17042

Description

GBS0012X

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

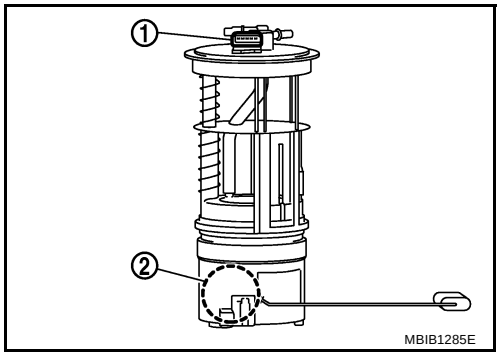
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)



CONSULT-II Reference Value in Data Monitor Mode

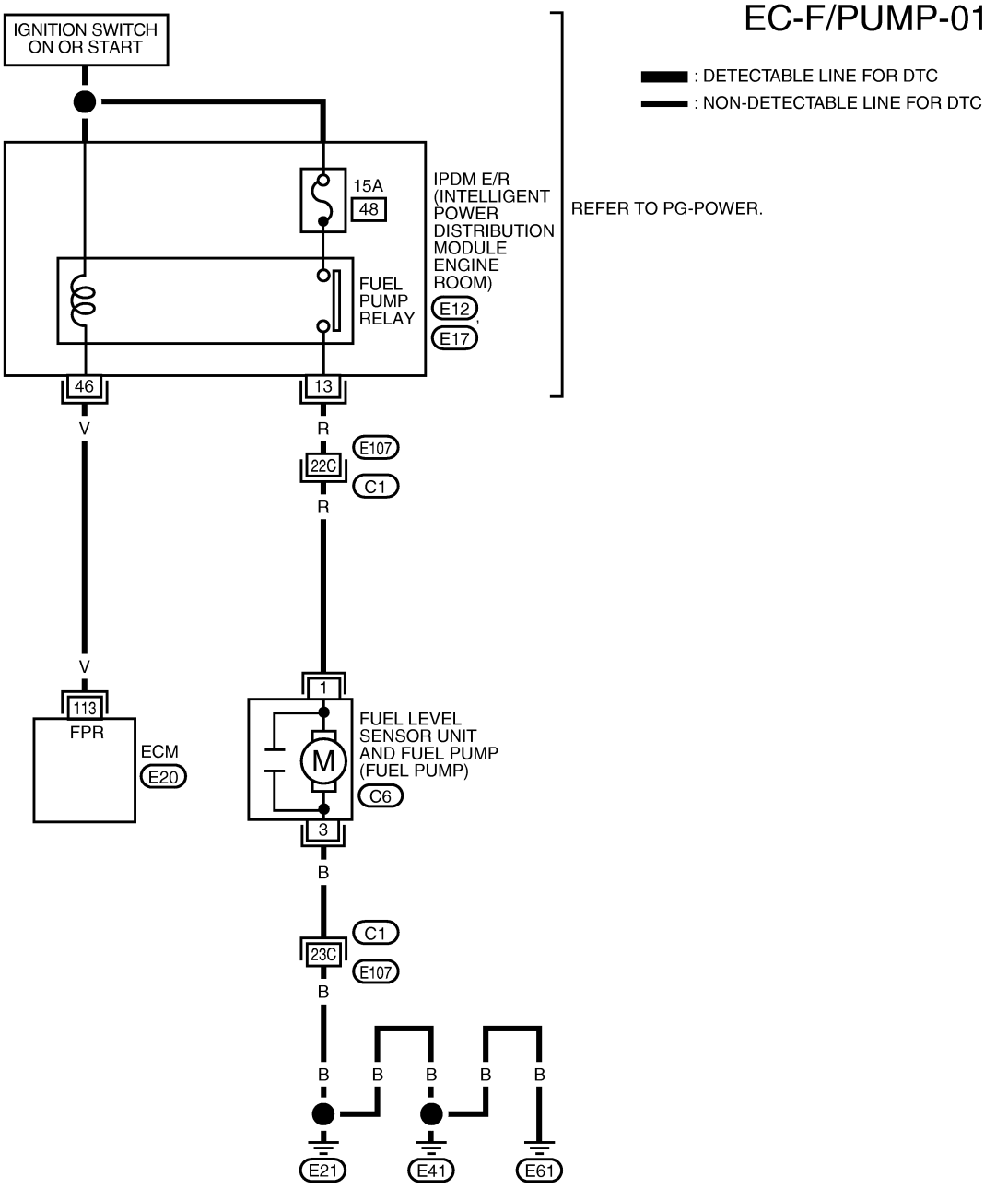
GBS0012Y

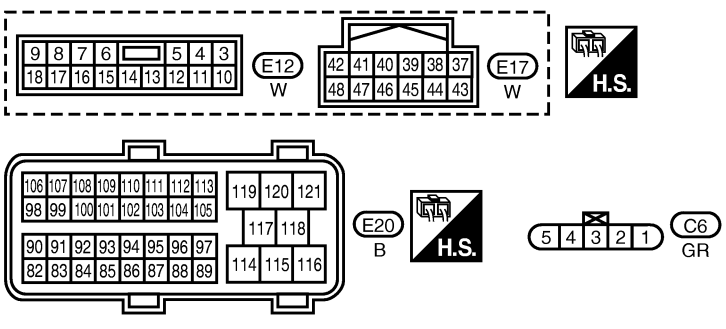
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

GBS0012Z





REFER TO THE FOLLOWING.
C1 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1322E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

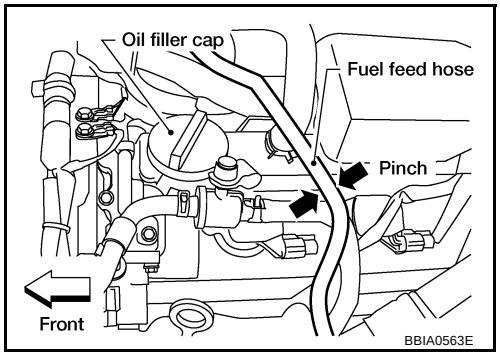
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	V	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS00130

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



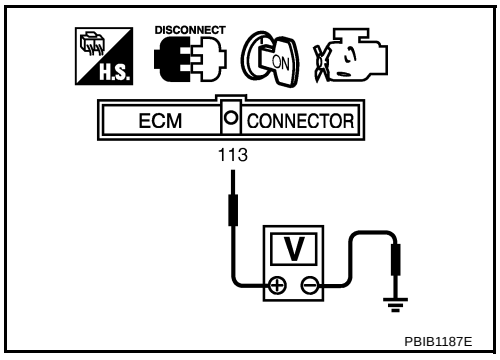
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

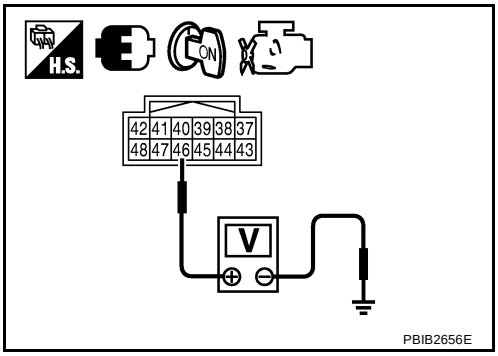
3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 12.



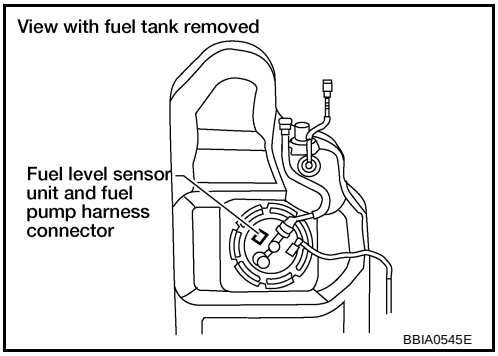
4. DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.

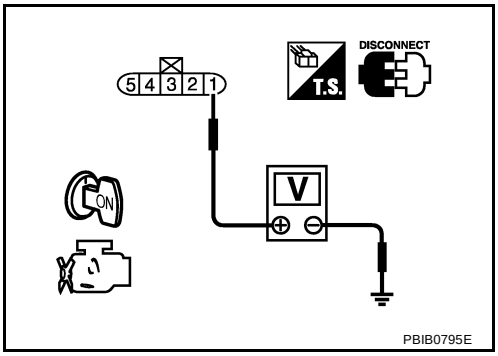


5. Check voltage between “fuel level sensor unit and fuel pump” terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.



6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CURCUIT-IV

1. Disconnect IPDM E/R harness connector E12.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 1 and IPDM E/R terminal 13.
   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 12.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E107
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

>> Repair open circuit or short to power in harness or connectors.

11. CHECK FUEL PUMP

Refer to EC-941, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair or replace harness or connectors.

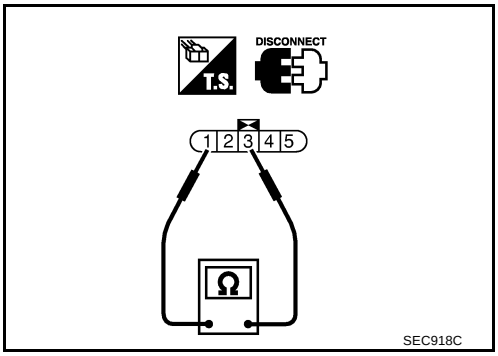
Component Inspection

GBS00131

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]



Removal and Installation

GBS00132

FUEL PUMP

Refer to FL-10, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

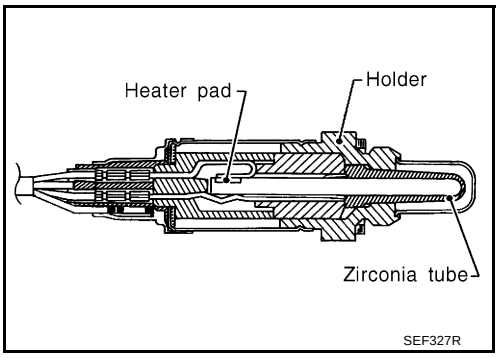
HO2S2

PFP:226A0

Component Description

GBS00133

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

GBS00134

Specification data are reference values.

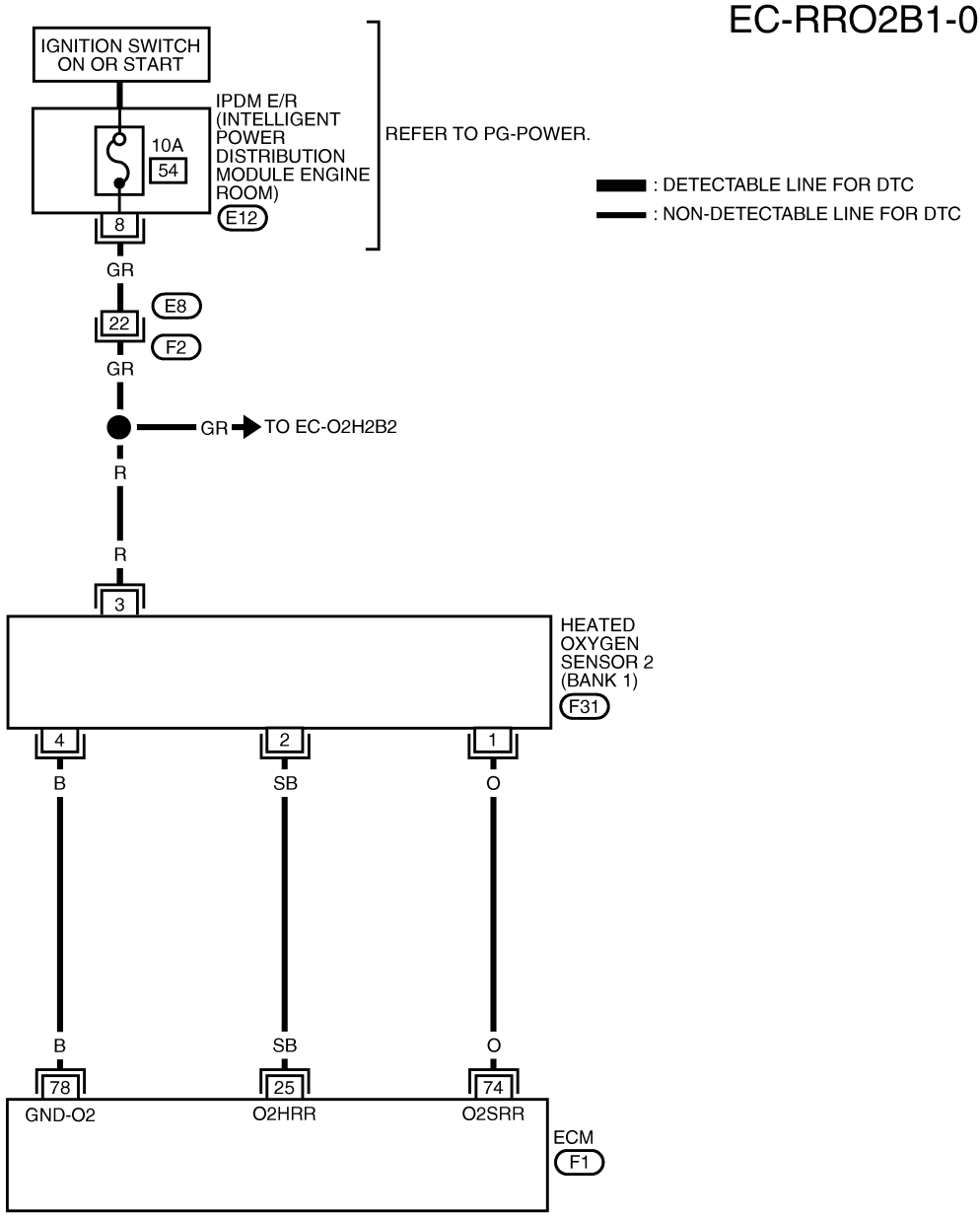
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ←→ RICH

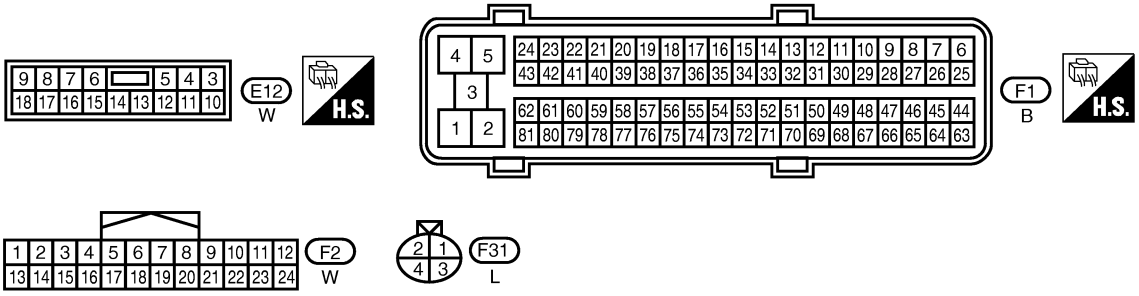
Wiring Diagram

GBS00135

BANK 1

EC-RRO2B1-01





MBWA1423E

Specification data are reference values and are measured between each terminal and ground.

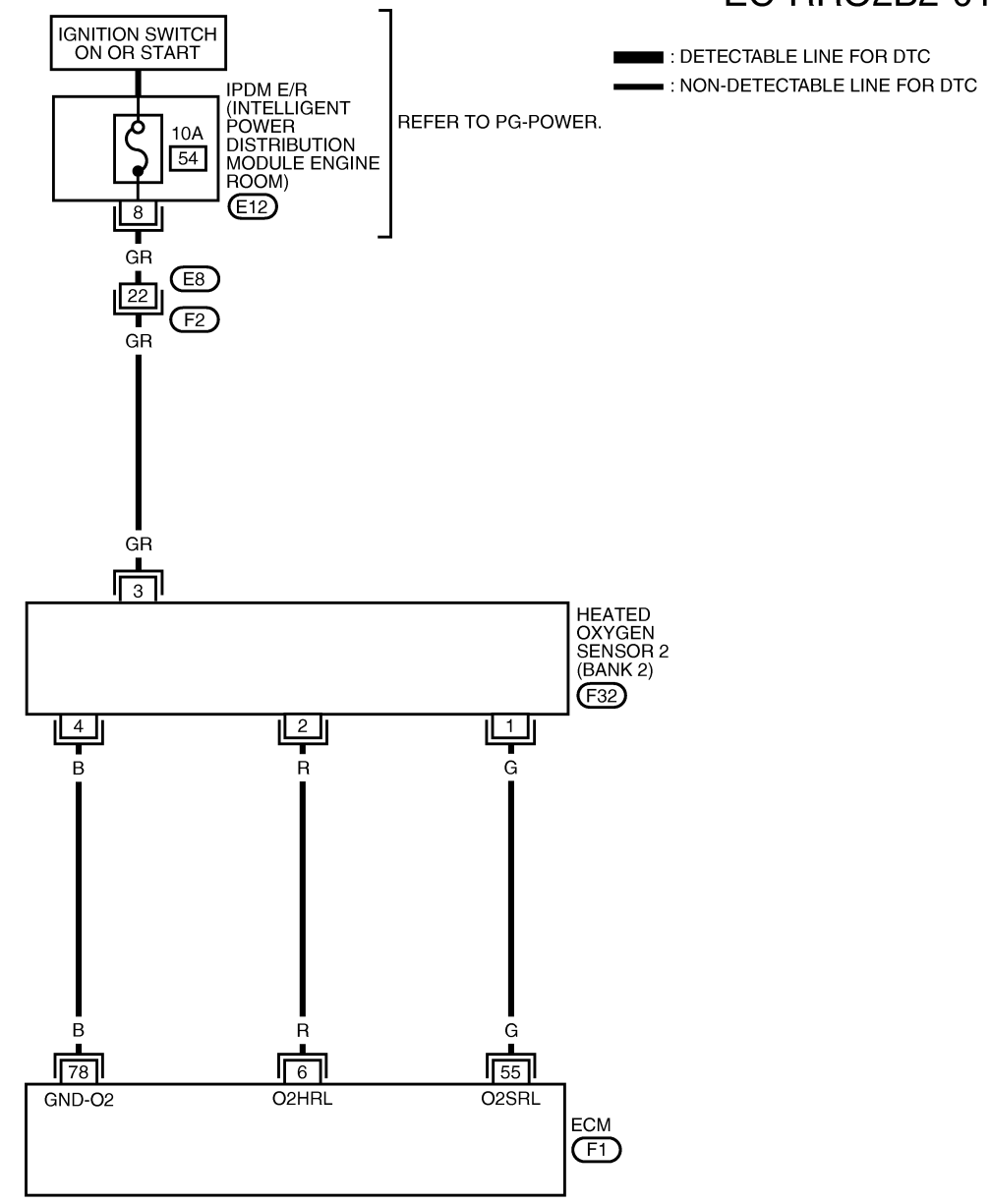
CAUTION:

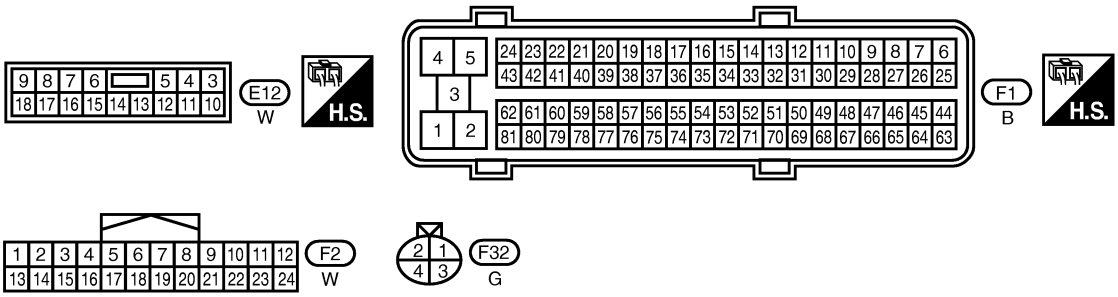
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-RRO2B2-01





MBWA1334E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

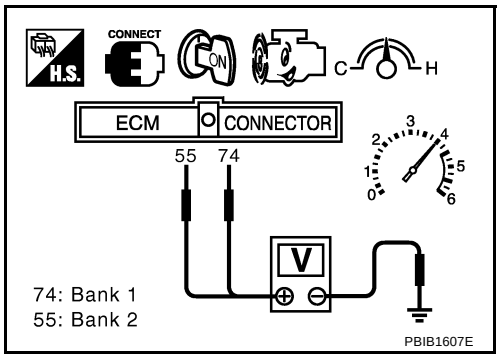
Diagnostic Procedure

GBS00136

1. CHECK OVERALL FUNCTION - I

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage while revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release the accelerator pedal as quickly as possible.)

The voltage does not remain in the range of 0.2 - 0.4V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK OVERALL FUNCTION - II

Keep engine at idle for 10 minutes, then check the voltage between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground, or check the voltage when coasting at 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).

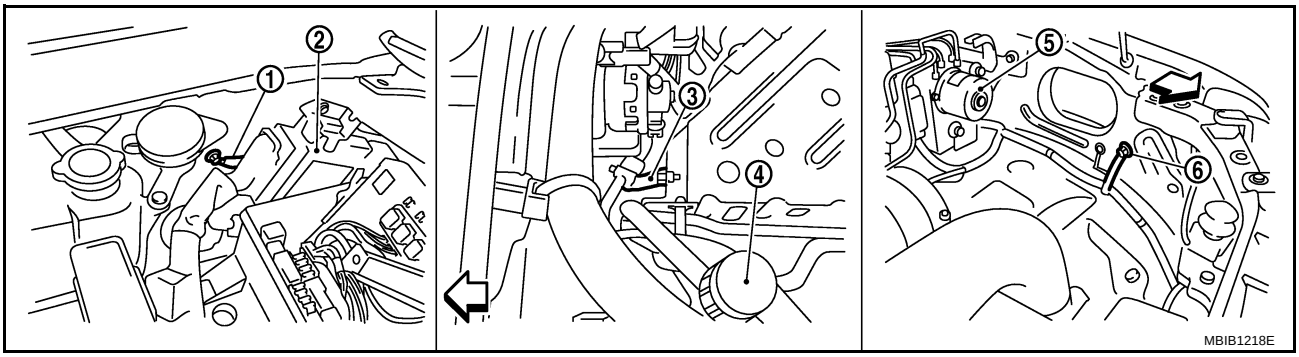
The voltage does not remain in the range of 0.2 - 0.4V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-685, "Ground Inspection" .



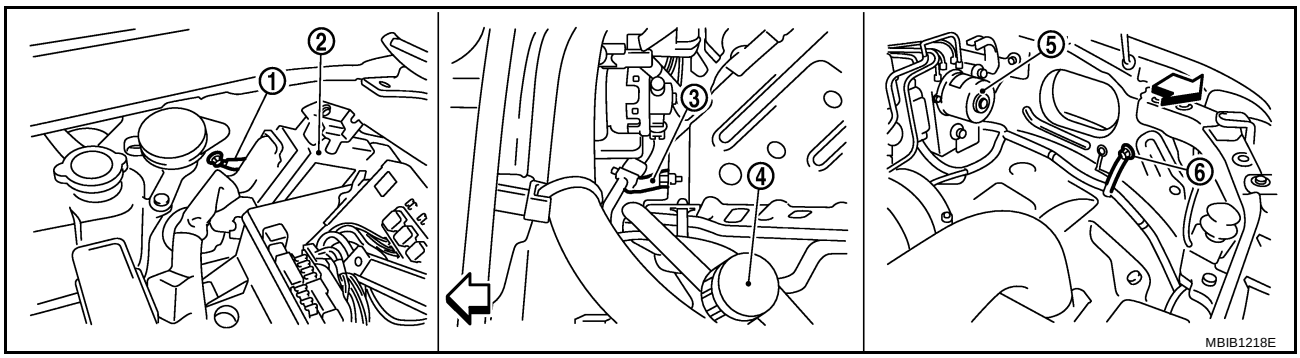
⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK >> GO TO 4.
NG >> Repair or replace ground connections.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank 1)

3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

Continuity should exist.

3. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

Continuity should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-949, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS00137

HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

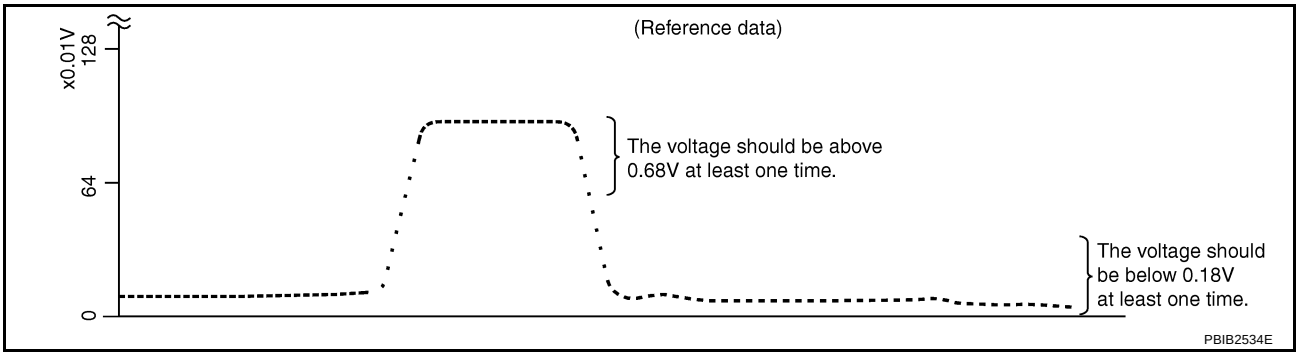
SEF174Y

6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

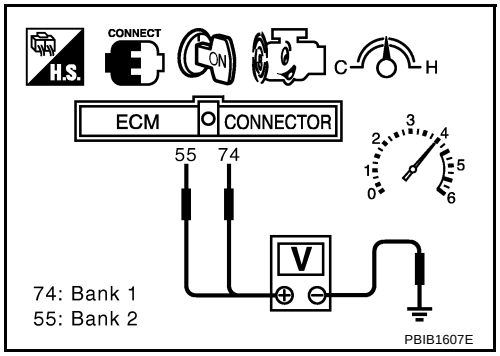
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

Removal and Installation

GBS00138

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

HO2S2 HEATER

PFP:226A0

Description

GBS00139

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

GBS0013A

Specification data are reference values.

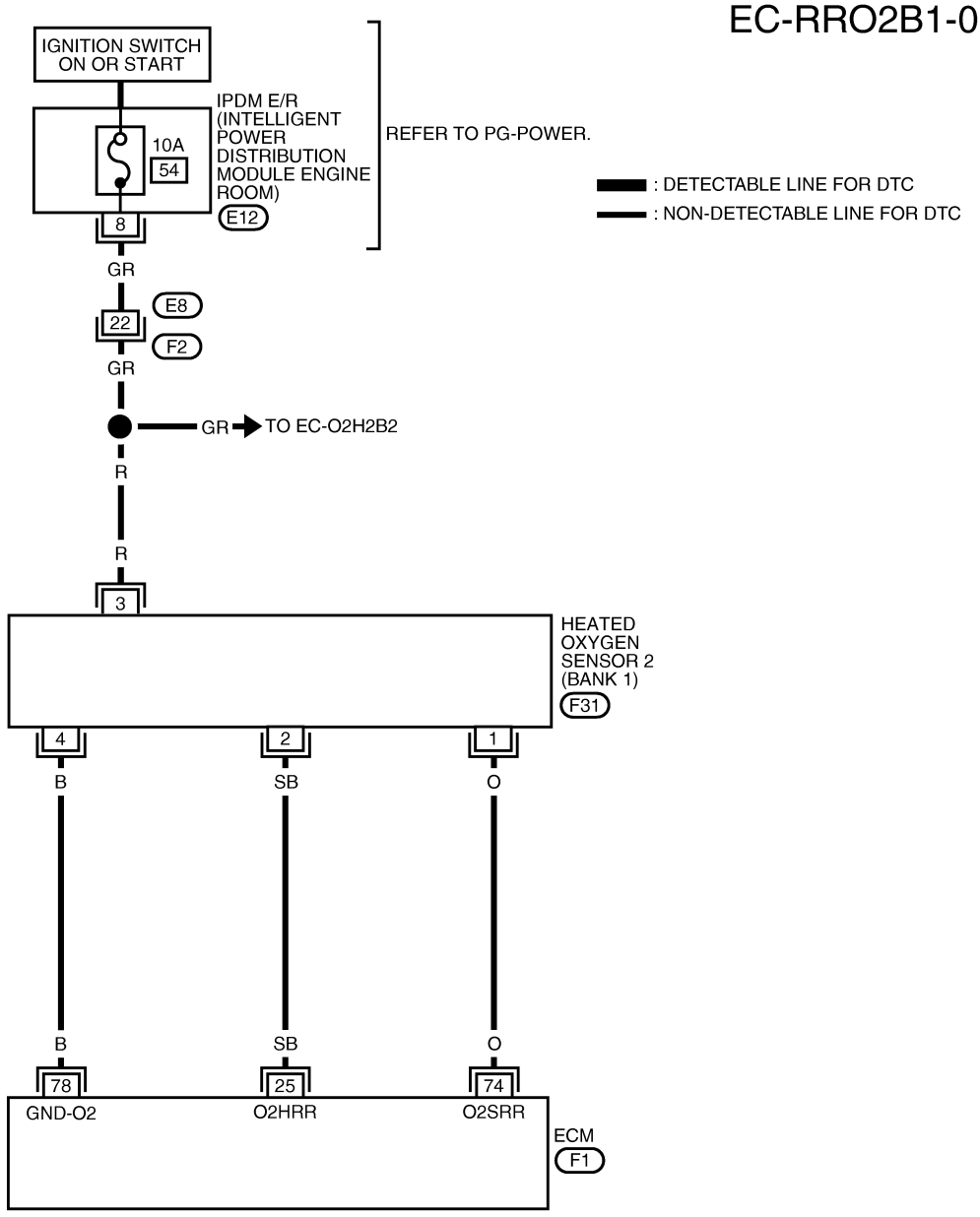
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	● Engine speed: Above 3,600 rpm	OFF

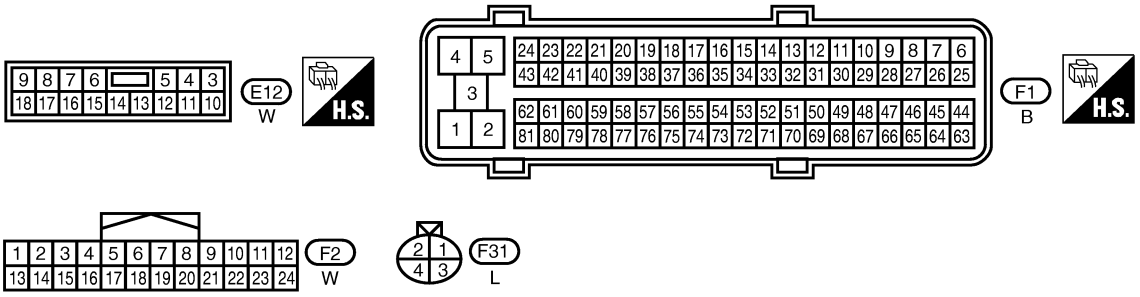
Wiring Diagram

GBS0013B

BANK 1

EC-RRO2B1-01





MBWA1423E

Specification data are reference values and are measured between each terminal and ground.

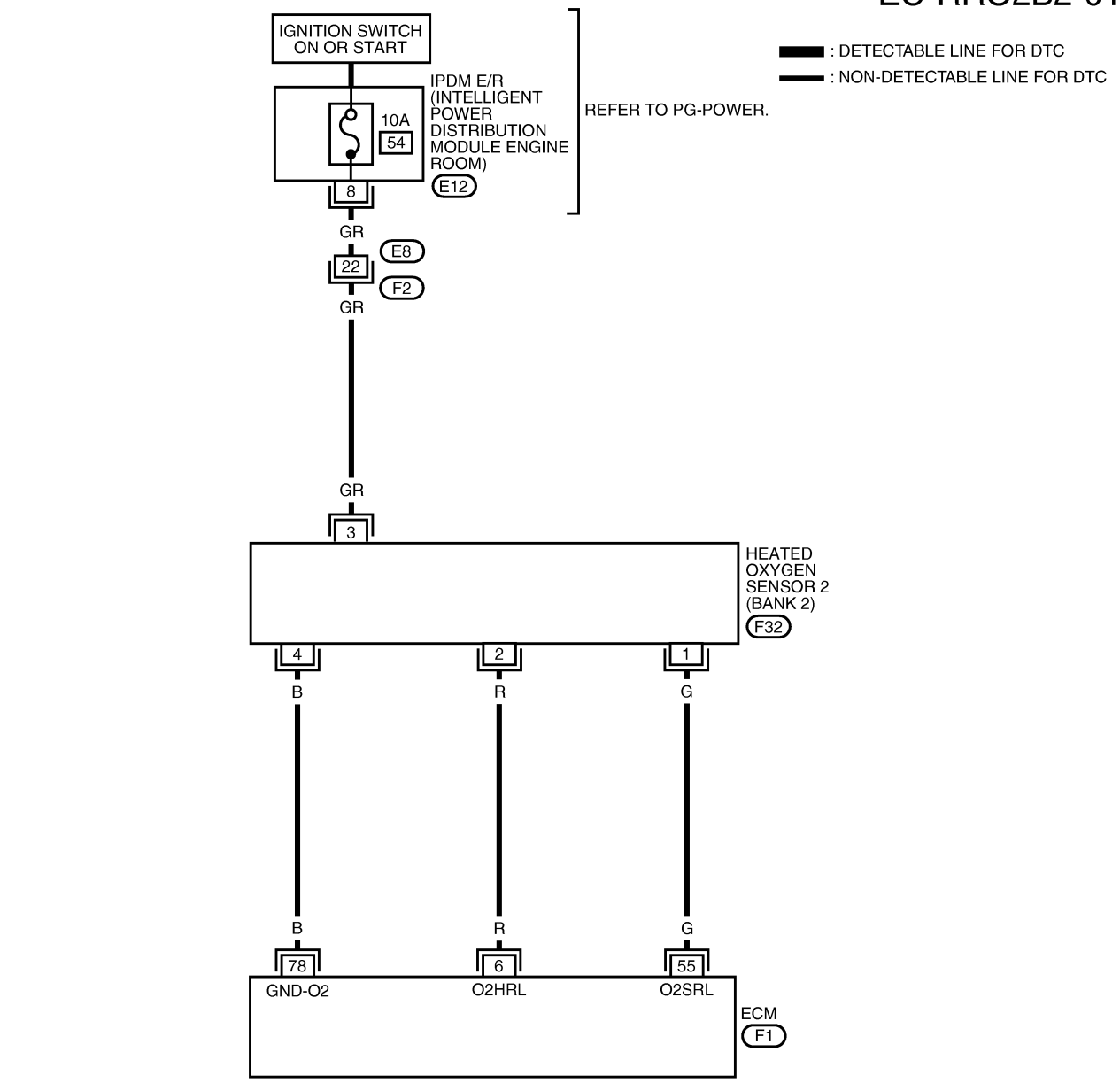
CAUTION:

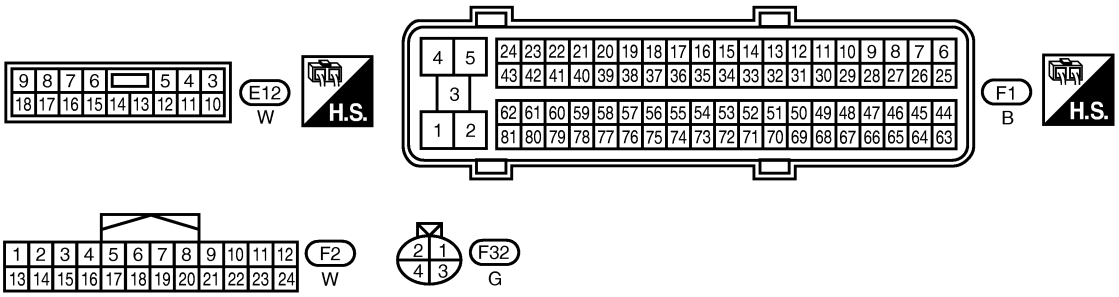
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	SB	Heated oxygen sensor 2 heater (Bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
74	O	Heated oxygen sensor 2 (Bank 1)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

BANK 2

EC-RRO2B2-01





MBWA1334E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine: Stopped **[Engine is running]** ● Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
55	G	Heated oxygen sensor 2 (Bank 2)	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

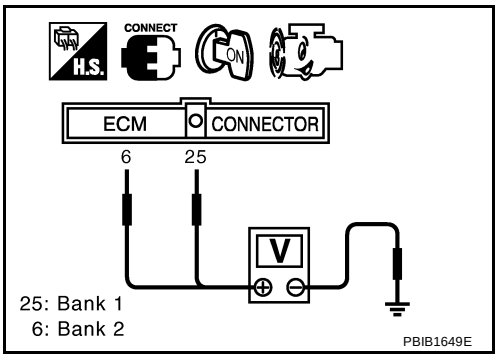
Diagnostic Procedure

GBS0013C

1. CHECK OVERALL FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 25 [HO2S2 (B1) heater signal] or 6 [HO2S2 (B2) heater signal] and ground.
6. Check the voltage under the following conditions.

Conditions	Voltage
At idle	0 - 1V
Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)



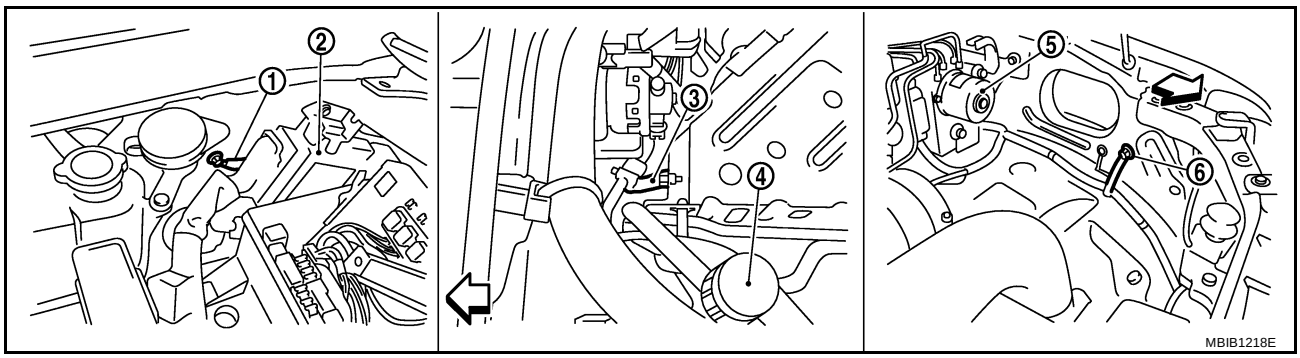
OK or NG

OK >> **INSPECTION END**

NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

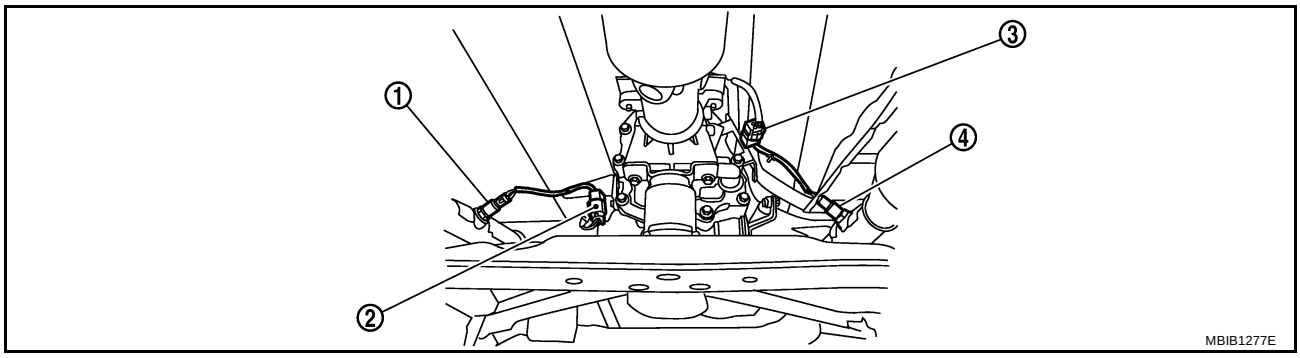
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK HO2S2 POWER SUPPLY CIRCUIT

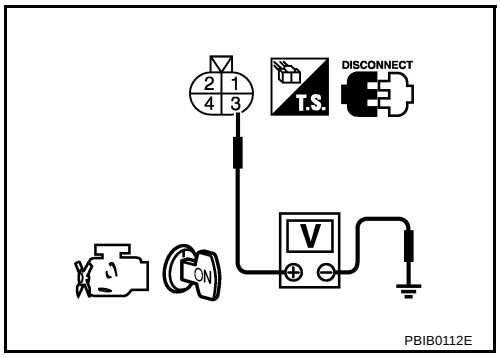
1. Disconnect heated oxygen sensor 2 harness connector.



1. Heated oxygen sensor 2 (bank 2)
2. Heated oxygen sensor 2 (bank 2) harness connector
3. Heated oxygen sensor 2 (bank 1) harness connector
4. Heated oxygen sensor 2 (bank1)

2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- IPDM E/R connector E12
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
25	2	1
6	2	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-958, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS0013D

HEATED OXYGEN SENSOR 2 HEATER

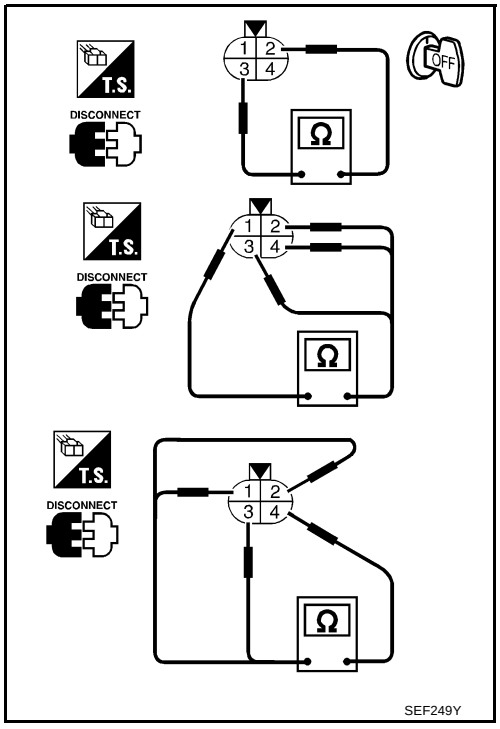
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	9.9 - 13.3 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**



Removal and Installation

GBS0013E

HEATED OXYGEN SENSOR 2

Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

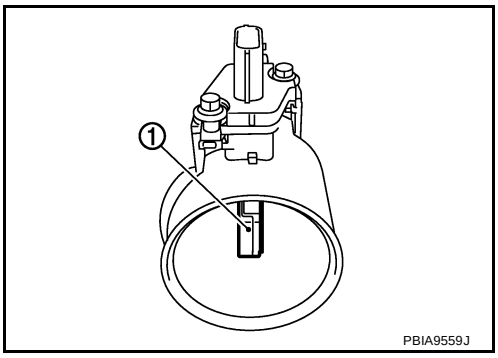
IAT SENSOR

PFP:22630

Component Description

GBS0013F

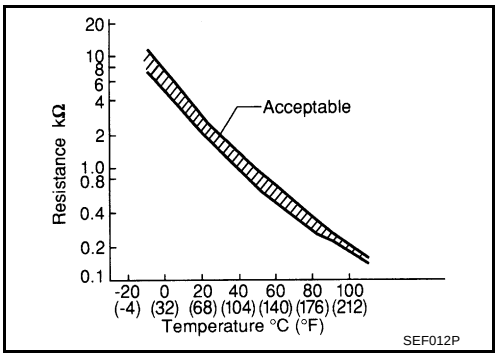
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

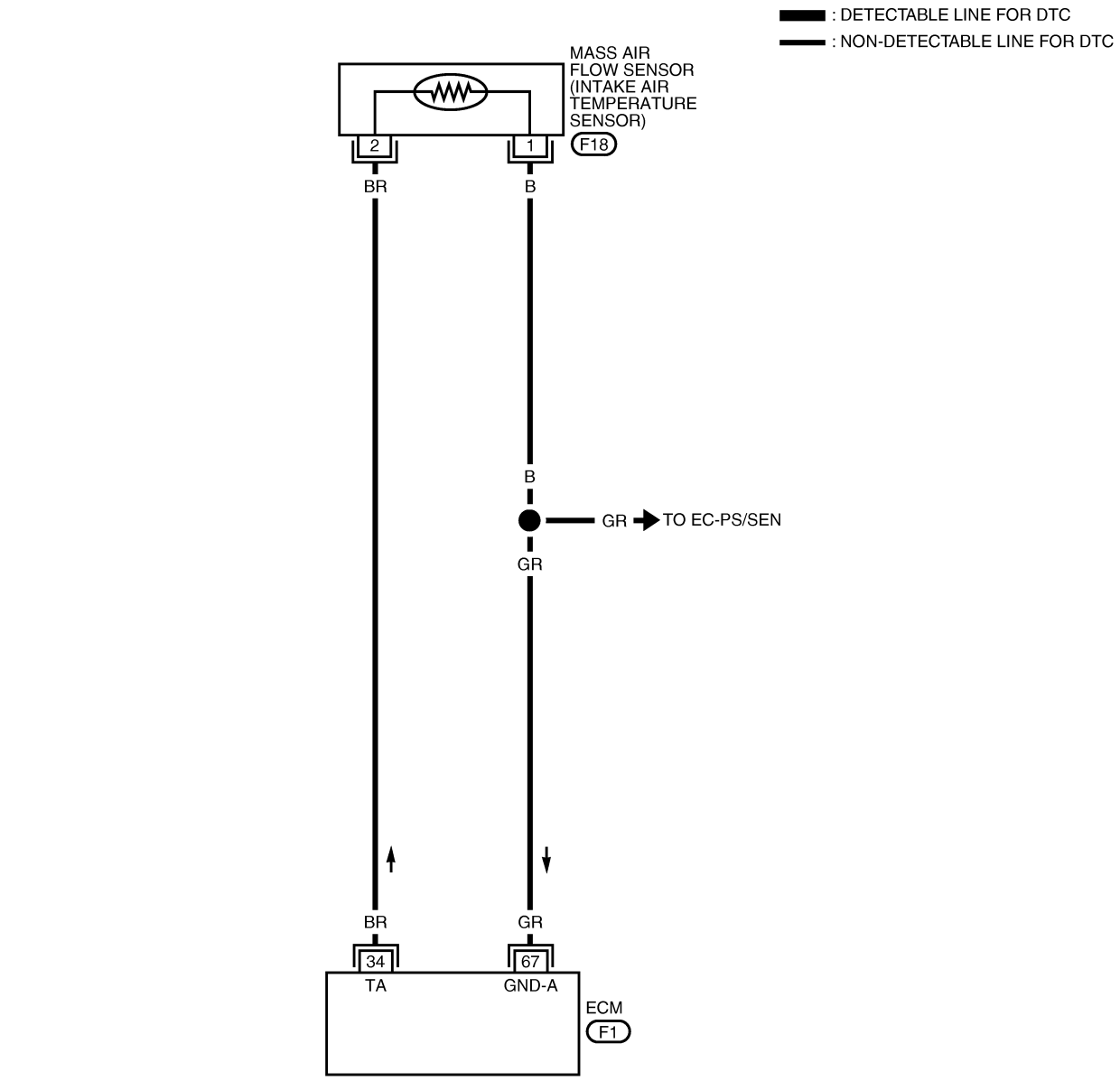


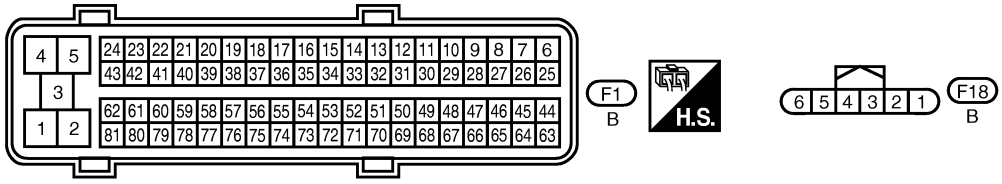
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Wiring Diagram

GBS0013G

EC-IATSEN-01





MBWA1355E

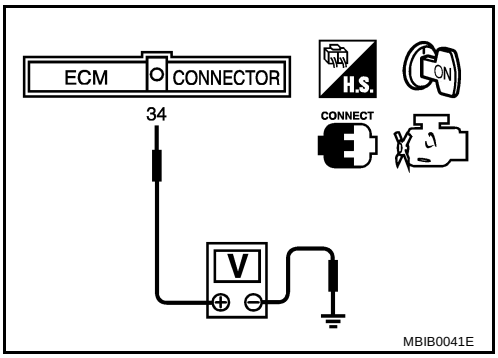
Diagnostic Procedure

GBS0013H

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 34 and ground with CONSULT-II or tester.

Voltage: Approximately 0 - 4.8V

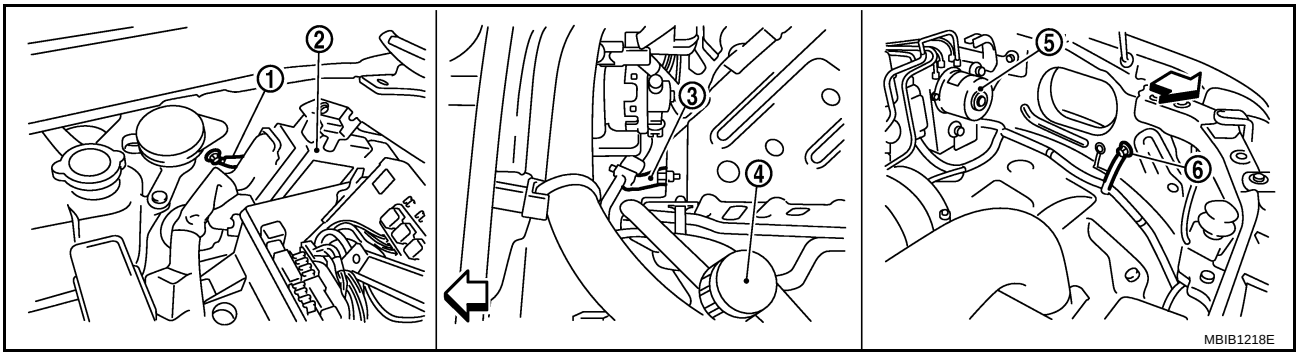


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

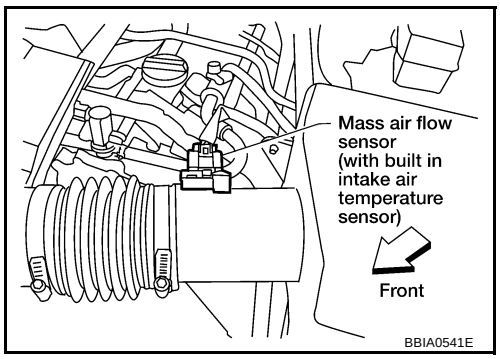
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

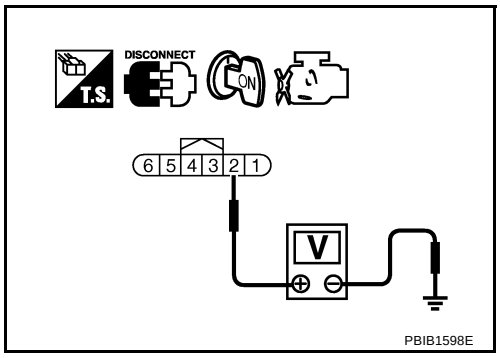
3. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch ON.



4. Check voltage between mass air flow sensor terminal 2 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-963, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

6. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

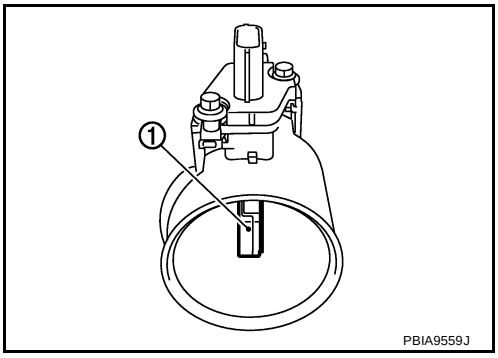
GBS0013I

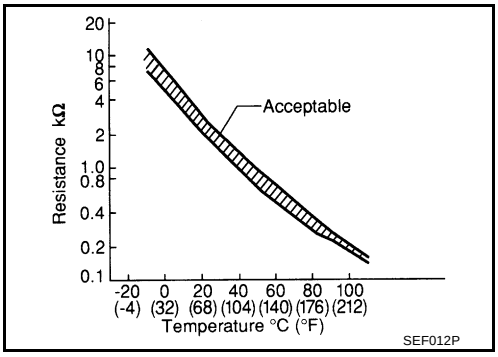
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

GBS0013J

MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

IGNITION SIGNAL

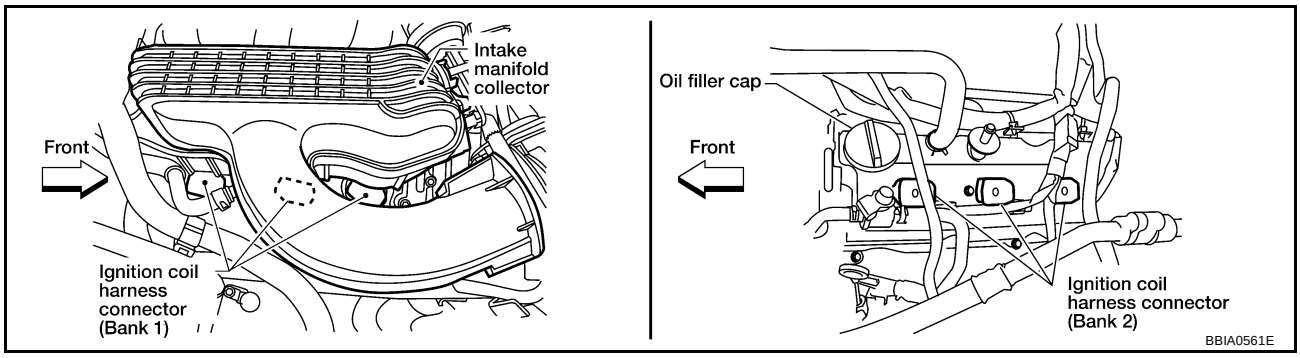
PFP:22448

Component Description

GBS0013K

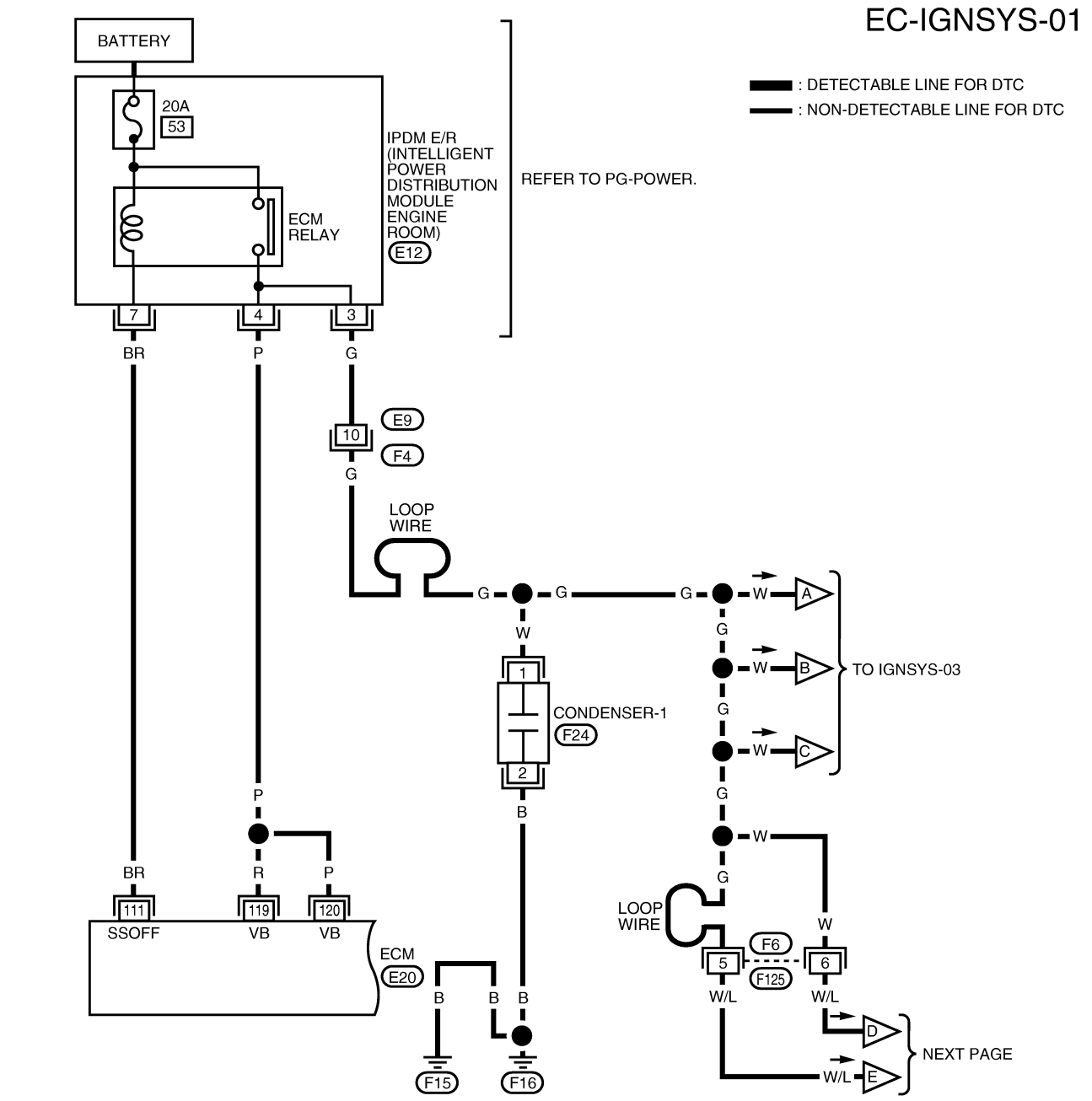
IGNITION COIL & POWER TRANSISTOR

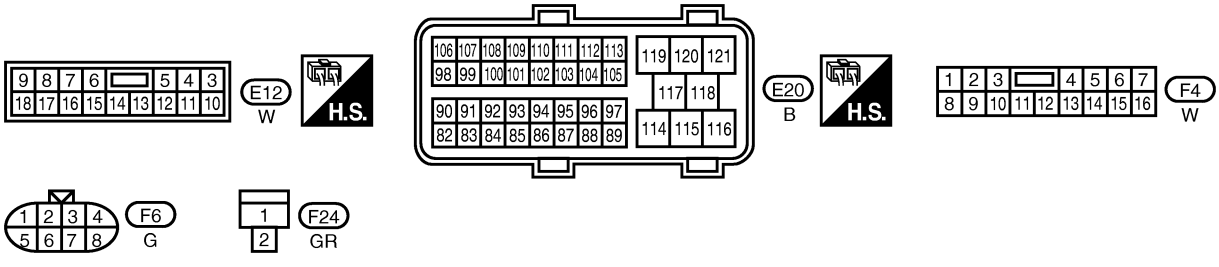
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Wiring Diagram

GBS0013L





MBWA1317E

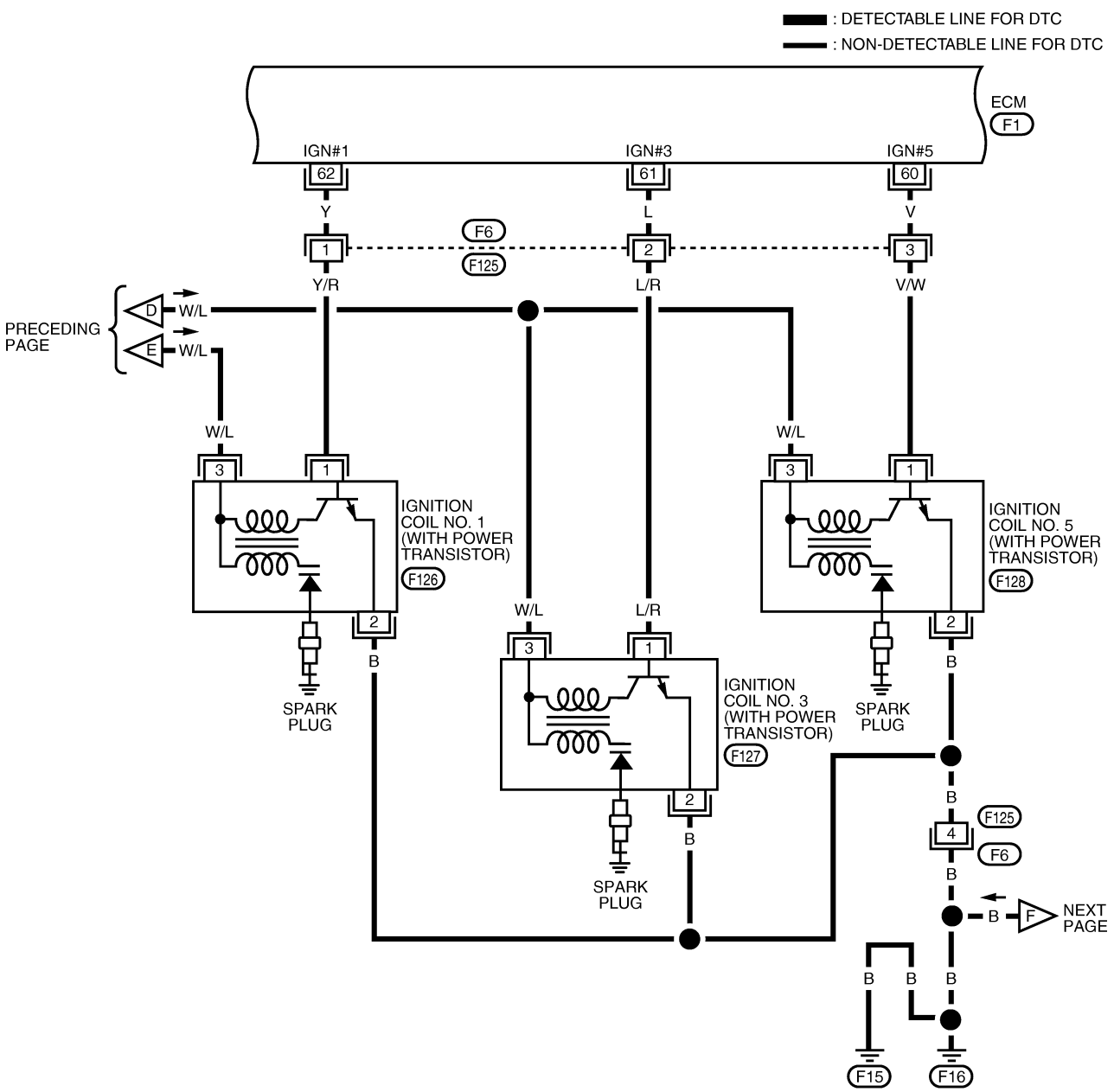
Specification data are reference values and are measured between each terminal and ground.

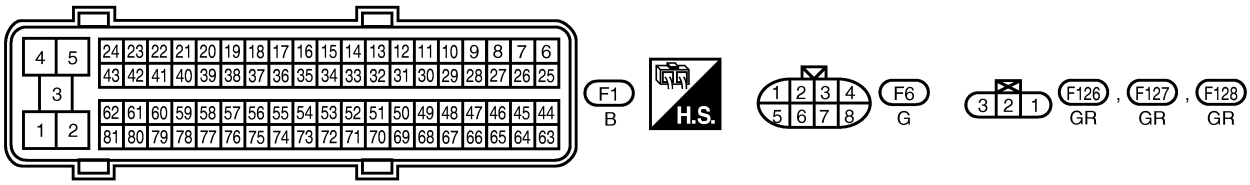
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02



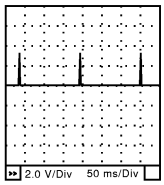
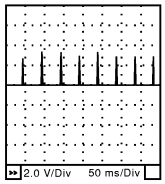


MBWA1318E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

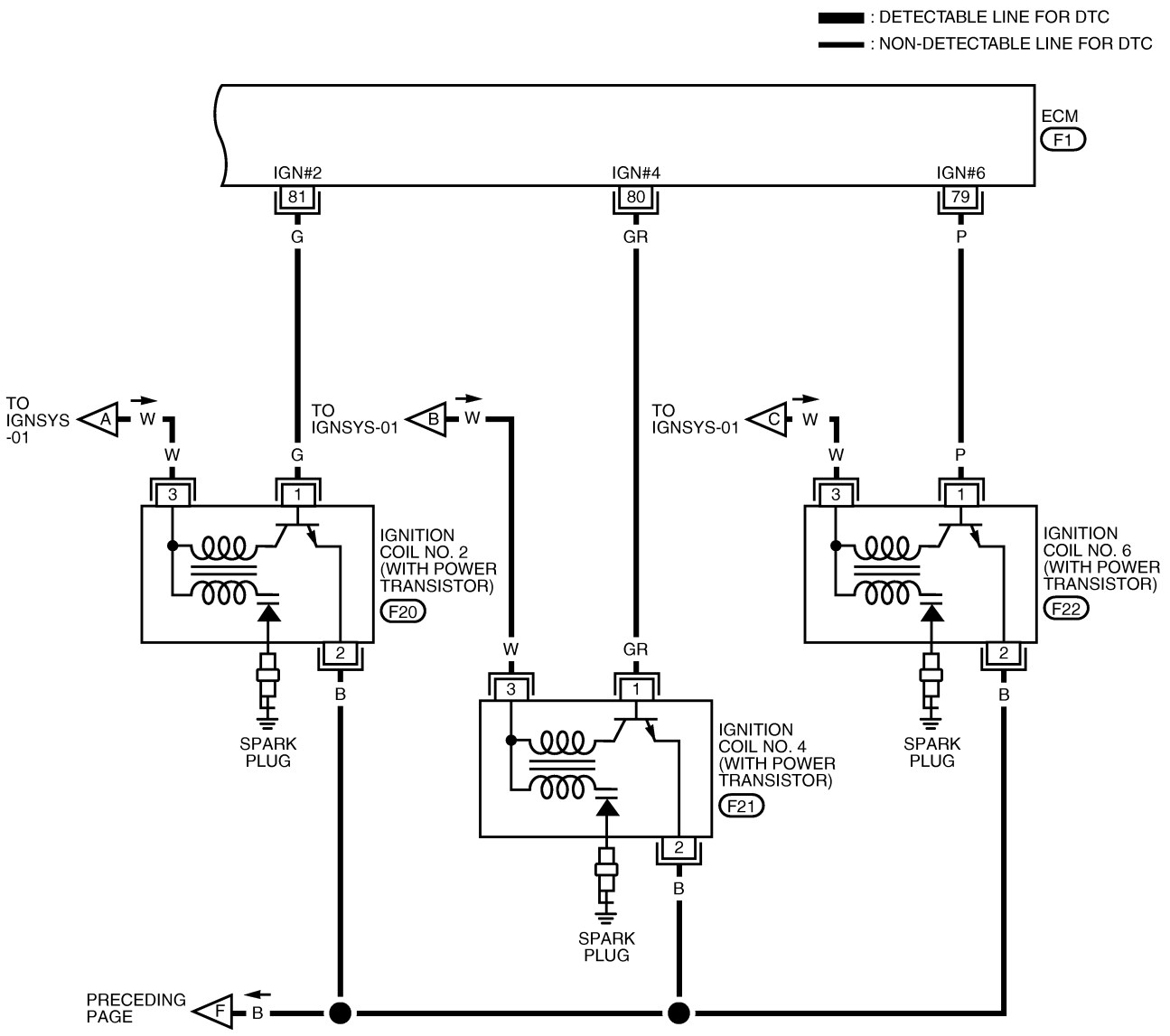
CAUTION:

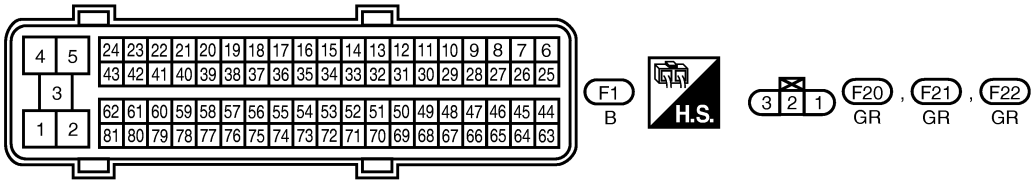
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 62	V L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03

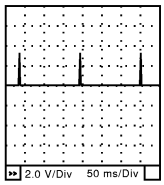
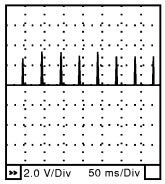




MBWA1319E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,500 rpm	0.1 - 0.4V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

GBS0013M

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

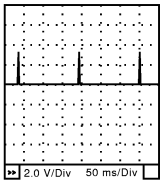
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

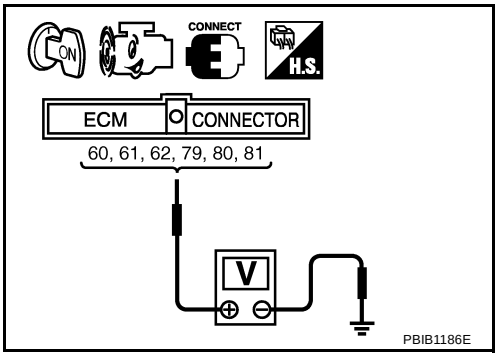
3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.
   NOTE:
   The pulse cycle changes depending on rpm at idle.



SEC986C



PBIB1186E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

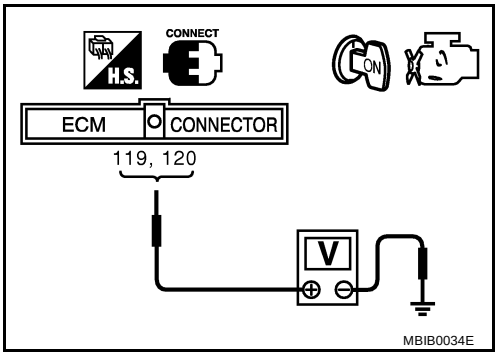
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

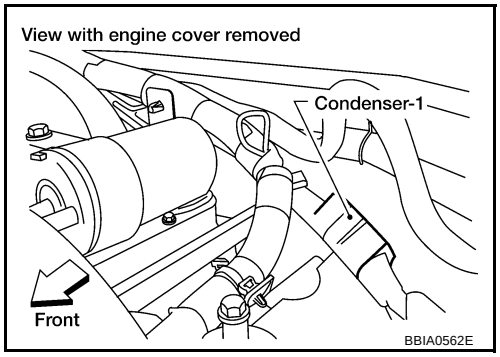
OK >> GO TO 5.
NG >> Go to EC-678, "POWER SUPPLY AND GROUND CIRCUIT" .



MBIB0034E

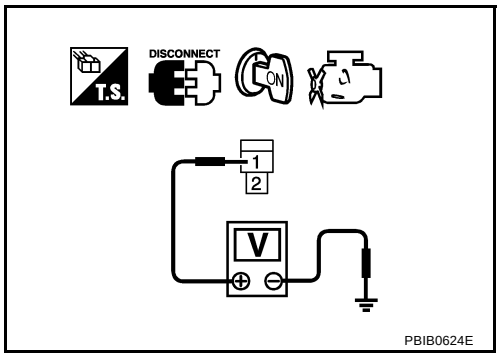
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Turn ignition switch ON.



4. Check voltage between condenser-1 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between condenser-1 and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to power in harness or connectors.

9. CHECK CONDENSER-1

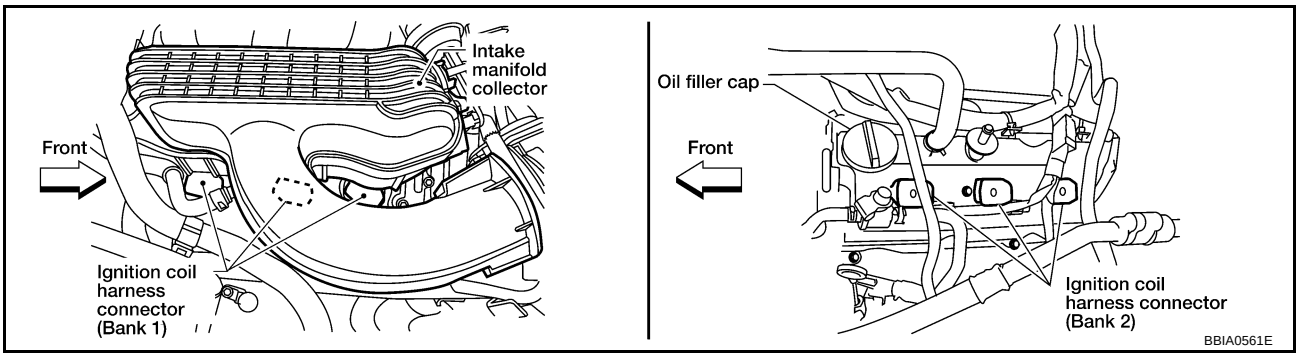
Refer to EC-975, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace condenser-1.

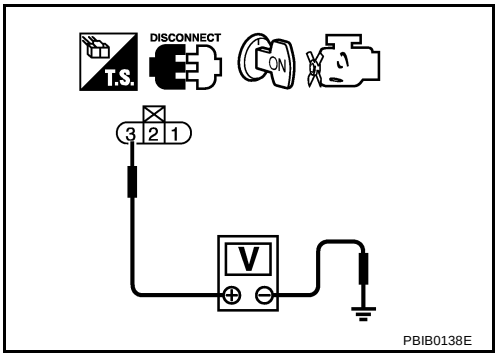
10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.



4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and harness connector F4

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F125, F6
- Harness for open or short between ignition coil and ground

>> Repair open circuit or short to power in harness or connectors.

14. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 and ignition coil terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F6, F125
- Harness for open or short between ignition coil and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-975, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS0013N

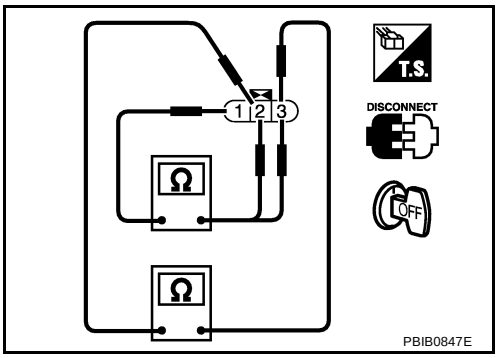
IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

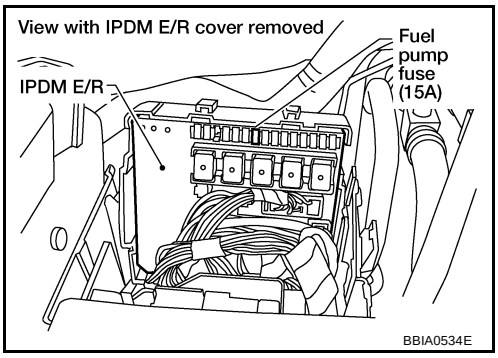
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	



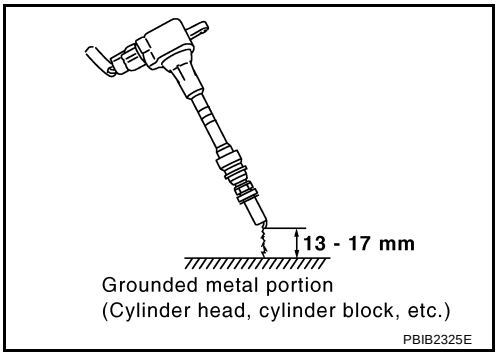
4. If NG, Replace ignition coil with power transistor.
   If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.



8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

    Spark should be generated.



    CAUTION:
    - **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
    - **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

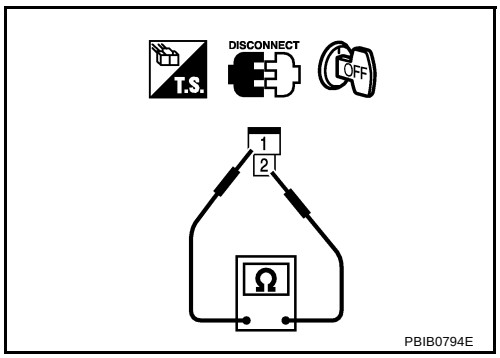
    NOTE:
    When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.
17. If NG, Replace ignition coil with power transistor.

CONDENSER-1

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.

3. Check resistance between condenser-1 terminals 1 and 2.

Resistance	Above 1 MΩ at 25°C (77°F)



GBS0013O

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-33, "IGNITION COIL" .

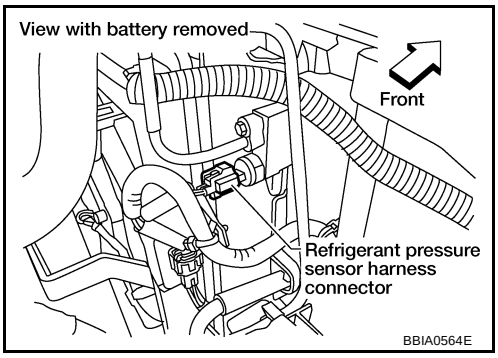
REFRIGERANT PRESSURE SENSOR

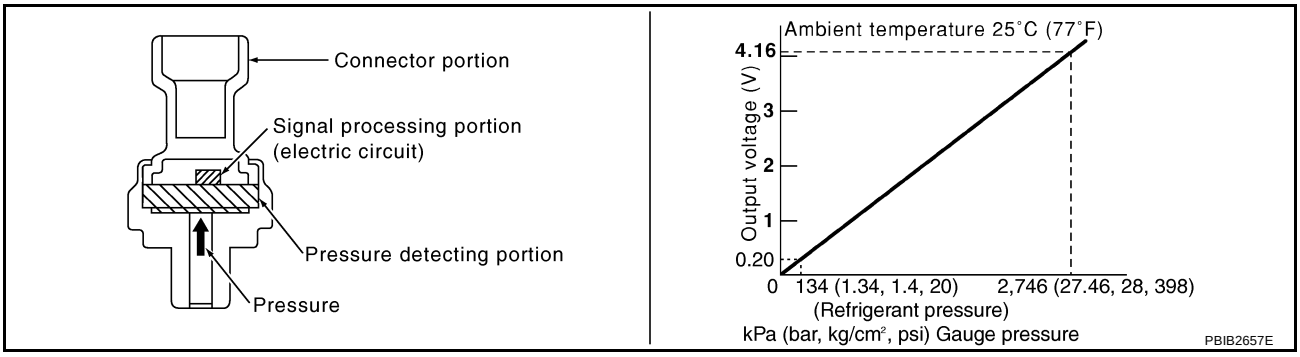
PFP:92136

Component Description

GBS0013P

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

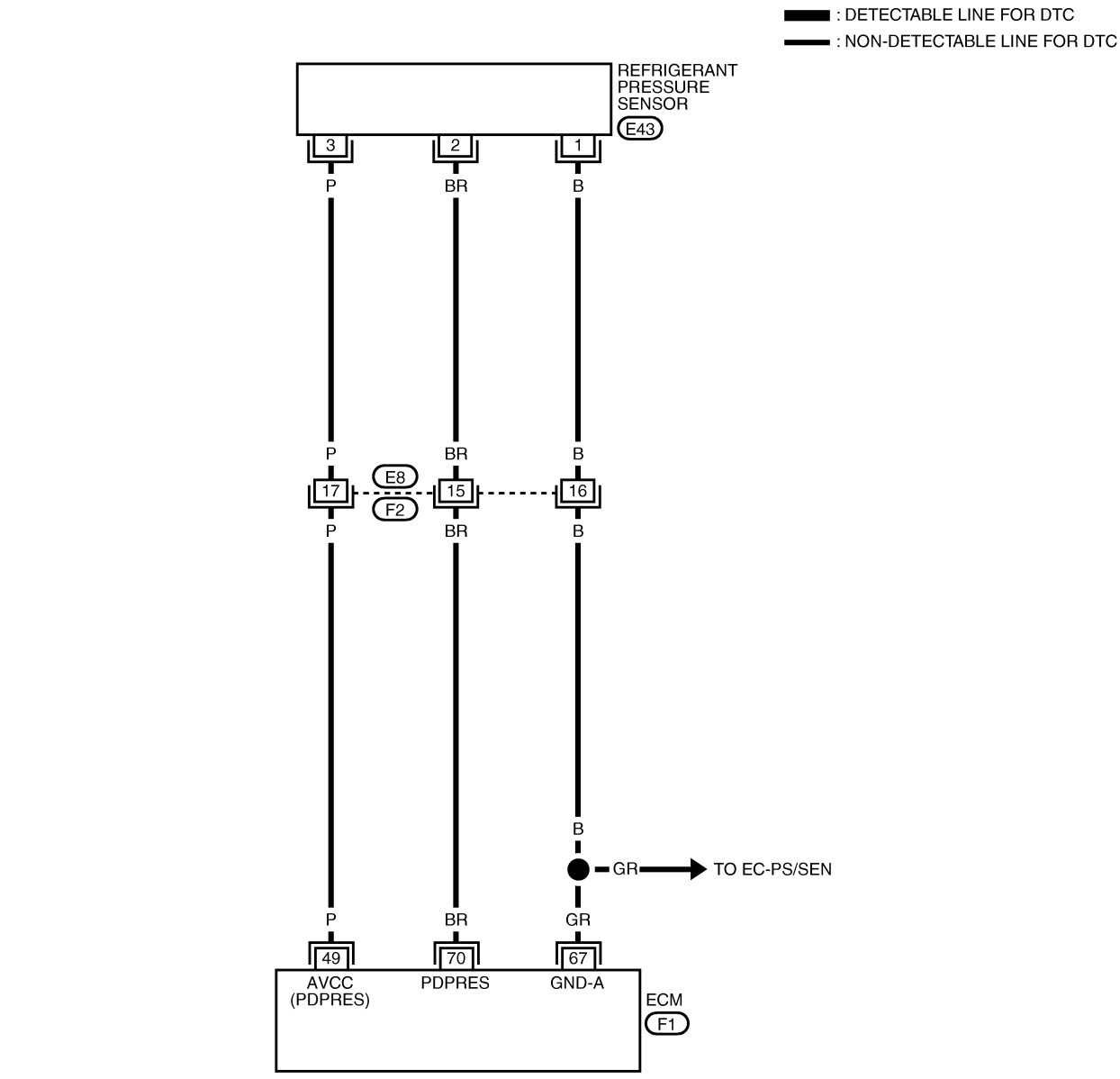


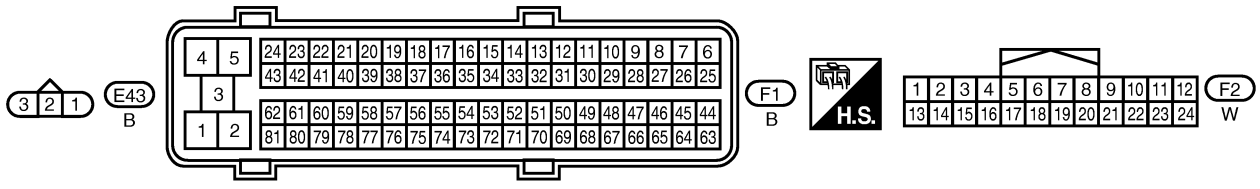


Wiring Diagram

GBS0013Q

EC-RP/SEN-01





MBWA1323E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	GR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
70	BR	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V

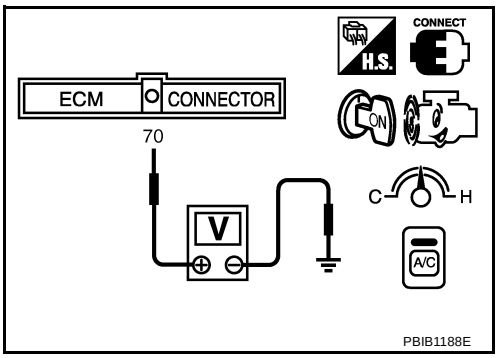
Diagnostic Procedure

GBS0013R

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

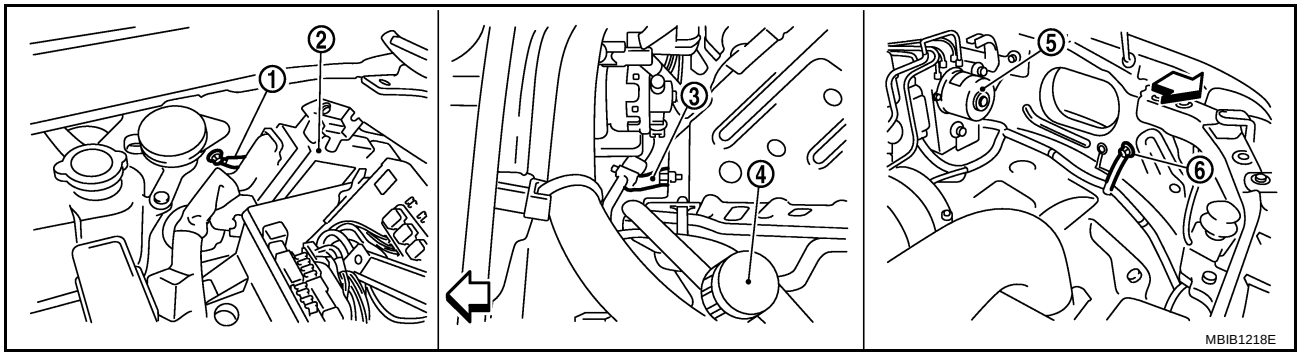


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to EC-685, "Ground Inspection" .



⇦ : Vehicle front

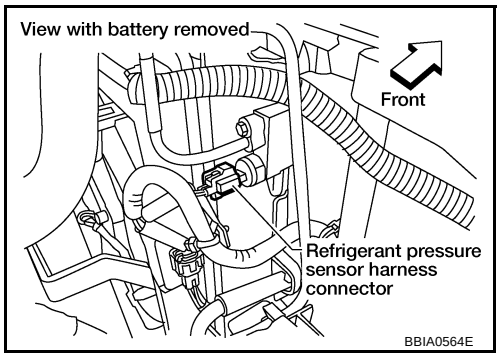
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

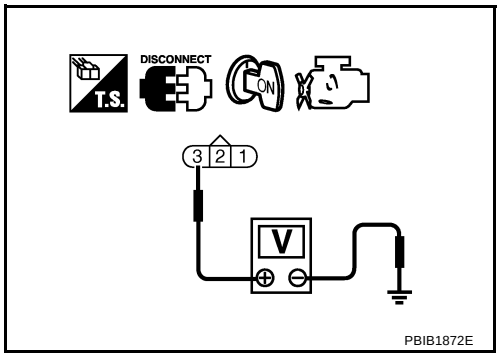
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

GBS0013S

REFRIGERANT PRESSURE SENSOR

Refer to MTC-121, "Removal and Installation for Refrigerant Pressure Sensor" .

VIAS

PFP:14956

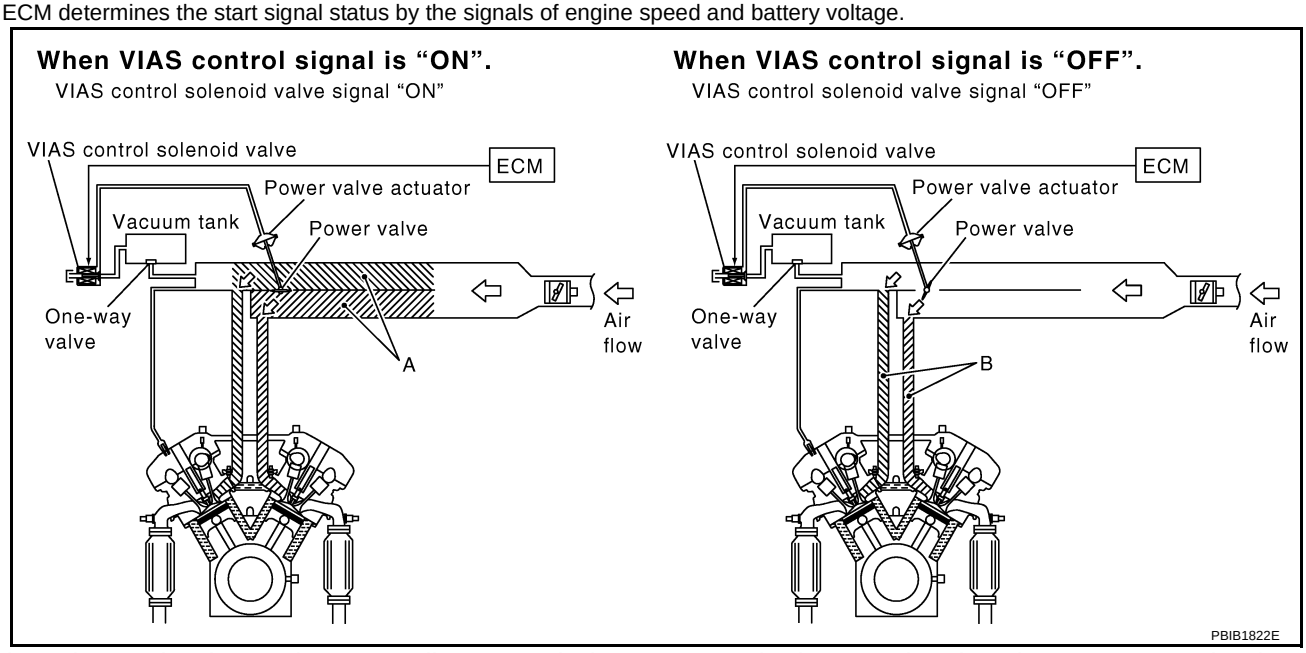
Description

GBS0013T

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.

Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.

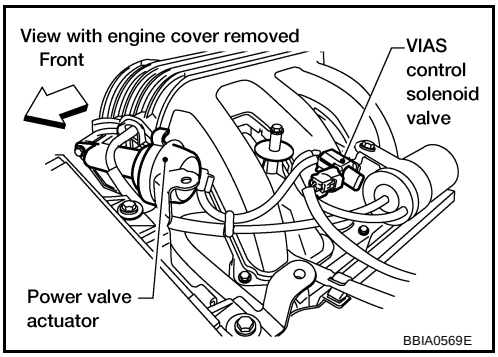
When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.

Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

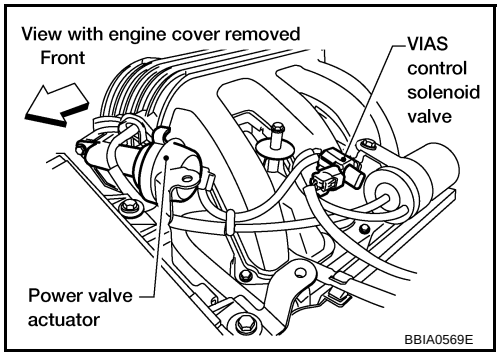
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

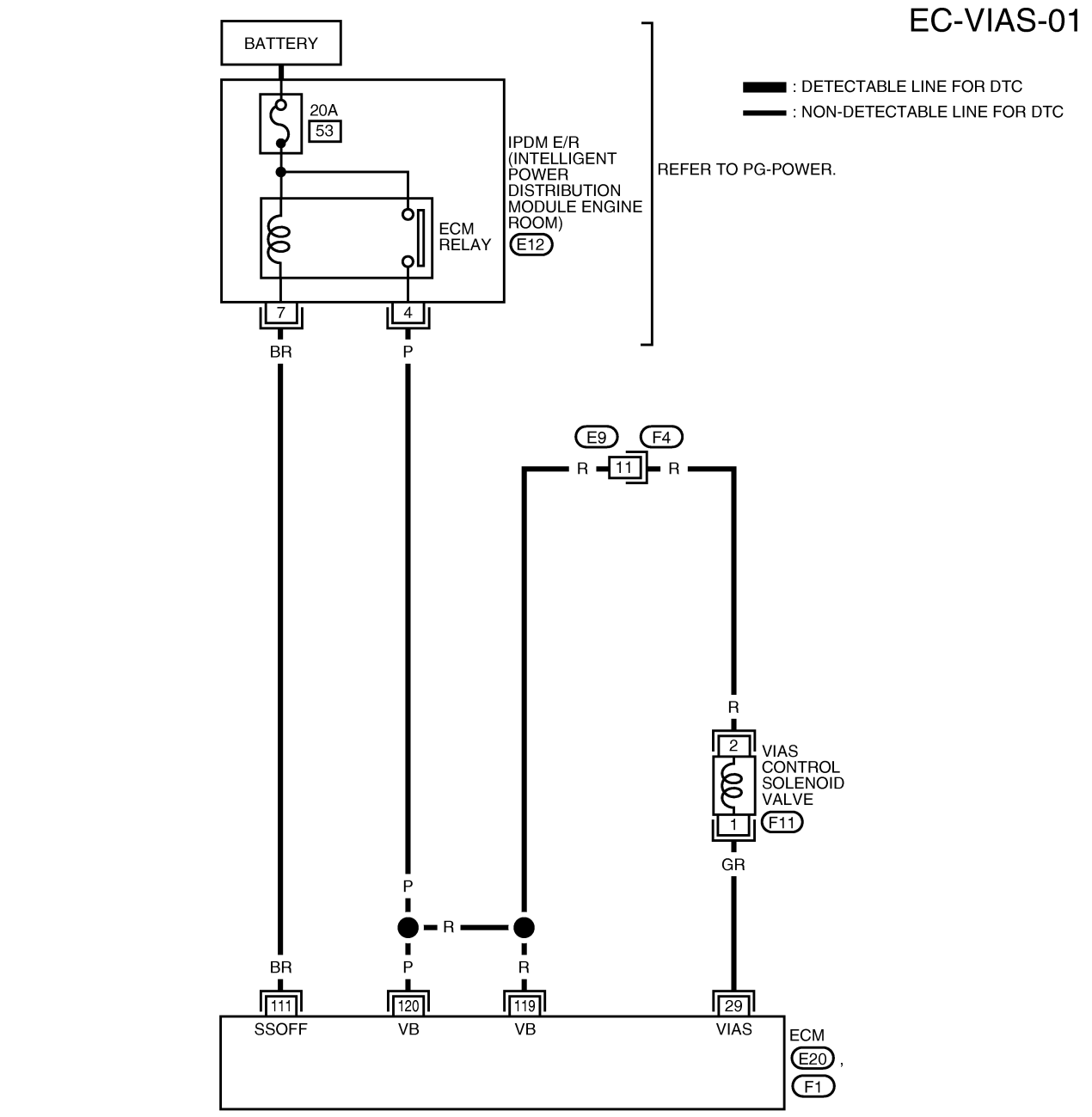
GBS0013U

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF

Wiring Diagram

GBS0013V



MBWA1320E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	GR	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0V
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

GBS0013W

1. CHECK OVERALL FUNCTION

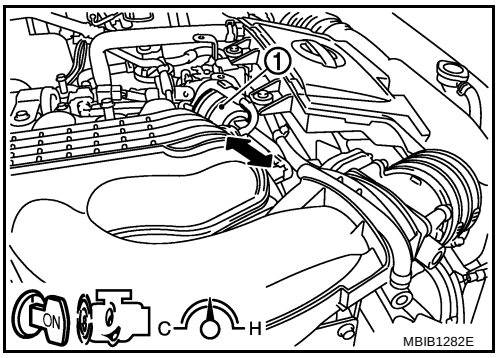
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

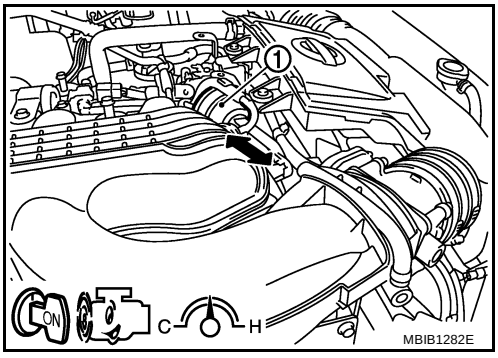
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator (1) rod moves.



MBIB1282E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to between 2,200 and 3,300 rpm and make sure that power valve actuator (1) rod moves.



MBIB1282E

OK or NG

OK >> **INSPECTION END**
NG (With CONSULT-II) >>GO TO 2.
NG (Without CONSULT-II) >>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

OK or NG

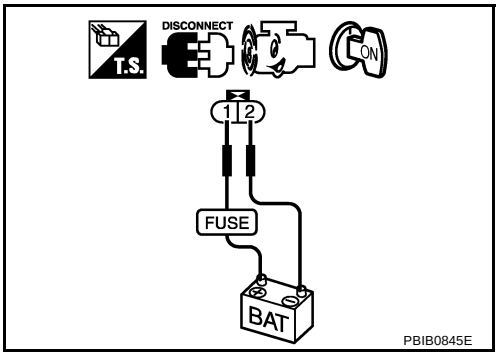
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.



PBIB0845E

OK or NG

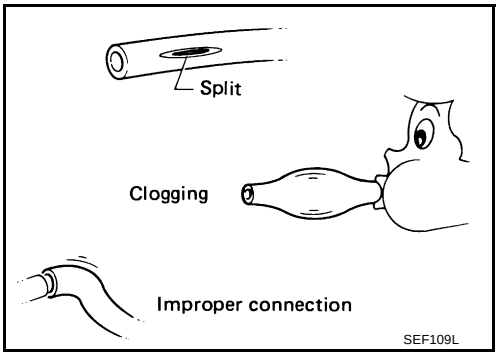
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-639, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



SEF109L

5. CHECK VACUUM TANK

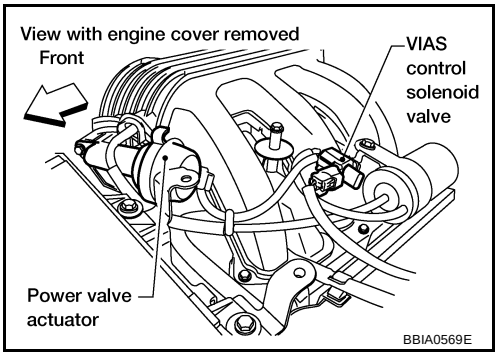
Refer to EC-990, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.

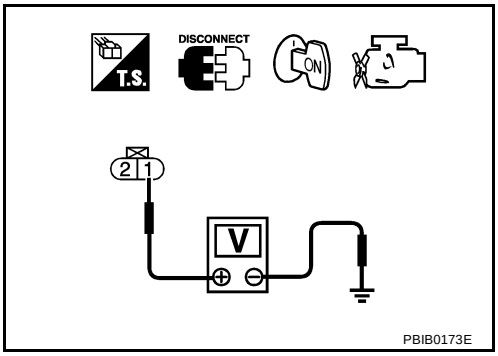


4. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
- Harness for open or short between VIAS control solenoid valve and ECM

>> Repair harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-990, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-677, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS0013X

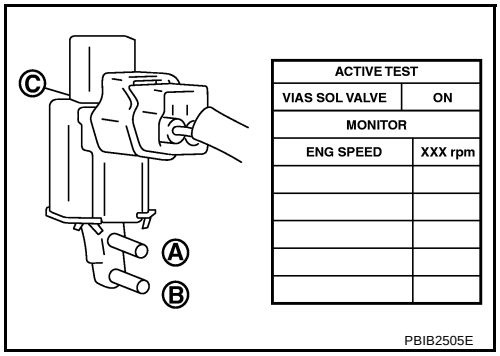
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

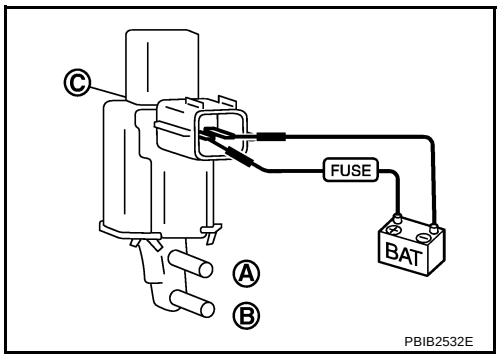


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

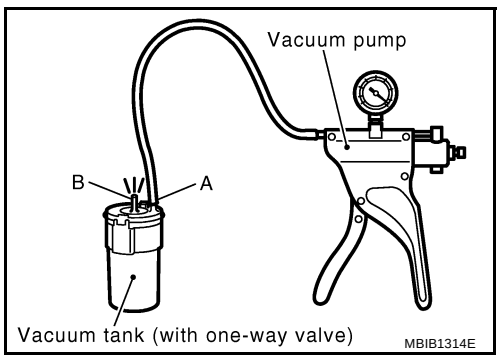
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port A of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at the port B.



Removal and Installation

GBS0013Y

VIAS CONTROL SOLENOID VALVE

Refer to EM-21, "INTAKE MANIFOLD" .

VSS

PFP:32702

Description

GBS0013Z

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

Diagnostic Procedure

GBS00140

1. INSPECTION START

Do you have CONSULT-II?

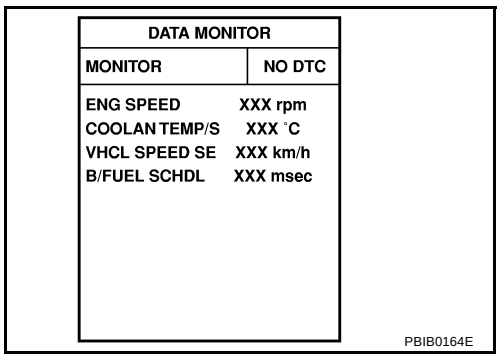
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II.
5. Select “VHCL SPEED SE” indication when rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

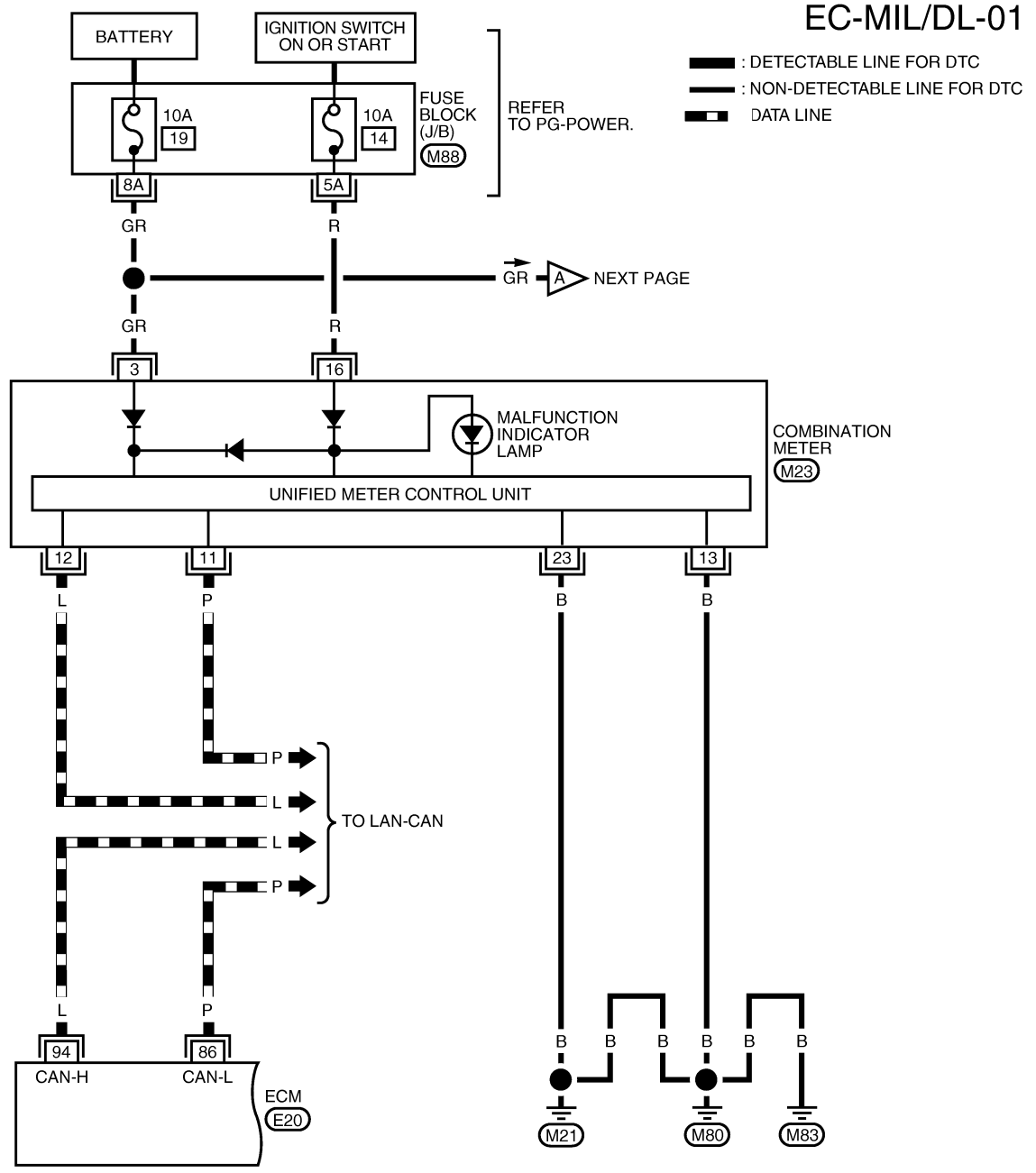
>> **INSPECTION END**

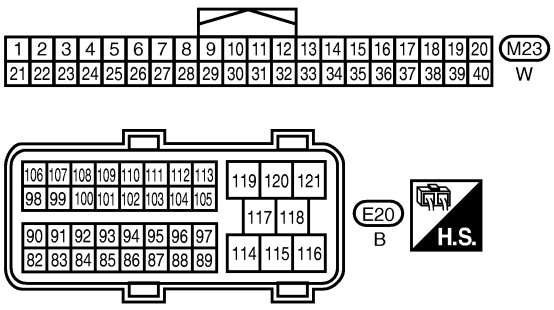
MIL AND DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

GBS00141

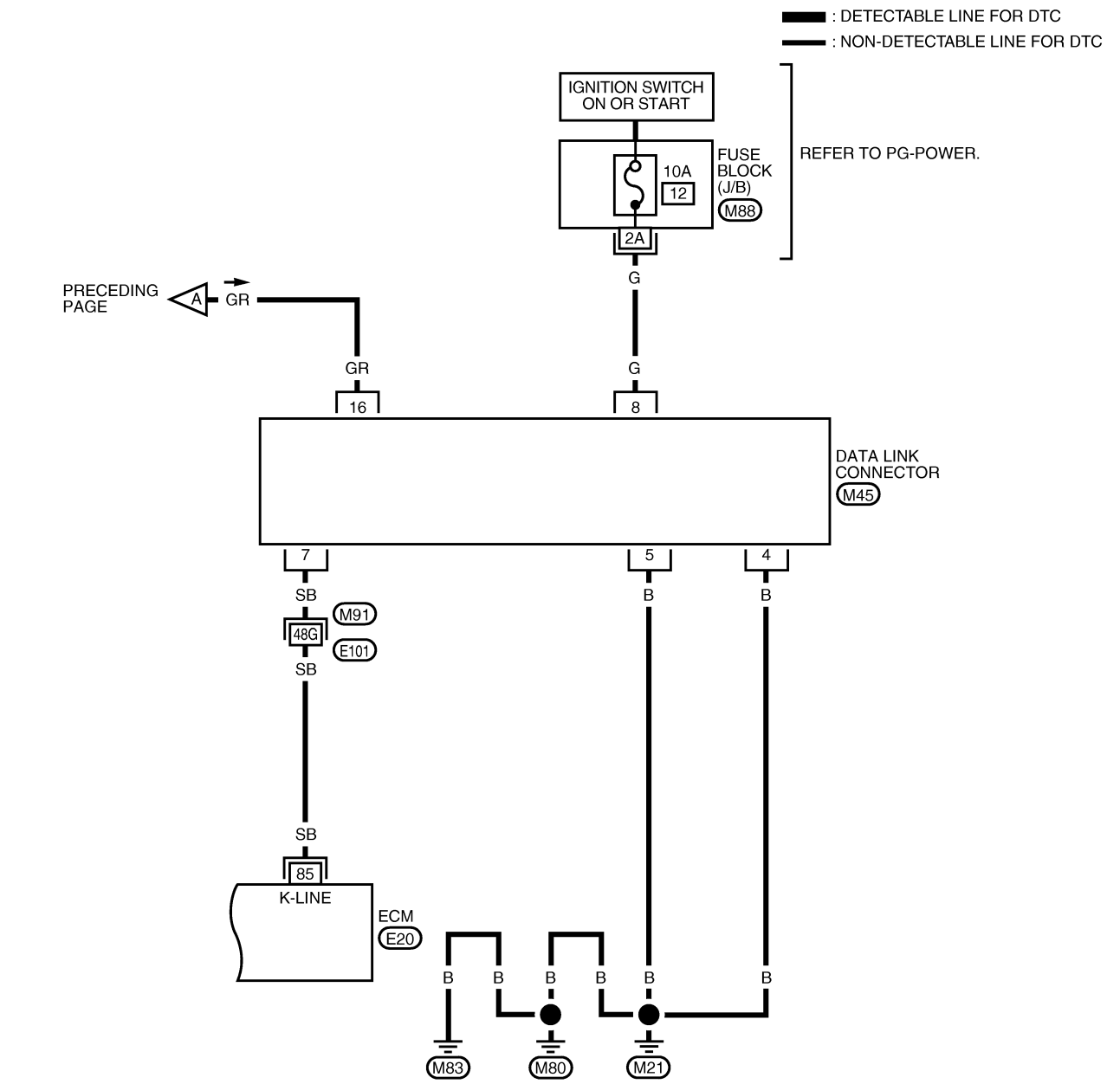


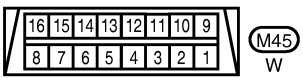


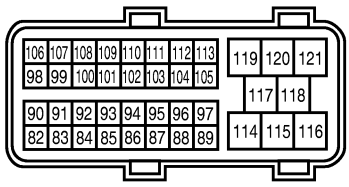
REFER TO THE FOLLOWING.
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1326E

EC-MIL/DL-02







REFER TO THE FOLLOWING.
M91 - SUPER MULTIPLE JUNCTION (SMJ)
M88 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1327E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

GBS00142

Fuel pressure at idling kPa (bar, kg/cm^2 , psi)	Approximately 350 (3.5, 3.57, 51)

Idle Speed and Ignition Timing

GBS00143

Target idle speed	No load* [in P or N position (A/T), Neutral position (M/T)]	625 ± 50 rpm
Air conditioner: ON	In P or N position (A/T), Neutral position (M/T)	775 rpm or more
Ignition timing	In P or N position (A/T), Neutral position (M/T)	15 ± 5° BTDC

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

GBS00144

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.2V*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

GBS00145

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

GBS00146

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

GBS00147

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen sensor 2 Heater

GBS00148

Resistance [at 25°C (77°F)]	9.9 - 13.3Ω

Crankshaft Position Sensor (POS)

GBS00149

Refer to EC-731, "Component Inspection" .

Camshaft Position Sensor (PHASE)

GBS0014A

Refer to EC-740, "Component Inspection" .

Throttle Control Motor

GBS0014B

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

GBS0014C

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω

Fuel Pump

GBS0014D

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

INDEX FOR DTC

PFP:00024

DTC No. Index

GBS0002N

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

DTC		Items (CONSULT-II screen item)	MIL lighting up	Reference page
CONSULT-II	ECM*1			
U1000	1000*2	CAN COMM CIRCUIT	—	EC-1067
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—
P0016	0016	CMP/CKP RELATION	—	EC-1070
P0088	0088	HIGH FUEL PRESS	×	EC-1072
P0089	0089	FUEL PUMP	—	EC-1074
P0093	0093	FUEL LEAK	×	EC-1076
P0102	0102	MAF SEN/CIRCUIT	—	EC-1080
P0103	0103	MAF SEN/CIRCUIT	—	EC-1080
P0112	0112	IAT SEN/CIRCUIT	—	EC-1086
P0113	0113	IAT SEN/CIRCUIT	—	EC-1086
P0117	0117	ECT SEN/CIRCUIT	—	EC-1091
P0118	0118	ECT SEN/CIRCUIT	—	EC-1091
P0122	0122	APP SEN 1/CIRCUIT	—	EC-1096
P0123	0123	APP SEN 1/CIRCUIT	—	EC-1096
P0182	0182	FUEL TEMP SEN/CIRC	—	EC-1101
P0183	0183	FUEL TEMP SEN/CIRC	—	EC-1101
P0192	0192	FRP SEN/CIRC	—	EC-1106
P0193	0193	FRP SEN/CIRC	—	EC-1106
P0200	0200	INJECTOR	×	EC-1111
P0201	0201	CYL1 INJECTOR	×	EC-1113
P0202	0202	CYL2 INJECTOR	×	EC-1113
P0203	0203	CYL3 INJECTOR	×	EC-1113
P0204	0204	CYL4 INJECTOR	×	EC-1113
P0217	0217	ENG OVER TEMP	×	EC-1120
P0222	0222	APP SEN 2/CIRCUIT	—	EC-1130
P0223	0223	APP SEN 2/CIRCUIT	—	EC-1130
P0234	0234	TC SYSTEM	—	EC-1135
P0237	0237	TC BOOST SEN/CIRC	—	EC-1141
P0238	0238	TC BOOST SEN/CIRC	—	EC-1141
P0335	0335	CKP SEN/CIRCUIT	×	EC-1147
P0336	0336	CKP SENSOR	×	EC-1153
P0340	0340	CMP SEN/CIRCUIT	×	EC-1159
P0341	0341	CMP SENSOR	×	EC-1165
P0501	0501	VEHICLE SPEED	—	EC-1171
P0502	0502	VEHICLE SPEED	—	EC-1173
P0503	0503	VEHICLE SPEED	—	EC-1175

DTC		Items (CONSULT-II screen item)	MIL lighting up	Reference page
CONSULT-II	ECM*1			
P0504	0504	BRAKE SW/CIRCUIT	—	EC-1177
P0563	0563	BATTERY VOLTAGE	—	EC-1191
P0580	0580	STRG SW/CIRC	—	EC-1194
P0581	0581	STRG SW/CIRC	—	EC-1194
P0605	0605	ECM	×	EC-1201
P0606	0606	ECM	×	EC-1203
P0628	0628	FUEL PUMP/CIRC	×	EC-1205
P0629	0629	FUEL PUMP/CIRC	×	EC-1205
P0642	0642	SENSOR PWR/CIRC1	—	EC-1210
P0643	0643	SENSOR PWR/CIRC1	—	EC-1210
P0652	0652	SENSOR PWR/CIRC2	—	EC-1215
P0653	0653	SENSOR PWR/CIRC2	—	EC-1215
P0686	0686	ECM RELAY	—	EC-1220
P1268	1268	INJECTOR 1	—	EC-1225
P1269	1269	INJECTOR 2	—	EC-1225
P1270	1270	INJECTOR 3	—	EC-1225
P1271	1271	INJECTOR 4	—	EC-1225
P1272	1272	FRP RELIEF VALVE	—	EC-1233
P1273	1273	FUEL PUMP	—	EC-1239
P1274	1274	FUEL PUMP	×	EC-1246
P1275	1275	FUEL PUMP	×	EC-1251
P1610 - P1615	1610 - 1615	NATS MALFUNTION	—	BL-87
P1616	1616	ECM	—	EC-1257
P1622	1622	INJ ADJ VAL UNRGST	—	EC-1259
P1623	1623	INJ ADJ VAL ERROR	—	EC-1261
P2135	2135	APP SENSOR	—	EC-1263
P2146	2146	INJ PWR/CIRC	×	EC-1269
P2147	2147	INJECTOR/CIRC	×	EC-1274
P2148	2148	INJECTOR/CIRC	×	EC-1274
P2149	2149	INJ PWR/CIRC	×	EC-1269
P2228	2228	BARO SEN/CIRC	—	EC-1281
P2229	2229	BARO SEN/CIRC	—	EC-1281

*1: In Diagnostic Test Mode II.
*2: The troubleshooting for this DTC needs CONSULT-II.

Alphabetical Index

GBS0002O

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC		MIL lighting up	Reference page
	CONSULT-II	ECM*1		
APP SEN 1/CIRCUIT	P0122	0122	—	EC-1096
APP SEN 1/CIRCUIT	P0123	0123	—	EC-1096
APP SEN 2/CIRCUIT	P0222	0222	—	EC-1130
APP SEN 2/CIRCUIT	P0223	0223	—	EC-1130
APP SENSOR	P2135	2135	—	EC-1263
BARO SEN/CIRC	P2228	2228	—	EC-1281
BARO SEN/CIRC	P2229	2229	—	EC-1281
BATTERY VOLTAGE	P0563	0563	—	EC-1191
BRAKE SW/CIRCUIT	P0504	0504	—	EC-1177
CAN COMM CIRCUIT	U1000	1000*2	—	EC-1067
CKP SEN/CIRCUIT	P0335	0335	×	EC-1147
CKP SENSOR	P0336	0336	×	EC-1153
CMP SEN/CIRCUIT	P0340	0340	×	EC-1159
CMP SENSOR	P0341	0341	×	EC-1165
CMP/CKP RELATION	P0016	0016	—	EC-1070
CYL1 INJECTOR	P0201	0201	×	EC-1113
CYL2 INJECTOR	P0202	0202	×	EC-1113
CYL3 INJECTOR	P0203	0203	×	EC-1113
CYL4 INJECTOR	P0204	0204	×	EC-1113
ECM	P0605	0605	×	EC-1201
ECM	P0606	0606	×	EC-1203
ECM	P1616	1616	—	EC-1257
ECM RELAY	P0686	0686	—	EC-1220
ECT SEN/CIRCUIT	P0117	0117	—	EC-1091
ECT SEN/CIRCUIT	P0118	0118	—	EC-1091
ENG OVER TEMP	P0217	0217	×	EC-1120
FRP RELIEF VALVE	P1272	1272	—	EC-1233
FRP SEN/CIRC	P0192	0192	—	EC-1106
FRP SEN/CIRC	P0193	0193	—	EC-1106
FUEL LEAK	P0093	0093	×	EC-1076
FUEL PUMP	P0089	0089	—	EC-1074
FUEL PUMP	P1273	1273	—	EC-1239
FUEL PUMP	P1274	1274	×	EC-1246
FUEL PUMP	P1275	1275	×	EC-1251
FUEL PUMP/CIRC	P0628	0628	×	EC-1205
FUEL PUMP/CIRC	P0629	0629	×	EC-1205
FUEL TEMP SEN/CIRC	P0182	0182	—	EC-1101
FUEL TEMP SEN/CIRC	P0183	0183	—	EC-1101
HIGH FUEL PRESS	P0088	0088	×	EC-1072

Items (CONSULT-II screen terms)	DTC		MIL lighting up	Reference page
	CONSULT-II	ECM*1		
IAT SEN/CIRCUIT	P0112	0112	—	EC-1086
IAT SEN/CIRCUIT	P0113	0113	—	EC-1086
INJ ADJ VAL ERROR	P1623	1623	—	EC-1261
INJ ADJ VAL UNRGST	P1622	1622	—	EC-1259
INJ PWR/CIRC	P2146	2146	×	EC-1269
INJ PWR/CIRC	P2149	2149	×	EC-1269
INJECTOR	P0200	0200	×	EC-1111
INJECTOR/CIRC	P2147	2147	×	EC-1274
INJECTOR/CIRC	P2148	2148	×	EC-1274
INJECTOR 1	P1268	1268	—	EC-1225
INJECTOR 2	P1269	1269	—	EC-1225
INJECTOR 3	P1270	1270	—	EC-1225
INJECTOR 4	P1271	1271	—	EC-1225
MAF SEN/CIRCUIT	P0102	0102	—	EC-1080
MAF SEN/CIRCUIT	P0103	0103	—	EC-1080
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	BL-87
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—
SENSOR PWR/CIRC1	P0642	0642	—	EC-1210
SENSOR PWR/CIRC1	P0643	0643	—	EC-1210
SENSOR PWR/CIRC2	P0652	0652	—	EC-1215
SENSOR PWR/CIRC2	P0653	0653	—	EC-1215
STRG SW/CIRC	P0580	0580	—	EC-1194
STRG SW/CIRC	P0581	0581	—	EC-1194
TC BOOST SEN/CIRC	P0237	0237	—	EC-1141
TC BOOST SEN/CIRC	P0238	0238	—	EC-1141
TC SYSTEM	P0234	0234	—	EC-1135
VEHICLE SPEED	P0501	0501	—	EC-1171
VEHICLE SPEED	P0502	0502	—	EC-1173
VEHICLE SPEED	P0503	0503	—	EC-1175

*1: In Diagnostic Test Mode II.
*2: The troubleshooting for this DTC needs CONSULT-II.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

GBS0002P

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine

GBS0002Q

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

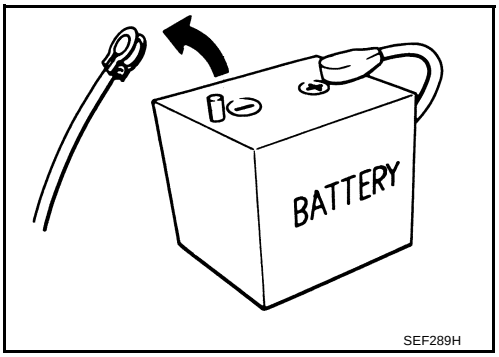
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-65, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precautions

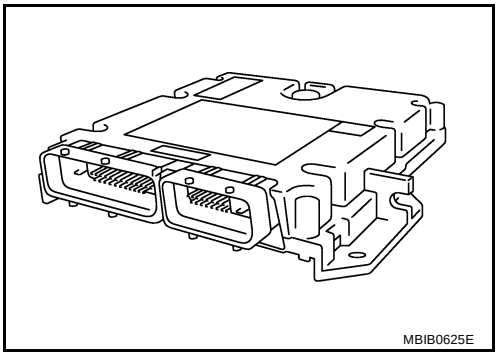
GBS0002R

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**

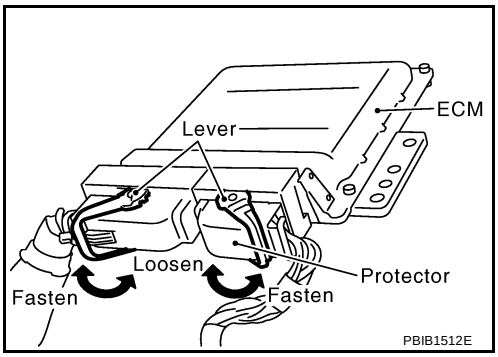


SEF289H

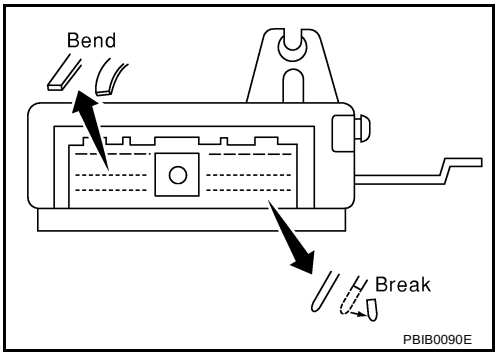
- **Do not disassemble ECM.**



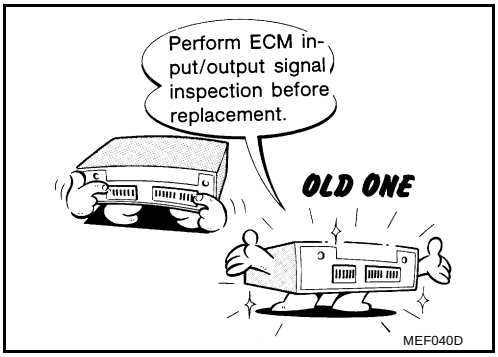
- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



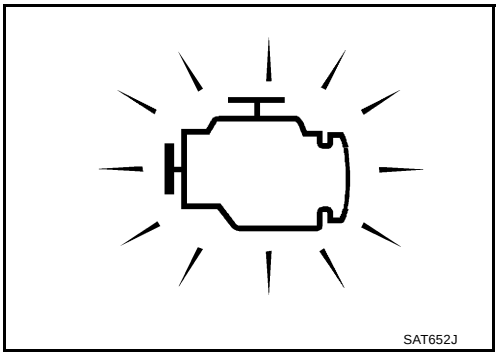
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**



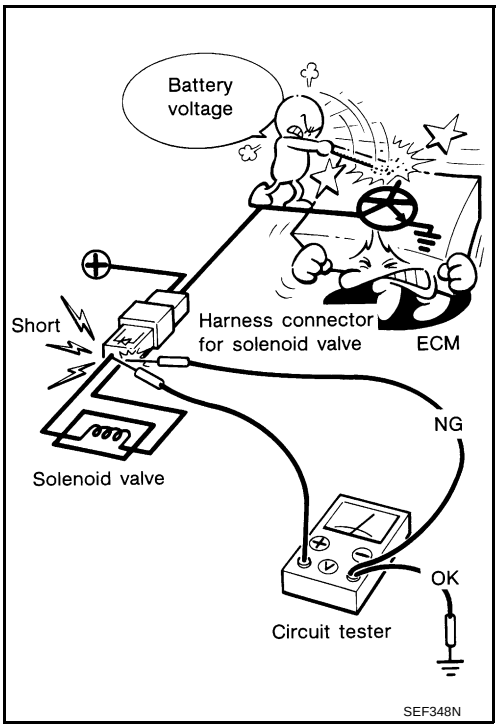
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1041, "ECM Terminals And Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**



- **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.

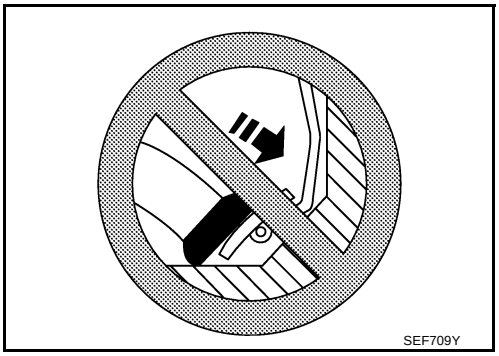

SAT652J

- **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.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.

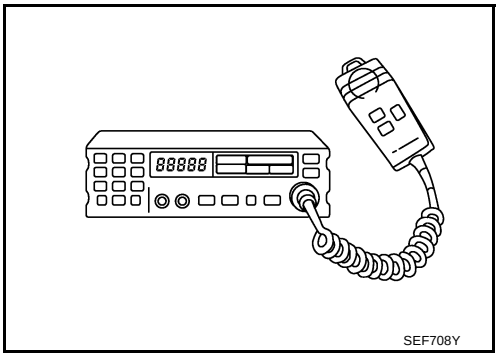


SEF348N

- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



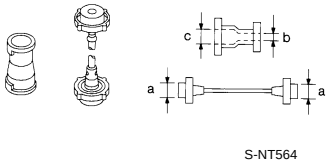
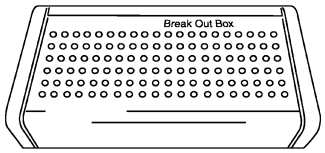
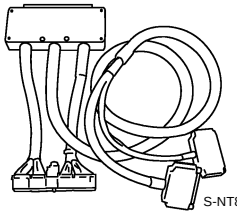
SEF708Y

PREPARATION

PFP:00002

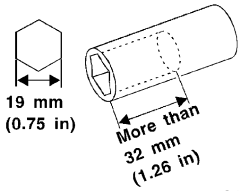
Special Service Tools

GBS0002T

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

GBS0002U

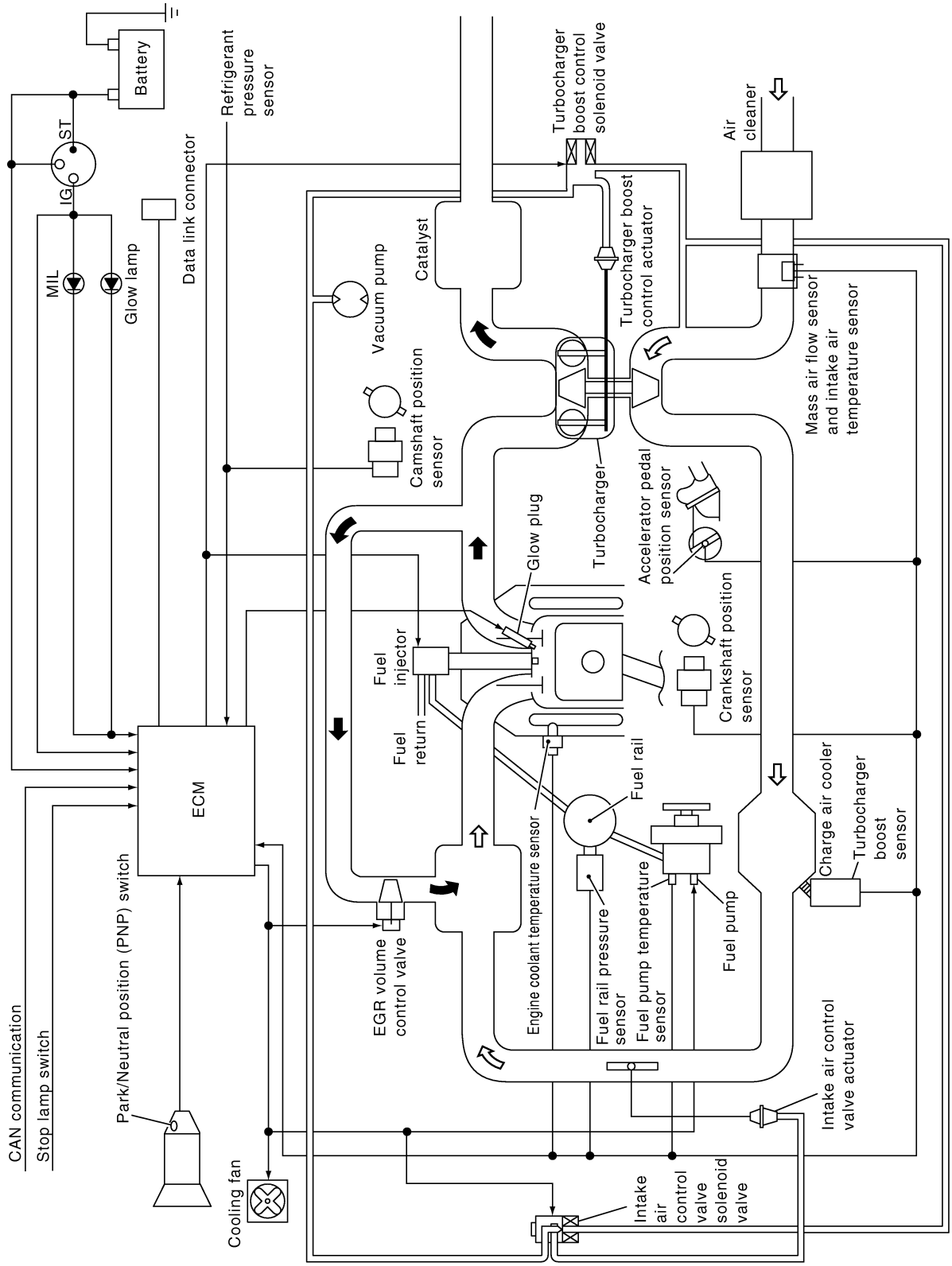
Tool name	Description
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

GBS0002V

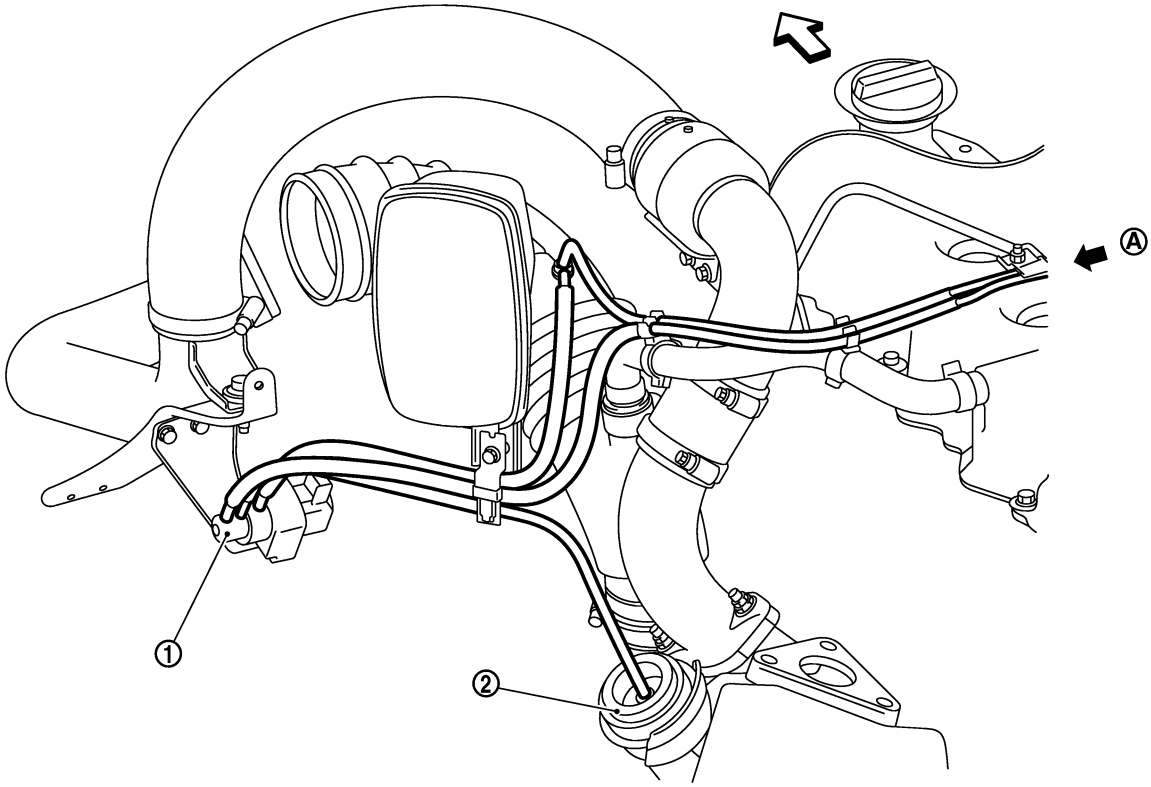


MBIB1411E

Vacuum Hose Drawing

GBS0002W

LEFT SIDE OF THE ENGINE ROOM



MBIB1387E

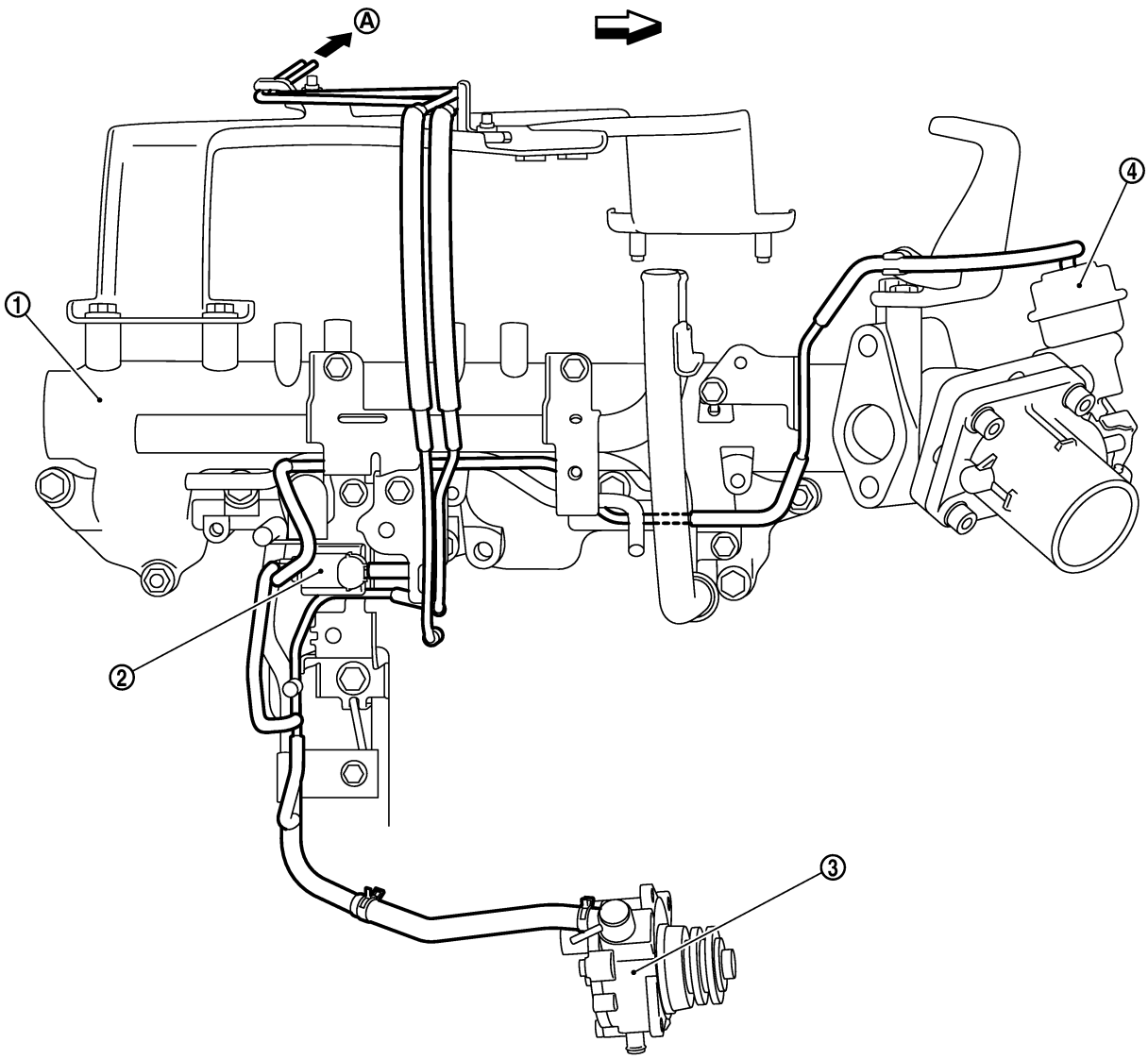
⇦ : Vehicle front

1. Turbocharger boost control solenoid valve
2. Turbocharger control actuator
A. From next page

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

Refer to EC-1004, "System Diagram" for Vacuum Control System.

RIGHT SIDE OF THE ENGINE ROOM



MBIB1288E

⇦ : Vehicle front

1. Fuel rail
2. Intake air control valve control solenoid valve
3. Vacuum pump
4. Intake air control valve actuator
A. To previous page

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

Refer to EC-1004, "System Diagram" for Vacuum Control System.

System Chart

GBS0002X

Input (Sensor)	ECM Function	Output (Actuator)
● Accelerator pedal position sensor ● Fuel rail pressure sensor ● Fuel pump temperature sensor ● Engine coolant temperature sensor ● Mass air flow sensor ● Intake air temperature sensor ● Crankshaft position sensor ● Camshaft position sensor ● Turbocharger boost sensor ● Wheel sensor*1 ● Ignition switch ● ASCD steering switch ● ASCD brake switch ● ASCD clutch switch ● Stop lamp switch ● Air conditioner switch*1 ● Park/neutral position switch ● Refrigerant pressure sensor ● Battery voltage	Fuel injection control	Fuel injector and Fuel pump
	Fuel injection timing control	Fuel injector and Fuel pump
	Fuel cut control	Fuel injector and Fuel pump
	Glow control system	Glow relay and glow indicator lamp*2
	ASCD vehicle speed control	Fuel injector and Fuel pump
	On board diagnostic system	Malfunction indicator lamp (MIL)*2
	EGR volume control	EGR volume control valve
	Cooling fan control	Cooling fan relay*2
	Turbocharger boost control	Turbocharger boost control solenoid valve
	Intake air control valve control	Intake air control valve control solenoid valve
	Air conditioning cut control	Air conditioner relay*2

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

Fuel Injection Control System

GBS0002Y

SYSTEM DESCRIPTION

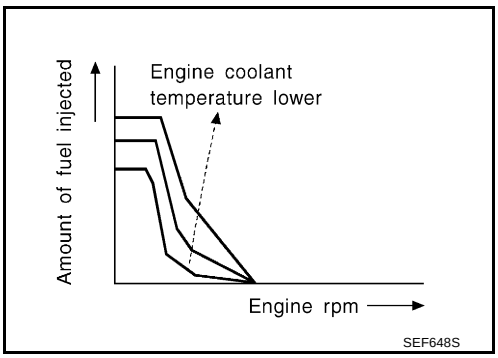
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.
Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (start control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Piston position		
Ignition switch	Start signal		
Fuel rail pressure sensor	Fuel rail pressure		

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, engine coolant temperature and fuel rail pressure.
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 control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Battery	Battery voltage		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Wheel sensor	Vehicle speed*		
Air conditioner switch	Air conditioner ON signal*		

*: The input signal is sent to the ECM through CAN communication line.

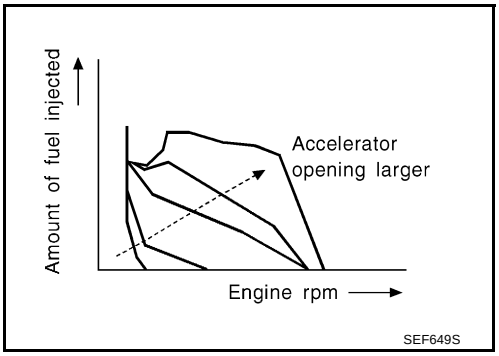
When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (normal control)	Fuel injector Fuel pump
Accelerator pedal position sensor	Accelerator position		
Fuel rail pressure sensor	Fuel rail pressure		

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM.
The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure 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

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection control (maximum amount control)	Fuel injector
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor	Engine speed		
Accelerator pedal position sensor	Accelerator pedal 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

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection control (deceleration control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

GBS0002Z

DESCRIPTION

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 determines the optimum injection timing using sensor signals accordance with the map.

Air Conditioning Cut Control

GBS00030

INPUT / OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay*2
Accelerator pedal position sensor	Accelerator pedal opening angle		
Wheel sensor	Vehicle speed*1		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
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)

GBS00031

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Wheel sensor	Vehicle speed*	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor	Engine speed		

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is 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 be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

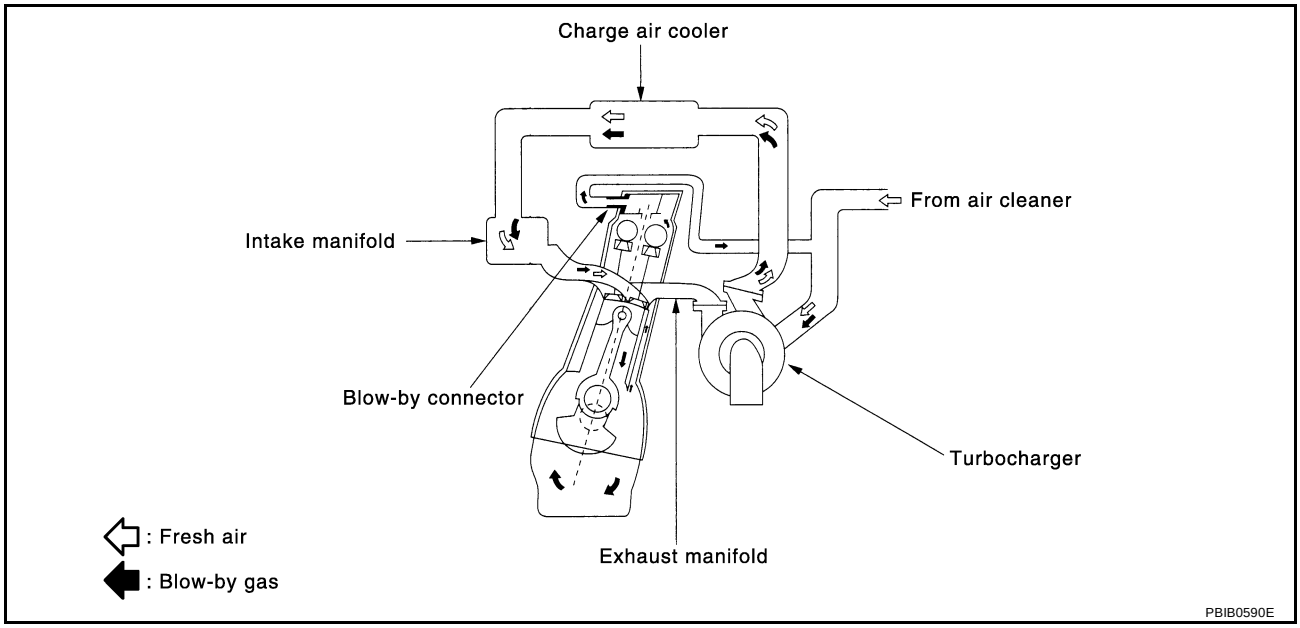
NOTE:
This function is different from deceleration control listed under EC-1007, "Fuel Injection Control System" .

Crankcase Ventilation System

GBS00032

DESCRIPTION

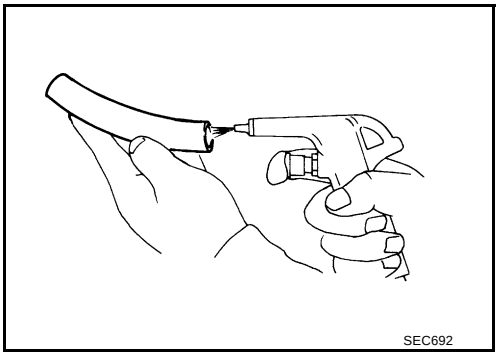
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



INSPECTION

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



CAN Communication

GBS00033

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-26, "CAN Communication Unit" , about CAN communication for detail.

BASIC SERVICE PROCEDURE

PFP:00018

Fuel Filter

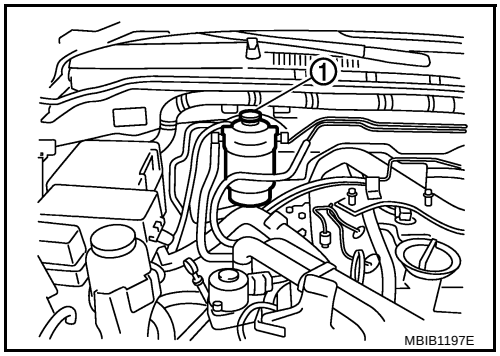
GBS00034

DESCRIPTION

A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING

Pump the priming pump (1) to bleed air.



- 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 fuel gallery. 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 1 minute after performing air bleeding.

WATER DRAINING

1. Remove the fuel filter, filter bracket, protector assembly from the dash panel as follows.

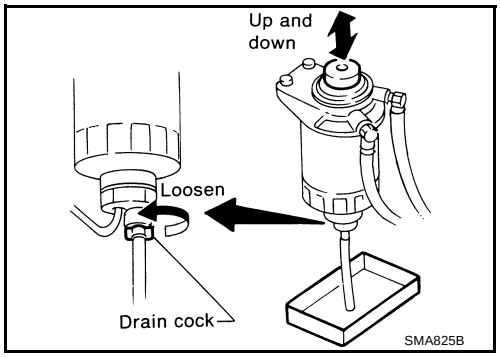
a. Remove the air cleaner case (upper), air duct assembly, and vacuum hose for brake booster (between the vacuum pump and vacuum pipe).

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. Remove the mounting nuts on the dash panel, then remove the 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 at the bottom of the fuel filter.
Loosening drain cock four to five turns causes water to start draining.
Do not remove drain cock by loosening it excessively.
If water dose not drain properly, move the priming up and down.



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.
Do not over-tighten the water draining cock. This will damage the cock thread, resulting in water or fuel leak.

3. Bleed air of the fuel filter. Refer to EC-1012, "AIR BLEEDING" .
4. Start the engine.

Fuel Pump Learning Value Clearing

GBS00035

DESCRIPTION

In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.
Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operation to clear the value of the fuel pump learning.
Fuel Pump Learning Value Clearing should be performed under the following conditions.

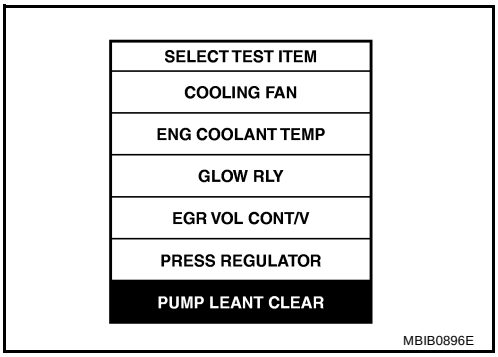
- Fuel pump is changed.
- ECM is replaced with used one which stores the fuel pump learning value of other fuel pump.

OPERATION PROCEDURE

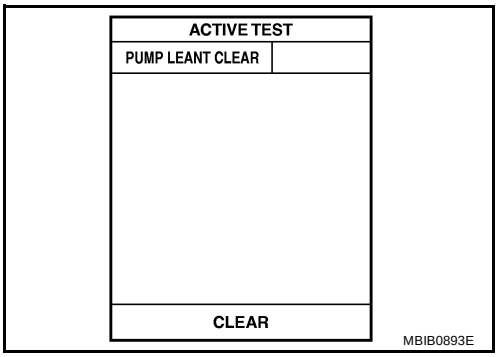
NOTE:
When removing fuel pump, perform Fuel Pump Learning Value Clearing before starting engine.

With CONSULT-II

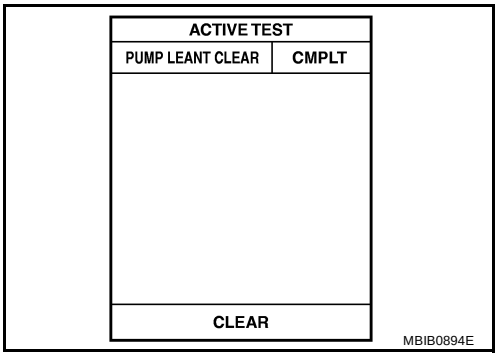
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



Without CONSULT-II

Fuel pump learning value can be erased from the back up memory in the ECM by the same operation as erasing DTC. In detail, refer to EC-1016, "Without CONSULT-II" .

Injector Adjustment Value Registration

GBS00036

DESCRIPTION

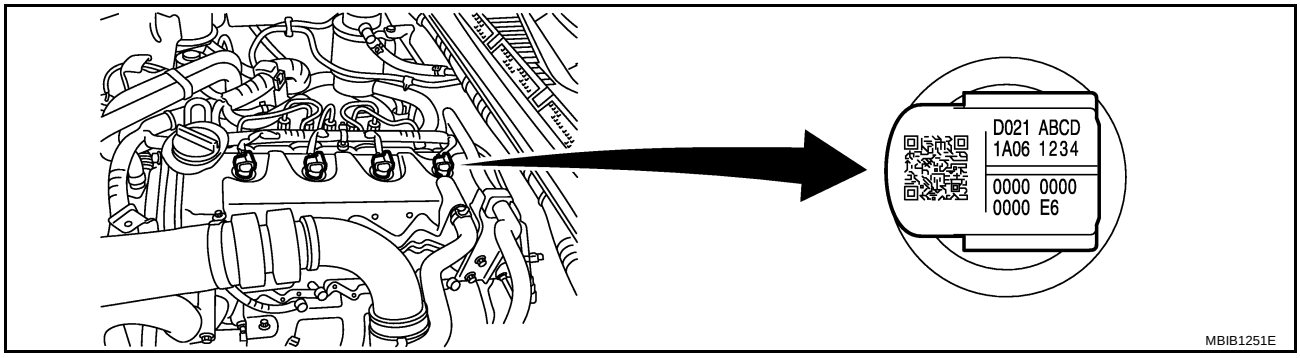
Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.

- Injector(s) are replaced.
- ECM is replaced.

For the first case, Injector Adjustment Value Registration for the replaced fuel injector must be performed. And for the second case, Injector Adjustment Value Registration for all the fuel injectors must be performed.



Example: Injector adjustment value = D021ABCD1A06123400000000000E6

OPERATION PROCEDURE

NOTE:

- **Before performing this procedure, record injector adjustment value printed on a fuel injector.**
- **When all fuel injectors are replaced or ECM is replaced, it is recommended to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode before performing this procedure. By performing “INJ ADJ VAL CLR” in “WORK SUPPORT” mode, injector adjustment value stored in ECM is initialized.**

1. Turn ignition switch ON (engine stopped).
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.

   NOTE:
   When touching “START”, CONSULT-II reads injector adjustment values stored in ECM.
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value, and touch “ENTER”.

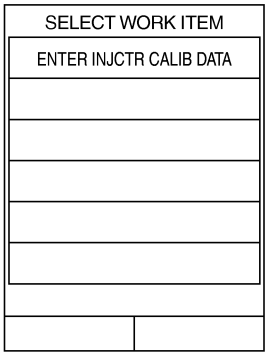
   NOTE:
   Input injector adjustment value is stored in CONSULT-II.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.

   NOTE:
   When touching “START”, injector adjustment values stored in CONSULT-II are written onto ECM memory.
7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a fuel injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

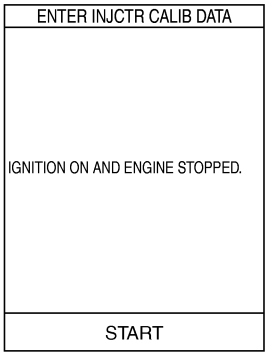
   NOTE:
   - In this step, CONSULT-II reads injector adjustment values stored in ECM and displays the values on the CONSULT-II screen. This is for checking if injector adjustment values are written onto ECM memory correctly.

- If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.

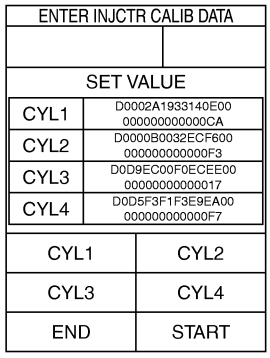
1. Turn ignition switch ON (engine stopped).



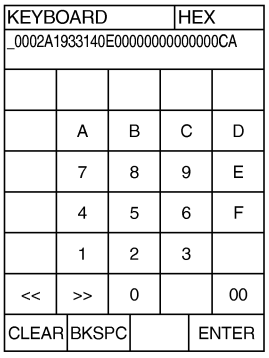
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.



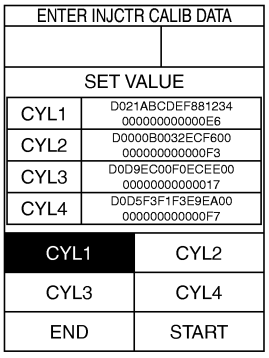
3. Touch “START”.



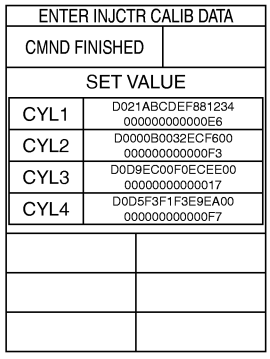
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.



5. Input injector adjustment value, and touch “ENTER”.



6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.



7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

MBIB1254E

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

DTC Detection Logic

GBS00037

When a malfunction is detected, the malfunction (DTC) and freeze frame data are stored in the ECM memory. The MIL will light up each time the ECM detects malfunction. For diagnostic items causing the MIL to light up, refer to EC-996, "INDEX FOR DTC" .

Diagnostic Trouble Code (DTC)

GBS00038

HOW TO READ DTC

The DTC can be read by the following methods.

With CONSULT-II

CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Example: P0117, P0335, P1268, etc. (CONSULT-II also displays the malfunctioning component or system.)

Without CONSULT-II

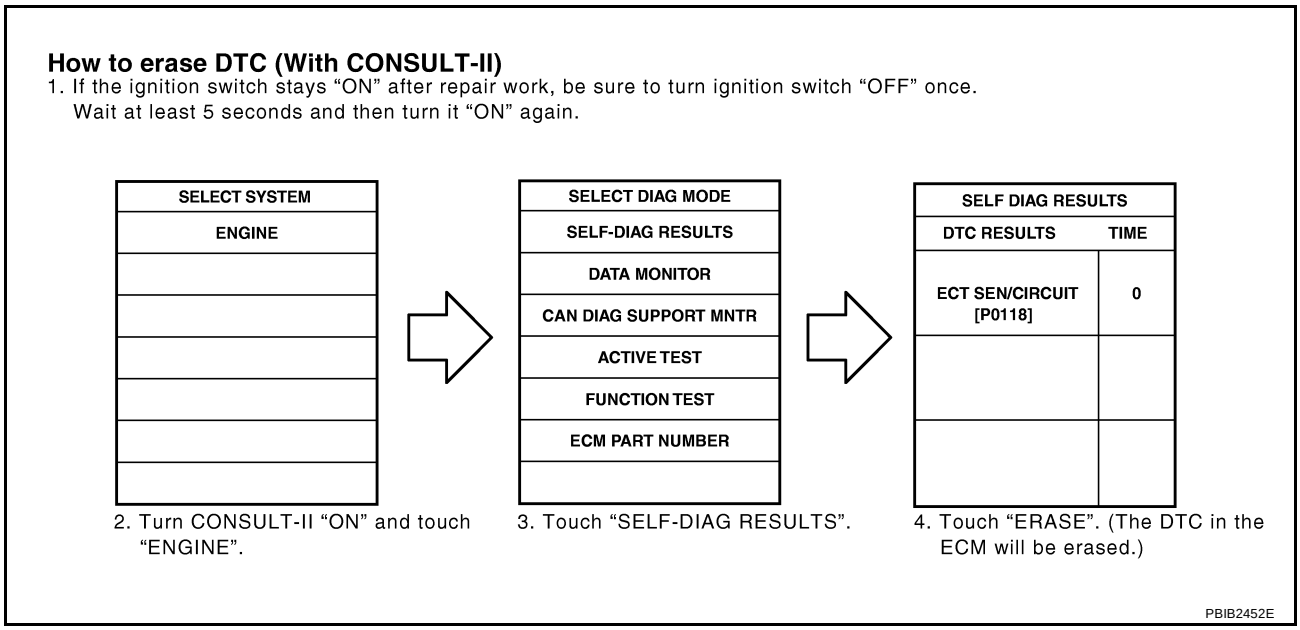
The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0335, 1260, etc.

- **Output of a DTC indicates a malfunction. However, the Diagnostic Test Mode II does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

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.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)



The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

Without CONSULT-II

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-1018, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - Freeze frame data
  - Fuel pump learning value

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.

Freeze Frame Data

GBS00039

The ECM records the driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed and intake manifold pressure at the moment a malfunction is detected.
The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II. For details, see EC-1017, "Freeze Frame Data" .
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.
Freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-1016, "HOW TO ERASE DTC" .

NATS (Nissan Anti-theft System)

GBS0003A

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-81, "NATS(Nissan Anti-Theft System)" .**
- **Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DAIG 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 all NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

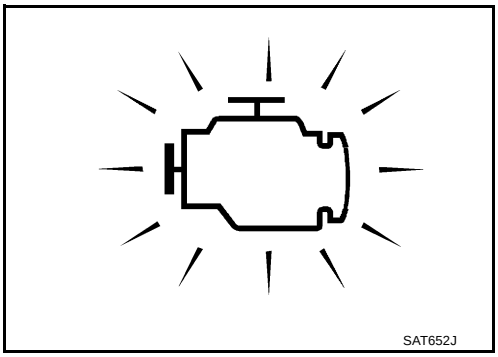
Malfunction Indicator Lamp (MIL)

GBS0003B

DESCRIPTION

The MIL is located on the combination meter.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   - If the MIL does not light up, refer to EC-1336, "MIL AND DATA LINK CONNECTOR" .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit. (See EC-1336, "MIL AND DATA LINK CONNECTOR" .)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MIL will light up to inform the driver that a malfunction has been detected.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs to be read.

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

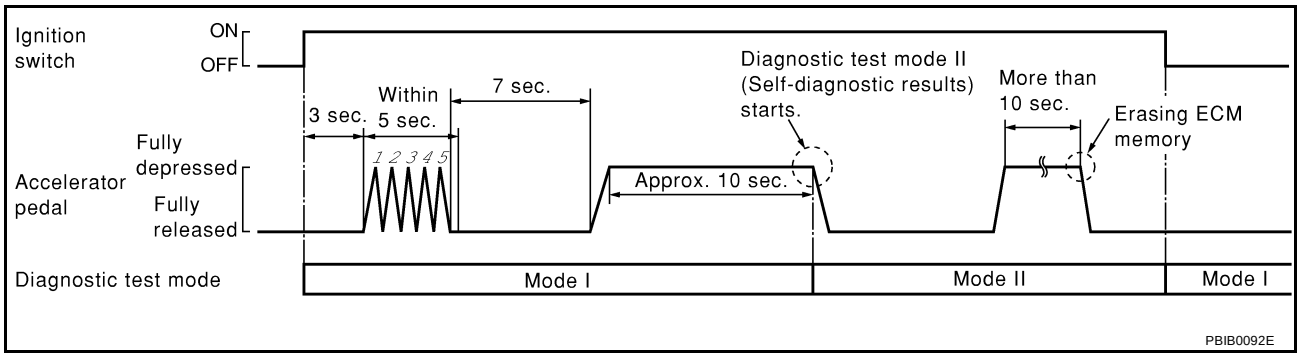
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-1018, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the combination meter should stay ON. If it remains OFF, check the bulb. Refer to EC-1336, "MIL AND DATA LINK CONNECTOR" .

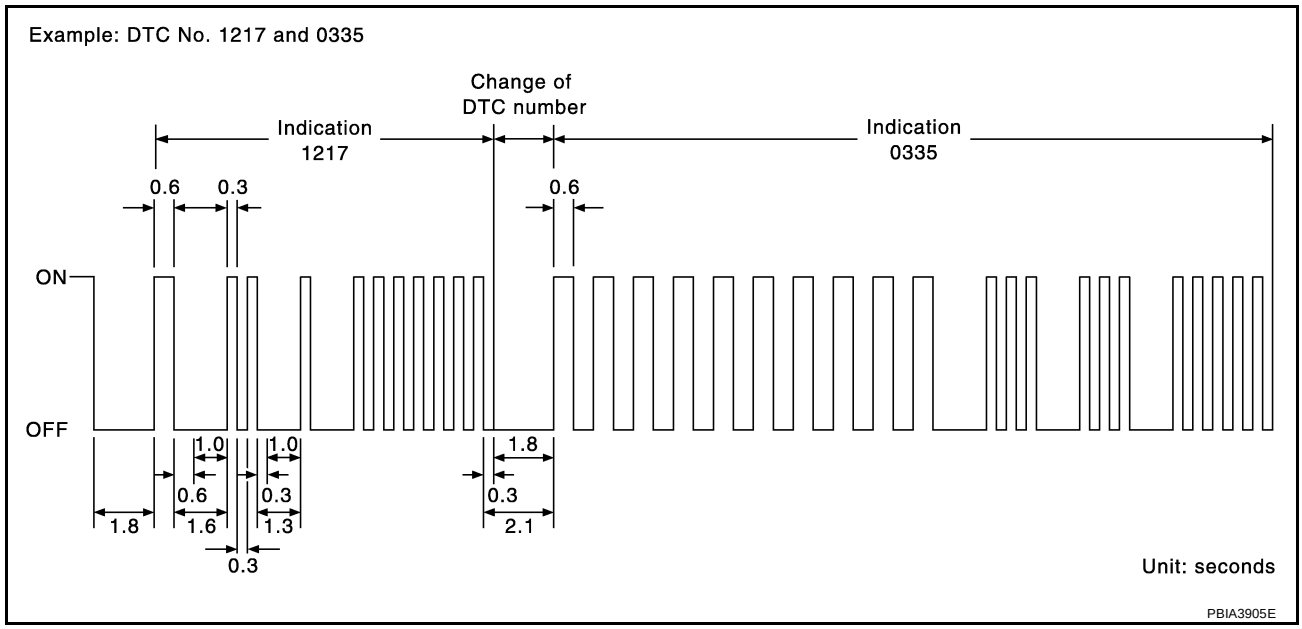
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC is indicated by the number of blinks of the MIL as shown below. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-996, "INDEX FOR DTC")

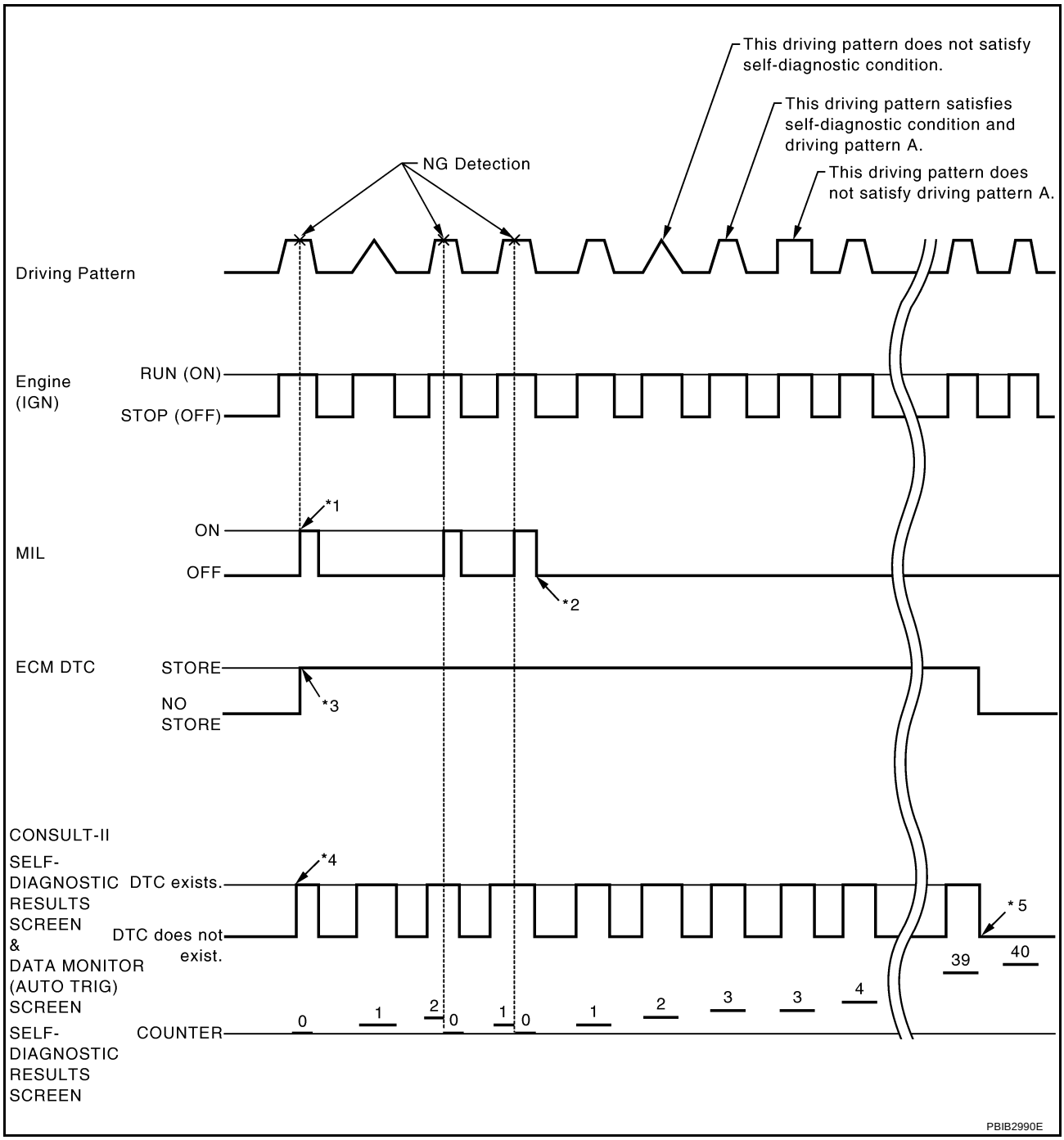
How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-1018, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Relationship Between MIL, DTC, CONSULT-II and Driving Patterns

GBS0003C



*1: When a malfunction is detected, MIL will light up.

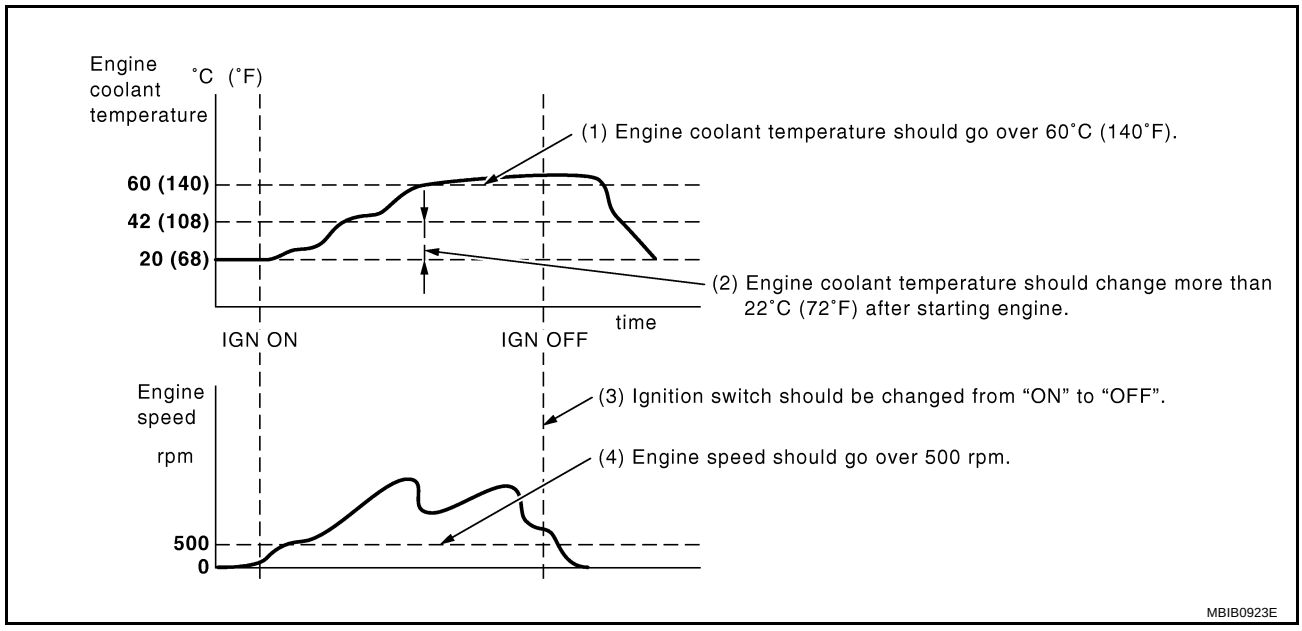
*2: MIL will not light up after ignition switch is turned OFF.

*3: When a malfunction is detected for the first time, the DTC will be stored in ECM.

*4: Other screens except SELF-DIAGNOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction. DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

*5: The DTC will not be displayed any longer after vehicle is driven 40 times (Driving pattern A) without the same malfunction. (The DTC still remain in ECM.)

DRIVING PATTERN A



- The counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the counter reaches 40.

TROUBLE DIAGNOSIS

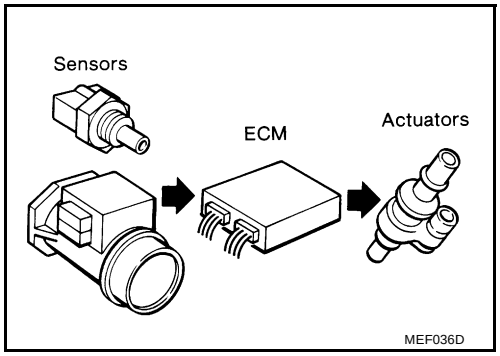
PFP:00004

Trouble Diagnosis Introduction

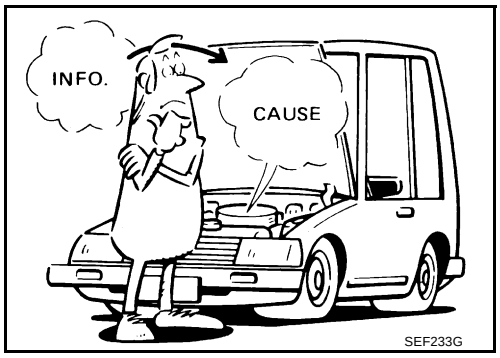
GBS0003D

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 actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.



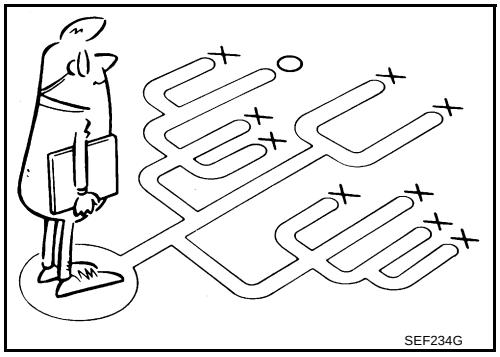
It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



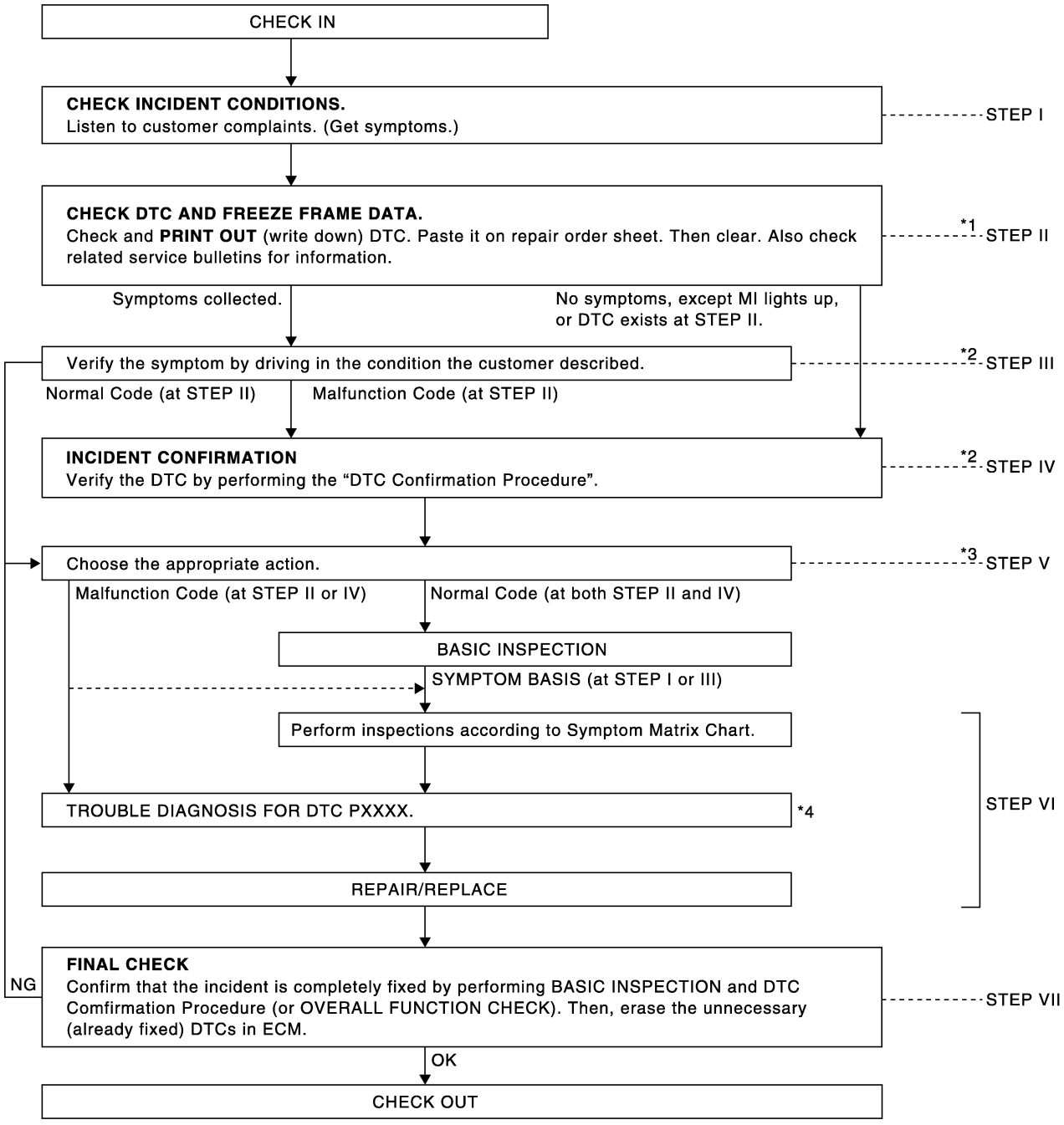
A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the EC-1023, "WORK FLOW" .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.

Start your diagnosis by looking for “conventional” incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.



WORK FLOW



PBIB0477E

*1 If time data of "SELF-DIAG RESULTS" is other than "0", perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1059, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-1024, "DIAGNOSTIC WORK SHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the DTC and the freeze frame data, then erase the DTC. The DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. Refer to EC-1016 . If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . 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-1031 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . 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 and the freeze frame data 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 EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . 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-1027 . Then perform inspections according to the Symptom Matrix Chart. Refer to EC-1031 .
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1041 or EC-1054 . 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, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Circuit Inspection”. Repair or replace the malfunction parts. If the malfunctioning part cannot be detected, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
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) 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-1016 .)

DIAGNOSTIC WORK SHEET

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 an incident. 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.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion when engine is cool ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator		☐ Turned on ☐ Not turned on	

MTBL0533

DTC Inspection Priority Chart

GBS0003E

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:

If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0016 Crankshaft position - camshaft position correlation ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P2135 Accelerator pedal position sensor ● P0182 P0183 Fuel pump temperature sensor ● P0192 P0193 Fuel rail pressure sensor ● P0237 P0238 Turbocharger boost sensor ● P0335 P0336 Crankshaft position sensor ● P0340 P0341 Camshaft position sensor ● P0563 Battery voltage ● P0605 P0606 P1616 ECM ● P0642 P0643 P0652 P0653 Sensor power supply ● P1610 - P1615 NATS ● P1622 P1623 Injector adjustment value ● P2228 P2229 Barometric pressure sensor
2	● P0089 P0628 P0629 P1272 - P1275 Fuel pump ● P0200 - P0204 P1268 - P1271 P2146 - P2149 Fuel injector ● P0686 ECM relay
3	● P0088 P0093 Fuel system ● P0217 Engine over temperature (OVERHEAT) ● P0234 Turbocharger system ● P0501 P0502 P0503 ASCD vehicle speed sensor ● P0504 ASCD brake switch ● P0580 P0581 ASCD steering switch

Basic Inspection

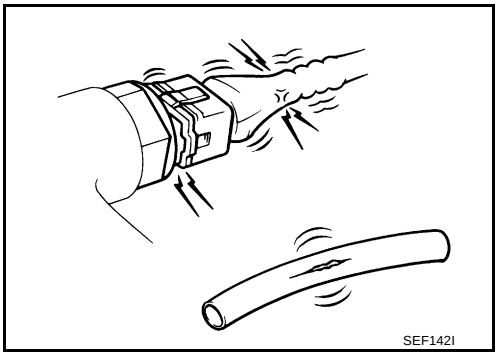
GBS0003F

Precaution:
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.**
- **Heater fan switch is OFF.**
- **Rear 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 incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-8, "PERIODIC MAINTENANCE (EXCEPT FOR EUROPE)" .
3. Open engine hood and check the following:
   - Harness connectors for improper connections
   - Vacuum hoses for splits, kinks, or improper connections
   - Wiring for improper connections, pinches, or cuts
4. Start engine and warm it up to the normal operating temperature.



>> GO TO 2.

2. PREPARATION FOR CHECKING IDLE SPEED

With CONSULT-II
Connect CONSULT-II to the data link connector.
Without CONSULT-II
Install diesel tacho tester to the vehicle.

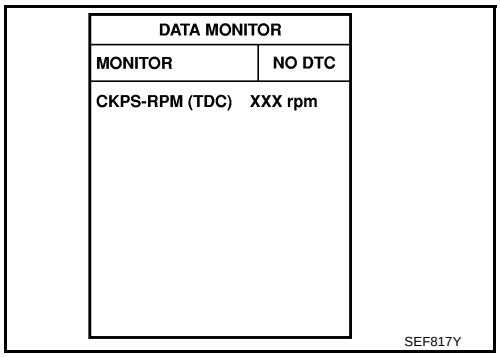
>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-II

1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
2. Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)



Without CONSULT-II
Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

1. Stop engine.
2. Listen 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 FUEL SYSTEM

Use priming pump to bleed air from fuel system. Refer to EC-1012, "AIR BLEEDING" .

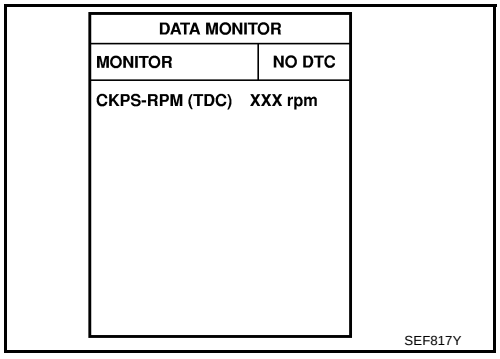
>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)



Without CONSULT-II
Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to EC-1012, "WATER DRAINING" .

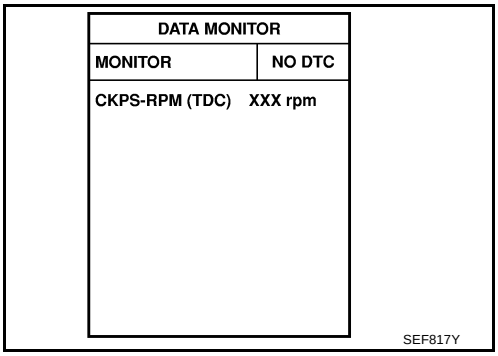
>> GO TO 8.

8. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)



Without CONSULT-II
Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK AIR CLEANER FILTER

1. Stop engine.
2. Check air cleaner filter for clogging or breaks.

OK or NG

OK >> GO TO 10.
NG >> Replace air cleaner filter.

10. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK BATTERY

Refer to SC-5, "BATTERY" .

OK or NG

OK >> Check charging system. Refer to SC-14, "CHARGING SYSTEM" .
NG >> Repair or replace.

12. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-236, "CHECKING COMPRESSION PRESSURE" .

OK or NG

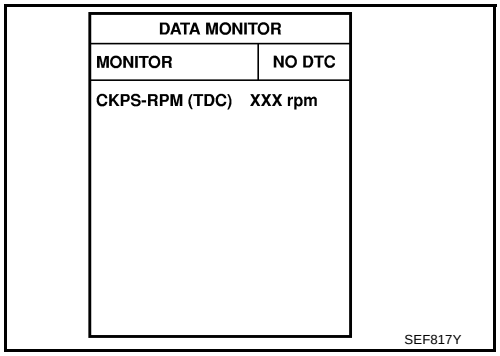
OK >> GO TO 13.
NG >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)



Without CONSULT-II

Read idle speed.

M/T: 750±25 rpm (in Neutral position)
A/T: 750±25 rpm (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> 1. Replace fuel injector.
2. GO TO 3.

Symptom Matrix Chart

GBS0003G

SYSTEM — Basic engine control system		SYMPTOM: HARD/NO START/RESTART (EXCP. HA)				SYMPTOM: ENGINE STALL			SYMPTOM		SYMPTOM		SYMPTOM		Reference page
		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	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
Fuel pump		5	5	5	5	5	5	5	5		5	5		5	—
Fuel injector		3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1113
Glow control system		1	1	1	1					1					EC-1283
Engine body		3	3	3	3	3	3	3		3	4	4		3	EM-250
EGR system											3	3			EC-1290
Air cleaner and duct											3	3			EM-159
Fuel rail pressure relief valve		3	3	3	3	3	3	3	3		3	3		3	EC-1076
ENGINE CONTROL	Fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1205
	Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1113
	Fuel injector adjustment value								1	1	1	1			EC-1014
	Mass air flow sensor circuit								1		1	1			EC-1080
	Engine coolant temperature circuit			1		1		1						1	EC-1091
	Vehicle speed signal circuit											1			LAN-26
	Accelerator pedal position sensor circuit								1		1	1			EC-1096, EC-1130, EC-1263
	Fuel rail pressure sensor circuit														EC-1106

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL									
		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	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1147
	Camshaft position sensor circuit			3	3										EC-1159
	Turbocharger boost sensor circuit								1		1	1			EC-1141
	Turbocharger boost control solenoid valve circuit								1		1	1			EC-1297
	Intake air control valve control solenoid valve circuit	1	1	1	1	1	1	1	1						EC-1302
	Start signal circuit	1	1	1	1	1		1	1		1	1			EC-1330
	Ignition switch circuit		1			1	1	1							EC-1059
	Power supply for ECM circuit		1			1	1	1							EC-1059
	Cooling fan relay circuit														EC-1120
	EGR volume control valve circuit								1		1	1			EC-1290
	Glow relay circuit	1	1	1											EC-1283
	ECM relay (Self shut-off) circuit		1				1	1	1						EC-1220
	ECM	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1201, EC-1203, EC-1257
NATS (Nissan Anti-theft System)			1												EC-1017

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

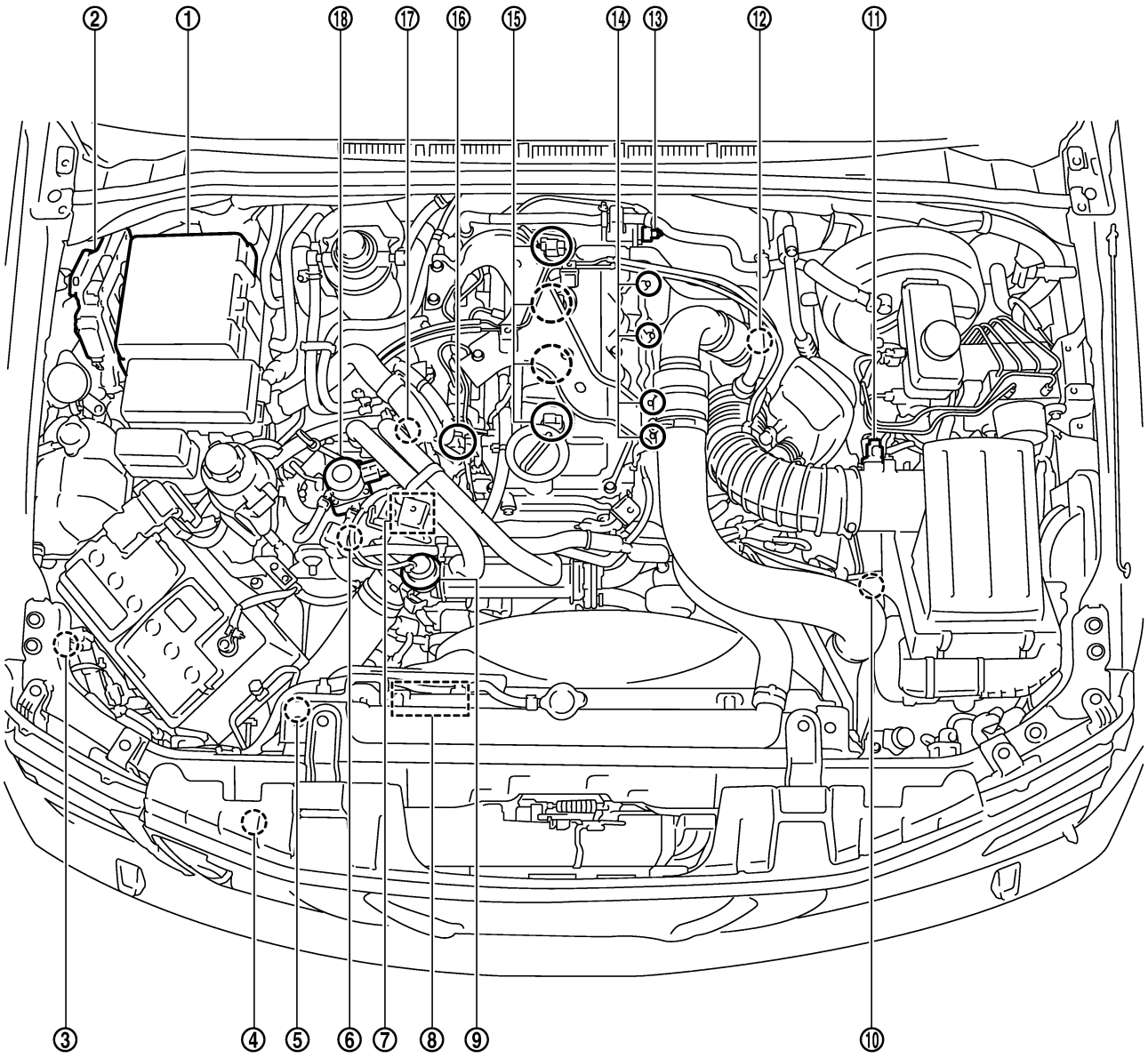
SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator lamp illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
Fuel pump		5	5	5		5					1	1	—
Fuel injector		3	3	3		4		3	3		1	1	EC-1113
Glow control system									1				EC-1283
Engine body			3	3	3	3	1		3				EM-250
EGR system								3					EC-1290
Air cleaner and duct								3					EM-159
Fuel rail pressure relief valve		3	3	3		3							EC-1076
ENGINE CONTROL	Fuel pump circuit	4	4	4		4					1	1	EC-1205
	Fuel injector circuit	1	1	1		1		1	1		1	1	EC-1113
	Fuel injector adjustment value	1	1			1		1	1			1	EC-1014
	Mass air flow sensor circuit							1			1	1	EC-1080
	Engine coolant temperature circuit	1	1		1						1	1	EC-1091
	Vehicle speed signal circuit										1	1	LAN-26
	Accelerator pedal position sensor circuit			1							1	1	EC-1096, EC-1130, EC-1263
	Fuel rail pressure sensor circuit										1	1	EC-1106

SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator lamp illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
ENGINE CONTROL	Crankshaft position sensor circuit	1	1								1	1	EC-1147
	Camshaft position sensor circuit										1	1	EC-1159
	Turbocharger boost sensor circuit										1	1	EC-1141
	Turbocharger boost control solenoid valve circuit							1	1				EC-1297
	Start signal circuit												EC-1330
	Ignition switch circuit												EC-1059
	Power supply for ECM circuit										1	1	EC-1059
	Cooling fan relay circuit				2								EC-1120
	EGR volume control valve circuit							1					EC-1290
	Glow relay circuit								1				EC-1283
	ECM relay (Self shut-off) circuit											1	EC-1220
	ECM	2	2	2	2	2	2	2	2	2	2	2	EC-1201, EC-1203, EC-1257
NATS (Nissan Anti-theft System)												1	EC-1017

1 - 5: The numbers refer to the order of inspection.

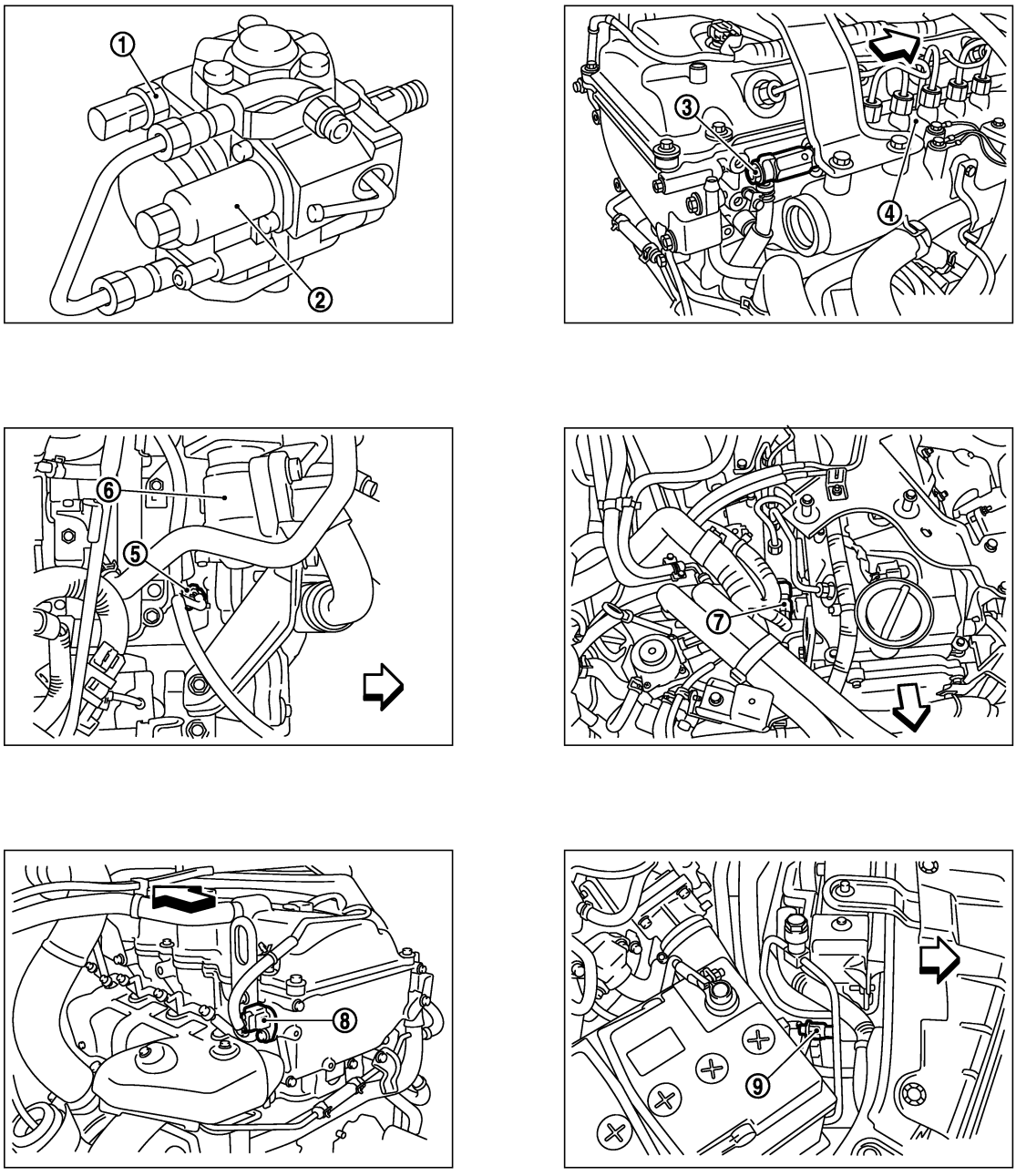
Engine Control Component Parts Location

GBS0003H



MBIB1198E

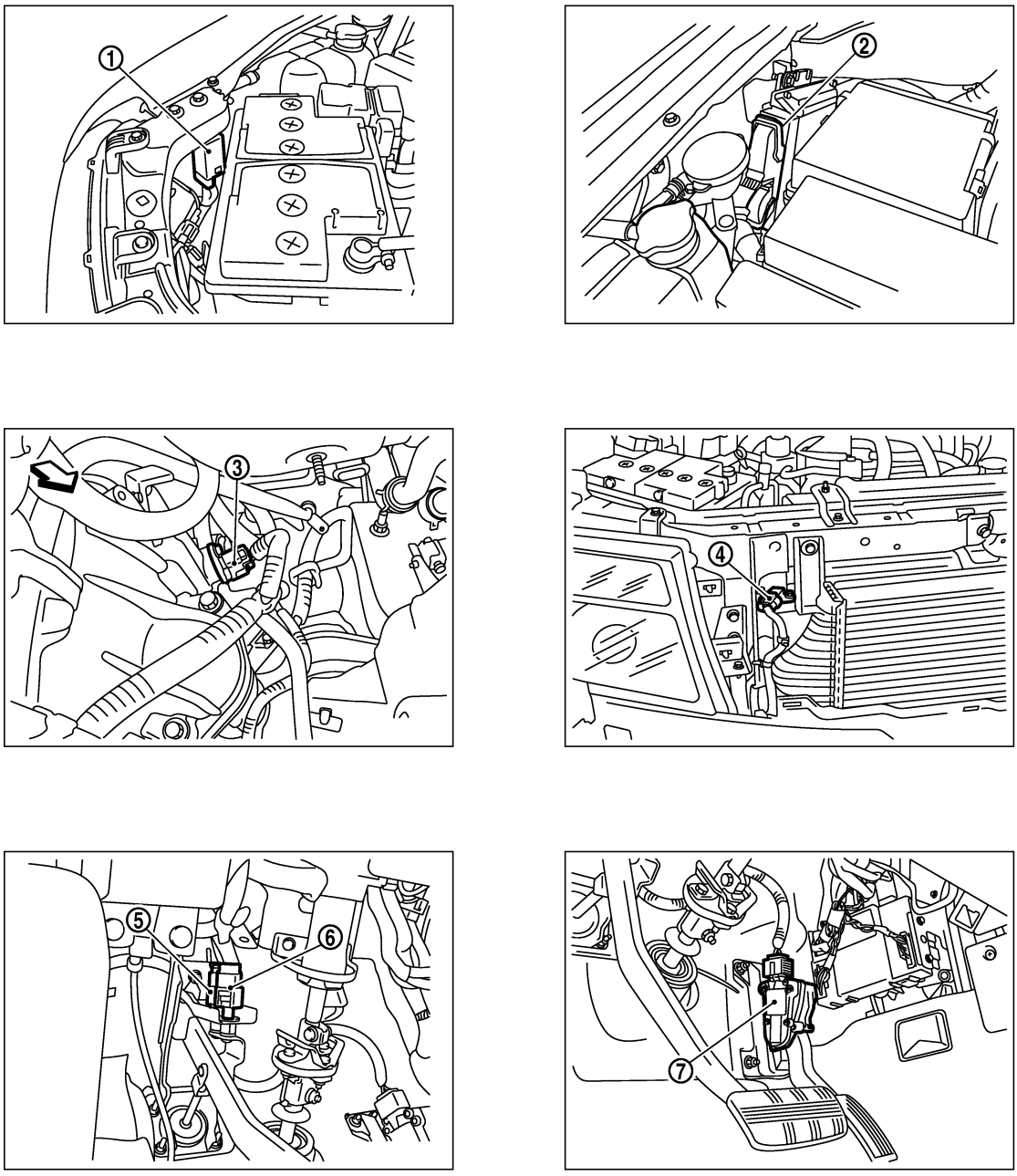
1. IPDM E/R
2. ECM
3. Glow relay
4. Turbocharger boost sensor
5. Refrigerant pressure sensor
6. Engine coolant temperature sensor
7. Fuel pump
8. Cooling fan motor
9. Intake air control valve actuator
10. Turbocharger boost control solenoid valve
11. Mass air flow sensor
12. Turbocharger boost control actuator
13. Camshaft position sensor
14. Glow plug
15. Fuel injector
16. Fuel rail pressure sensor
17. Intake air control valve control solenoid valve
18. EGR volume control valve



MBIB1388E

⇦ : Vehicle front

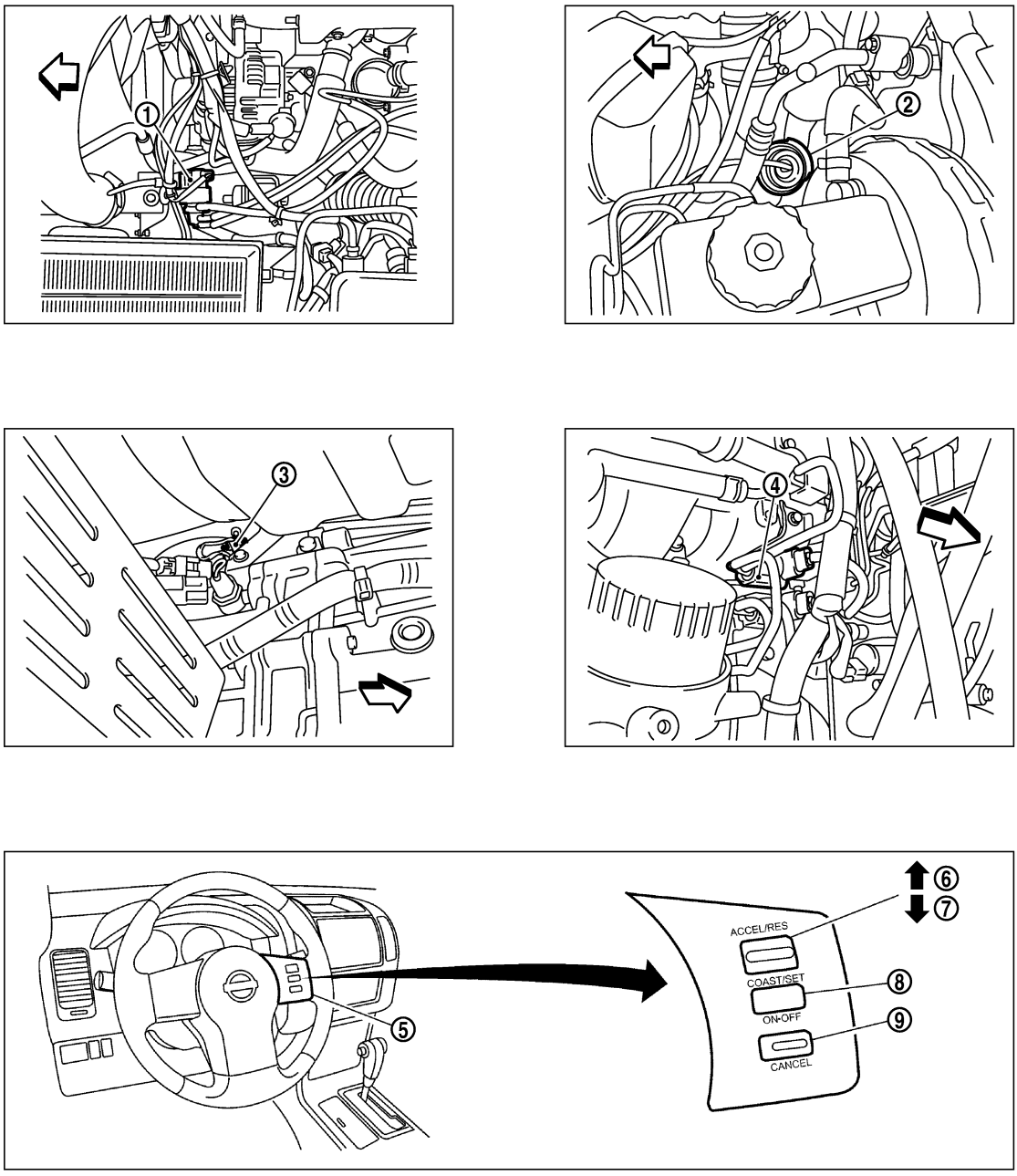
1. Fuel pump temperature sensor
2. Fuel pump
3. Fuel rail pressure relief valve
4. Fuel rail
5. Engine coolant temperature sensor
6. EGR volume control valve
7. Fuel rail pressure sensor
8. Camshaft position sensor
9. Refrigerant pressure sensor



MBIB1249E

⇦ : Vehicle front

1. Glow relay
2. ECM
3. Crankshaft position sensor (View from under the vehicle)
4. Turbocharger boost sensor (View with front grille removed)
5. ASCD brake switch
6. Stop lamp switch
7. Accelerator pedal position sensor



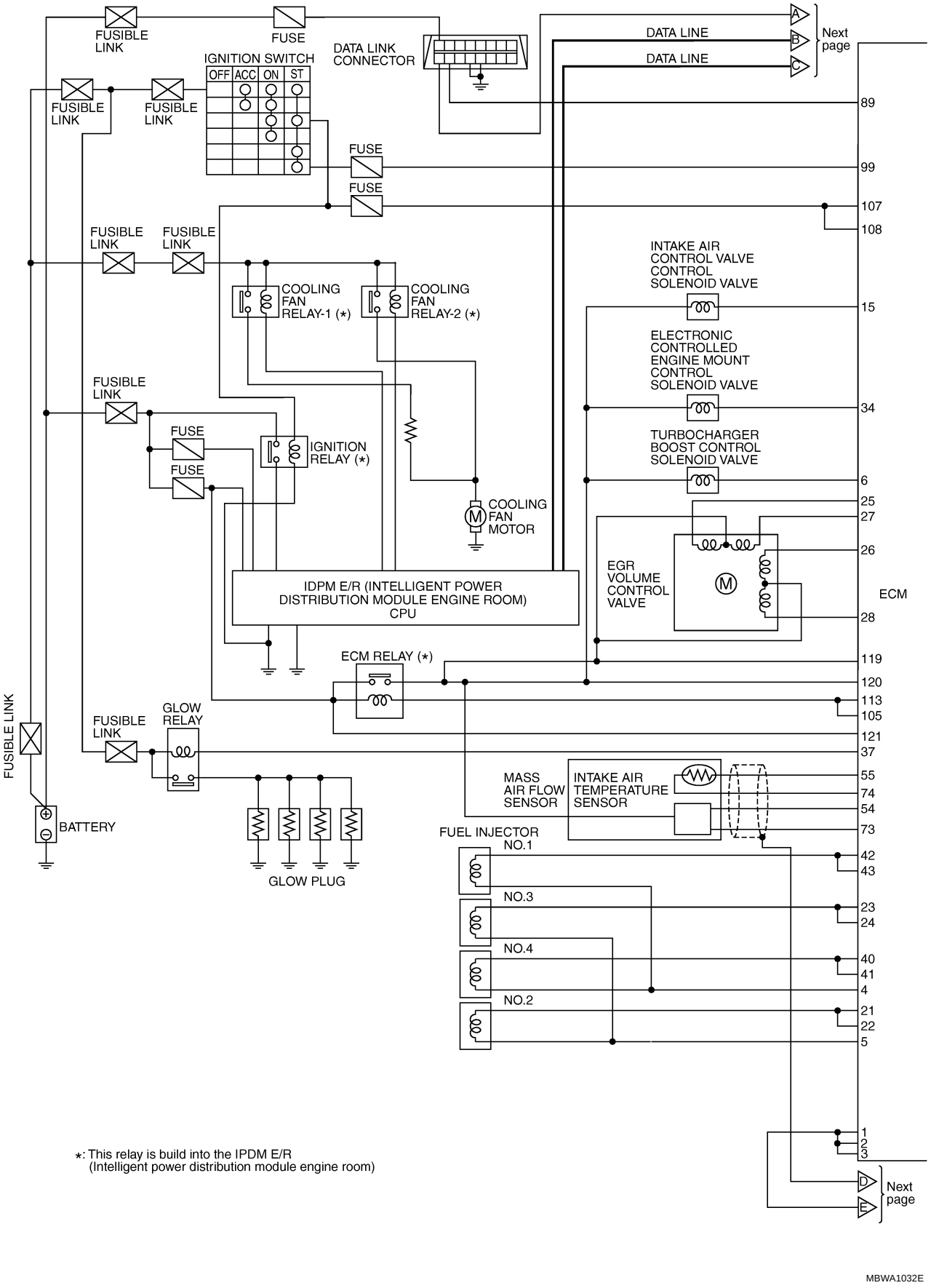
MBIB1289E

⇦ : Vehicle front

1. Turbocharger boost control solenoid valve (View with air cleaner upper case removed)
2. Turbocharger boost control actuator
3. PNP switch (M/T) (View from under the vehicle)
4. Intake air control valve control solenoid valve
5. ASCD steering switch
6. RESUME/ACCELERATE switch
7. SET/COAST switch
8. MAIN switch
9. CANCEL switch

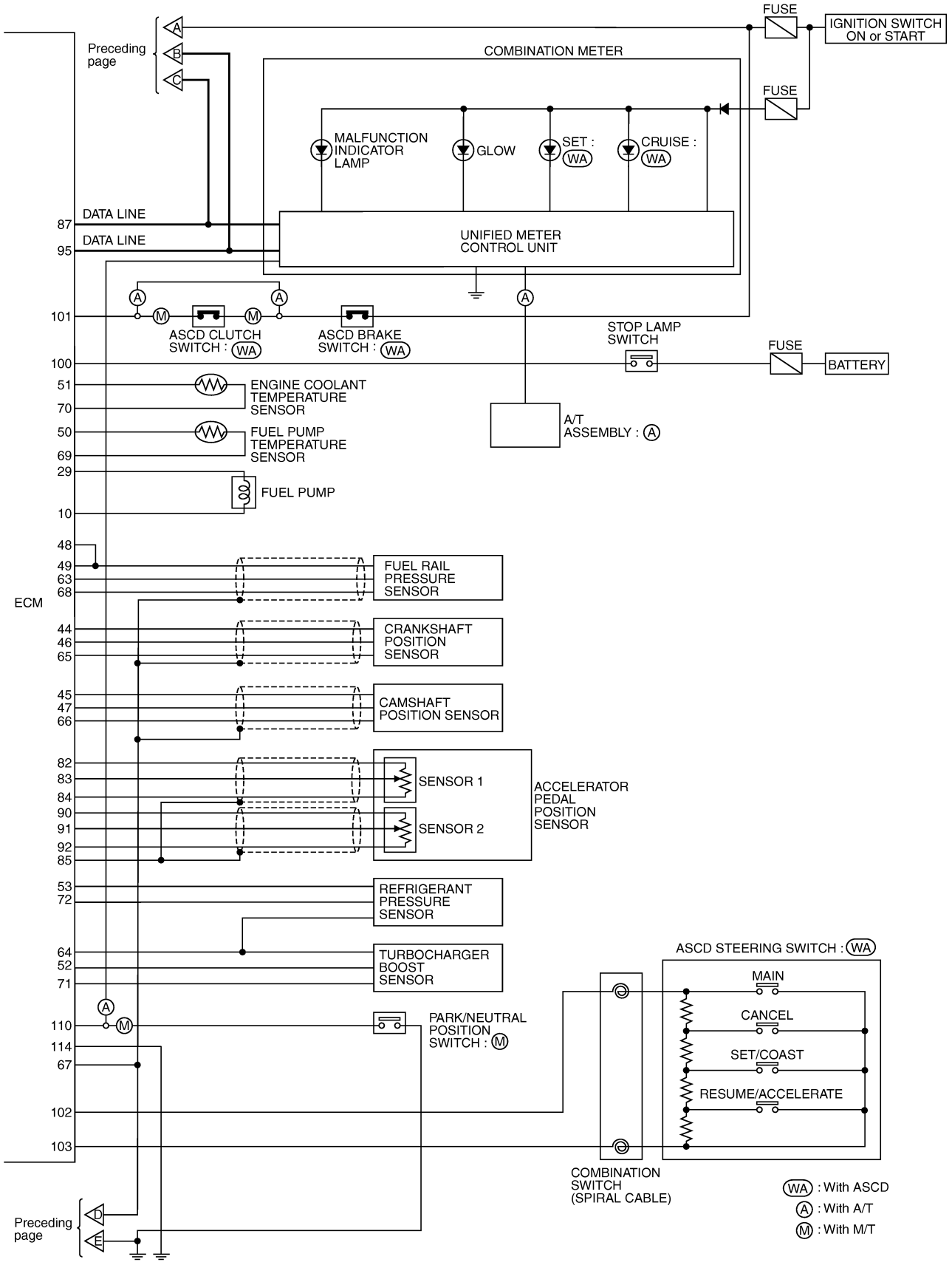
Circuit Diagram

GBS0003I



*: This relay is build into the IPDM E/R
(Intelligent power distribution module engine room)

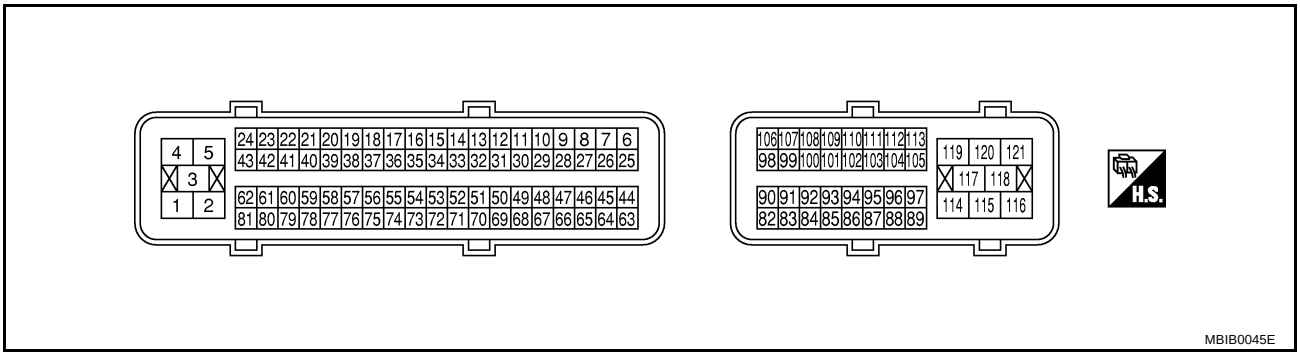
MBWA1032E


FUSE
IGNITION SWITCH ON or START
FUSE
Preceding page
A
B
C
COMBINATION METER
MALFUNCTION INDICATOR LAMP
GLOW
SET : WA
CRUISE : WA
DATA LINE
87
DATA LINE
95
UNIFIED METER CONTROL UNIT
101
ASCD CLUTCH SWITCH : WA
ASCD BRAKE SWITCH : WA
STOP LAMP SWITCH
FUSE
100
BATTERY
51
70
ENGINE COOLANT TEMPERATURE SENSOR
50
69
FUEL PUMP TEMPERATURE SENSOR
A/T ASSEMBLY : A
29
FUEL PUMP
10
48
49
63
68
FUEL RAIL PRESSURE SENSOR
ECM
44
46
65
CRANKSHAFT POSITION SENSOR
45
47
66
CAMSHAFT POSITION SENSOR
82
83
84
90
91
92
85
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
53
72
REFRIGERANT PRESSURE SENSOR
64
52
71
TURBOCHARGER BOOST SENSOR
ASCD STEERING SWITCH : WA
MAIN
CANCEL
SET/COAST
RESUME/ACCELERATE
110
PARK/NEUTRAL POSITION SWITCH : M
114
67
102
103
COMBINATION SWITCH (SPIRAL CABLE)
Preceding page
D
E
WA : With ASCD
A : With A/T
M : With M/T

MBWA1417E

ECM Harness Connector Terminal Layout

GBS0003J

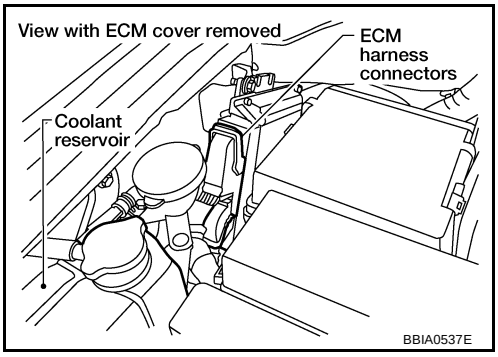


ECM Terminals And Reference Value

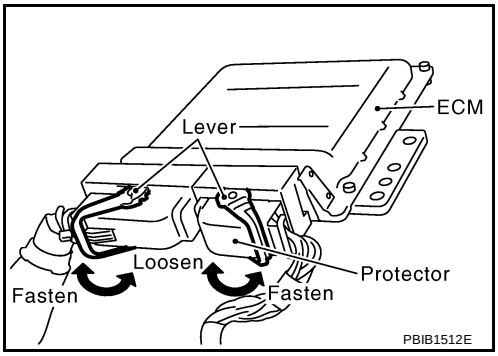
GBS0003K

PREPARATION

1. ECM located in the engine room passenger side behind coolant reservoir tank.
2. Remove ECM harness connector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



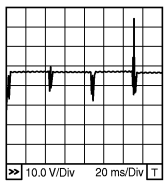
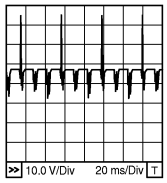
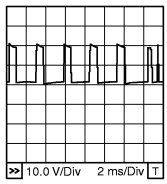
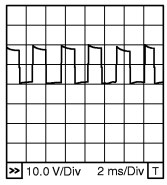
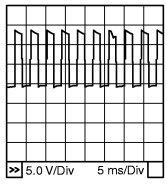
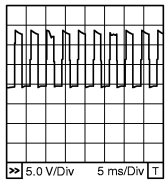
ECM INSPECTION TABLE

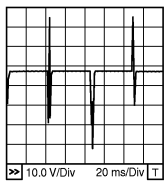
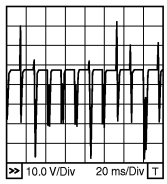
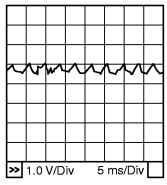
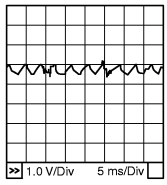
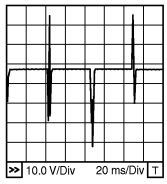
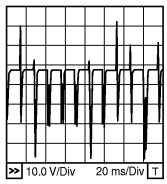
Remarks: Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

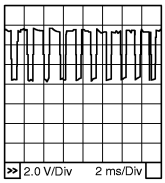
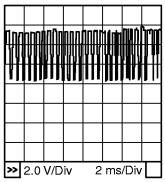
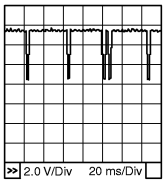
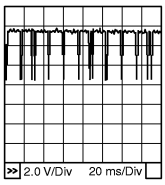
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4 5	V G	Fuel injector power supply (For cylinder No. 1 and 4) Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1295E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1296E
6	BR	Turbocharger boost control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 6.3V ★  MBIB0889E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.6V ★  MBIB0890E
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E
15	GR	Intake air control valve control solenoid valve	**[Engine is running]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	Approximately 0.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	G P W W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E
25 26 27 28	Y O GR V	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.)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E
37	G	Glow relay	Refer to EC-1283, "GLOW CONTROL SYSTEM" .	
40 41 42 43	W GR W B	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	W	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
45	W	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	R	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.7V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 3.7V ★  MBIB0880E
47	R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 4.9V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 4.9V ★  MBIB0878E
48 49	L B	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.0 - 2.3V
50	Y	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
51	SB	Engine coolant temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with engine coolant temperature

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
52	BR	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.1 - 2.4V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.3 - 2.6V
53	W	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
54	G	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 2.0V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
55	W	Intake air temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.2V Output voltage varies with intake air temperature
63	R	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	V	Sensor power supply (Turbocharger boost sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
65	B	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
66	B	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	W	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
70	LG	Engine coolant temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
71	L	Turbocharger boost sensor ground	**[Ignition switch ON]**	Approximately 0.3V
72	BR	Refrigerant pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
74	R	Intake air temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
87	P	CAN communication line	**[Ignition switch ON]**	Approximately 2.0 - 2.6V Output voltage varies with the communication status.
89	SB	Data link connector	**[Ignition switch ON]** ● CONSULT-II: Disconnected	Approximately 0V - Battery voltage (11 - 14V)
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V
95	L	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
99	V	Start signal	**[Ignition switch ON]**	Approximately 0.3V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
100	V	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	W	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
102	SB	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● ON/OFF switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B	ASCD steering switch ground	**[Ignition switch ON]**	Approximately 0.3V
105	BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	R R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
110	G (A/T) O (M/T)	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch ON] ● Except the above position	BATTERY VOLTAGE (11 - 14V)
113	BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	V	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function (ENGINE)

GBS0003L

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 DTC and freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.

Diagnostic test mode	Function
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- Freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE			
			SELF-DIAG RESULTS		DATA MONITOR	ACTIVE TEST
			DTC	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor	×	×	×	
		Camshaft position sensor	×			
		Engine coolant temperature sensor	×	×	×	×
		Vehicle speed signal	×	×	×	
		Fuel pump temperature sensor	×		×	
		Accelerator pedal position sensor 1	×		×	
		Accelerator pedal position sensor 2	×		×	
		Fuel rail pressure sensor	×		×	
		Mass air flow sensor	×		×	
		Intake air temperature sensor	×			
		Turbocharger boost sensor	×	×	×	
		Refrigerant pressure sensor			×	
		Battery voltage	×		×	
		Park/neutral position (PNP) switch			×	
		Stop lamp switch	×		×	
		Barometric pressure sensor (built-into ECM)	×		×	
		ASCD steering switch	×		×	
		ASCD brake switch	×		×	
		ASCD clutch switch	×		×	
	OUTPUT	Fuel pump	×		×	×
		Fuel injector	×		×	×
		Glow relay			×	×
		Cooling fan relay	×		×	×
		Turbocharger boost control solenoid valve	×			
		Intake air control valve control solenoid valve				
		EGR volume control valve			×	×

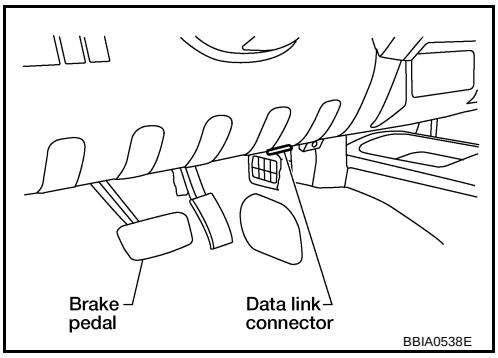
X: Applicable

INSPECTION PROCEDURE

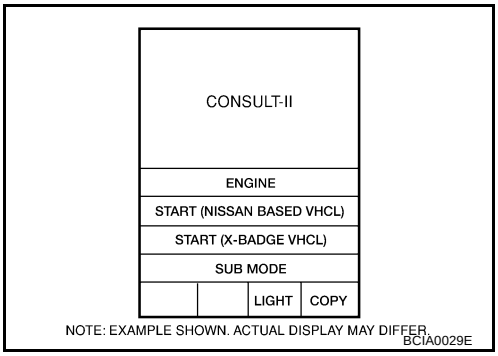
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

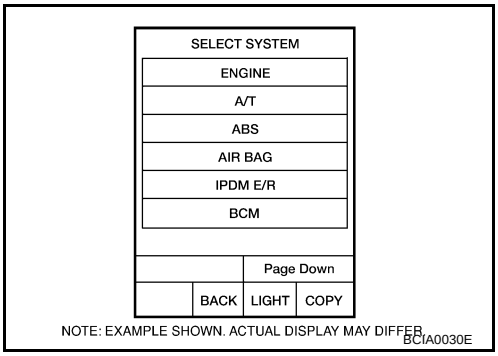
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel near the hood opener handle.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

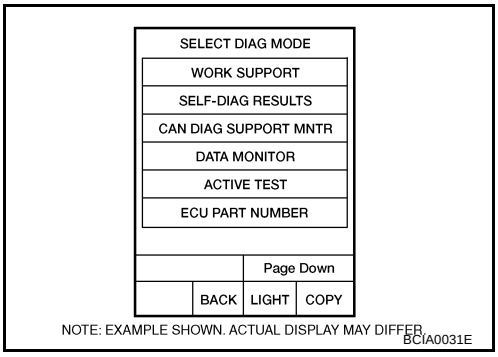


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-47, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	DESCRIPTION	USAGE
ENTER INJCTR CALIB DATA	● Injector adjustment value is written onto ECM memory.	When performing Injector Adjustment Value Registration.
CONFIG CLR	● ASCD application status stored in ECM is initialized. **NOTE:** After the status is initialized, ECM recognizes ASCD application status when the following condition is met. ● For ASCD: ASCD MAIN switch is pressed.	When initializing ASCD application status stored in ECM.
INJ ADJ VAL CLR	● Injector adjustment value stored in ECM is initialized.	Before changing injector adjustment value stored in ECM, it is recommended to perform this work item.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items detected in “SELF-DIAG RESULTS” mode, refer to EC-996, "INDEX FOR DTC" .

Freeze Frame Data

Freeze frame data item	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-996, "INDEX FOR DTC" .)
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.
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.
INT MANI PRES [kPa]	● The intake manifold pressure at the moment a malfunction is detected is displayed.

DATA MONITOR MODE

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CONDITION	SPECIFICATION
CKPS·RPM (TDC) [rpm]	×	×	● The engine speed computed from the crankshaft position sensor signal is displayed.	
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed form the vehicle speed signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	×	×	● The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN [V]	×	×	● The accelerator pedal position sensor 1 signal voltage is displayed.	This signal is converted by ECM internally. Thus, it differs from ECM terminals voltage.
ACCEL SEN 2 [V]	×	×	● The accelerator pedal position sensor 2 signal voltage is displayed.	This signal is converted by ECM internally. Thus, it differs from ECM terminals voltage.

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CONDITION	SPECIFICATION
ACT CR PRESS [MPa]	×	×	● The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position switch signal.	
START SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the starter signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
BRAKE SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the stop lamp switch signal.	
BRAKE SW2 [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the ASCD brake switch and ASCD clutch switch signal.	
IGN SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from ignition switch signal.	
MAS AIR/FL SE [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	This signal is converted by ECM internally. Thus, it differs from ECM terminals voltage.
MAIN INJ WID [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT [mA]		×	● Indicates the fuel pump power supply current from the ECM.	
GLOW RLY [ON/OFF]		×	● The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN [LOW/HI/OFF]		×	● Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW ... Operates at low speed HI ... Operates at high speed OFF ... Stopped	
EGR VOL CON/V [step]		×	● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/A VOLUME [mg/]			● The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN [kPa]	×	×	● The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
INT/M PRES SE [kPa]			● Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	

MONITOR ITEM	ECM INPUT SIG-NAL	MAIN SIG-NALS	CONDITION	SPECIFICATION
CYL COUNT [1/2/3/4]			● The cylinder being injected is displayed. 1 ... Cylinder No.1 is injected. 2 ... Cylinder No.2 is injected. 3 ... Cylinder No.3 is injected. 4 ... Cylinder No.4 is injected.	
SET SW [ON/OFF]	×		● Indicates [ON/OFF] condition from SET/COAST switch signal.	
RESUME/ACC SW [ON/OFF]	×		● Indicates [ON/OFF] condition from RESUME/ACCEL switch signal.	
CANCEL SW [ON/OFF]	×		● Indicates [ON/OFF] condition from CANCEL switch signal.	
MAIN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from MAIN switch signal.	
ASCD APPLY [YES/NO]			● Displaying ASCD application status stored in ECM.	
VDC APPLY [YES/NO]			● Displaying VDC application status stored in ECM.	● Always “NO” is displayed.
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
Voltage [V]			Voltage, frequency, duty cycle or pulse width measured by the probe.	Only “#” is displayed if item is unable to be measured. Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured. [Hz] or [%]
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BAL-ANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector
COOLING FAN *	● Ignition switch: ON ● Operate the cooling fan at LOW, HI speed and turn OFF using CONSULT-II.	Cooling fan moves at LOW, HI speed and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector

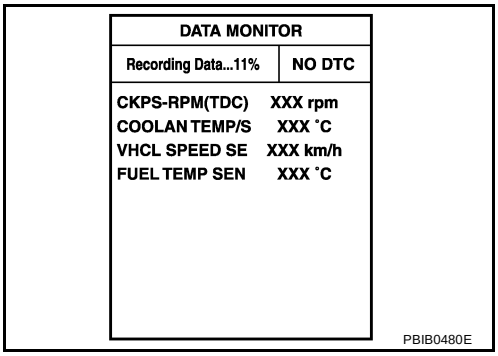
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
GLOW RLY	● Ignition switch: ON (Engine stopped) ● Turn the glow relay ON and OFF using CONSULT-II and listen to operating sound.	Glow relay makes the operating sound.	● Harness and connector ● Glow relay
EGR VOL CONT/V	● Ignition switch: ON ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
PRES REGULATOR	● Ignition switch: ON ● Change fuel rail pressure using CONSULT-II	Fuel leaks.	● Fuel line ● Fuel pressure relief valve
PUMP LEANT CLEAR	● This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .		

*: Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

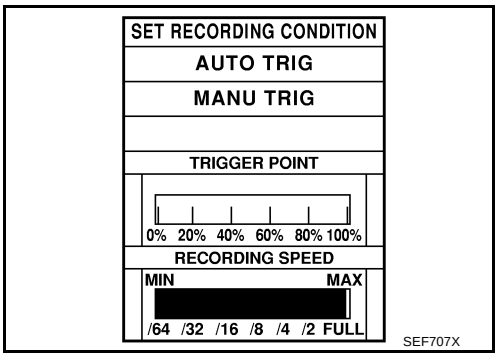
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

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 in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):



– DTC 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:

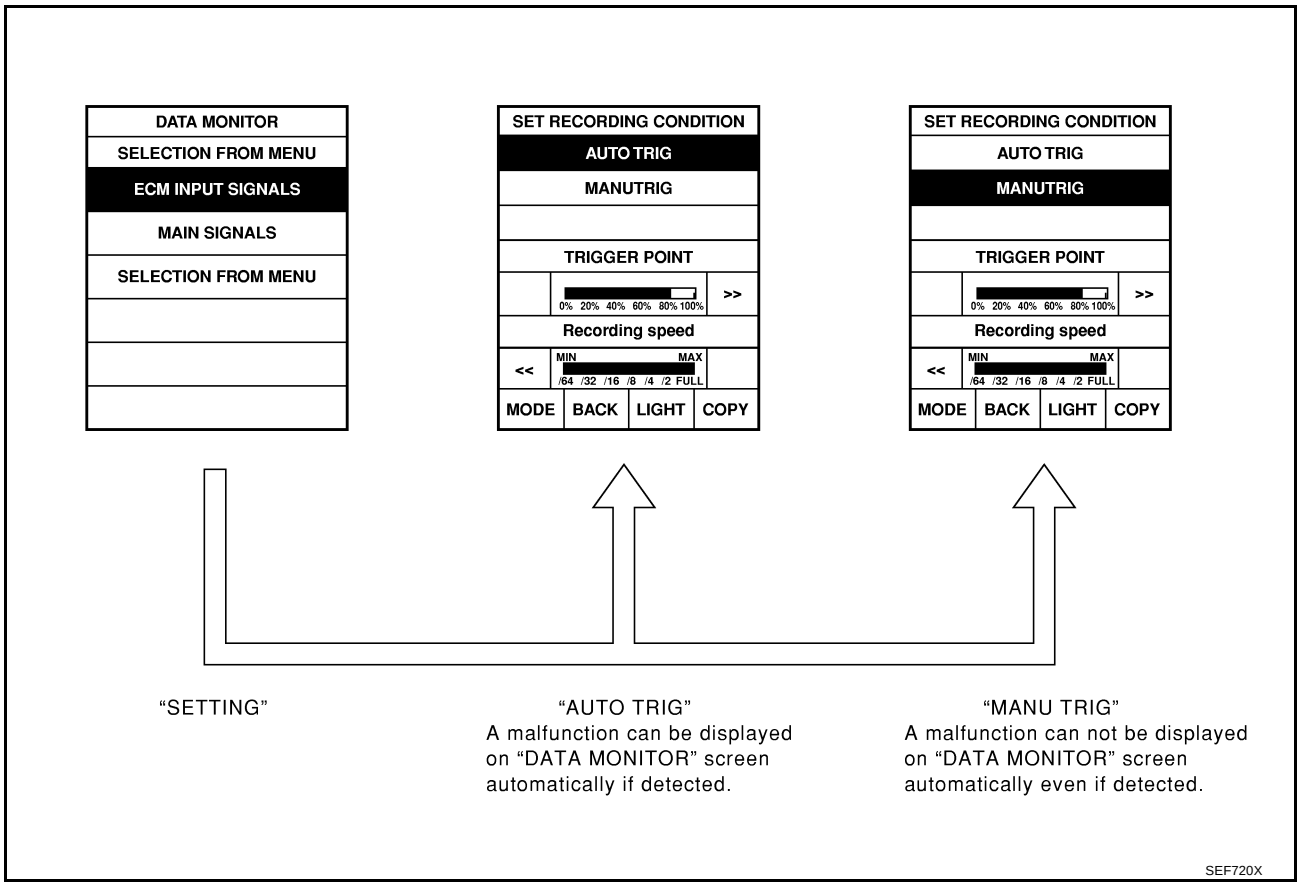
1. “AUTO TRIG”

– 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-24, "How to Perform Efficient Diagnosis for an Electrical Incident" , “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.



FUNCTION TEST

This mode is used to inform customers of their vehicle condition of periodic maintenance.

CONSULT-II Reference Value in Data Monitor Mode

GBS0003M

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	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	● Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.28 - 0.48V
		Accelerator pedal: Fully depressed	More than 2.0V
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	25 - 35 MPa
		2,000 rpm	40 - 50 MPa
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2	● Ignition switch: ON	● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	OFF
		● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	ON
IGN SW	● Ignition switch: ON → OFF		ON → OFF
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.7V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.7V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
MAIN INJ WID	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Idle speed	No load	0.50 - 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 - 0.80 msec
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA
GLOW RLY	Refer to EC-1283, "GLOW CONTROL SYSTEM" .		
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,200 rpm	0 step
INT/A VOLUME	● Engine: After warming up, idle the engine		150 - 450 mg/

MONITOR ITEM	CONDITION		SPECIFICATION
BARO SEN	● Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2 , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2 , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2 , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2 , 11.36 psi)
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	Approx. 100.00 kPa
		3,600 rpm	Approx. 140.00 kPa
		4,000 rpm	Approx. 135.00 kPa
CYL COUNT	● Engine is running		1 → 3 → 4 → 2
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
ASCD APPLY	● Ignition switch: ON	Models with ASCD	YES
		Models without ASCD	NO
VDC APPLY	● Ignition switch: ON		NO
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

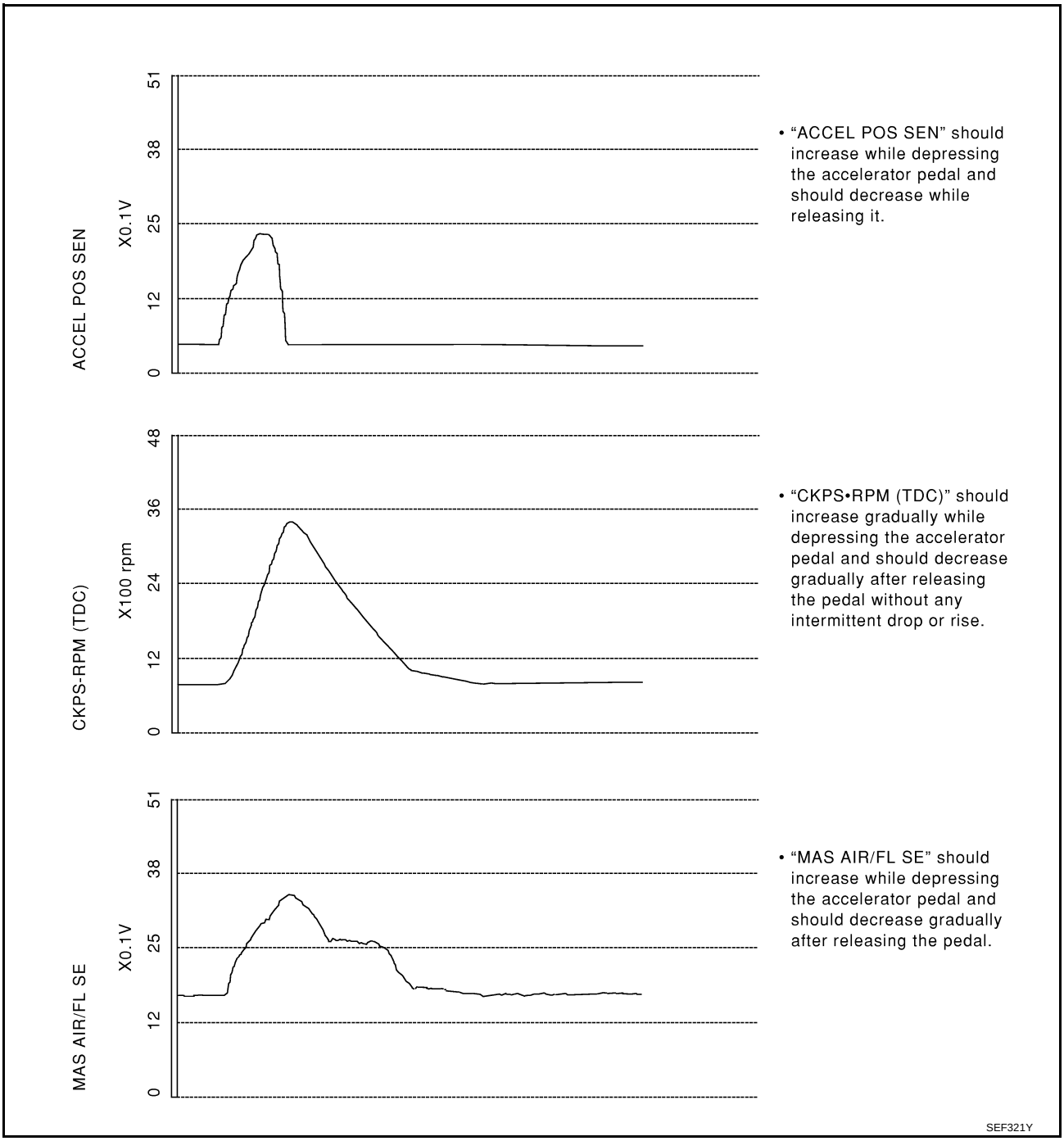
Major Sensor Reference Graph in Data Monitor Mode

GBS0003N

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.



TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

GBS0003O

Intermittent incidents may occur. In many cases, the incident 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 intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON INTERMITTENT INCIDENT 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 malfunctioning area.

Diagnostic Procedure

GBS0003P

1. INSPECTION START

Erase DTCs. Refer to EC-1016, "HOW TO ERASE DTC" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-1066, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-24, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

ECM Terminals and Reference Value

GBS0003Q

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
105	BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	R R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
113	BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	V	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

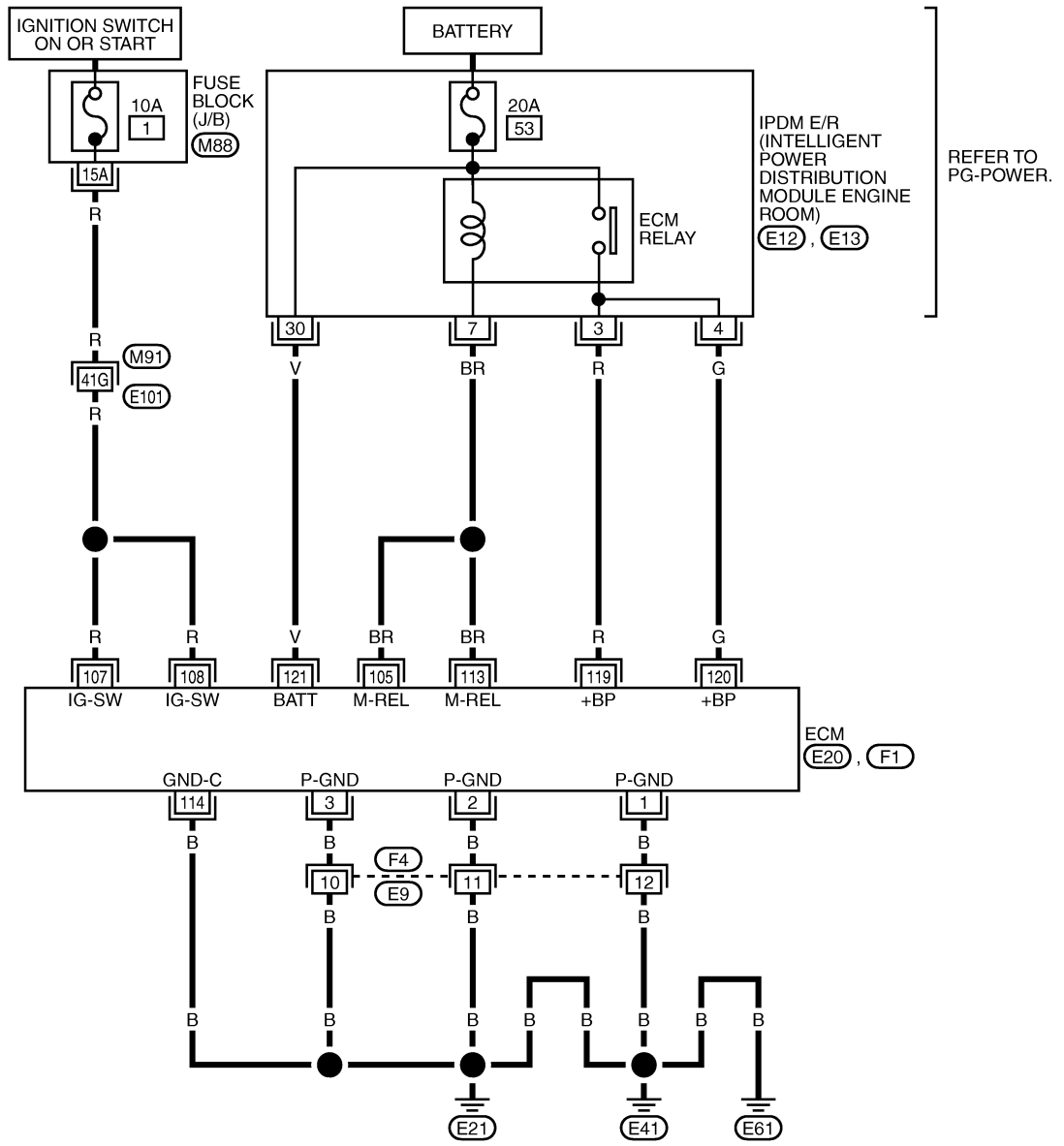
Wiring Diagram

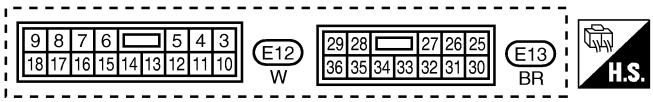
GBS0003R

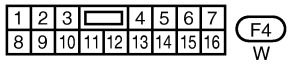
EC-MAIN-01

: DETECTABLE LINE FOR DTC

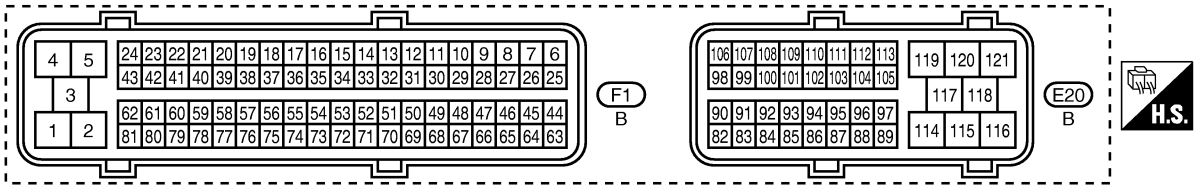
: NON-DETECTABLE LINE FOR DTC







REFER TO THE FOLLOWING.
M88 -FUSE BLOCK-JUNCTION BOX (J/B)
M91 -SUPER MULTIPLE JUNCTION (SMJ)



MBWA1034E

Diagnostic Procedure

GBS0003S

1. INSPECTION START

Start engine.
Is engine running?

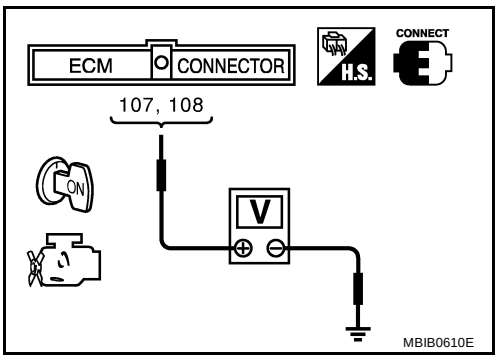
Yes or No

Yes >> GO TO 7.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminals 107, 108 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

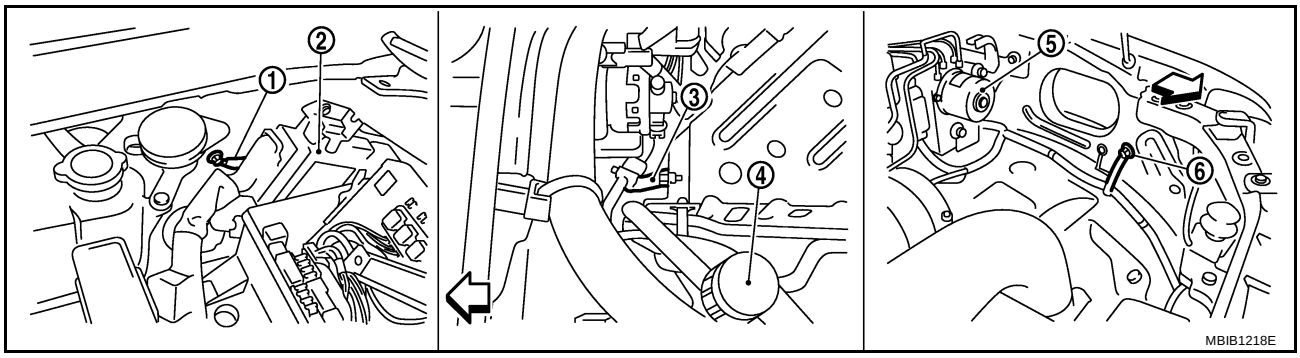
Check the following.

- Harness connectors M91, E101
- Fuse block (J/B) connector M88
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK GROUND CONNECTIONS-I

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 2, 3, 114 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

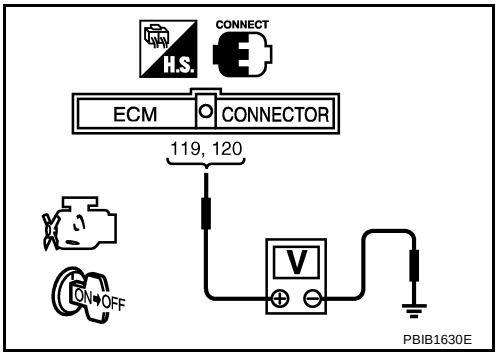
- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Turn ignition switch ON and then OFF.
4. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.



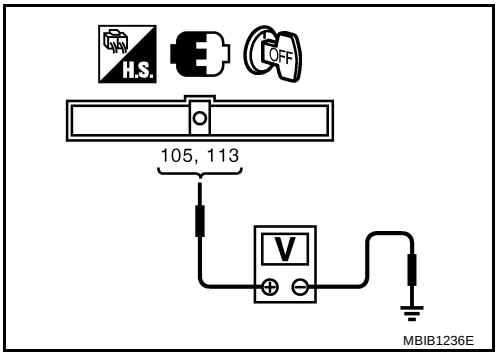
OK or NG

OK >> GO TO 11.
NG (Battery voltage does not exist.)>>GO TO 8.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 10.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF, and wait at least 10 seconds.
2. Check voltage between ECM terminals 105, 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 10.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 119 and IPDM E/R terminal 3, ECM terminal 120 and IPDM E/R terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 105, 113 and IPDM E/R terminal 7.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

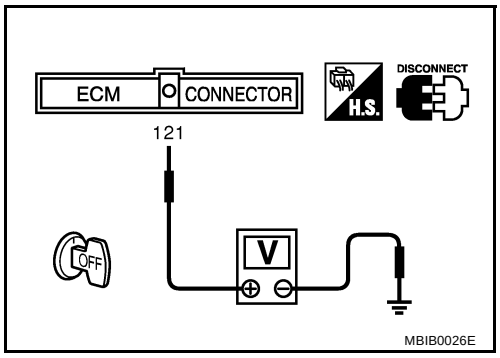
OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. CHECK 20A FUSE

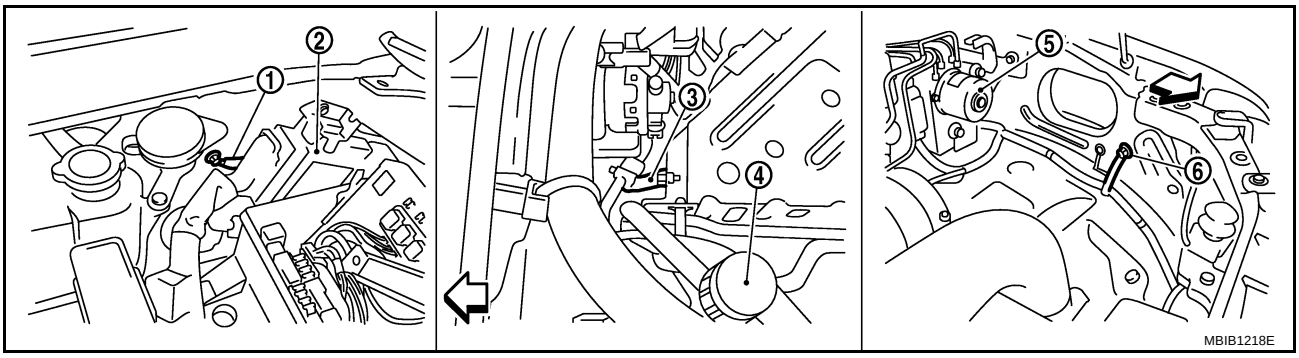
1. Disconnect 20A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 13.
NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS-II

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 14.
NG >> Repair or replace ground connections.

14. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between ECM terminals 1, 2, 3, 114 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F4, E9
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

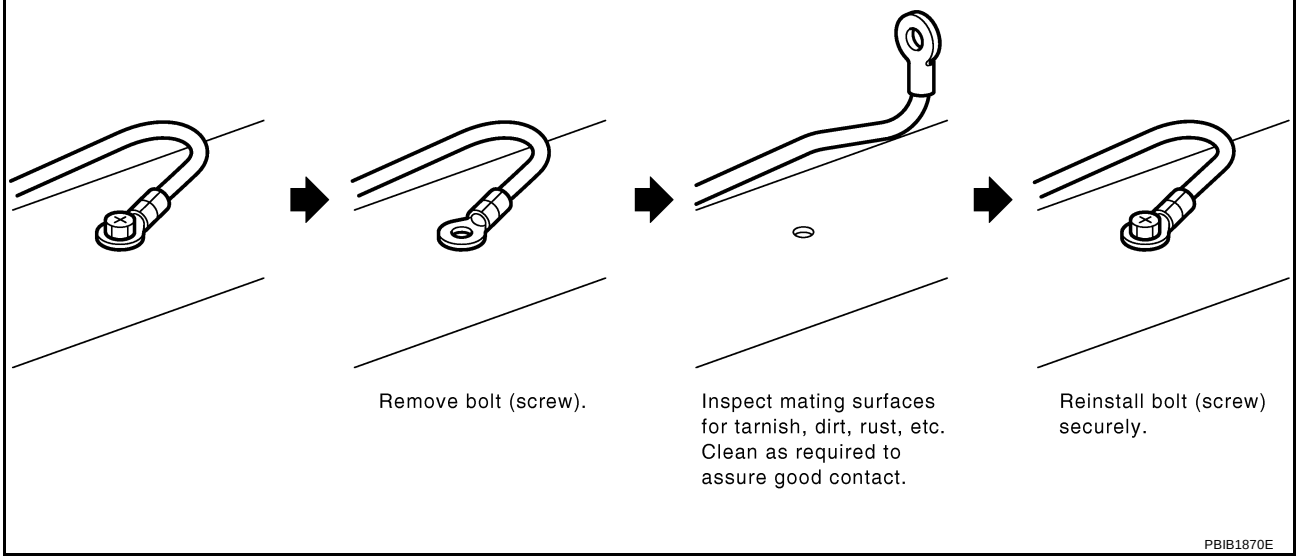
GBS0003T

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-27, "Ground Distribution" .

Ground Inspection



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

GBS0003U

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

GBS0003V

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	● ECM can not communicate to other control unit. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

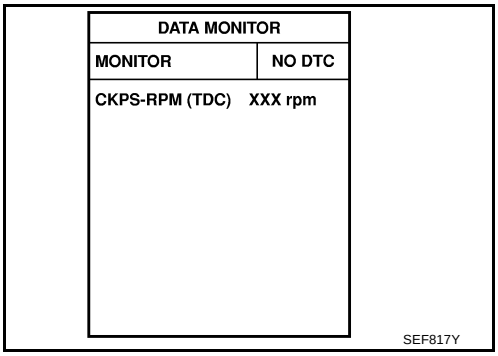
DTC Confirmation Procedure

GBS0003W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1069, "Diagnostic Procedure" .

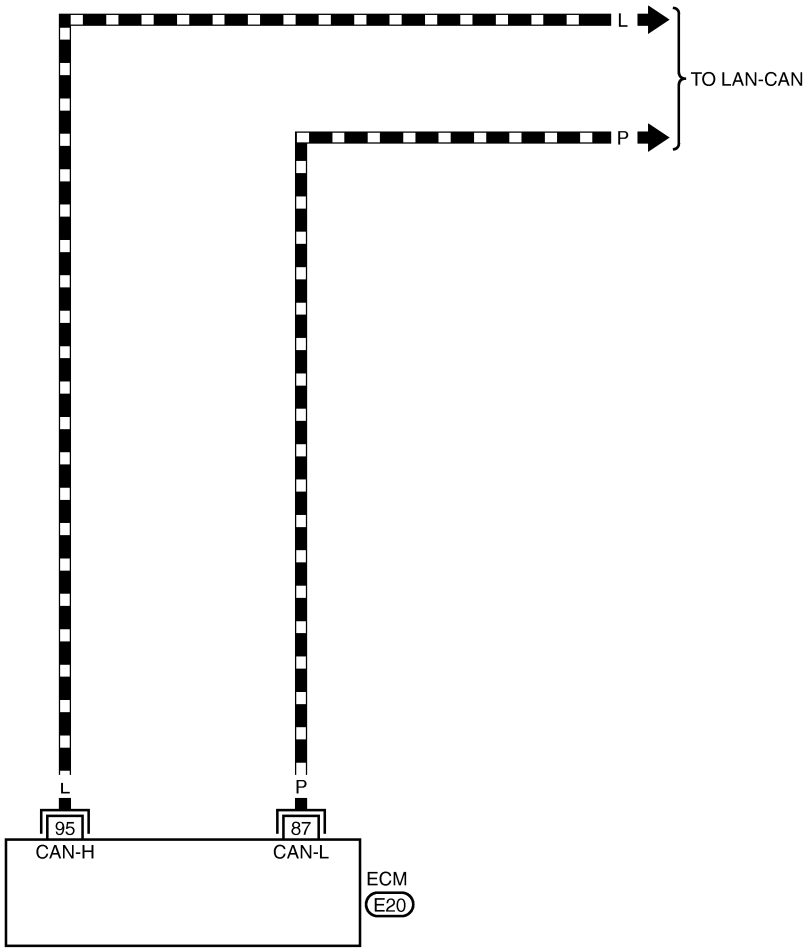


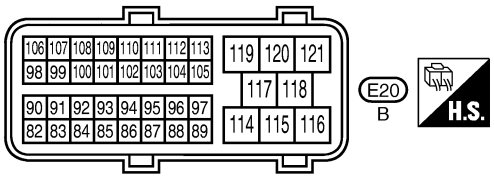
Wiring Diagram

GBS0003X

EC-CAN-01

: DATA LINE
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





MBWA1035E

Diagnostic Procedure

GBS0003Y

Go to LAN-3, "Precautions When Using CONSULT-II" .

DTC P0016 CKP - CMP CORRELATION

PFP:10328

On Board Diagnosis Logic

GBS0003Z

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P0016 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0016 0016	Crankshaft position - camshaft position correlation	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	● Camshaft position sensor ● Crankshaft position sensor ● Timing chain ● Signal plate

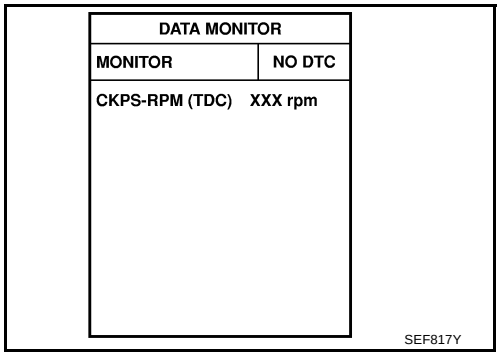
DTC Confirmation Procedure

GBS00040

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1070, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1070, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00041

1. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1163, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 3.
NG >> Remove debris and clean the signal plate or replace sprocket.

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1152, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor.

4. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 5.
NG >> Replace the signal plate.

5. CHECK TIMING CHAIN

Refer to EM-217, "SECONDARY TIMING CHAIN" and EM-223, "PRIMARY TIMING CHAIN" .

OK or NG

OK >> GO TO 6.
NG >> Replace timing chain.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0088 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

GBS00042

NOTE:
If DTC P0088 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0088 0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	● Fuel pump ● Fuel injector ● Fuel rail pressure sensor

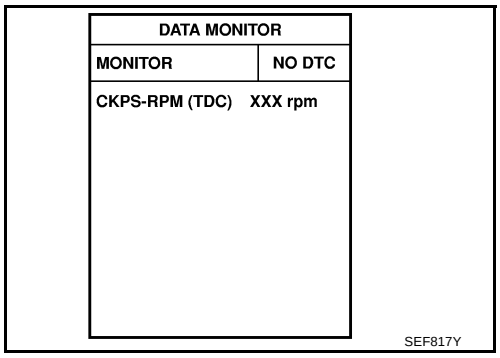
DTC Confirmation Procedure

GBS00043

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 20 seconds.
4. If DTC is detected, go to EC-1072, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 20 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1072, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00044

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-1118, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel injector.

3. CHECK FUEL PUMP

Refer to EC-1209, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

GBS00045

FUEL INJECTOR

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P0089 FUEL PUMP

PFP:16700

On Board Diagnosis Logic

GBS00046

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P0089 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0089 0089	Fuel pump performance	Fuel pressure is too much higher than the target value.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

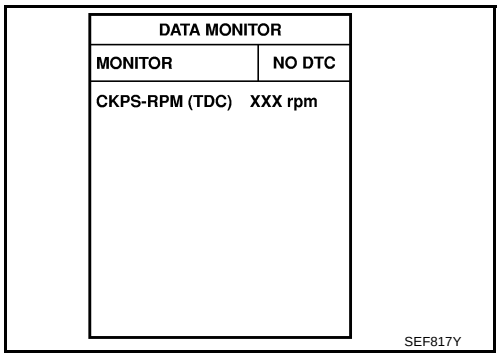
DTC Confirmation Procedure

GBS00047

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 30 seconds.
4. If DTC is detected, go to EC-1075, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 30 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1075, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00048

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1074, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
5. Perform EC-1074, "DTC Confirmation Procedure" , again.
6. Is DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel rail.

3. CHECK FUEL PUMP

Refer to EC-1209, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace Fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

GBS00049

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P0093 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

GBS0004A

NOTE:
If DTC P0093 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0093 0093	Fuel system leak	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	● Fuel pump ● Fuel rail ● Fuel pipe ● Fuel rail pressure relief valve ● Air mixed with fuel ● Lack of fuel

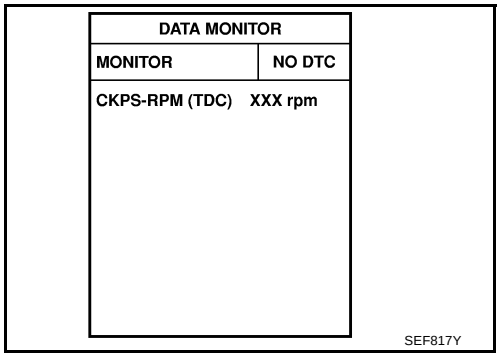
DTC Confirmation Procedure

GBS0004B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
4. If DTC is detected, go to EC-1077, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1077, "Diagnostic Procedure" .

Diagnostic Procedure

GBS0004C

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1076, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
5. Perform EC-1076, "DTC Confirmation Procedure" , again.
6. Is DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.

- Fuel tube from fuel pump to fuel rail
- Fuel rail
- Fuel tube from fuel rail to fuel injector

3. Also check for improper connection or pinches.

OK or NG

OK >> GO TO 3.
NG >> Repair malfunctioning part.

3. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-1078, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

GBS0004D

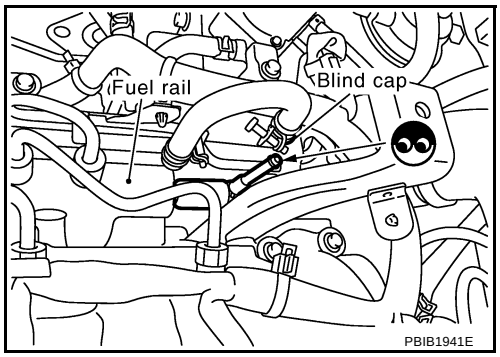
FUEL RAIL PRESSURE RELIEF VALVE

With CONSULT-II

WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

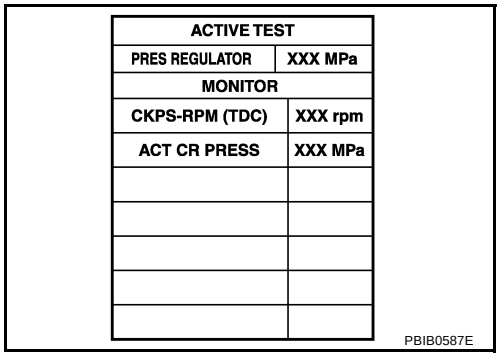
1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.



5. Select “PRES REGULATOR” in “ACTIVE TEST MODE” with CONSULT-II.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching “UP” or “Qu” on the CONSULT-II screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

   WARNING:

   - **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
   - **If the fuel comes out, stop the engine immediately.**



Without CONSULT-II

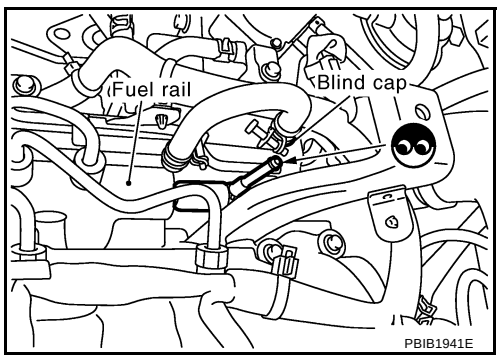
WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

   WARNING:

   - **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
   - **If the fuel comes out, stop the engine immediately.**



Removal and Installation

GBS0004E

FUEL RAIL

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

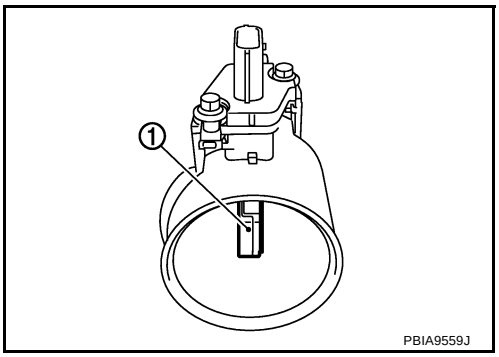
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

GBS0004F

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

GBS0004G

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.7V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.7V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

GBS0004H

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	G	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 2.0V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
67	—	Sensor ground (Sensor shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

GBS0004I

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

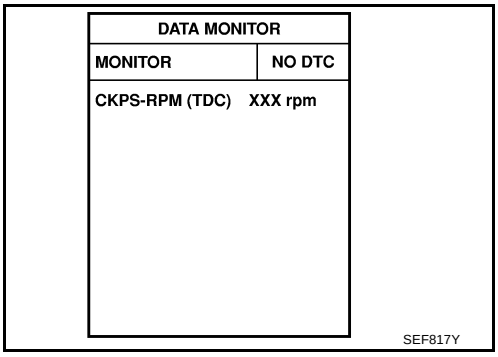
DTC Confirmation Procedure

GBS0004J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1083, "Diagnostic Procedure" .



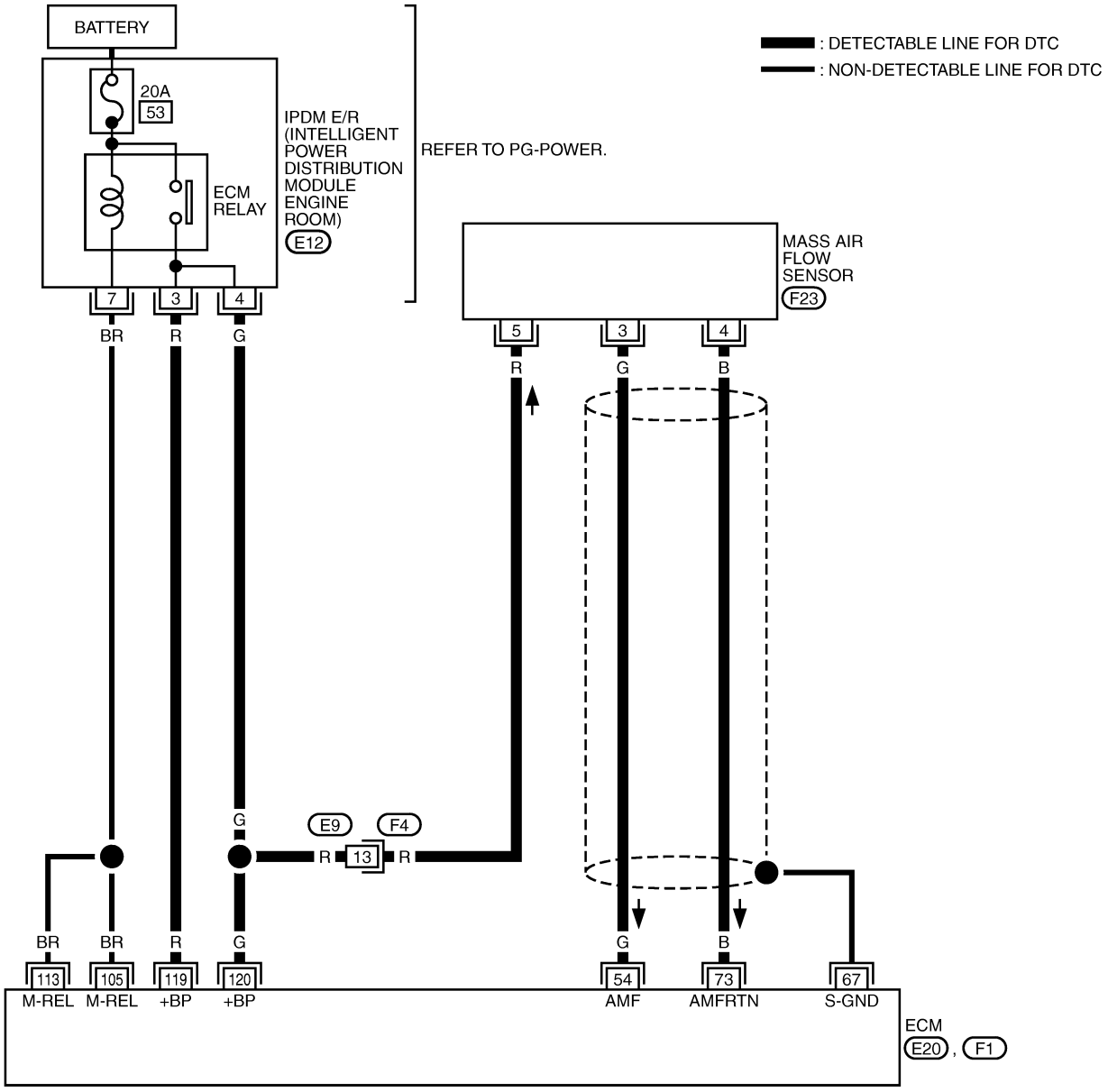
WITHOUT CONSULT-II

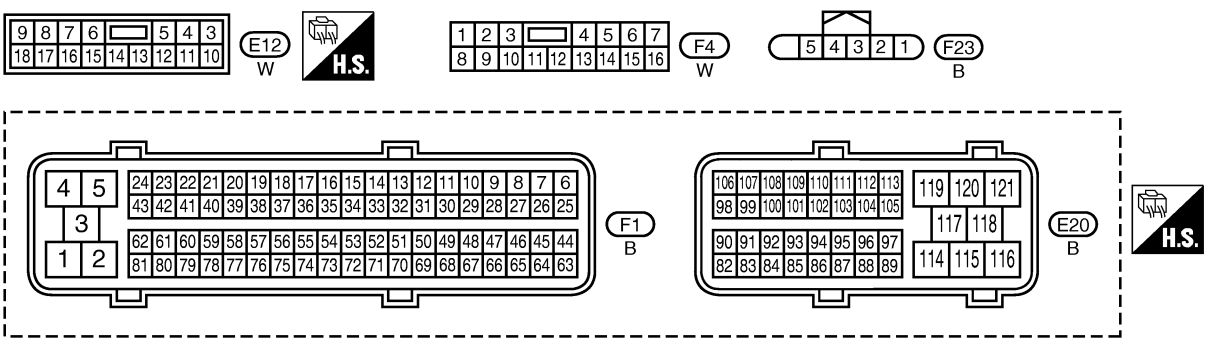
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1083, "Diagnostic Procedure" .

Wiring Diagram

GBS0004K

EC-MAFS-01





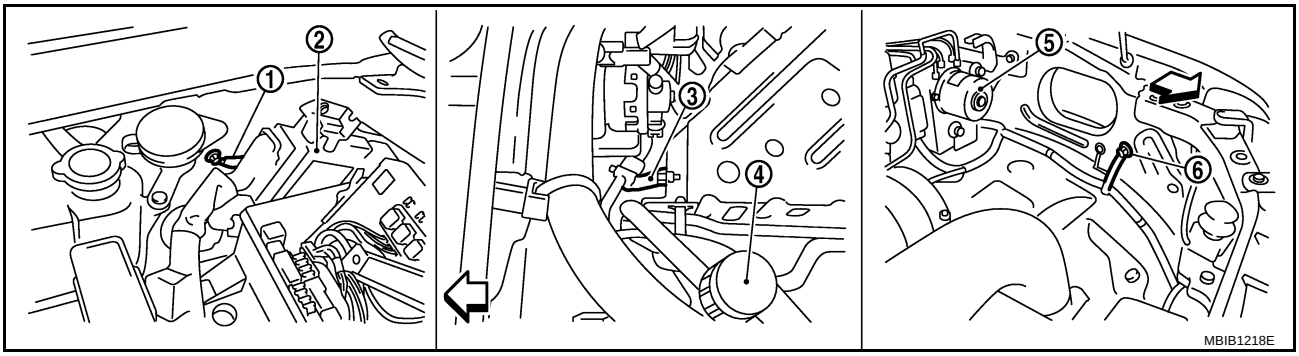
MBWA1036E

Diagnostic Procedure

GBS0004L

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

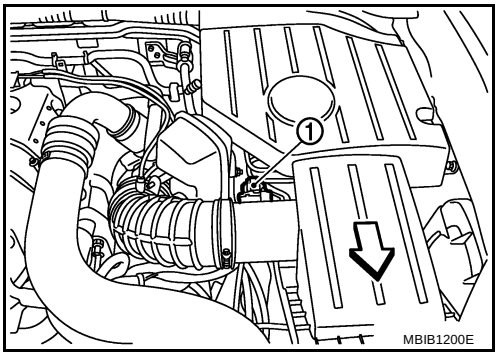
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.

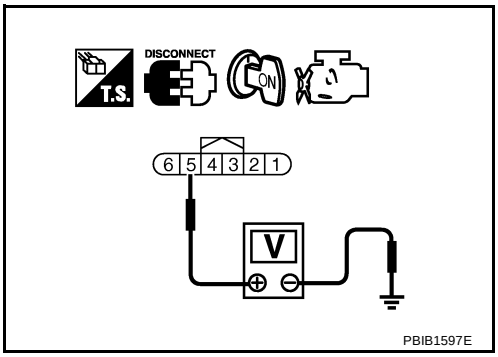
– ⇦: Vehicle front

2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 4 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

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 3 and ECM terminal 54.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1084, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

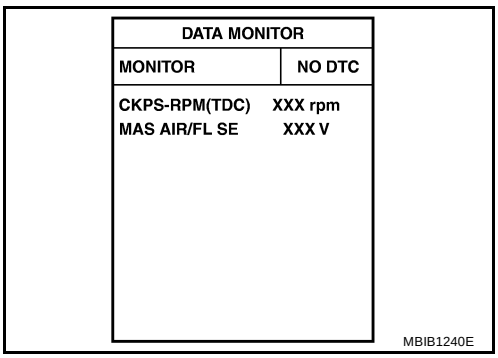
GBS0004M

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.

4. Select “MAS AIR/FL SE” and check indication under the following conditions.



Condition	MAS AIR/FL SE (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
Idle to about 4,000 rpm	1.3 - 1.7 to Approx. 4.0*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

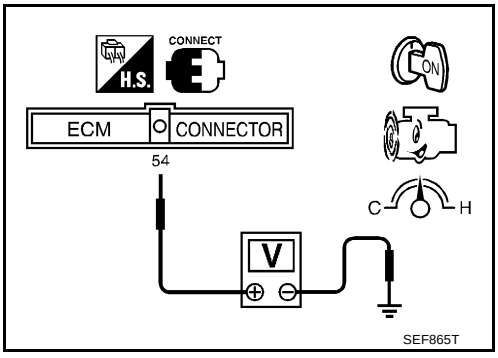
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm	1.6 - 2.0 to Approx. 4.3*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

GBS0004N

MASS AIR FLOW SENSOR

Refer to EM-159, "AIR CLEANER AND AIR DUCT" .

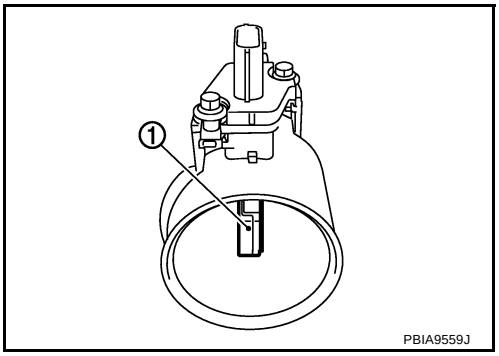
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

GBS0004O

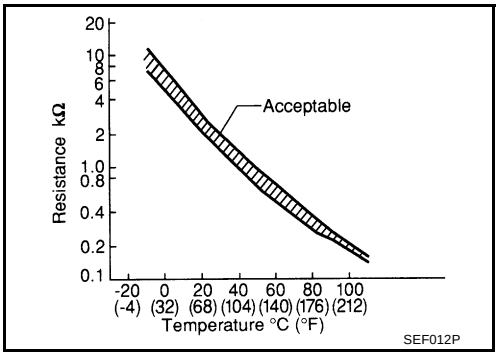
The intake air temperature sensor is built into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	2.4	1.800 - 2.200
80 (176)	0.8	0.283 - 0.359

*: This data is reference values and is measured between ECM terminal 55 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

GBS0004P

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

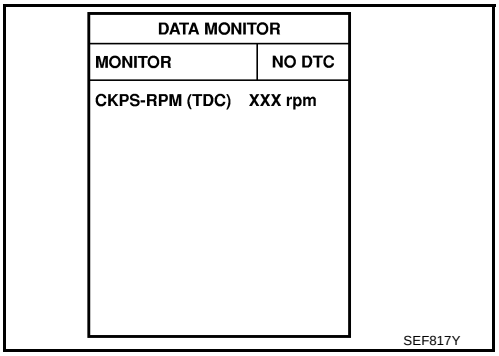
DTC Confirmation Procedure

GBS0004Q

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1089, "Diagnostic Procedure" .



WITHOUT CONSULT-II

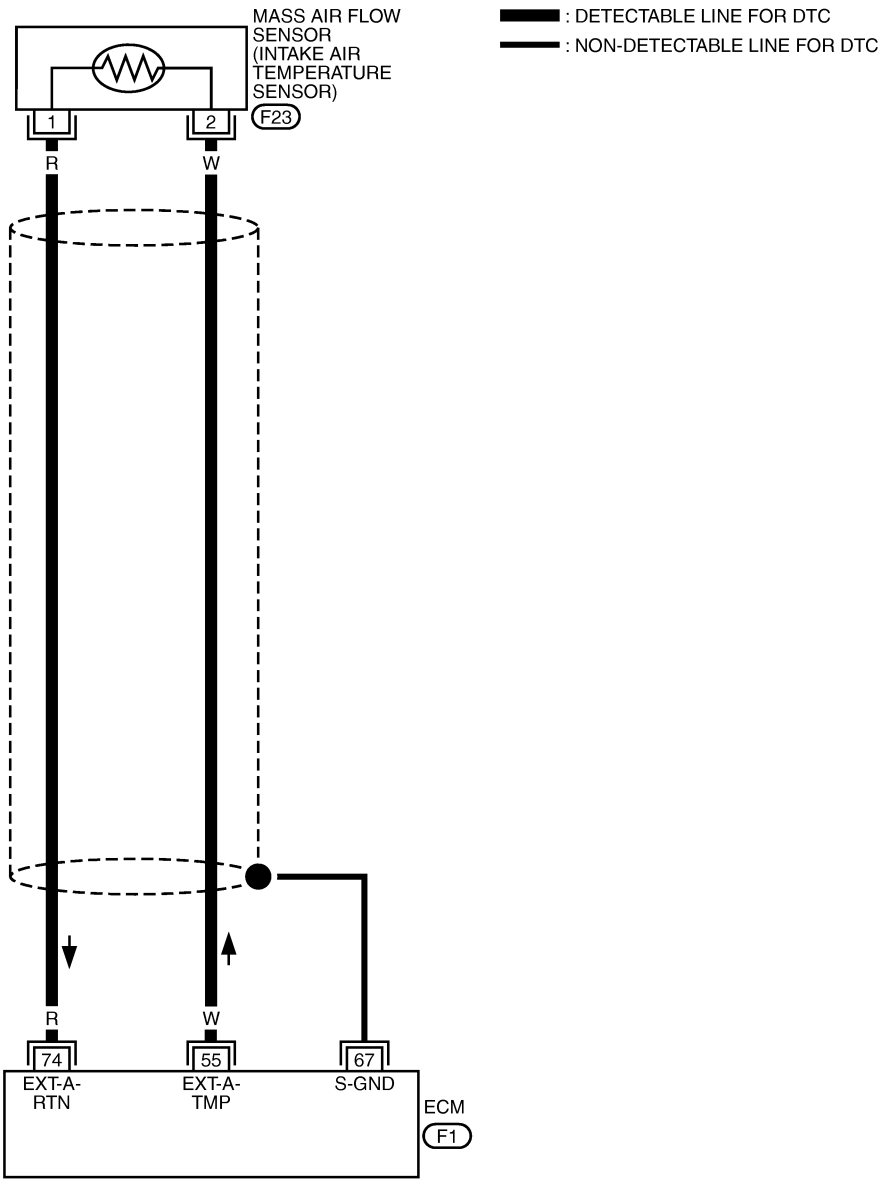
1. Turn ignition switch ON and wait at least 5 seconds.

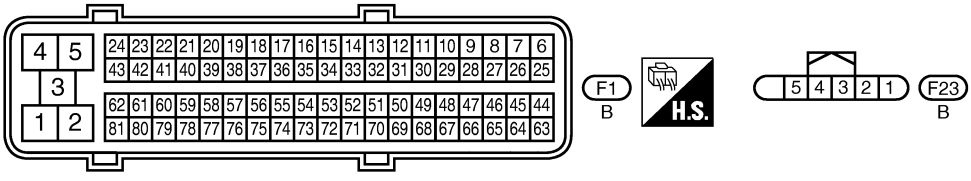
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1089, "Diagnostic Procedure" .

Wiring Diagram

GBS0004R

EC-IATS-01





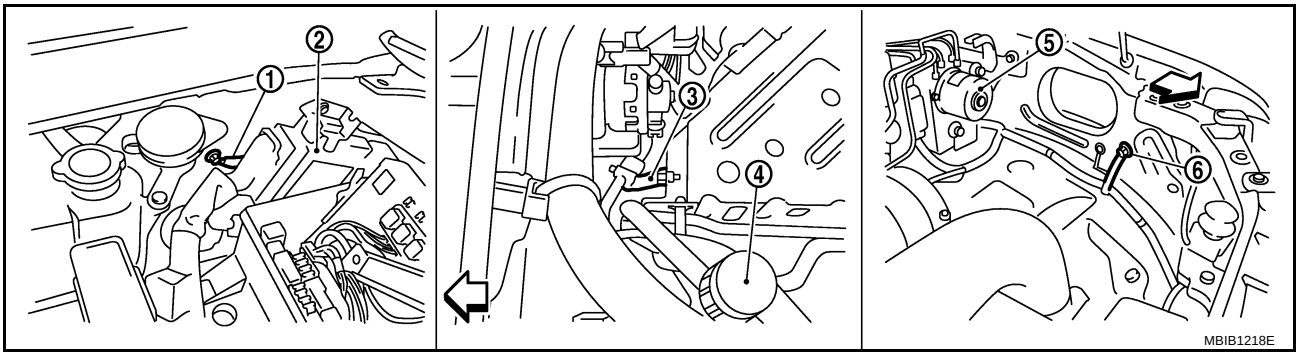
MBWA1037E

Diagnostic Procedure

GBS0004S

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

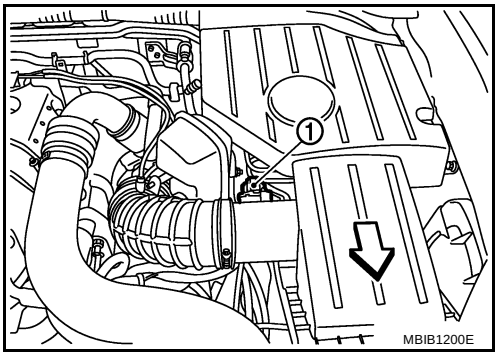
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) (1) harness connector.

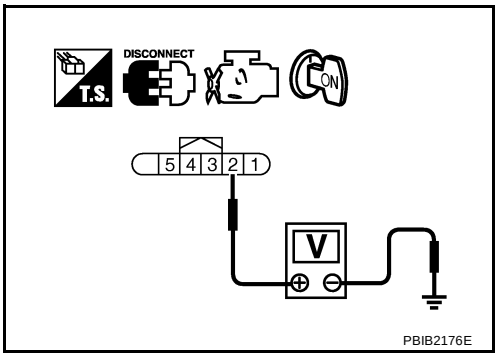
– ⇦: Vehicle front

2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 1 and ECM terminal 74.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1090, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

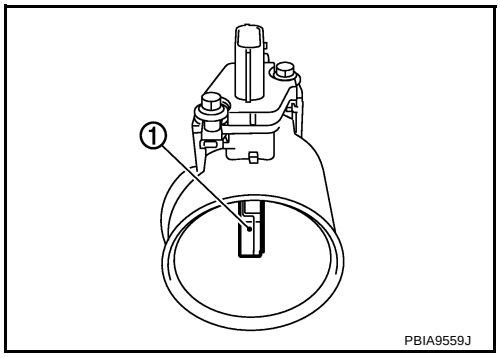
GBS0004T

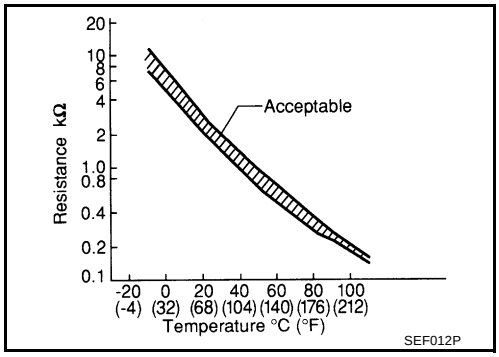
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

GBS0004U

MASS AIR FLOW SENSOR

Refer to EM-159, "AIR CLEANER AND AIR DUCT" .

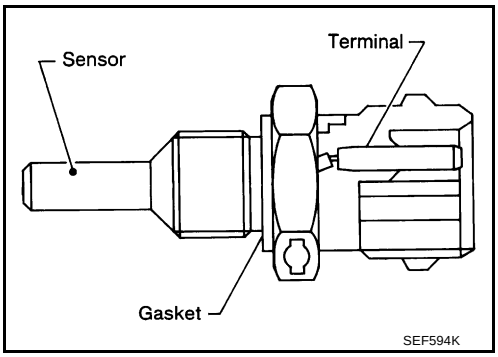
DTC P0117, P0118 ECT SENSOR

PFP:22630

Description

GBS0004V

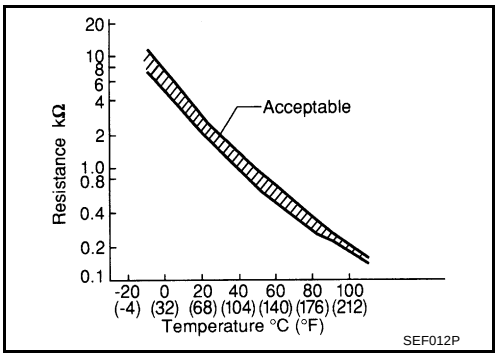
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 51 (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

GBS0004W

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

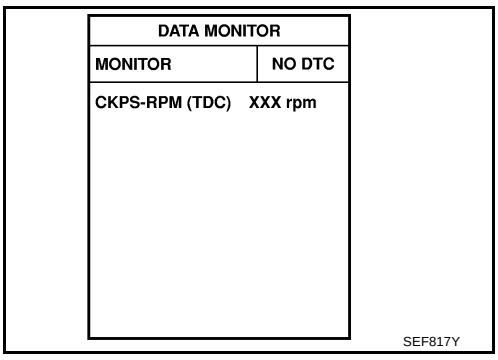
GBS0004X

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1094, "Diagnostic Procedure" .



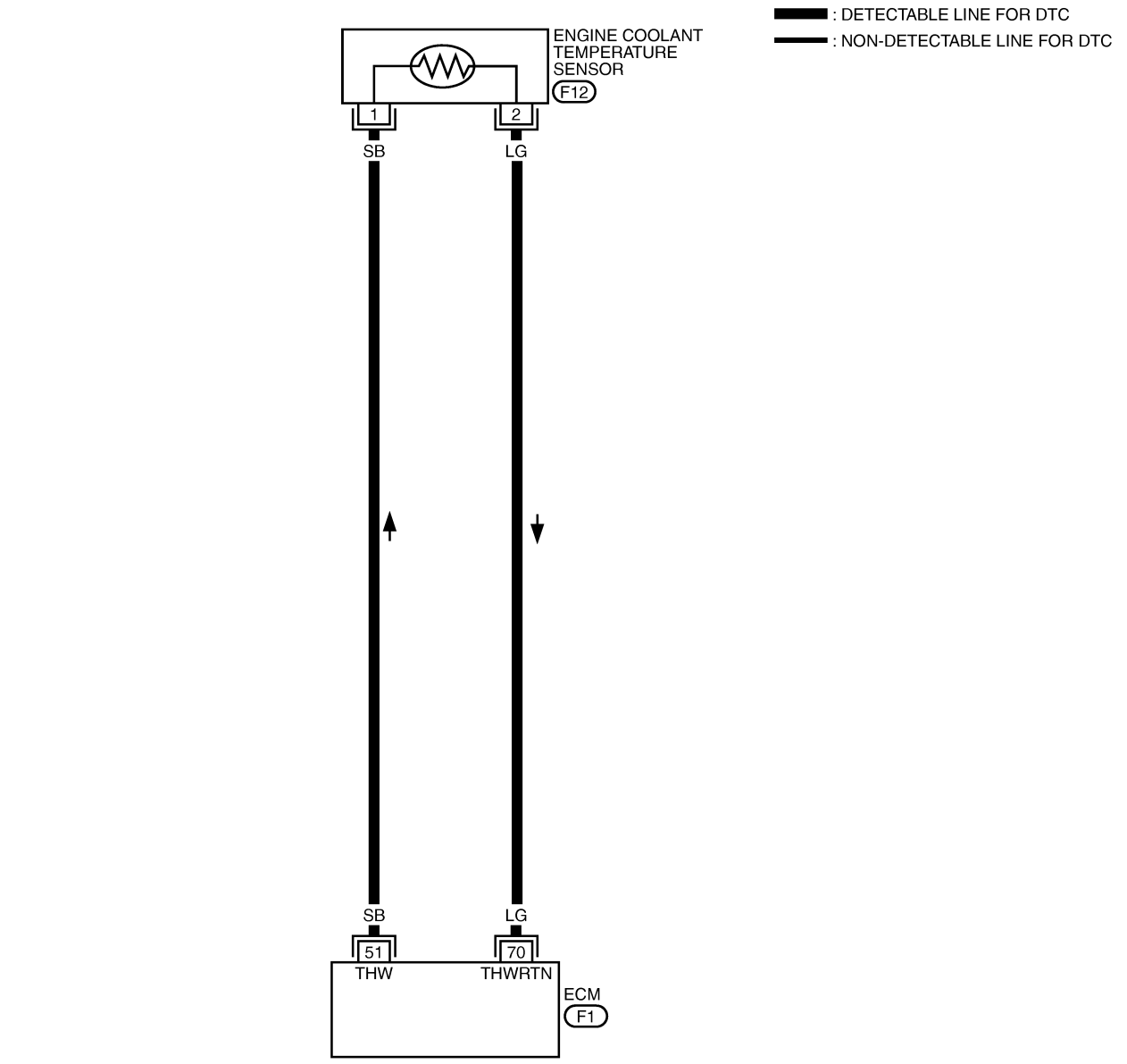
WITHOUT CONSULT-II

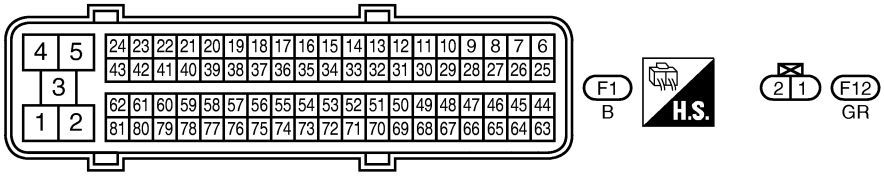
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1094, "Diagnostic Procedure" .

Wiring Diagram

GBS0004Y

EC-ECTS-01





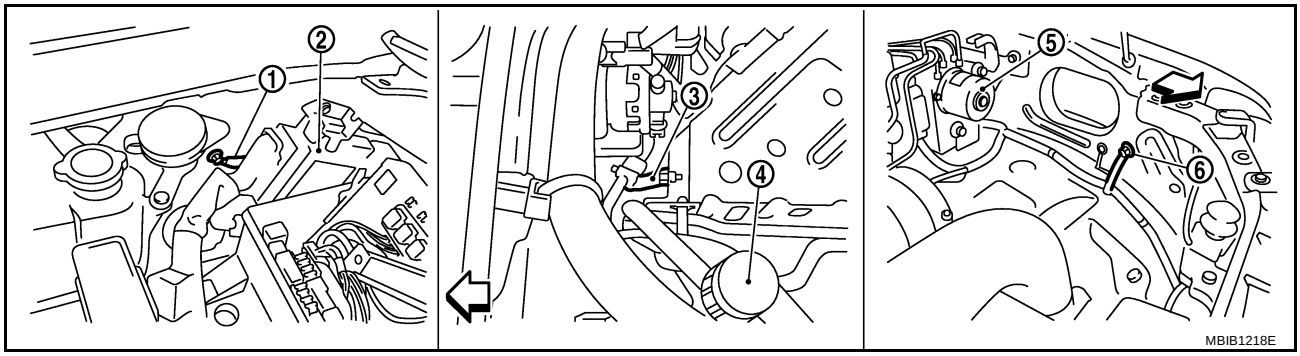
MBWA1038E

Diagnostic Procedure

GBS0004Z

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

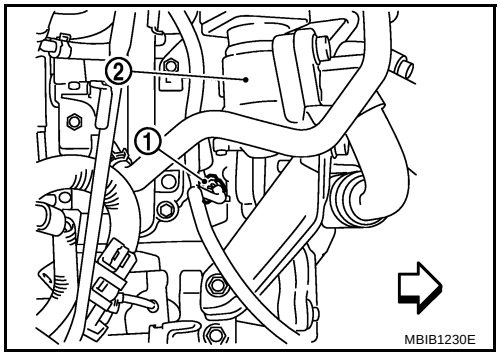
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor (1) harness connector.

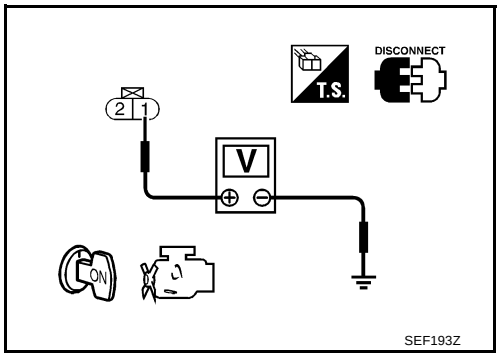
– ⇦: Vehicle front
– EGR volume control valve (2)

2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 70. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1095, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

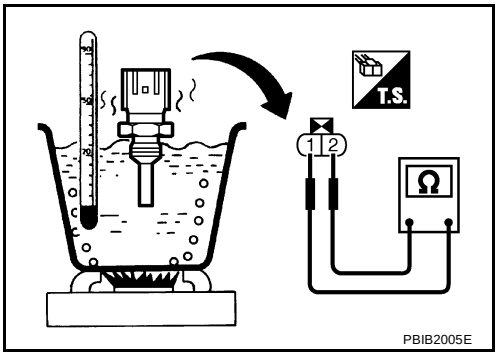
>> **INSPECTION END**

Component Inspection

GBS00050

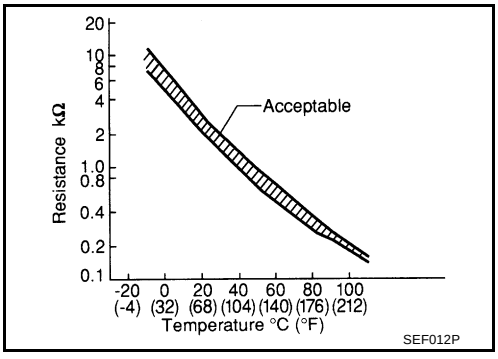
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

GBS00051

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-236, "CYLINDER HEAD" .

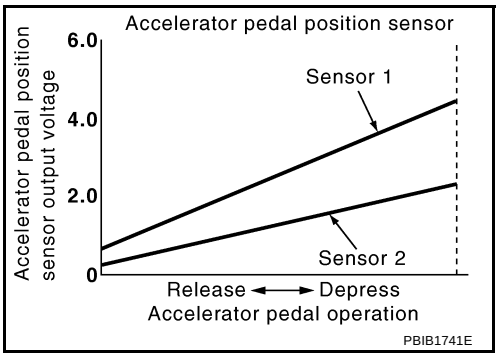
DTC P0122, P0123 APP SENSOR

PFP:18002

Description

GBS00052

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

GBS00053

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.28 - 0.48V
		Accelerator pedal: Fully depressed	More than 2.0V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

GBS00054

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS00055

The MIL will not light up for these self-diagnoses.

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0642 or P0643, first perform the trouble diagnosis for DTC P0642 or P0643. Refer to EC-1210, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123 0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

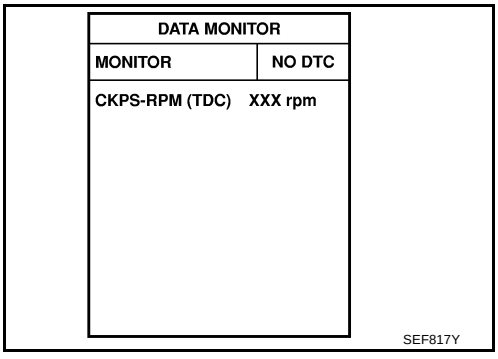
DTC Confirmation Procedure

GBS00056

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1099, "Diagnostic Procedure" .



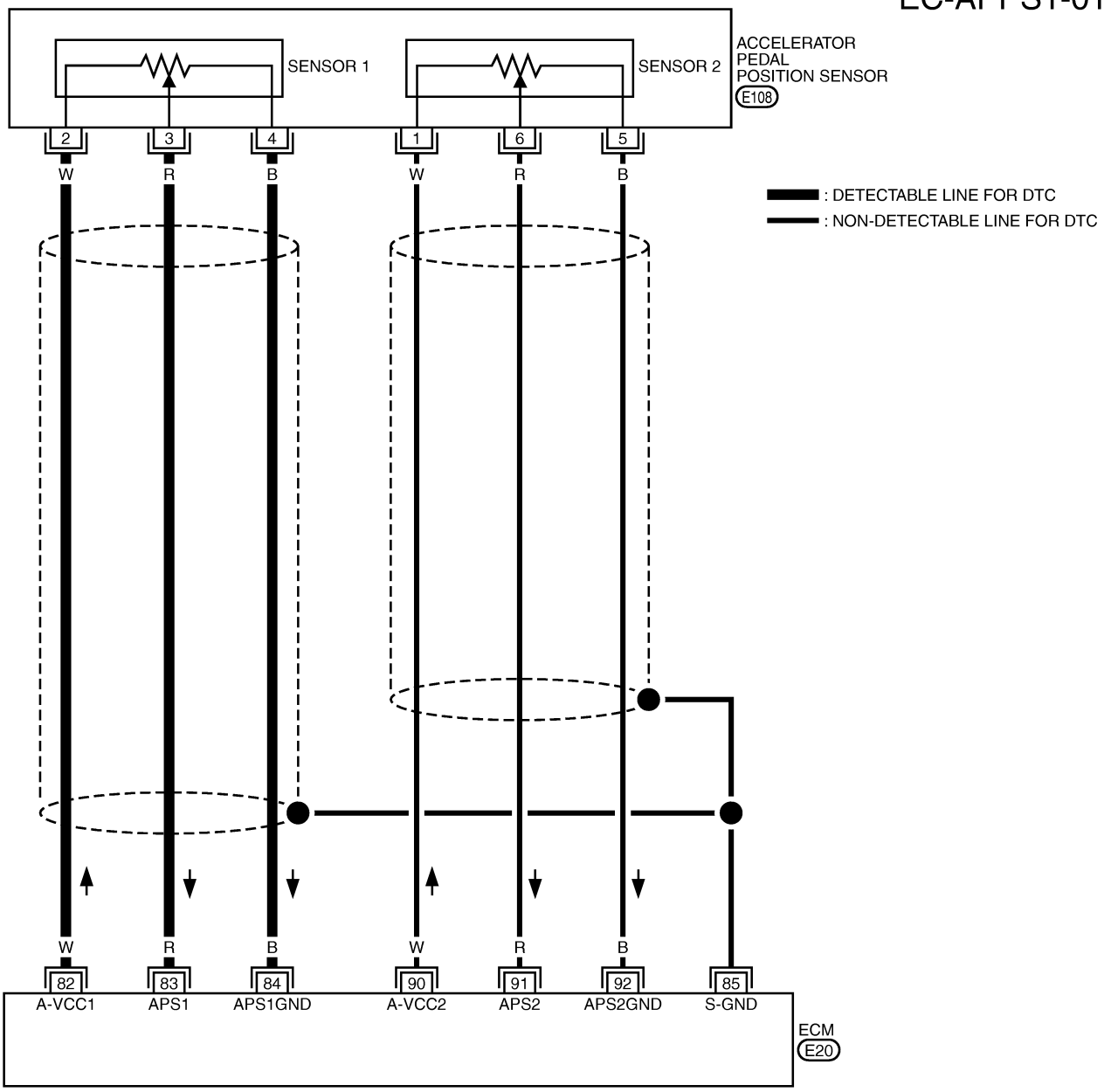
WITHOUT CONSULT-II

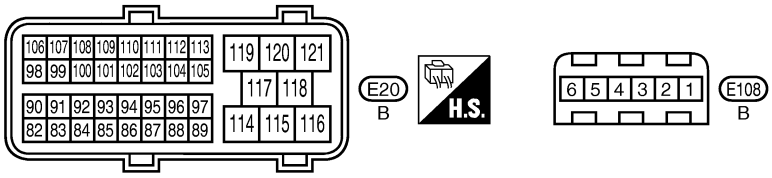
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1099, "Diagnostic Procedure" .

Wiring Diagram

GBS00057

EC-APPS1-01





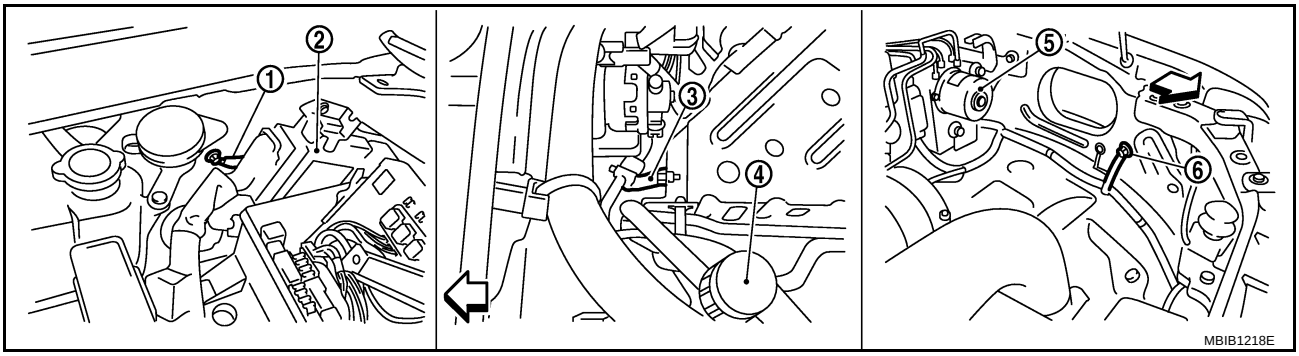
MBWA1039E

Diagnostic Procedure

GBS00058

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

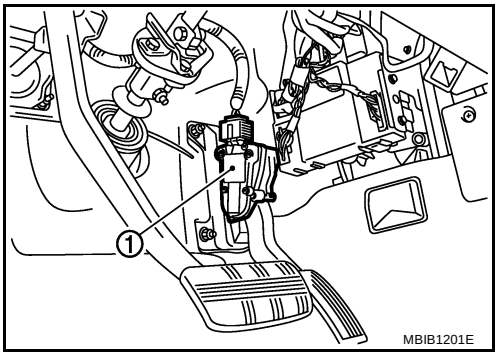
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

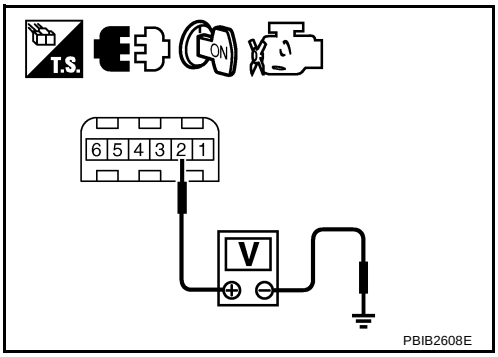
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 84.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1100, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

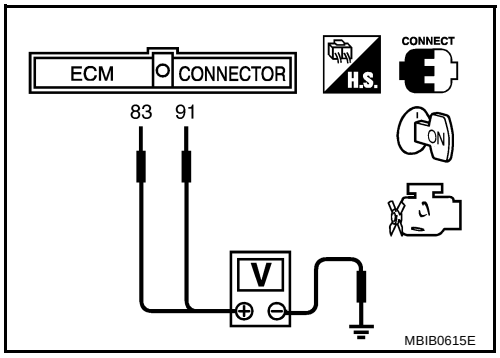
Component Inspection

GBS00059

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.95 - 1.17V
	Fully depressed	More than 4.6V
91 (Accelerator pedal position sensor 2)	Fully released	0.58 - 0.78V
	Fully depressed	More than 2.3V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

GBS0005A

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

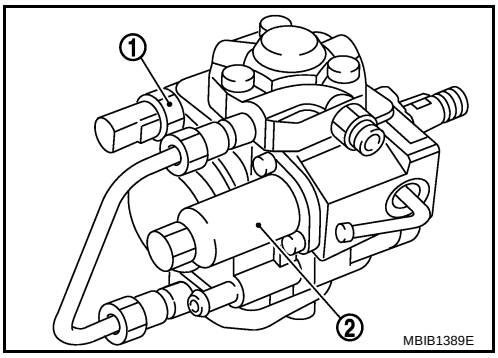
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

PFP:16700

Description

GBS0005B

Fuel pump temperature sensor (1) is built in the fuel pump (2). The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.



CONSULT-II Reference Value in Data Monitor Mode

GBS0005C

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL TEMP SEN	● Engine: After warming up	More than 40°C (104°F)

ECM Terminals and Reference Value

GBS0005D

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	Y	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS0005E

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel pump temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel pump temperature sensor
P0183 0183	Fuel pump temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

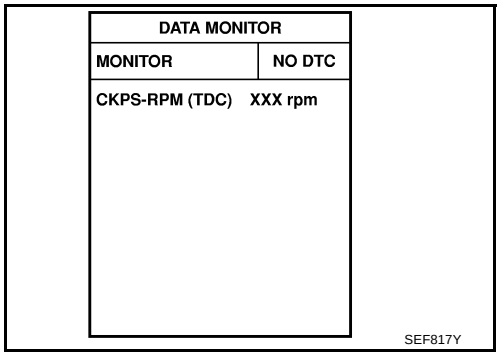
DTC Confirmation Procedure

GBS0005F

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1104, "Diagnostic Procedure" .



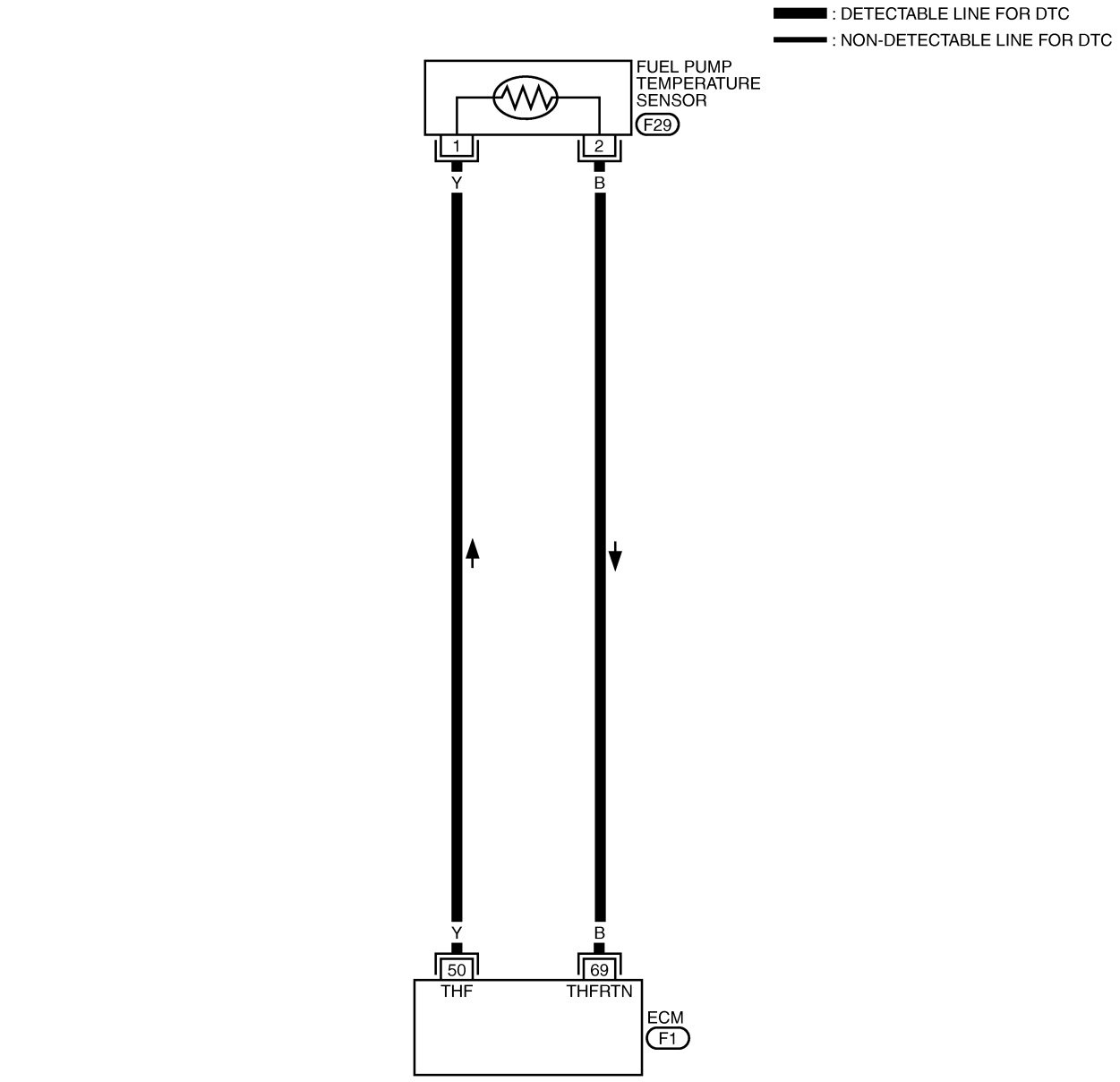
WITHOUT CONSULT-II

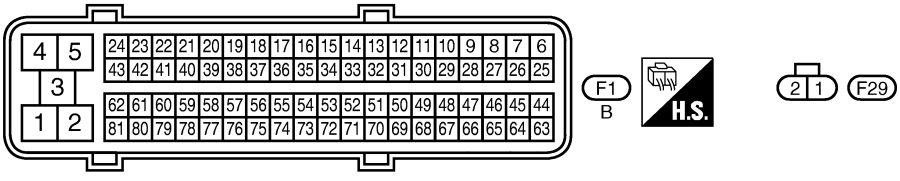
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1104, "Diagnostic Procedure"

Wiring Diagram

GBS0005G

EC-FTS-01





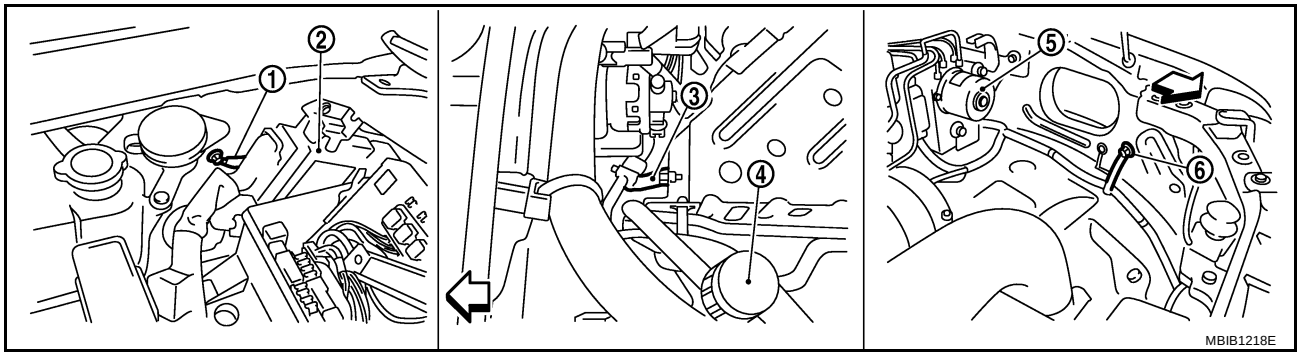
MBWA1040E

Diagnostic Procedure

GBS0005H

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

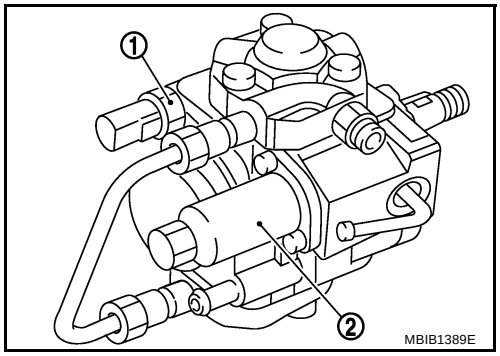
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

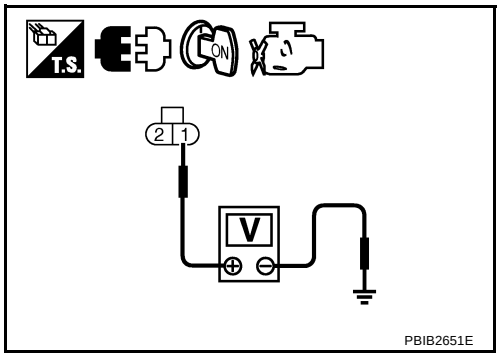
2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor (1) harness connector.
   – Fuel pump (2)
2. Turn ignition switch ON.



3. Check voltage between fuel pump temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel pump temperature sensor terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Removal and Installation

GBS0005I

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P0192, P0193 FRP SENSOR

PFP:16638

Description

GBS0005J

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises.
The ECM controls the fuel pressure in the fuel rail by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-II Reference Value in Data Monitor Mode

GBS0005K

Specification data are reference values.

MONITOR	CONDITION		SPECIFICATOIN
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	25 - 35 MPa
		2,000 rpm	40 - 50 MPa

ECM Terminals and Reference Value

GBS0005L

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48 49	L B	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.0 - 2.3V
63	R	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	W	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS0005M

The MIL will not light up for these self-diagnoses.

NOTE:
If DTC P0192 or P0193 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0192 0192	Fuel rail pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel rail temperature sensor
P0193 0193	Fuel rail pressure sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

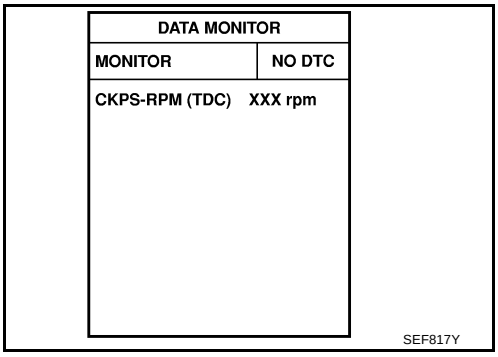
DTC Confirmation Procedure

GBS0005N

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1109, "Diagnostic Procedure" .



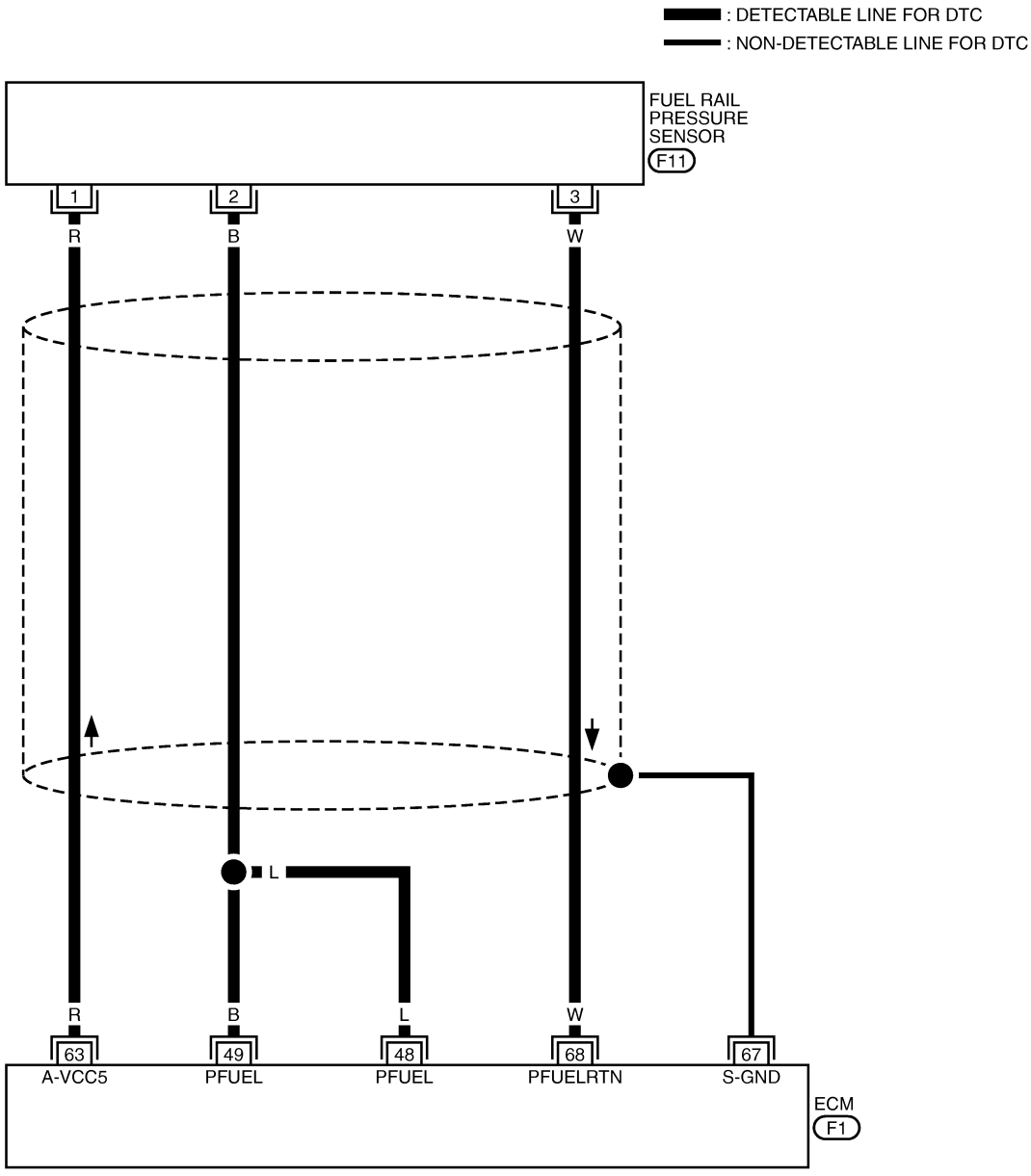
WITHOUT CONSULT-II

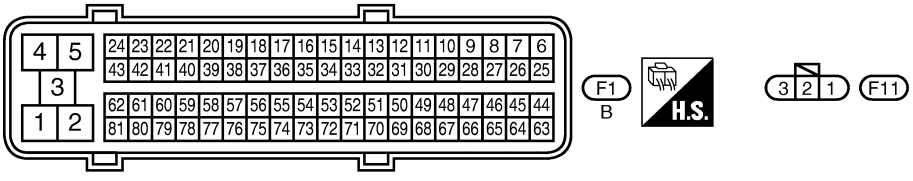
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1109, "Diagnostic Procedure" .

Wiring Diagram

GBS0005O

EC-FRPS-01





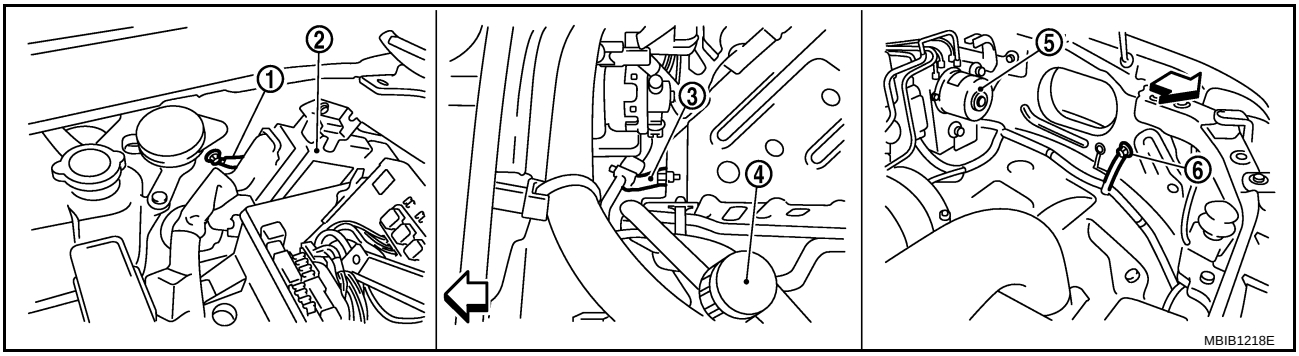
MBWA1041E

Diagnostic Procedure

GBS0005P

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

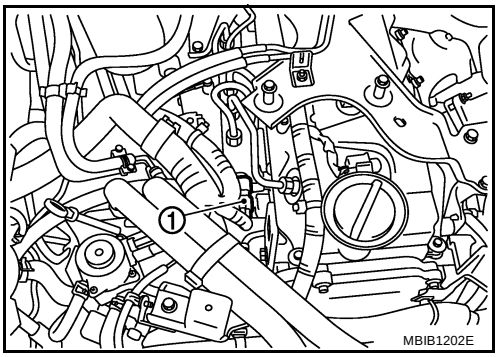
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

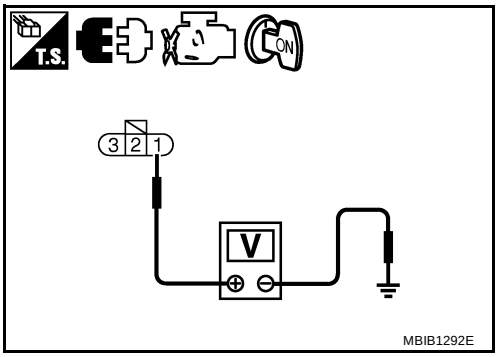
2. CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

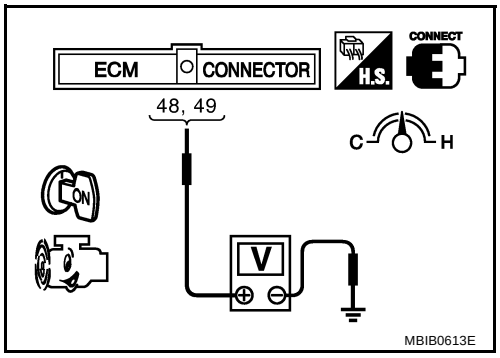
Component Inspection

GBS0005Q

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminals 48, 49 (fuel rail pressure sensor signal) and ground under the following conditions.

Condition	Voltage V
Idle	1.7 - 2.0
2,000 rpm	2.0 - 2.3



4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.
5. If NG, replace fuel rail.

Removal and Installation

GBS0005R

FUEL RAIL

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0200 FUEL INJECTOR

PFP:16600

On Board Diagnosis Logic

GBS0005S

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0200 0200	Fuel injector power supply circuit	ECM detects a voltage of power source for the fuel injector is excessively high or low.	● ECM

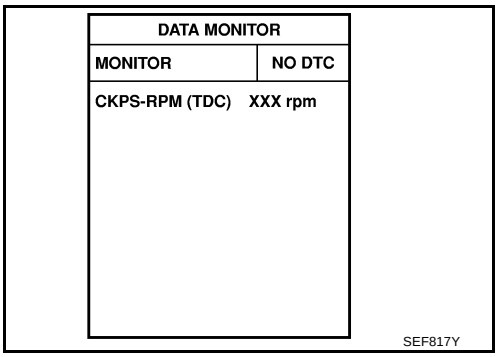
DTC Confirmation Procedure

GBS0005T

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1111, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1111, "Diagnostic Procedure" .

Diagnostic Procedure

GBS0005U

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 EC-1111, "DTC Confirmation Procedure" , again.
5. Is DTC P0200 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
3. Perform EC-1111, "DTC Confirmation Procedure" , again.
4. Is DTC 0200 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

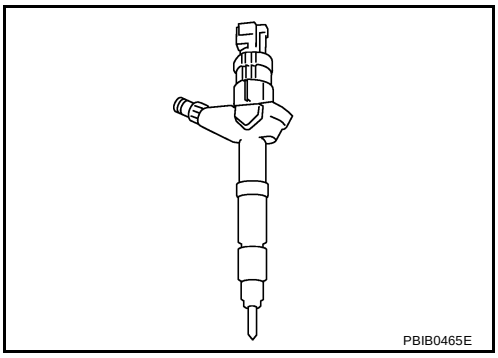
DTC P0201 - P0204 FUEL INJECTOR

PFP:16600

Component Description

GBS0005V

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

GBS0005W

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Idle speed	No load	0.50 - 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 - 0.80 msec

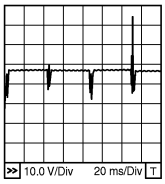
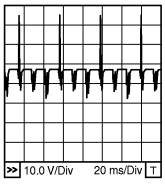
ECM Terminals and Reference Value

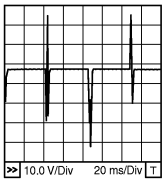
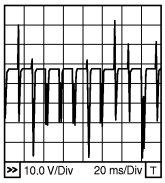
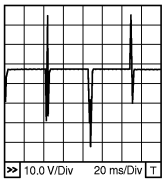
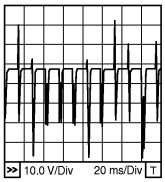
GBS0005X

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	V	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1295E
5	G	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1296E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	G P W W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E
40 41 42 43	W GR W B	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0005Y

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201 0201	No. 1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.) ● Fuel injector
P0202 0202	No. 2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203 0203	No. 3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204 0204	No. 4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC Confirmation Procedure

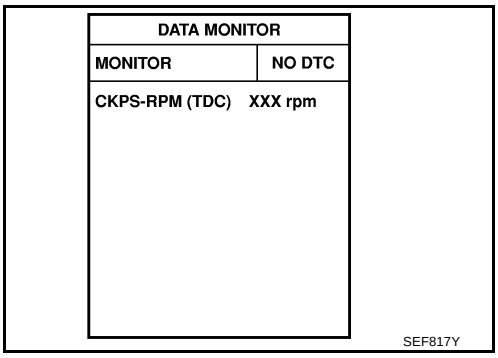
GBS0005Z

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

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 DTC is detected, go to EC-1117, "Diagnostic Procedure" .



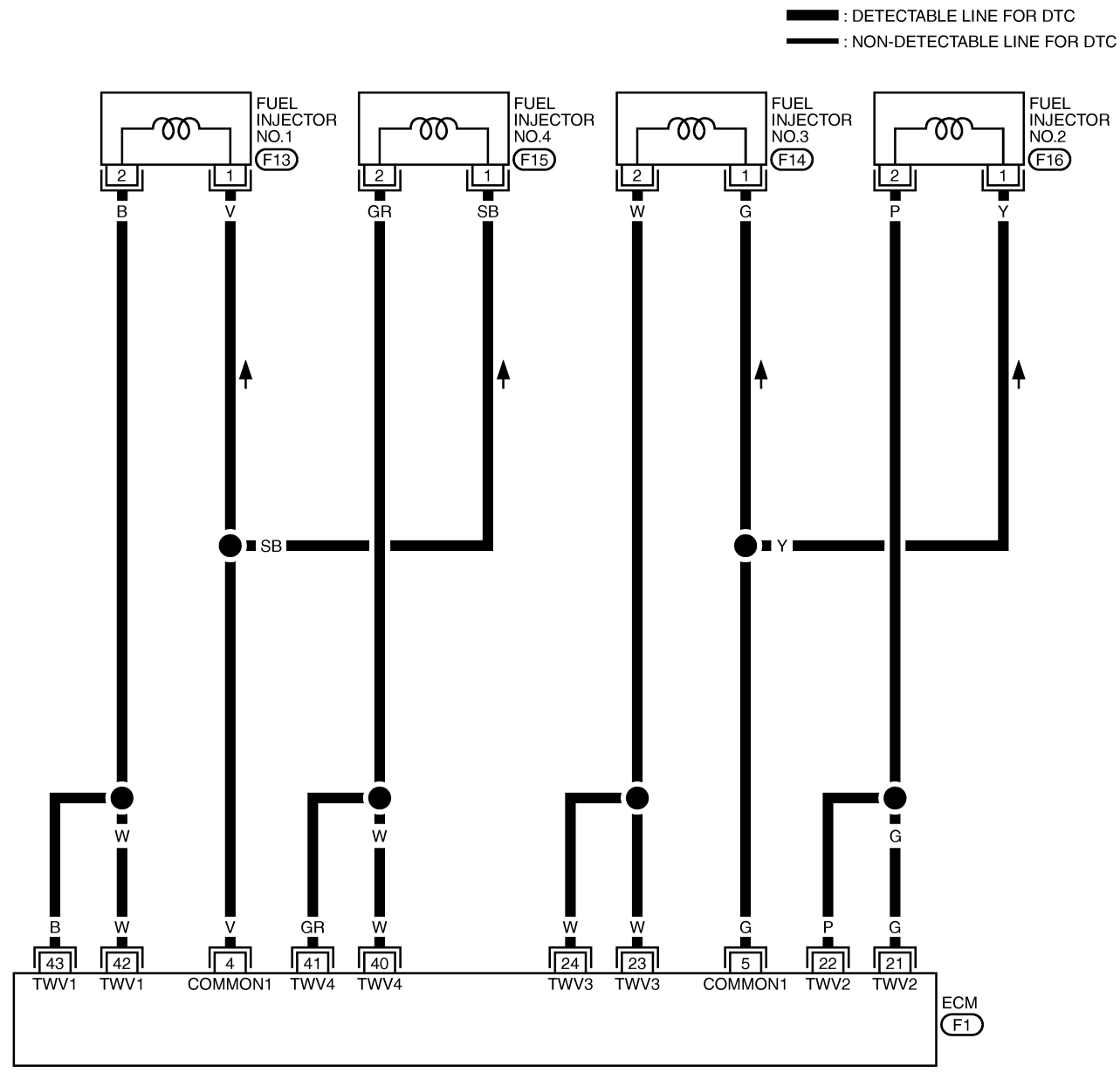
WITHOUT CONSULT-II

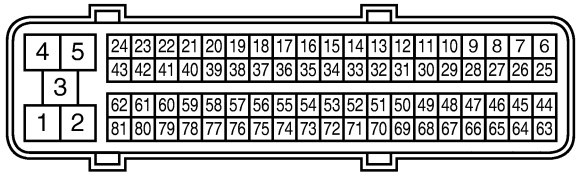
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1117, "Diagnostic Procedure" .

Wiring Diagram

GBS00060

EC-INJECT-01





F1
B

H.S.

1
2

F13 , F14 , F15 , F16
LGR LGR LGR LGR

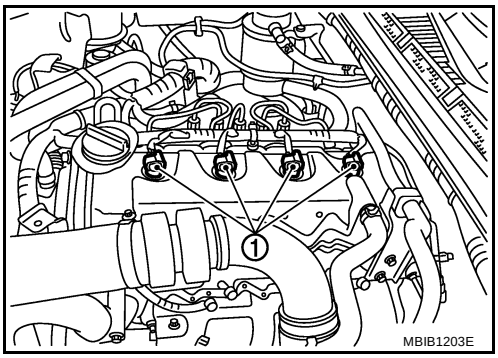
MBWA1042E

Diagnostic Procedure

GBS00061

1. CHECK FUEL INJECTOR POWER SUPPLY FOR OPEN AND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector (1) harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	4	1	No.1
P0202	5	1	No.2
P0203	5	1	No.3
P0204	4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	42, 43	2	No.1
P0202	21, 22	2	No.2
P0203	23, 24	2	No.3
P0204	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1118, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.

   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform EC-1115, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

Without CONSULT-II

1. Remove two fuel injectors.

   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .
6. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
7. Perform DTC Confirmation Procedure, EC-1115, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

Yes >> GO TO 5.
No >> GO TO 6.

5. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS00062

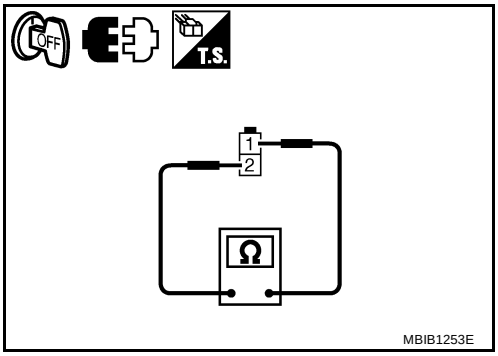
FUEL INJECTOR

1. Disconnect fuel injector harness connector.

2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



GBS00063

Removal and Installation

FUEL INJECTOR

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0217 ENGINE OVER TEMPERATURE

PFP:21481

Description

GBS00064

SYSTEM DESCRIPTION

NOTE:
If DTC P0217 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to **EC-1067, "DTC U1000 CAN COMMUNICATION LINE"** **.**

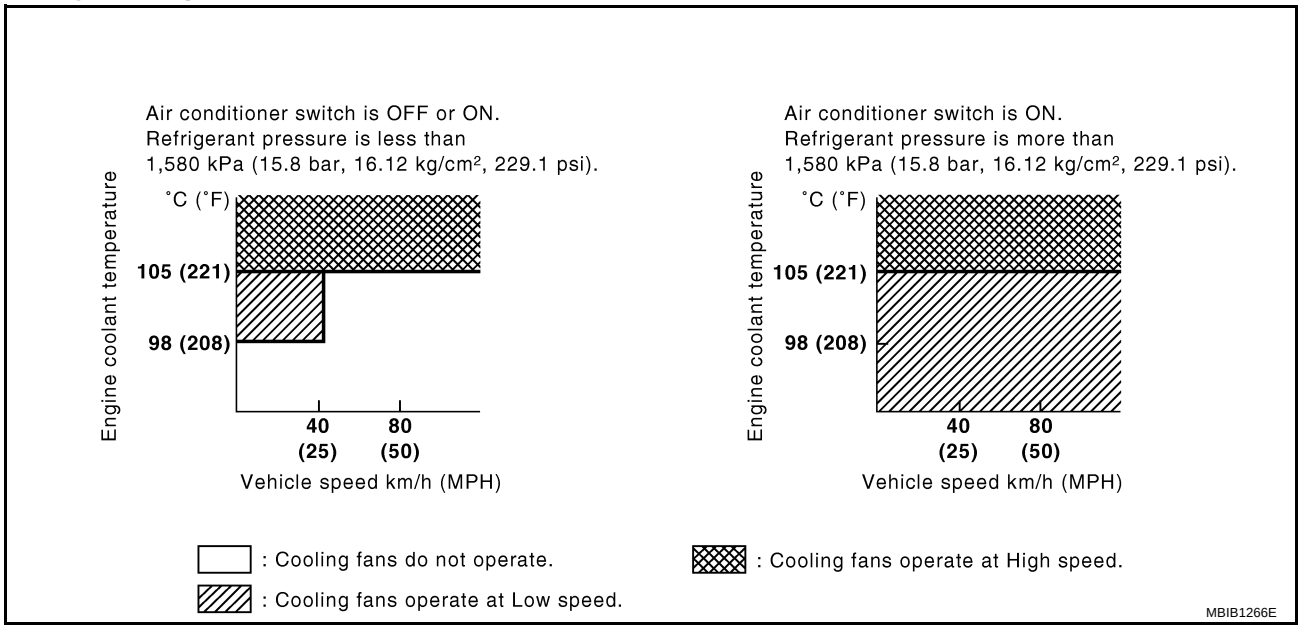
Cooling Fan Control

Sensor	Input Signal to ECM	ECM function	Actuator
Wheel sensor	Vehicle speed*	Cooling fan control	IPDM E/R (Cooling fan relays)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*		
Refrigerant pressure sensor	Refrigerant pressure		

*: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	2
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

COMPONENT DESCRIPTION

Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low (LOW)	1	3
High (HI)	2	3

CONSULT-II Reference Value in Data Monitor Mode

GBS00065

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI

On Board Diagnosis Logic

GBS00066

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217 0217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● IPDM E/R ● Cooling fan ● Cooling fan (Crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Reservoir tank ● Reservoir tank cap ● Water pump ● Thermostat For more information, refer to EC-1128, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-37, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-21, "Changing 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-15, "Engine Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

GBS00067

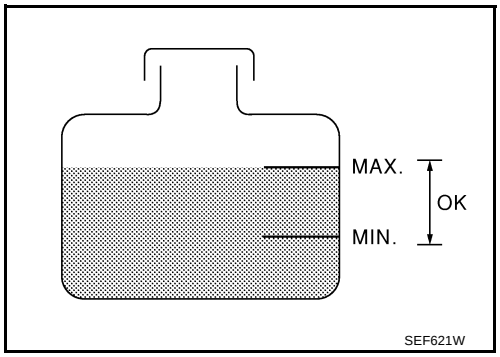
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

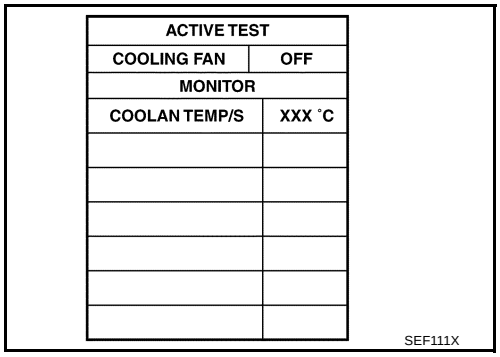
- **Never remove a radiator cap and/or a reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and the reservoir tank.**
- **Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1125, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1125, "Diagnostic Procedure" .
3. Turn ignition switch ON.

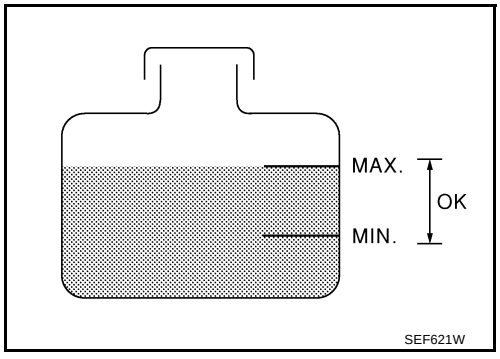


4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1125, "Diagnostic Procedure" .



WITHOUT CONSULT-II

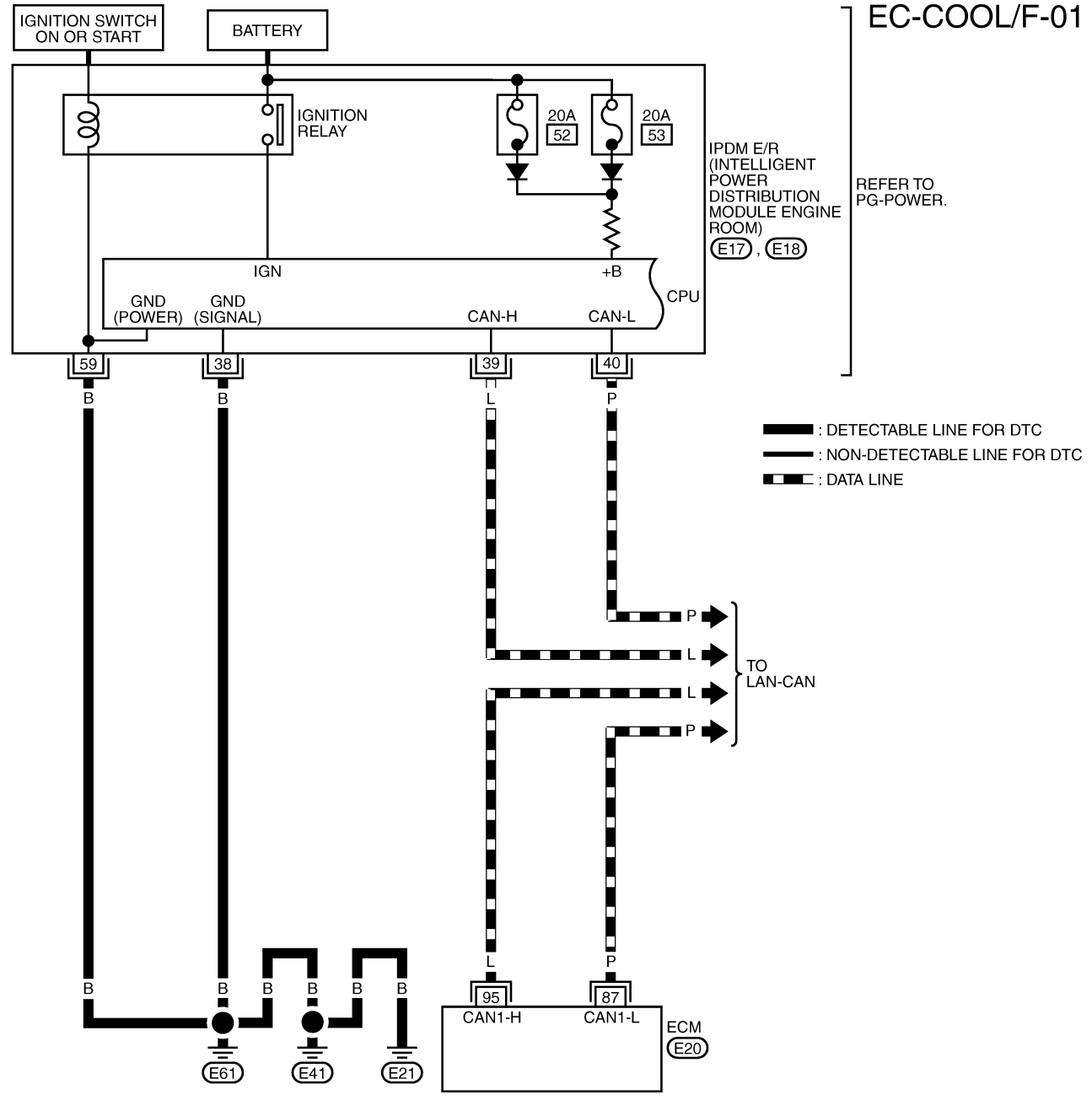
1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1125, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1125, "Diagnostic Procedure" .

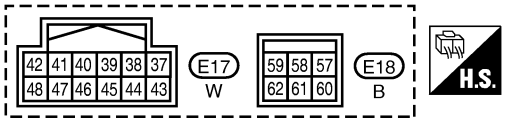


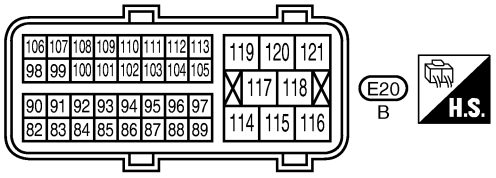
3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-19, "Auto Active Test" .
4. If NG, go to EC-1125, "Diagnostic Procedure" .

Wiring Diagram

GBS00068

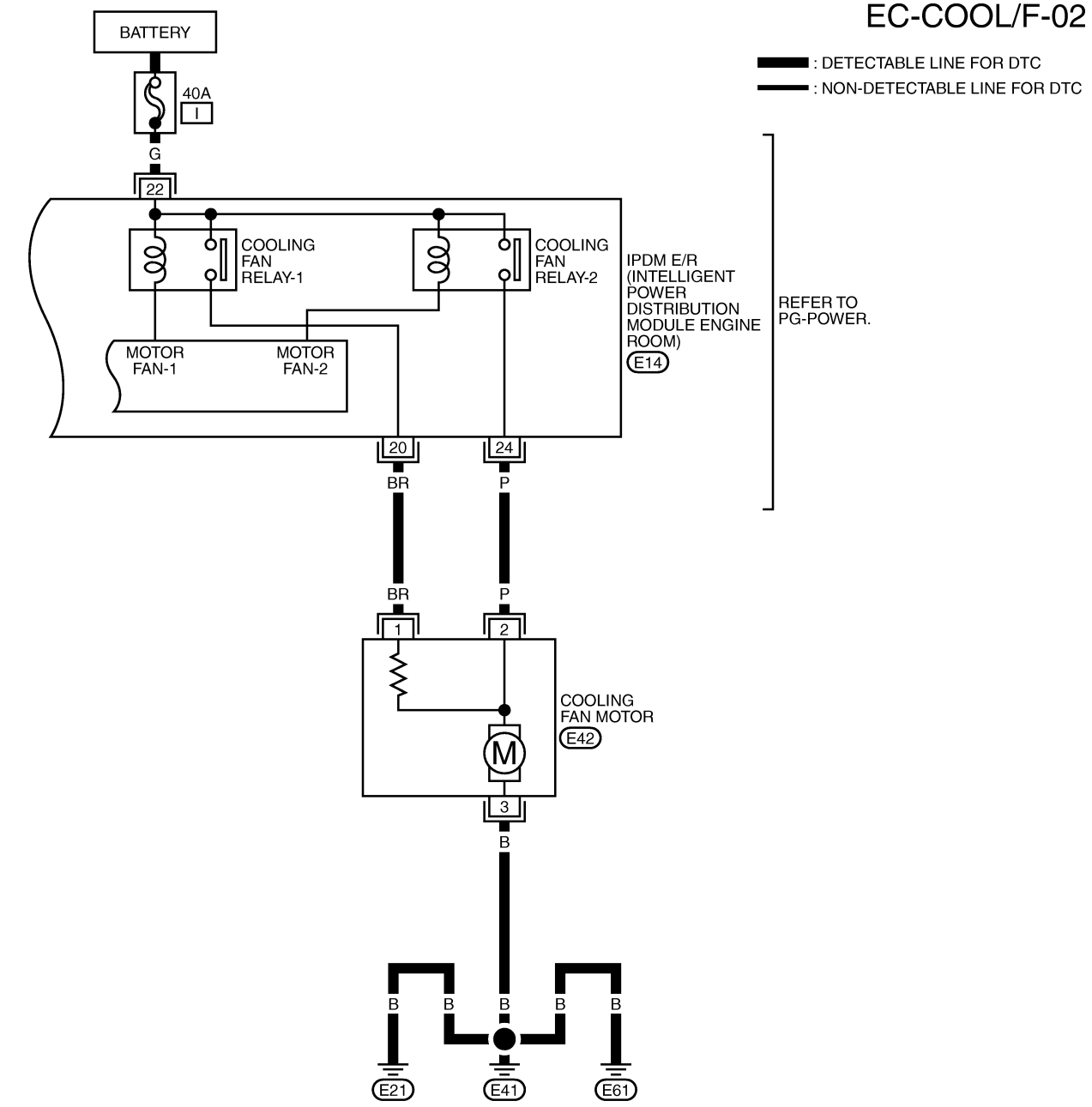






MBWA1332E

EC-COOL/F-02



MBWA1068E

Diagnostic Procedure

GBS00069

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Check cooling fan (crankshaft driven). Refer to CO-48, "Removal and Installation" .

2. CHECK COOLING FAN OPERATION

With CONSULT-II

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that cooling fan operate at each speed (LOW/HI).

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-1127, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-19, "Auto Active Test" .
2. Make sure that cooling fan operate at each speed (Low/High).

OK or NG

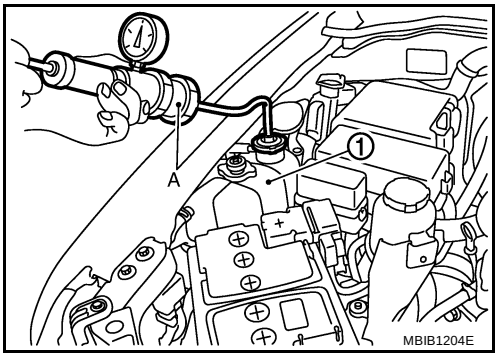
OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-1127, "PROCEDURE A" .)

4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops. Refer to CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

- Reservoir tank (1)
- A: SST (EG17650301)

CAUTION:
Higher than the specified pressure may cause radiator damage. Pressure should not drop.



MBIB1204E

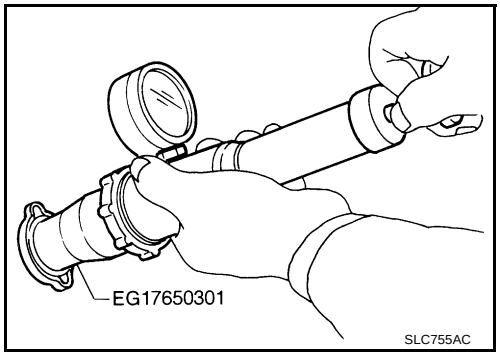
OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

- Hose
- Radiator
- Radiator cap
- Water pump
- Reservoir tank

5. CHECK RESERVOIR TANK CAP

Apply pressure to cap with a tester and check reservoir tank cap relief pressure.
Refer to CO-42, "Checking Reservoir Tank Cap" .



OK or NG

OK >> GO TO 6.
NG >> Replace reservoir tank cap.

6. CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to CO-52, "THERMOSTAT AND WATER PIPING" .
- Engine coolant temperature sensor. Refer to EC-1095, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-1128, "Main 12 Causes of Overheating" .

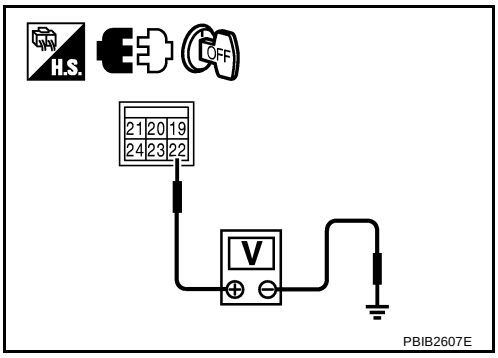
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLILNG FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E14.
3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

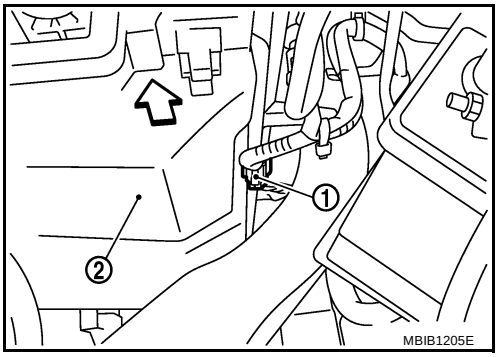
- 40A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor (1) harness connector.
   - ⇦: Vehicle front
   - Radiator shroud (upper) (2)
2. Check harness continuity between the following;
   cooling fan motor terminal 1 and IPDM E/R terminal 20,
   cooling fan motor terminal 2 and IPDM E/R terminal 24.
   Refer to Wiring Diagram.

Continuity should exist.



3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTER GROUND CIRCUIT FOR OPEN OR SHORT

1. Check harness continuity between cooling fan motor terminal 3 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK COOLING FAN MOTOR

Refer to EC-1129, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace cooling fan motors.

6. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connector.

Main 12 Causes of Overheating

GBS0006A

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-15, "Engine Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-37, "LEVEL CHECK" .
	4	● Reservoir tank cap	● Pressure tester	See CO-42, "Checking Reservoir Tank Cap" .	
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-52, "THERMOSTAT AND WATER PIPING" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1120).
ON*2	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	See CO-48, "COOLING FAN" .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See CO-37, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-37, "LEVEL CHECK" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-236, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-254, "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 CO-34, "OVERHEATING CAUSE ANALYSIS" .

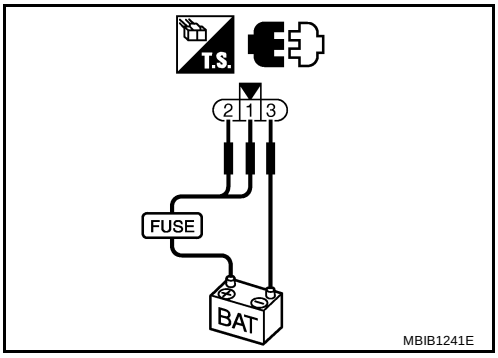
Component Inspection

GBS0006B

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(–)
Low (LOW)	1	3
High (HI)	2	3



Cooling fan motor should operate.
If NG, replace cooling fan motor.

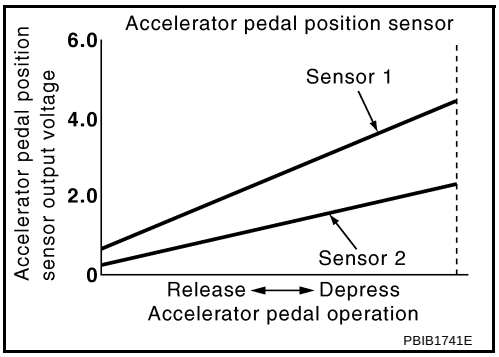
DTC P0222, P0223 APP SENSOR

PFP:18002

Description

GBS0006C

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

GBS0006D

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.28 - 0.48V
		Accelerator pedal: Fully depressed	More than 2.0V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

GBS0006E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS0006F

The MIL will not light up for these self-diagnoses.

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223 0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

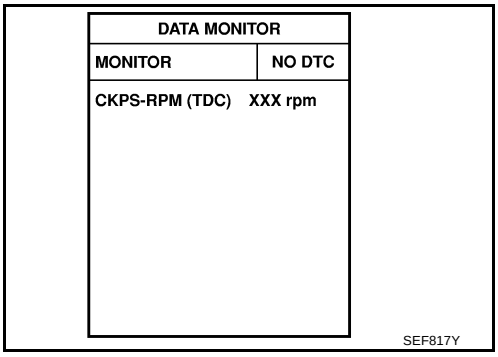
DTC Confirmation Procedure

GBS0006G

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1133, "Diagnostic Procedure" .



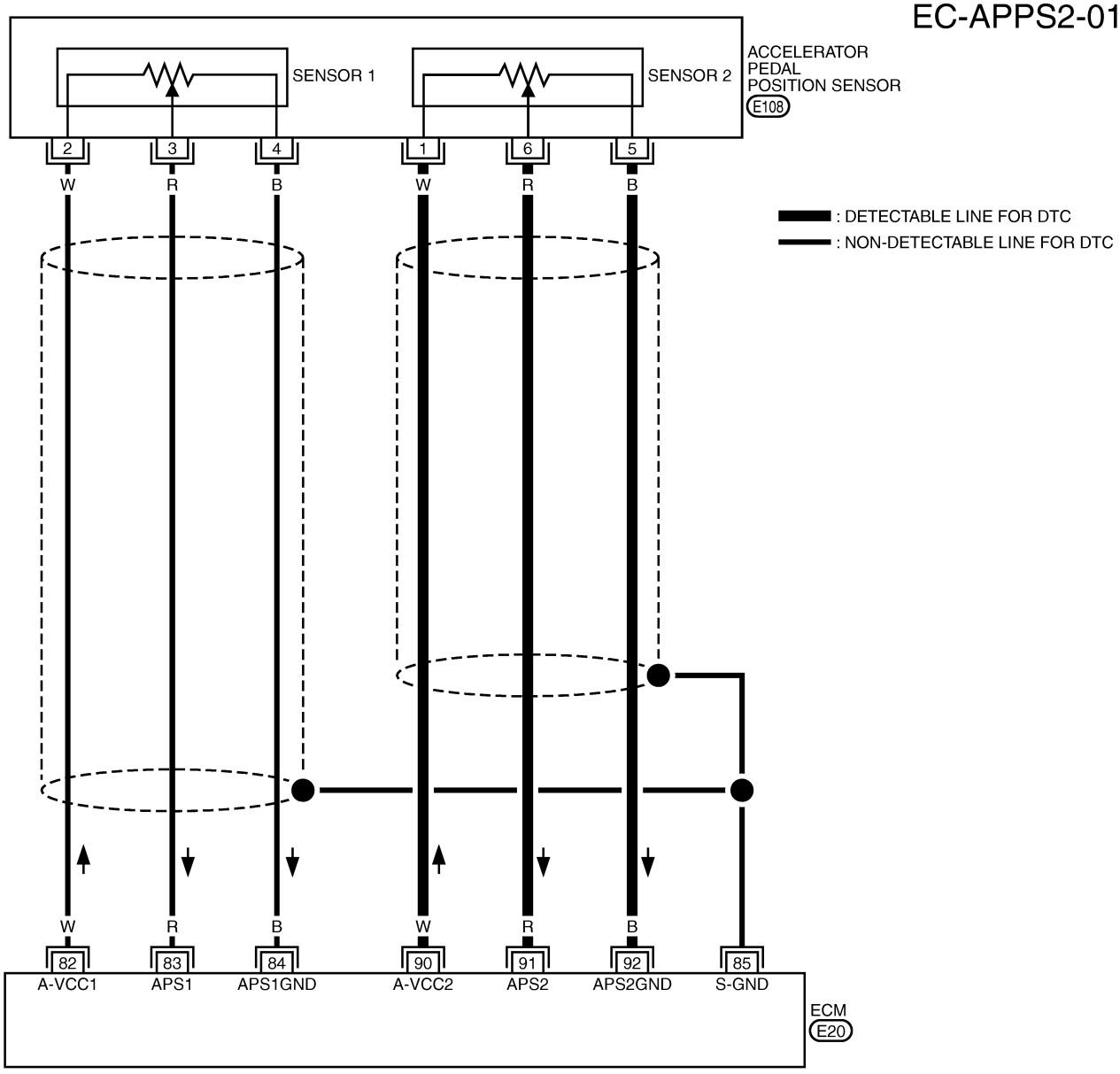
WITHOUT CONSULT-II

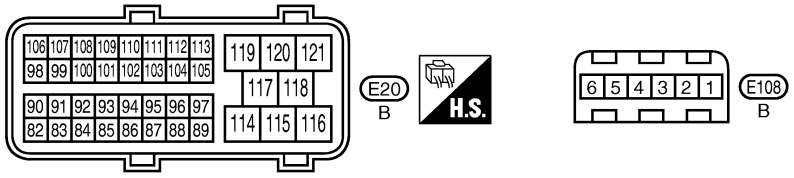
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1133, "Diagnostic Procedure" .

Wiring Diagram

GBS0006H

EC-APPS2-01





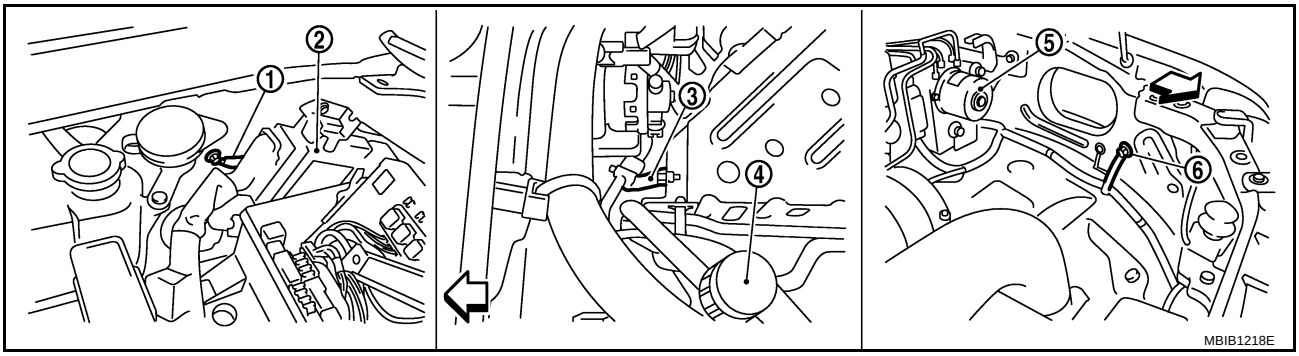
MBWA1043E

Diagnostic Procedure

GBS0006I

1. CHCEK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

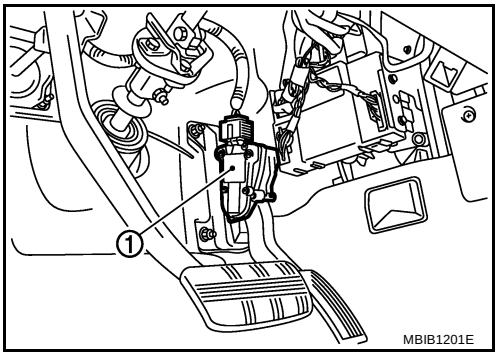
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

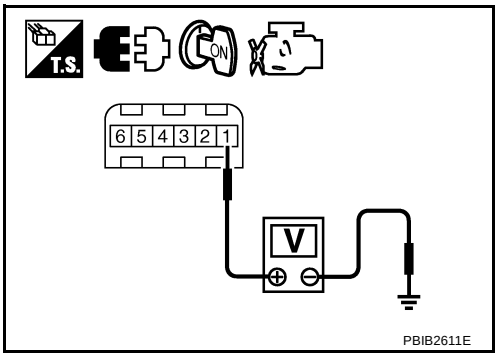
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 92.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1134, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

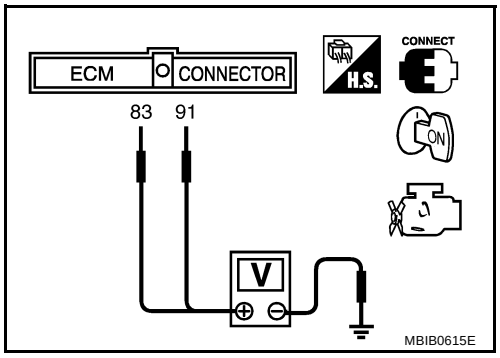
Component Inspection

GBS0006J

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.95 - 1.17V
	Fully depressed	More than 4.6V
91 (Accelerator pedal position sensor 2)	Fully released	0.58 - 0.78V
	Fully depressed	More than 2.3V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

GBS0006K

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

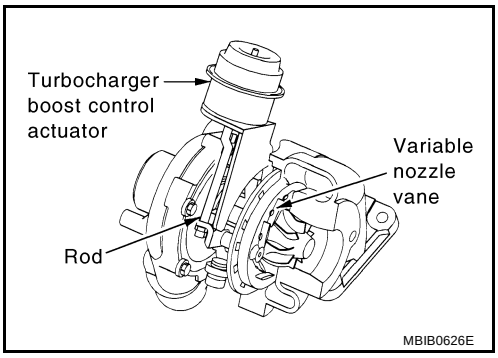
DTC P0234 TC SYSTEM

PFP:14411

Description

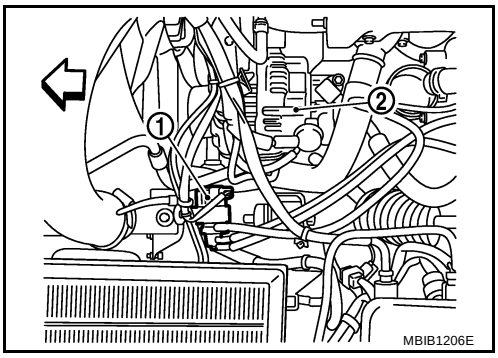
GBS0006L

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve (1) is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

- ⇦: Vehicle front
- Alternator (2)



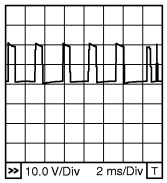
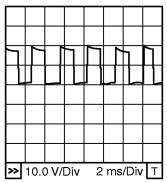
ECM Terminals and Reference Value

GBS0006M

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	BR	Turbocharger boost control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 6.3V ★  MBIB0889E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.6V ★  MBIB0890E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0006N

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P0234 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

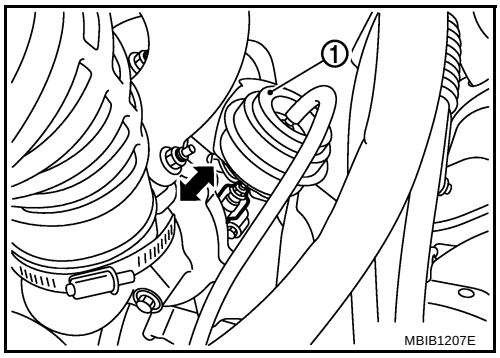
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0234 0234	Turbocharger overboost condition	ECM detects turbocharger boost pressure is excessively high.	● Turbocharger ● Vacuum pump ● Turbocharger boost sensor ● Turbocharger boost control solenoid valve

Overall Function Check

GBS0006O

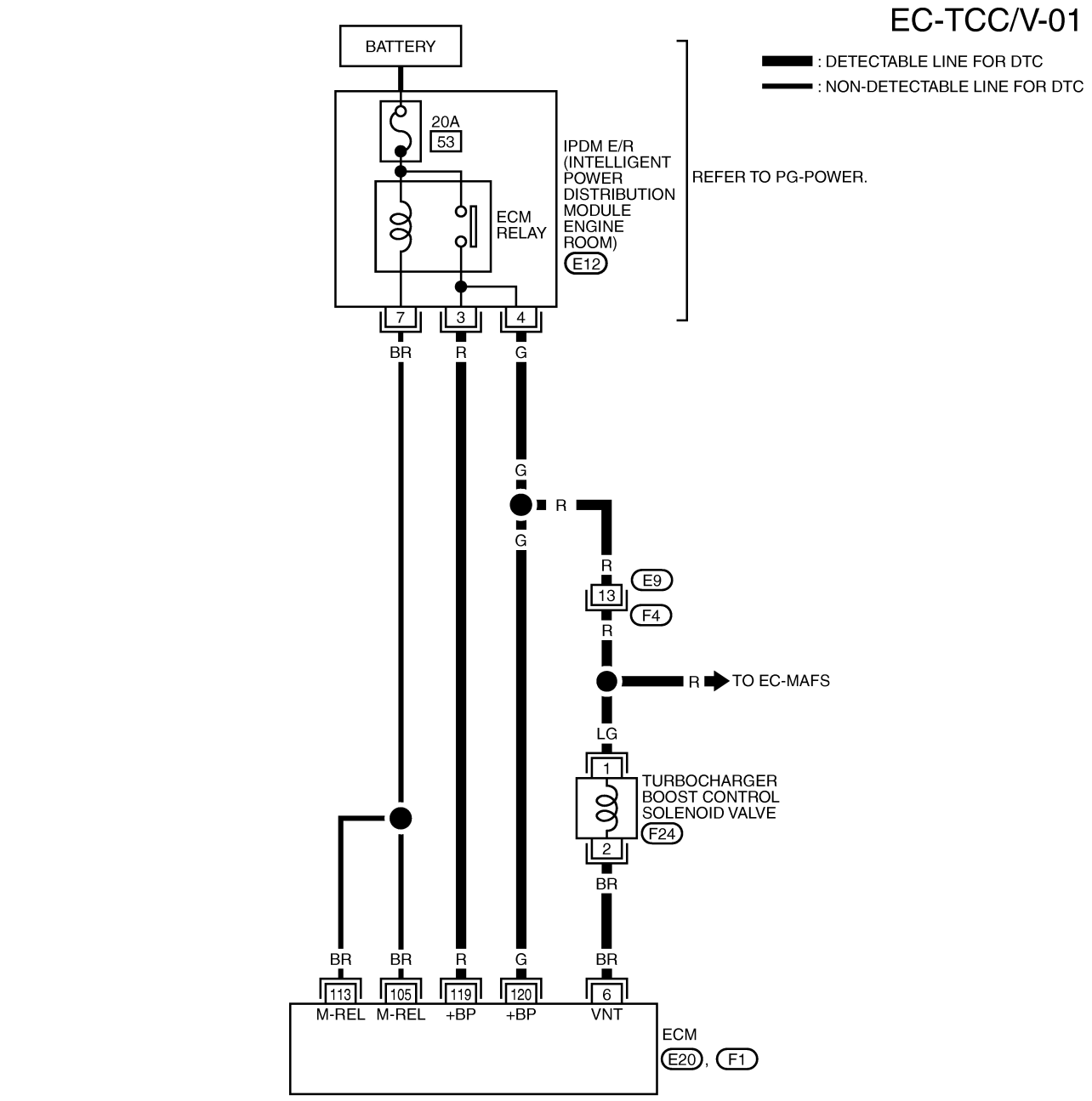
Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

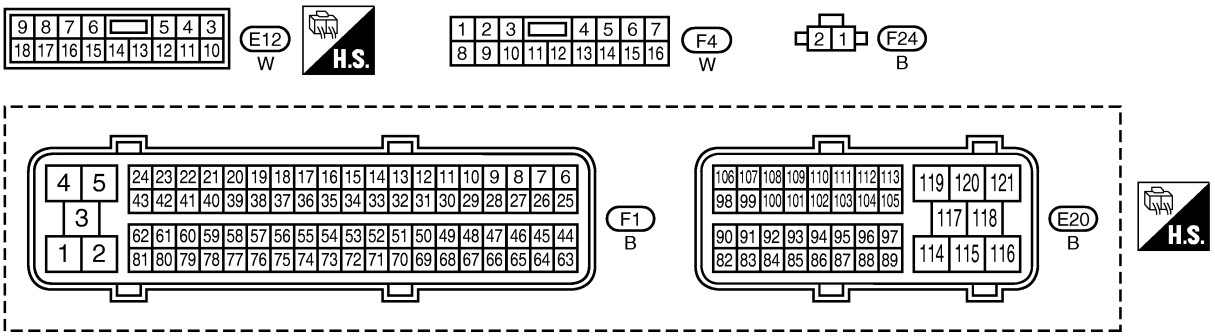
1. Start engine and let it idle.
2. Make sure that turbocharger control actuator (1) rod moves slightly when engine is started.
3. If NG, go to EC-1138, "Diagnostic Procedure" .



Wiring Diagram

GBS0006P





MBWA1044E

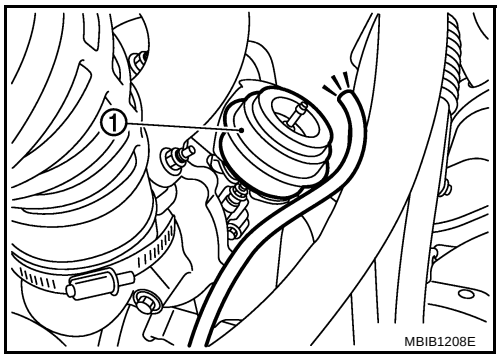
Diagnostic Procedure

GBS0006Q

1. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to turbocharger control actuator (1).
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum should exist.

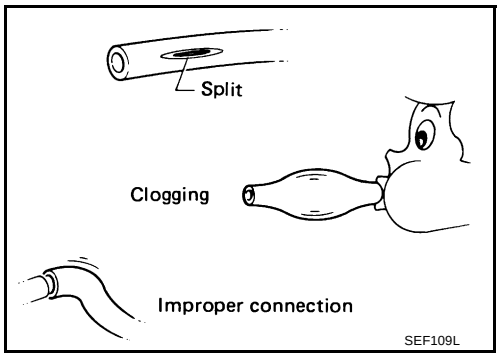


OK or NG

OK >> GO TO 8.
NG >> GO TO 2.

2. CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-1005, "Vacuum Hose Drawing" .

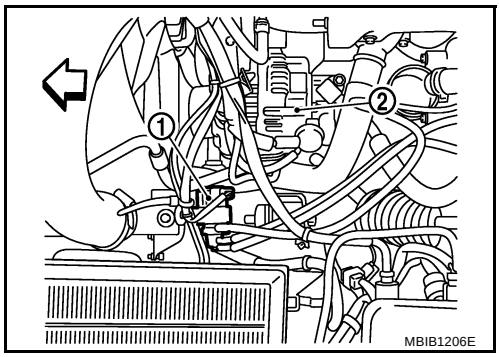


OK or NG

OK >> GO TO 3.
NG >> Repair or replace vacuum hoses and vacuum gallery.

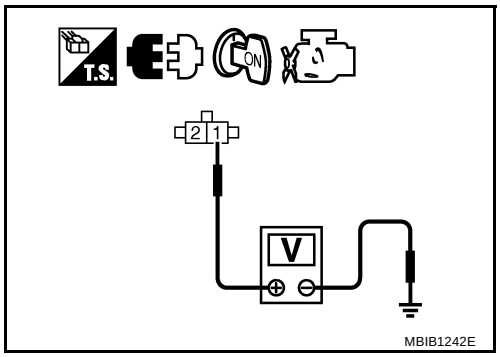
3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve (1) harness connector.
   - ⇦ : Vehicle front
   - Alternator (2)
2. Turn ignition switch ON.



3. Check voltage between turbocharger boost control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 6 and turbocharger boost control solenoid valve terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TURBOCHARGE BOOST CONTROL SOLENOID VALVE

Refer to EC-1140, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace turbocharger boost control solenoid valve.

7. CHECK VACUUM PUMP

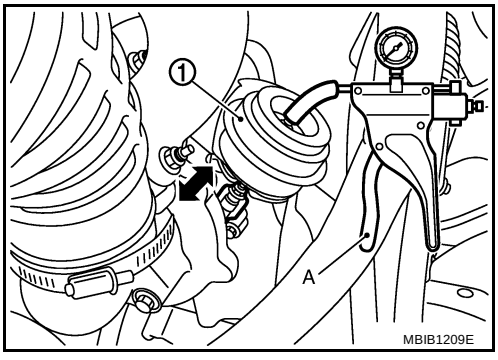
Refer to EM-186, "VACUUM PUMP" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum pump assembly.

8. CHECK TURBOCHARGER BOOST CONTROL ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump A to turbocharger boost control actuator (1).
3. Make sure that the turbocharger boost control actuator rod moves smoothly when applying vacuum of -53.3kPa (-533mbar, -400mmHg, -15.75inHg) and releasing it.



OK or NG

OK >> GO TO 9.
NG >> Replace turbocharger assembly.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1146, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

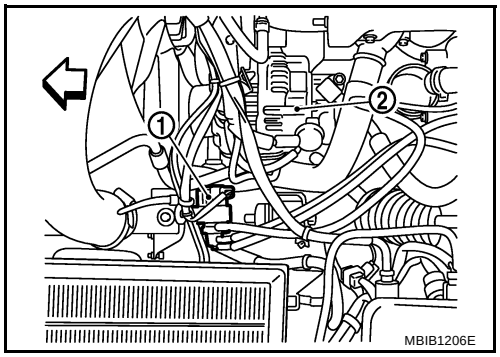
Component Inspection

GBS0006R

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve (1) harness connector.

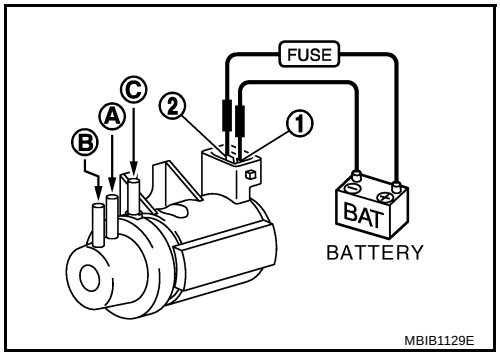
- ⇦ : Vehicle front
- Alternator (2)



2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.
3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	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

Operation takes less than 1 second.



If NG, replace turbocharger boost control solenoid valve.

Removal and Installation

GBS0006S

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EM-162, "CHARGE AIR COOLER" .

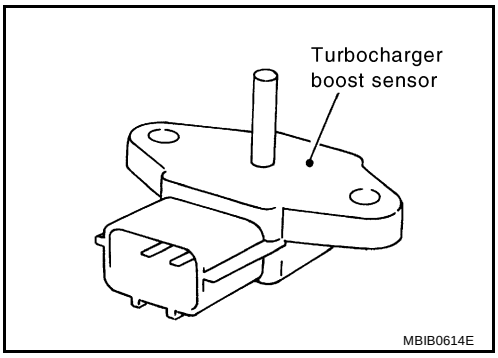
DTC P0237, P0238 TC BOOST SENSOR

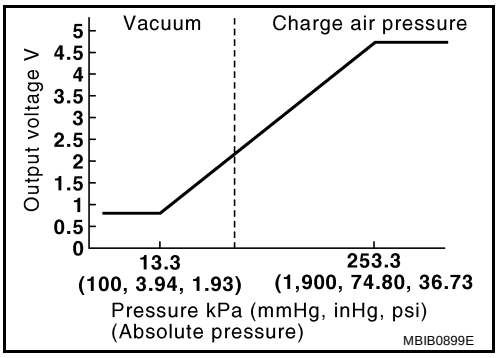
PFP:22365

Component Description

GBS0006T

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

GBS0006U

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	Approx. 100.00 kPa
		3,600 rpm	Approx. 140.00 kPa
		4,000 rpm	Approx. 135.00 kPa

ECM Terminals and Reference Value

GBS0006V

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 damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	BR	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.1 - 2.4V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.3 - 2.6V
64	V	Turbocharger boost sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
71	L	Turbocharger boost sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS0006W

The MIL will not light up for these self-diagnoses.

NOTE:
If DTC P0237 or P0238 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237 0237	Turbocharger boost sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbocharger boost sensor
P0238 0238	Turbocharger boost sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

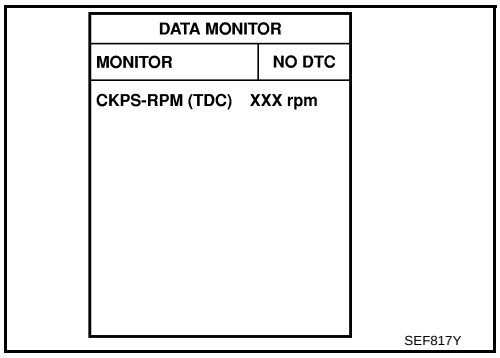
DTC Confirmation Procedure

GBS0006X

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1144, "Diagnostic Procedure" .



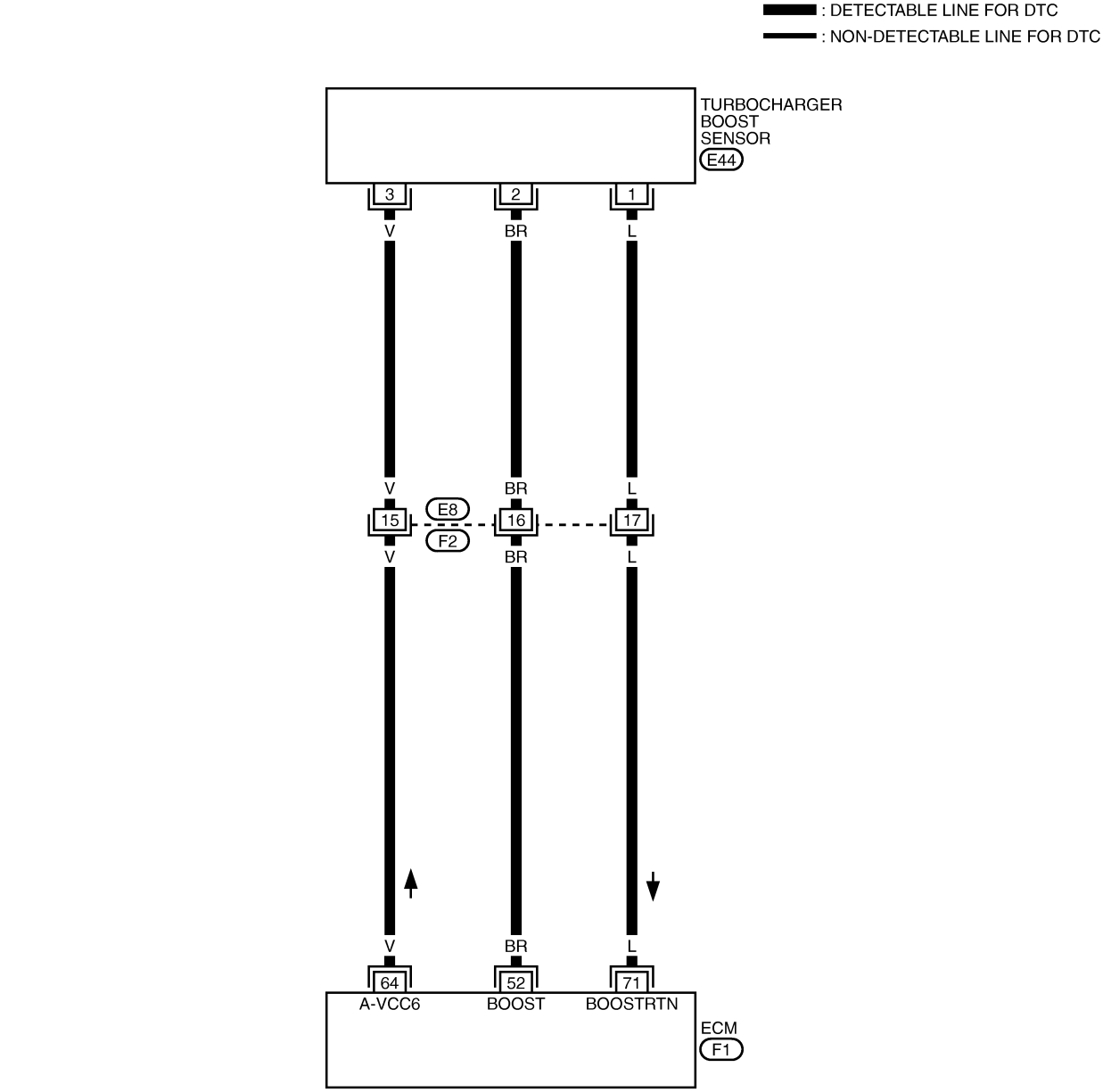
WITHOUT CONSULT-II

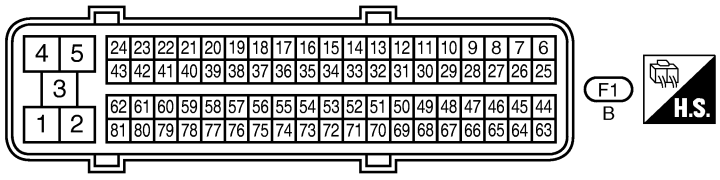
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1144, "Diagnostic Procedure" .

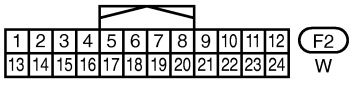
Wiring Diagram

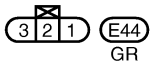
GBS0006Y

EC-BOOST-01









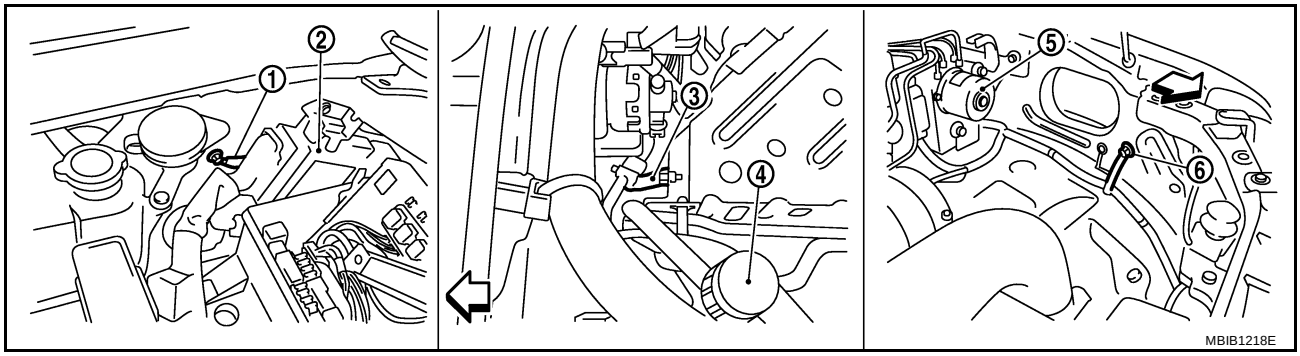
MBWA1045E

Diagnostic Procedure

GBS0006Z

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

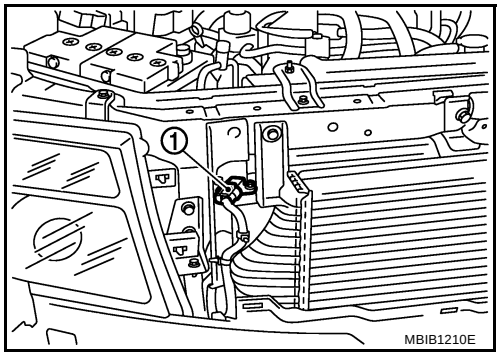
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

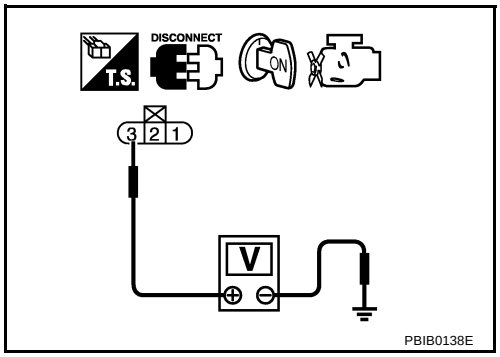
2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharge boost sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharge boost sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK TURBOCHAGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor terminal 1 and ECM terminal 71. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHAGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 52 and turbocharger boost sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1146, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

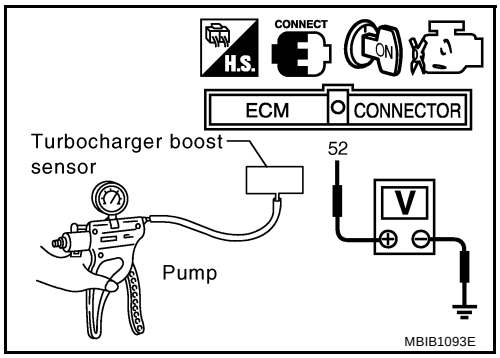
GBS00070

CHECK TURBOCHARGER BOOST SENSOR

1. Remove turbocharger boost sensor with its harness connected.
2. Turn ignition switch ON.
3. Use pump to apply pressure sensor as shown in the figure.

   CAUTION:
   - **Always calibrate the pressure pump gauge when using it.**
   - **Inspection should be done at room temperature [10-30°C (50-86°F)].**
4. Check the output voltage between ECM terminal 52 and ground under the following conditions.

Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approximately 2.3V
+40 kPa (400 mbar, 300mmHg, 11.81 inHg)	Approximately 2.9V



Removal and Installation

GBS00071

TURBOCHARGER BOOST SENSOR

Refer to EM-162, "CHARGE AIR COOLER" .

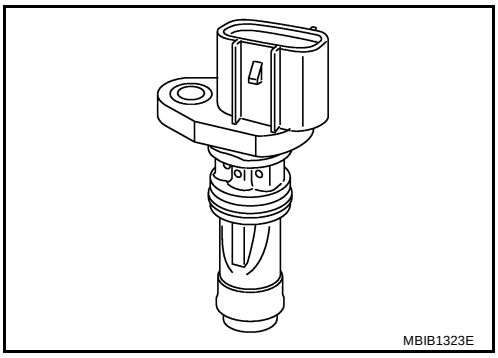
DTC P0335 CKP SENSOR

PFP:23731

Description

GBS00072

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


MBIB1323E

CONSULT-II Reference Value in Data Monitor Mode

GBS00073

Specification data are reference values.

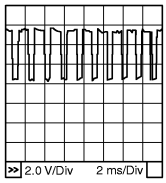
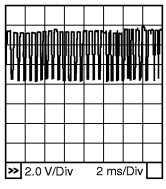
MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication

ECM Terminals and Reference Value

GBS00074

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	W	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	R	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.7V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 3.7V ★  MBIB0880E
65	B	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS00075

NOTE:
If DTC P0335 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor

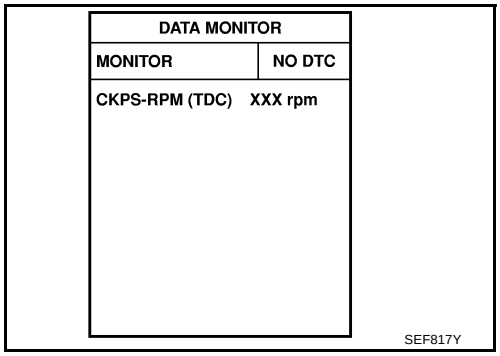
DTC Confirmation Procedure

GBS00076

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1150, "Diagnostic Procedure" .



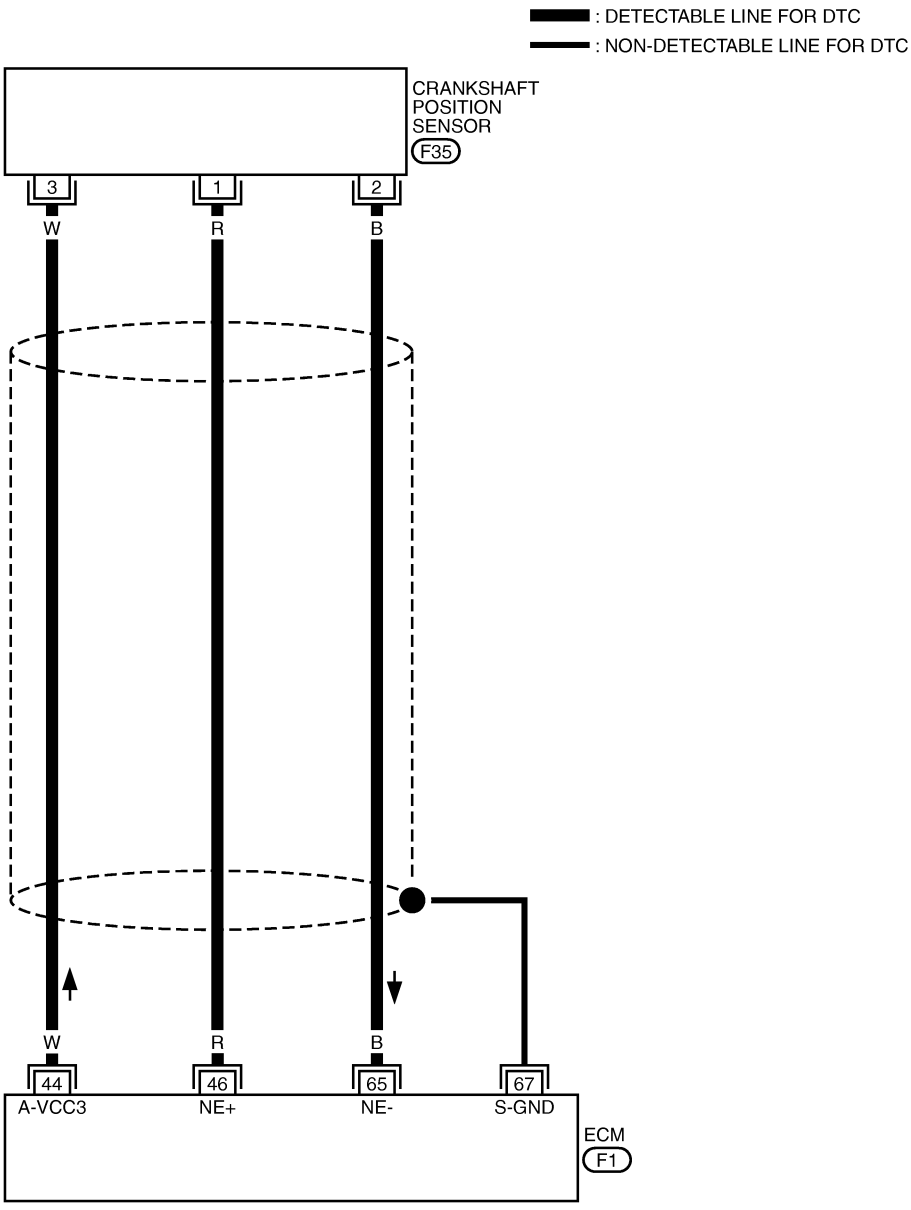
WITHOUT CONSULT-II

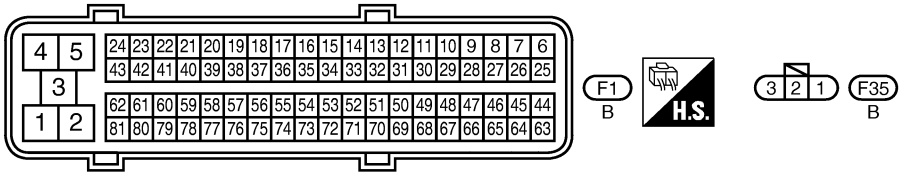
1. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1150, "Diagnostic Procedure" .

Wiring Diagram

GBS00077

EC-CKPS-01





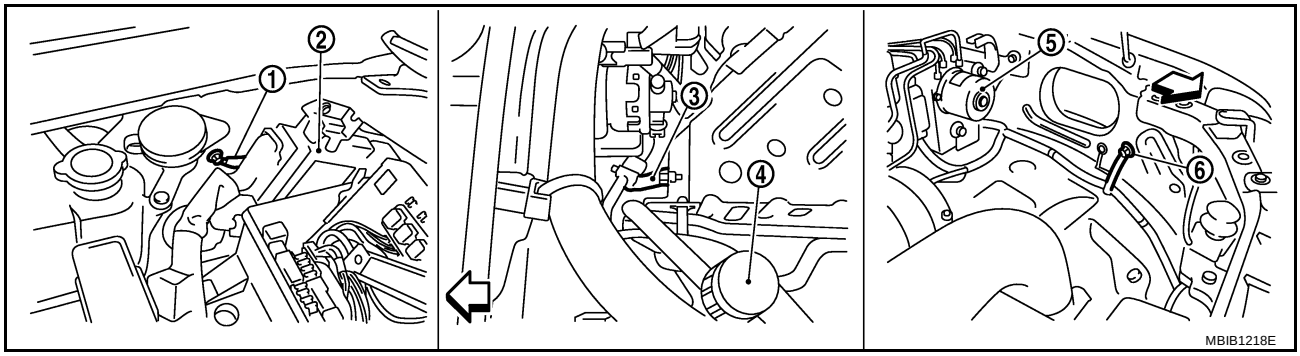
MBWA1046E

Diagnostic Procedure

GBS00078

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

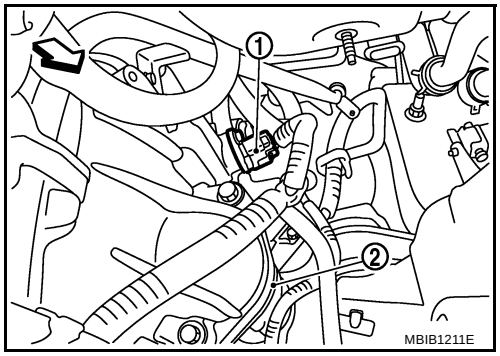
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

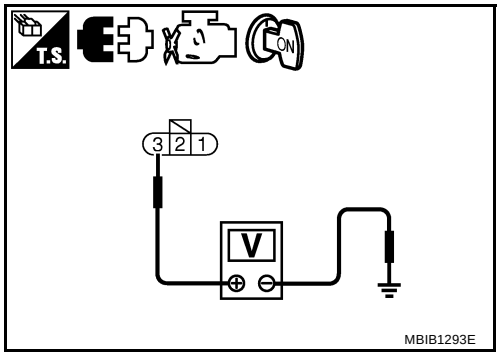
2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor (1) harness connector.
   - Illustration shows the view from under the vehicle
   - ⇦: Vehicle front
   - Starter motor (2)
2. Turn ignition switch ON.



3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1152, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

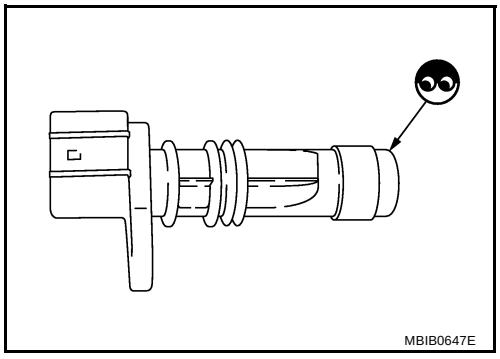
>> **INSPECTION END**

Component Inspection

GBS00079

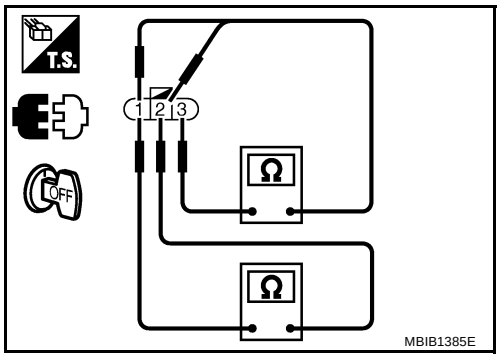
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace crankshaft position sensor.

Removal and Installation

GBS0007A

CRANKSHAFT POSITION SENSOR

Refer to EM-180, "OIL PAN AND OIL STRAINER" .

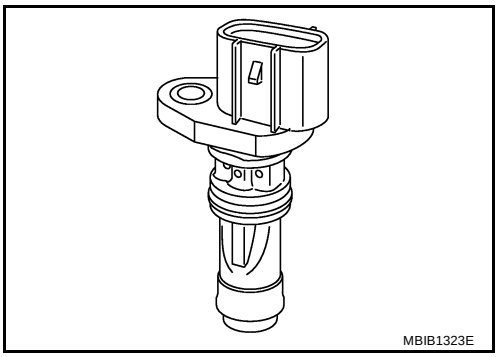
DTC P0336 CKP SENSOR

PFP:23731

Description

GBS0007B

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


MBIB1323E

CONSULT-II Reference Value in Data Monitor Mode

GBS0007C

Specification data are reference values.

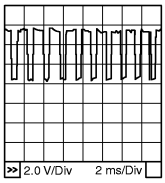
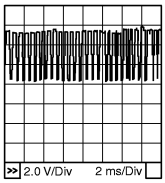
MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

ECM Terminals and Reference Value

GBS0007D

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	W	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	R	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.7V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 3.7V ★  MBIB0880E
65	B	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0007E

NOTE:
If DTC P0336 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0336 0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor ● Signal plate

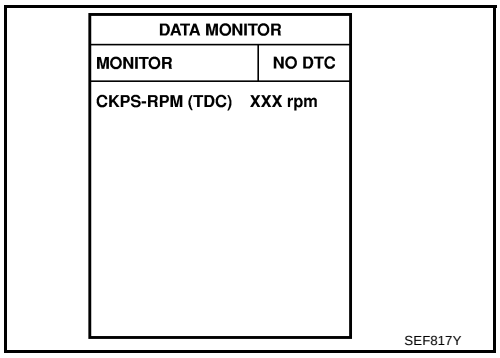
DTC Confirmation Procedure

GBS0007F

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1156, "Diagnostic Procedure" .



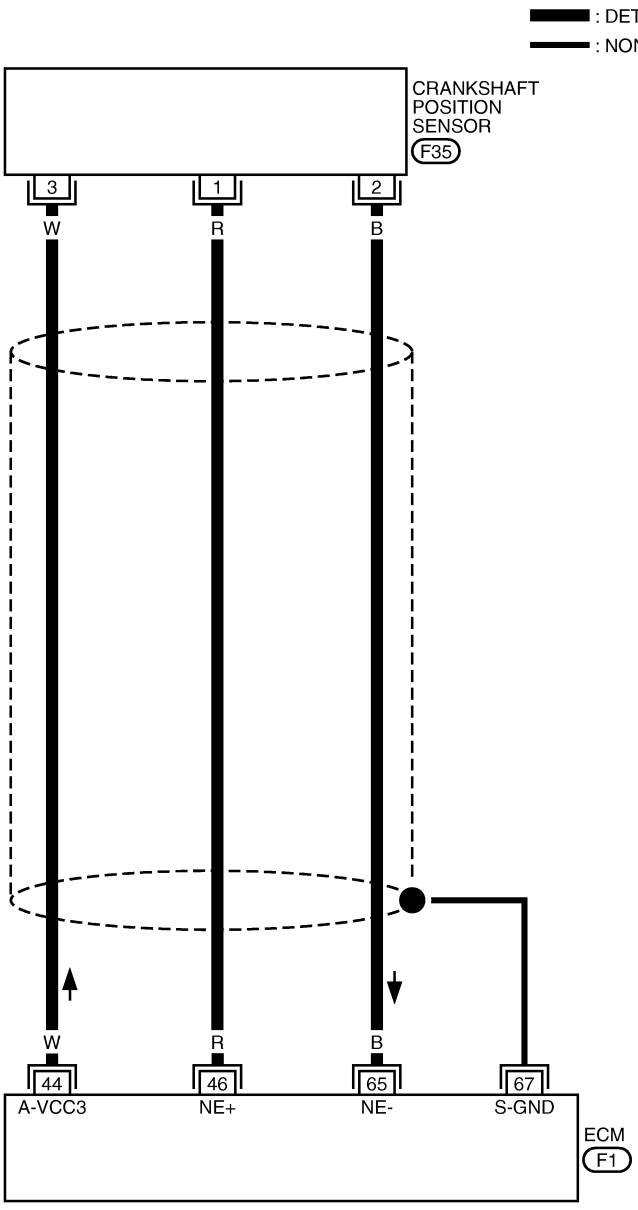
WITHOUT CONSULT-II

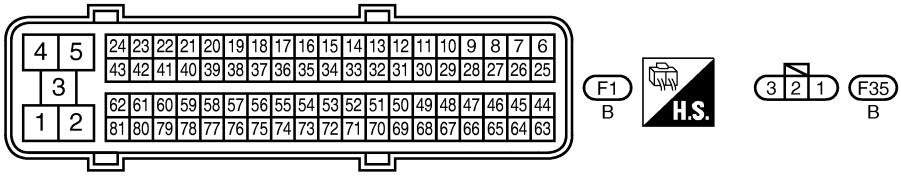
1. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1156, "Diagnostic Procedure" .

Wiring Diagram

GBS0007G

EC-CKPS-01





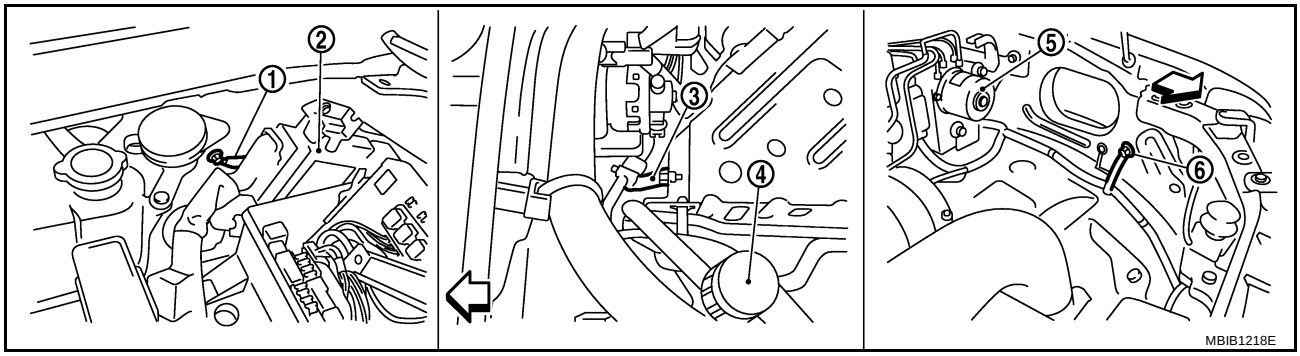
MBWA1046E

Diagnostic Procedure

GBS0007H

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

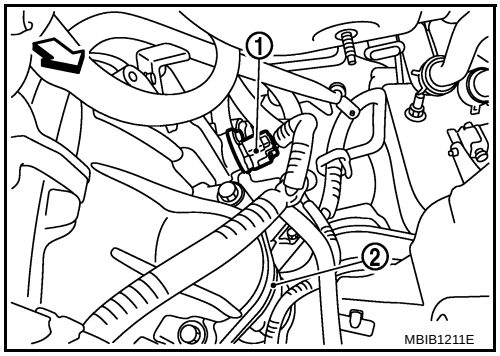
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor (1) harness connector.
   - Illustration shows the view from under the vehicle
   - ⇦: Vehicle front
   - Starter motor (2)
2. Turn ignition switch ON.



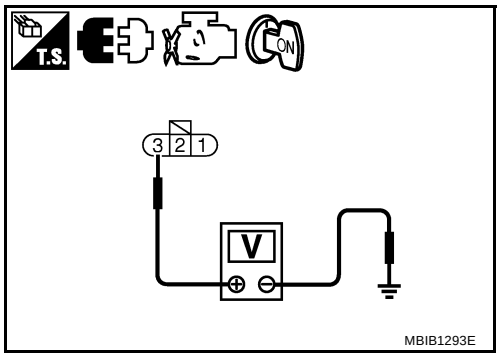
3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

   Voltage: Approximately 5.3V

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1158, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 7.
NG >> Replace the signal plate.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

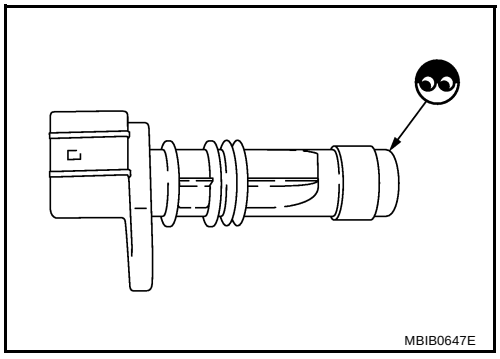
>> **INSPECTION END**

Component Inspection

GBS0007I

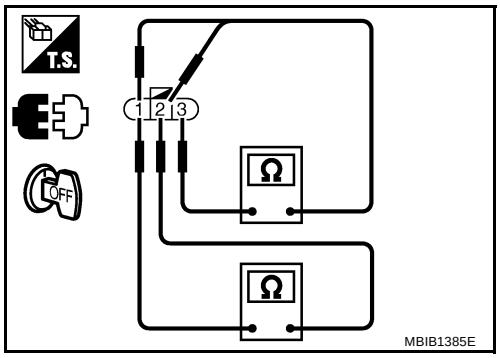
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace crankshaft position sensor.

Removal and Installation

GBS0007J

CRANKSHAFT POSITION SENSOR

Refer to EM-180, "OIL PAN AND OIL STRAINER" .

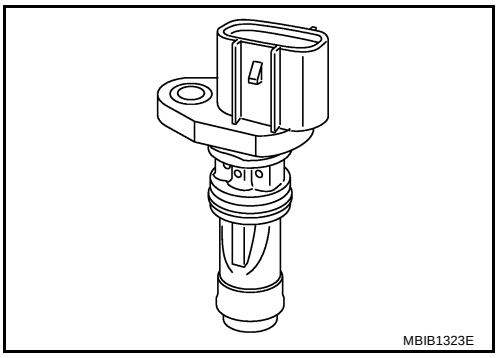
DTC P0340 CMP SENSOR

PFP:23731

Description

GBS0007K

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.

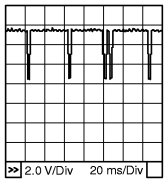
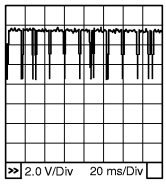

MBIB1323E

ECM Terminals and Reference Value

GBS0007L

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	W	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 4.9V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 4.9V ★  MBIB0878E
66	B	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0007M

NOTE:
If DTC P0340 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor

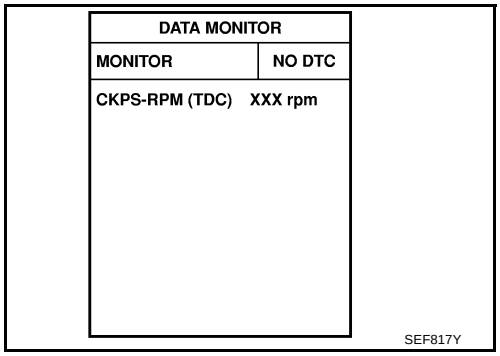
DTC Confirmation Procedure

GBS0007N

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1162, "Diagnostic Procedure" .



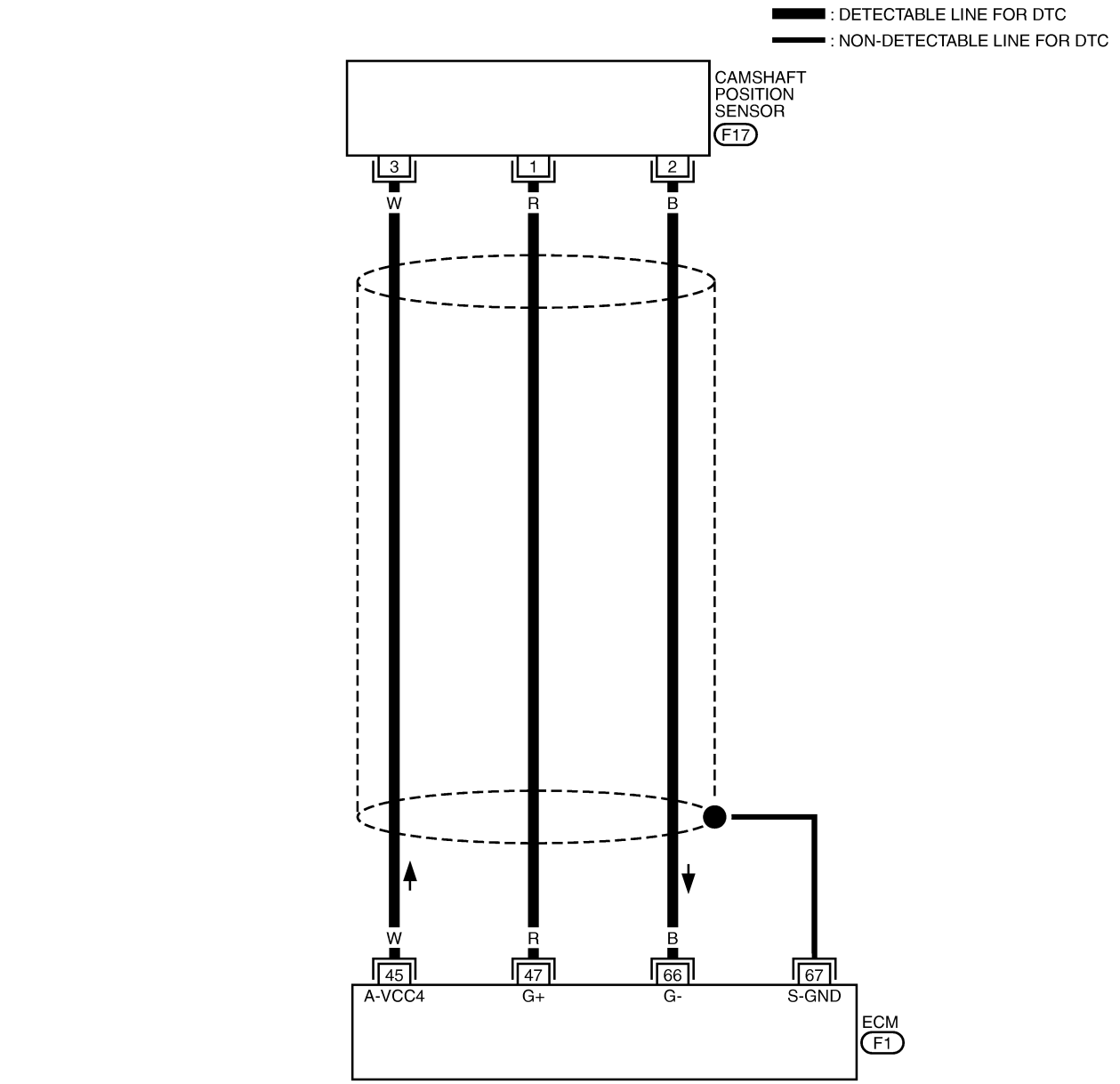
WITHOUT CONSULT-II

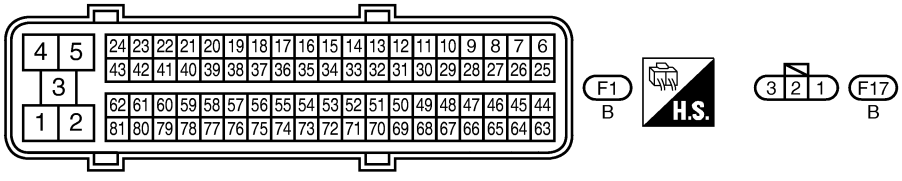
1. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1162, "Diagnostic Procedure" .

Wiring Diagram

GBS0007O

EC-CMPS-01





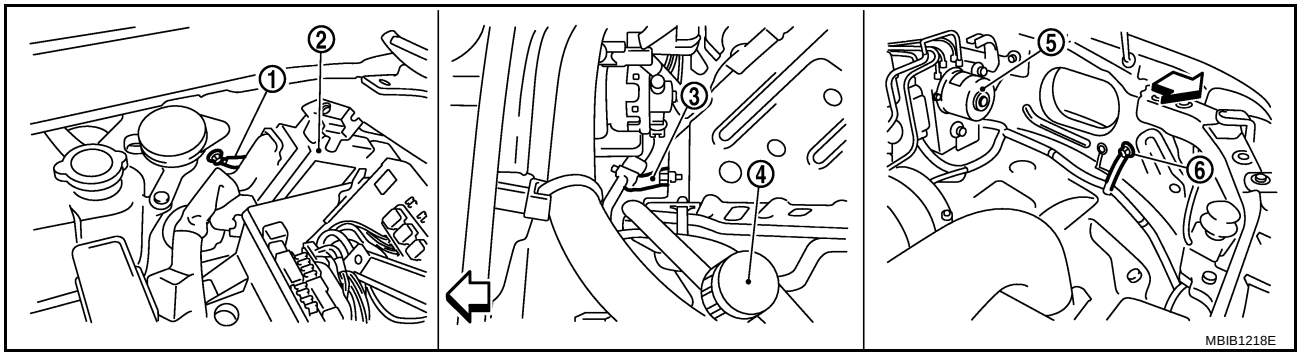
MBWA1047E

Diagnostic Procedure

GBS0007P

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

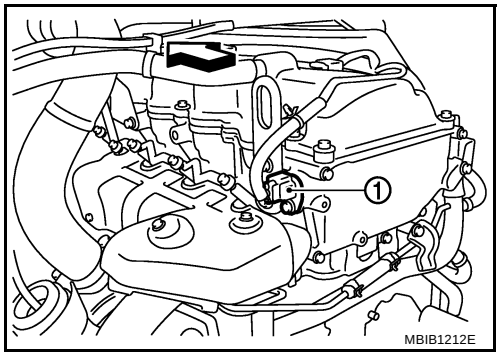
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (1) harness connector.

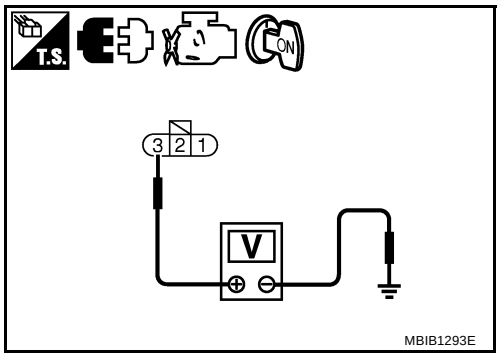
– ⇦: Vehicle front

2. Turn ignition switch ON.



3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1163, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

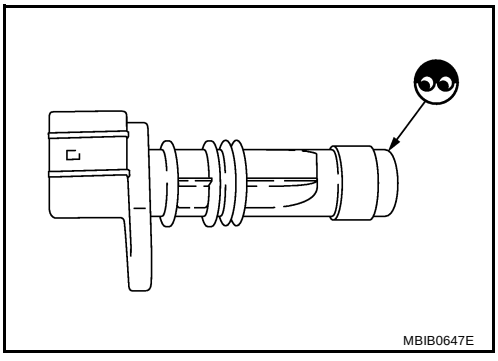
>> **INSPECTION END**

Component Inspection

GBS0007Q

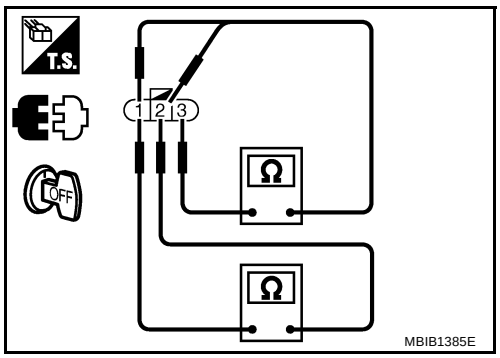
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace camshaft position sensor.

Removal and Installation

GBS0007R

CAMSHAFT POSITION SENSOR

Refer to EM-203, "CAMSHAFT" .

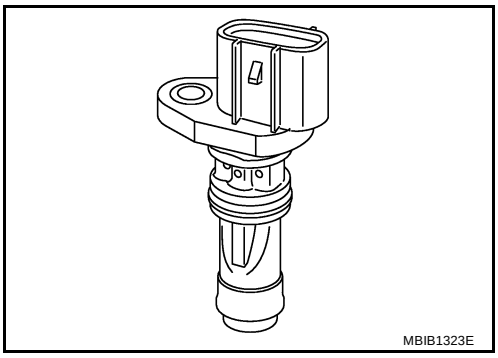
DTC P0341 CMP SENSOR

PFP:23731

Description

GBS0007S

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.

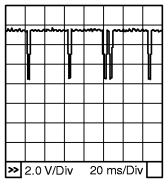
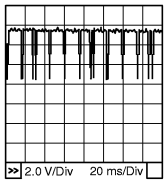

MBIB1323E

ECM Terminals and Reference Value

GBS0007T

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	W	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 4.9V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 4.9V ★  MBIB0878E
66	B	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0007U

NOTE:
If DTC P0341 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0341 0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	● Harness connectors (The sensor circuit is opener shorted.) ● Camshaft position sensor ● Starter motor ● Starting system circuit ● Signal plate

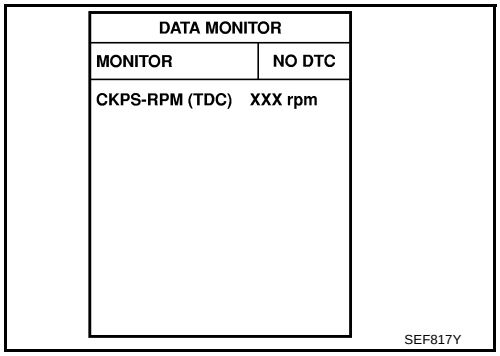
DTC Confirmation Procedure

GBS0007V

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1168, "Diagnostic Procedure" .



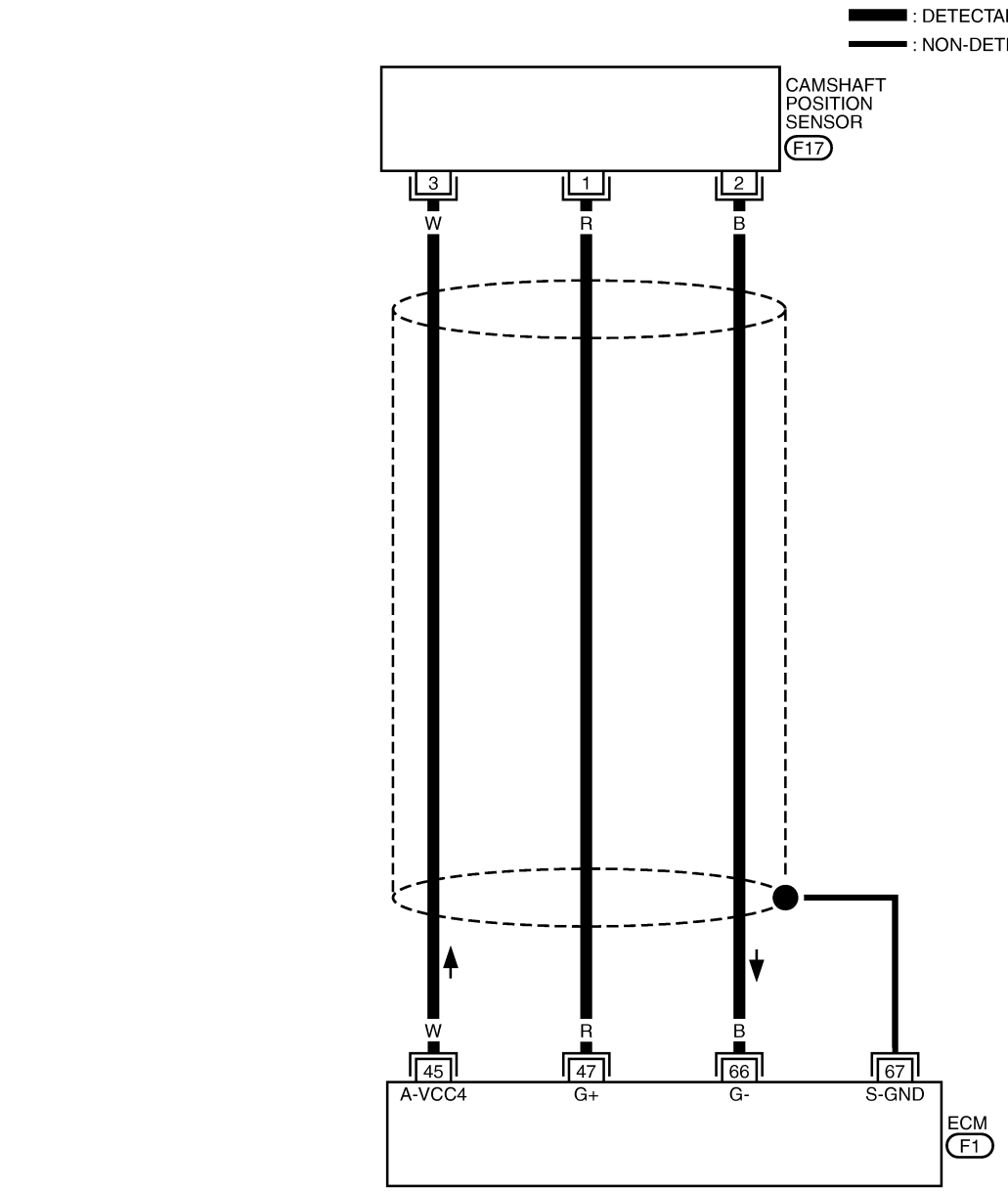
WITHOUT CONSULT-II

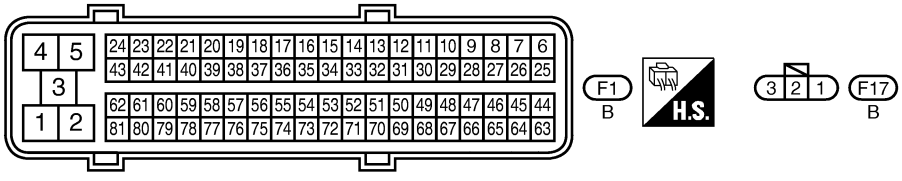
1. Start engine and let it idle for at least 5 seconds.
   If engine can not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1168, "Diagnostic Procedure" .

Wiring Diagram

GBS0007W

EC-CMPS-01





MBWA1047E

Diagnostic Procedure

GBS0007X

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the starter motor operate?

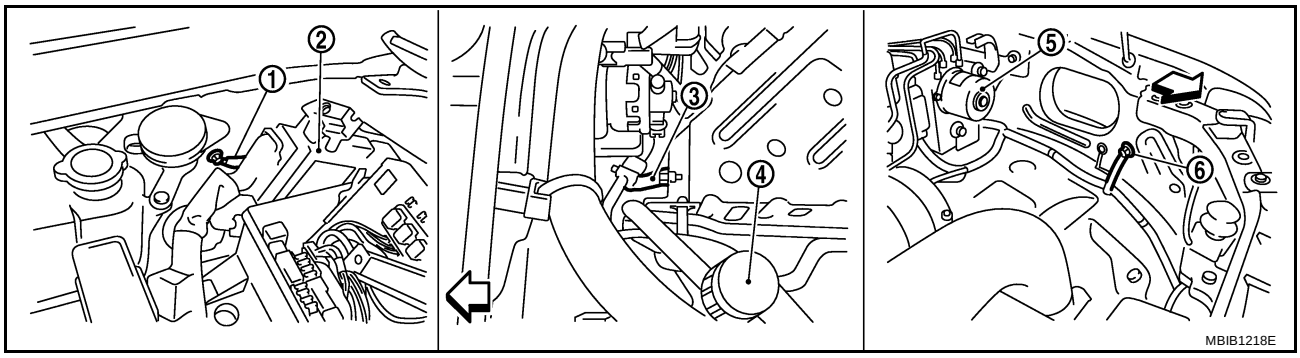
Does the engine turn over?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-30, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

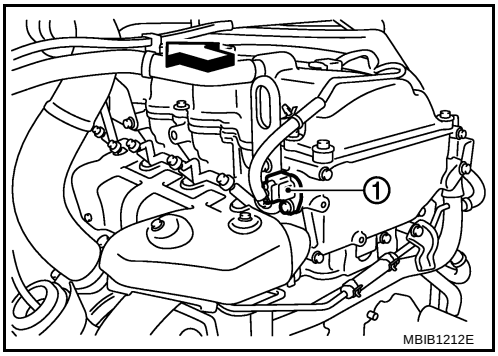
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (1) harness connector.
- ⇦: Vehicle front
2. Turn ignition switch ON.

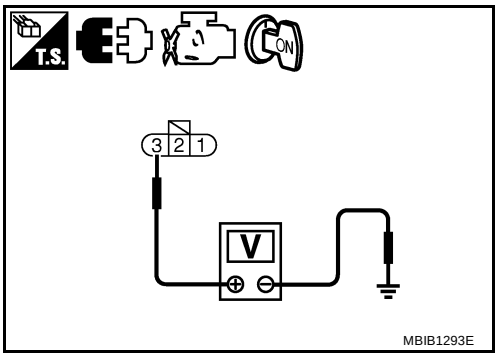


3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1170, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

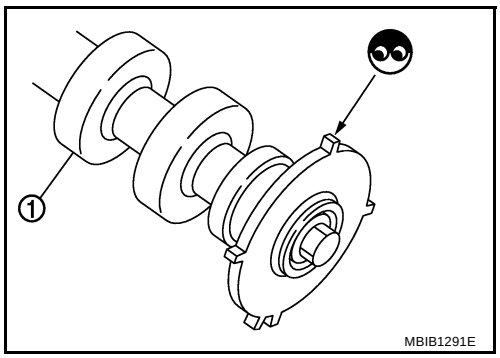
7. CHECK CAMSHAFT (LEFT SIDE)

Check the following.

- Accumulation of debris to the signal plate of camshaft (left side) (1) rear end
- Chipping signal plate of camshaft (left side) rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft (left side) rear end or replace signal plate.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

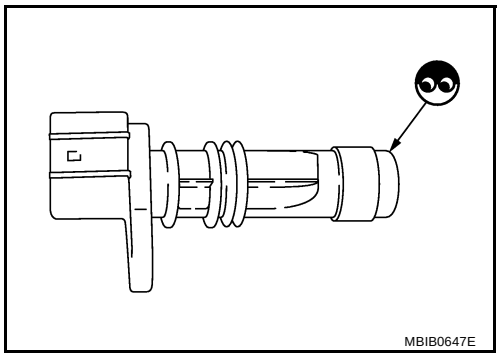
>> **INSPECTION END**

Component Inspection

GBS0007Y

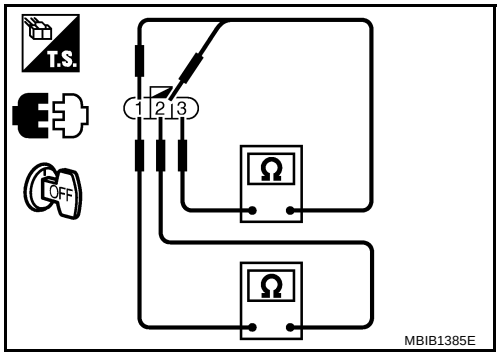
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace camshaft position sensor.

Removal and Installation

GBS0007Z

CAMSHAFT POSITION SENSOR

Refer to EM-203, "CAMSHAFT" .

DTC P0501 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

GBS00080

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

GBS00081

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P0501 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0501 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1203, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0501 0501	Vehicle speed sensor range/performance	A change of vehicle speed signal is excessively large during specified time.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) ● Wheel sensor ● ECM

DTC Confirmation Procedure

GBS00082

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

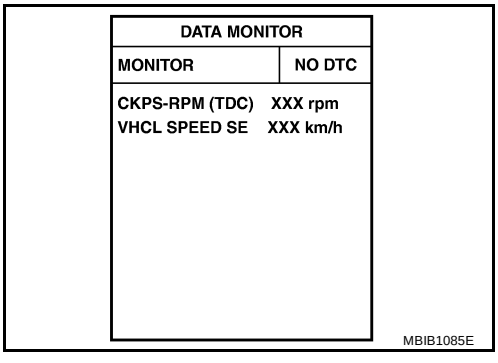
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1172, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:
Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 10 km/h (6 MPH).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1172, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00083

1. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0502 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

GBS00084

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

GBS00085

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P0502 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0502 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1203, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0502 0502	Vehicle speed sensor circuit low input	Vehicle speed signal is excessively low compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) ● Wheel sensor ● ECM

DTC Confirmation Procedure

GBS00086

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

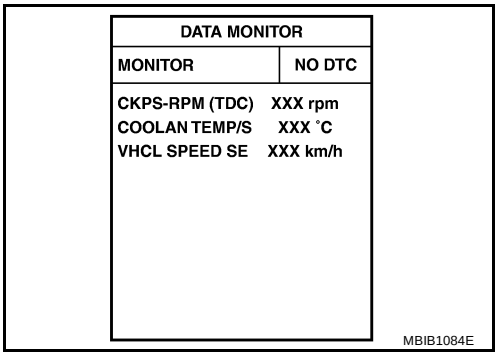
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Maintain the following condition for at least 5 seconds.

CKPS·RPM (TDC)	More than 2,800 rpm
COOLAN TEMP/S	More than 60°C (140 °F)
Clutch pedal (M/T)	Released
Shift lever	1st position

4. If DTC is detected, go to EC-1174, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:

Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following condition for at least 5 seconds.

Engine speed	More than 2,800 rpm
Clutch pedal (M/T)	Released
Shift lever	1st position

3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1176, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00087

1. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0503 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

GBS00088

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

GBS00089

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P0503 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0503 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1203, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0503 0503	Vehicle speed sensor circuit high input	Vehicle speed signal is excessively high compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) ● Wheel sensor ● ECM

DTC Confirmation Procedure

GBS0008A

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

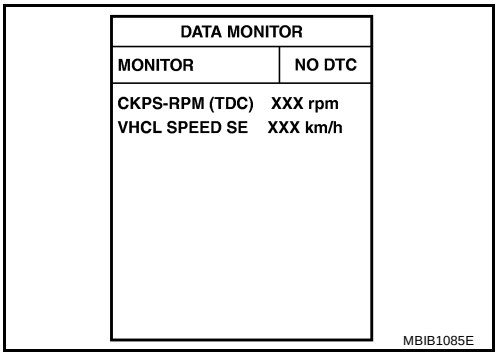
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1176, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:
Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 10 km/h (6 MPH).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1176, "Diagnostic Procedure" .

Diagnostic Procedure

GBS0008B

1. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Refer to BRC-8, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

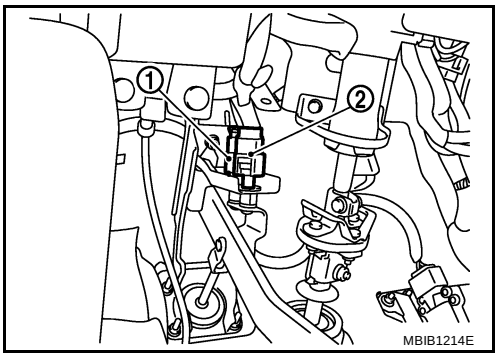
DTC P0504 ASCD BRAKE SWITCH

PFP:25320

Component Description

GBS0008C

When the brake pedal is depressed, ASCD brake switch (1) and stop lamp switch (2) are turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

GBS0008D

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	OFF
		● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	ON

ECM Terminals and Reference Value

GBS0008E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	V	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	W	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V

On Board Diagnosis Logic

GBS0008F

The MIL will not light up for this diagnosis.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0504 0504	ASCD brake switch	● When the vehicle speed is above 5 km/h (3 MPH), ON signal from the stop lamp switch and OFF signal from the ASCD brake switch are sent to the ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is open or shorted.) ● Harness or connectors (The ASCD brake switch circuit is open or shorted.) ● Harness or connectors (The ASCD clutch switch circuit is open or shorted.) (M/T) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch (M/T) ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation (M/T) ● ECM

DTC confirmation Procedure

GBS0008G

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

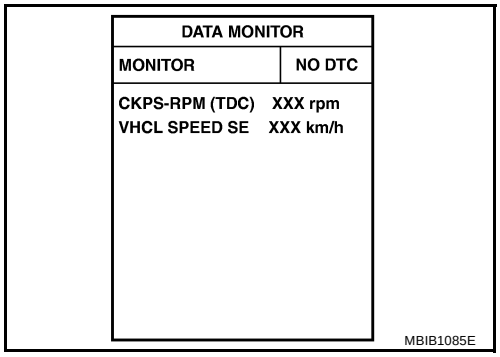
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Steps 3 and 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.



VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position

If DTC is detected, go to EC-1181, "Diagnostic Procedure" .
If DTC is not detected, go to the following step.

5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

6. If DTC is detected, go to EC-1181, "Diagnostic Procedure" .

WITHOUT CONSULT-II

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator lights up.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position

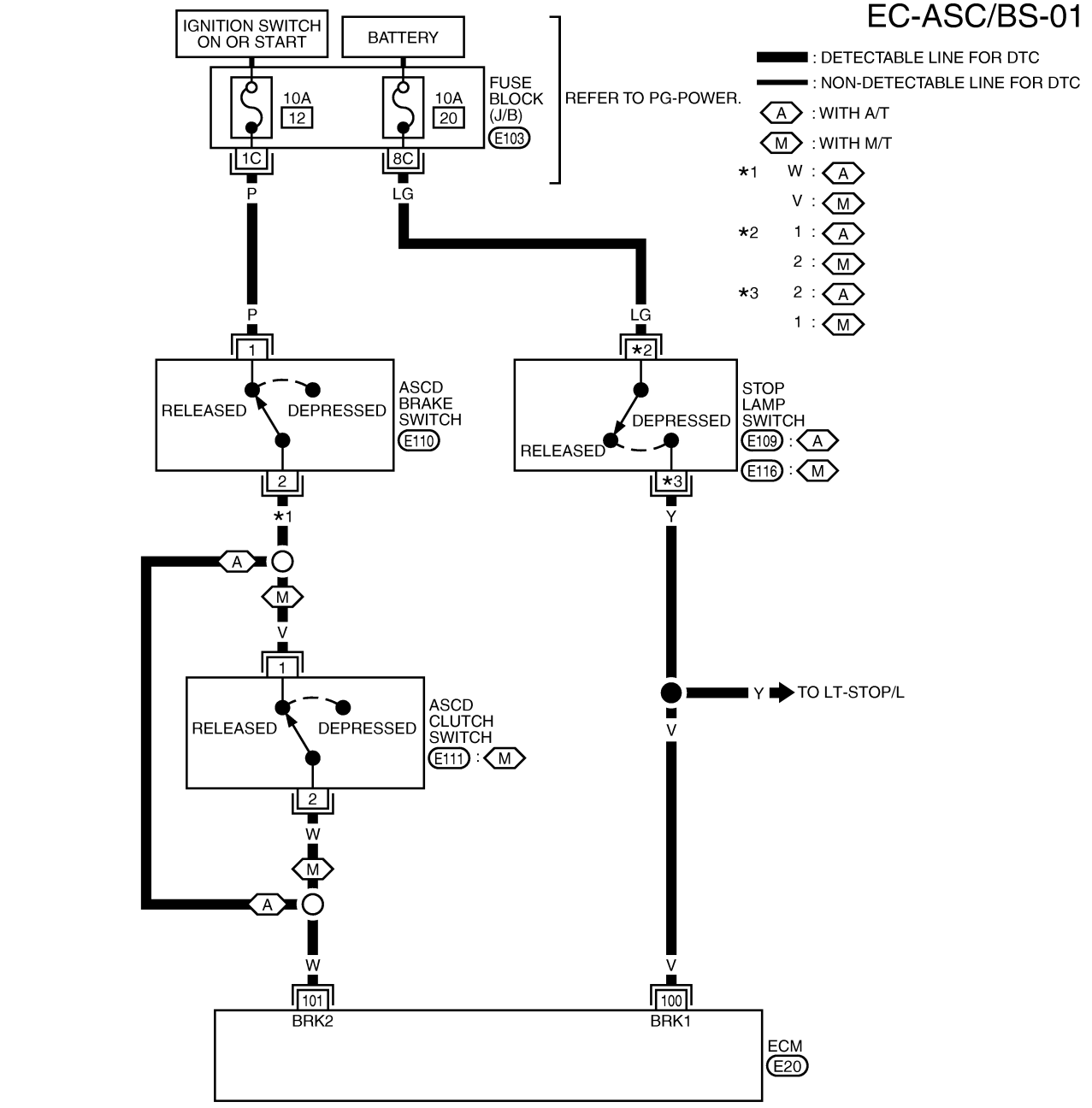
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
   If DTC is detected, go to EC-1181, "Diagnostic Procedure" .
   If DTC is not detected, go to the following step.
6. Start engine.
7. Drive the vehicle for at least 5 consecutive seconds under the following condition.

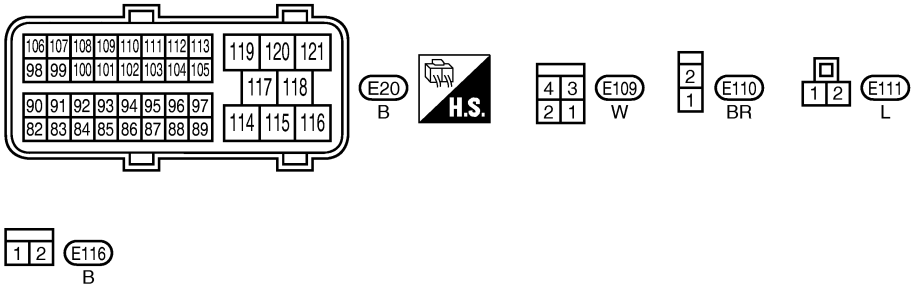
Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

8. If DTC is detected, go to EC-1181, "Diagnostic Procedure" .

Wiring Diagram

GBS0008H





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-
JUNCTION BOX (J/B)

MBWA1360E

Diagnostic Procedure

GBS0008I

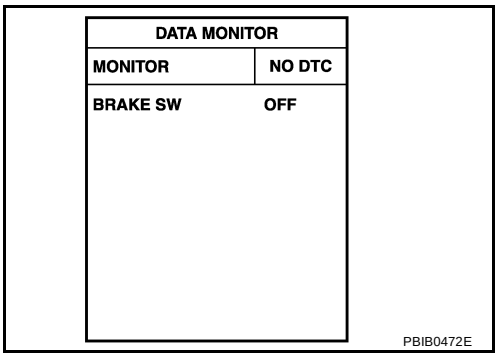
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

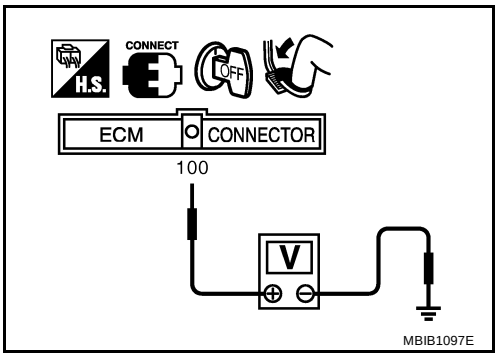
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

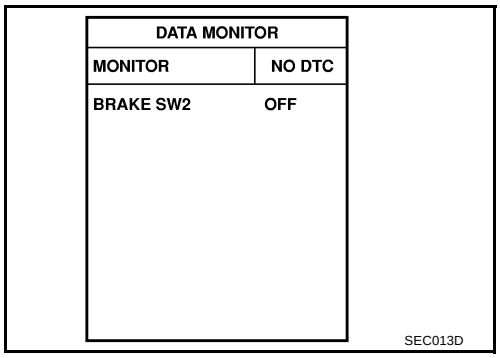
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

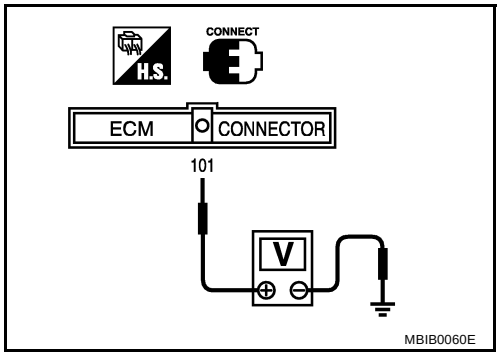
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0V

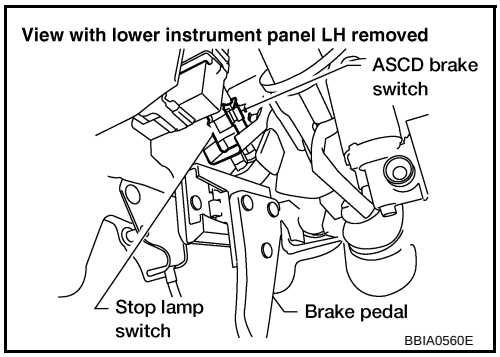


OK or NG

OK >> GO TO 11.
NG >> GO TO 7.

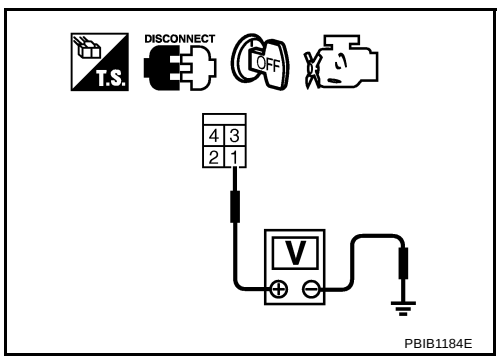
3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

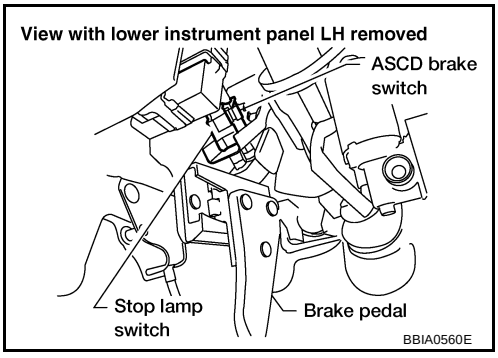
Refer to EC-1190, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

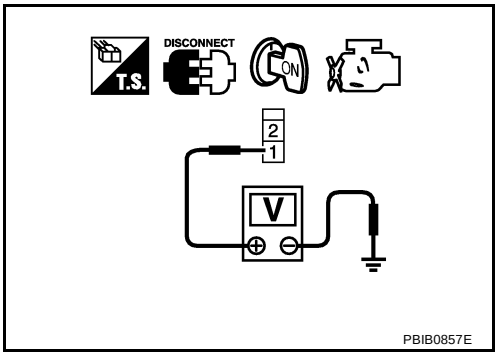


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

Refer to EC-1190, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

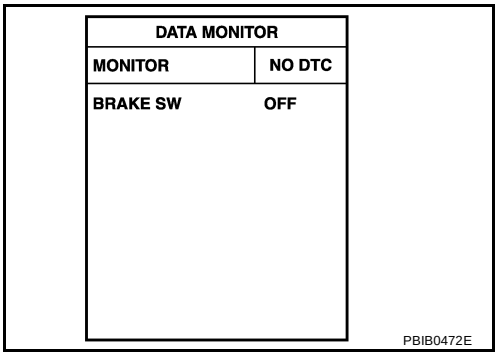
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

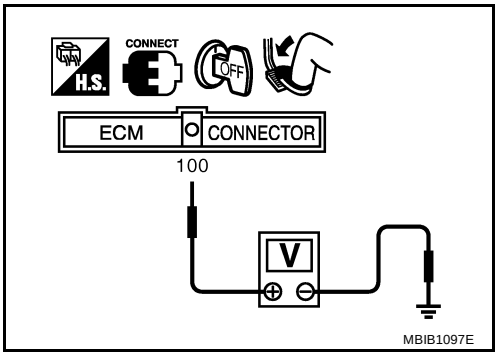
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

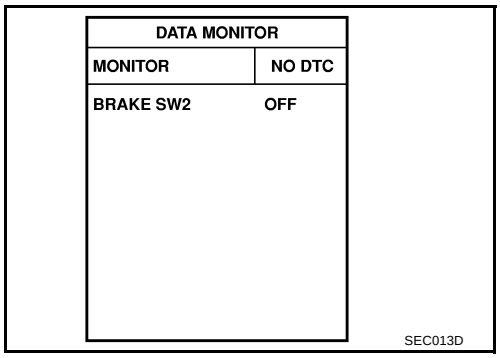
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

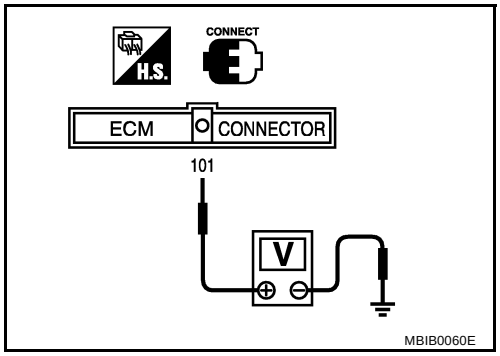
CONDITION	INDICATION
Clutch pedal and brake pedal: Fully released	OFF
Clutch pedal and/or brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and brake pedal: Fully released	Battery voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V

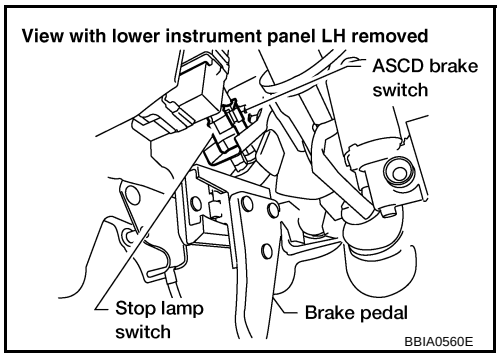


OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

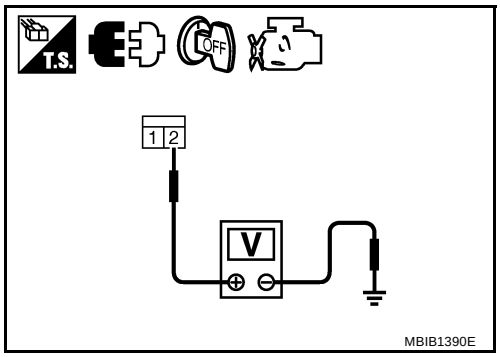
3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

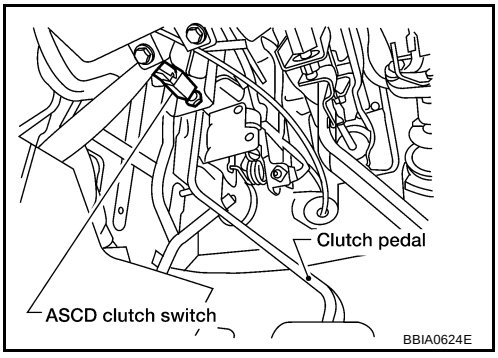
Refer to EC-1190, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

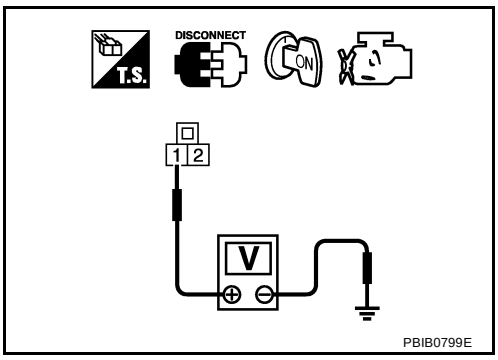
7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

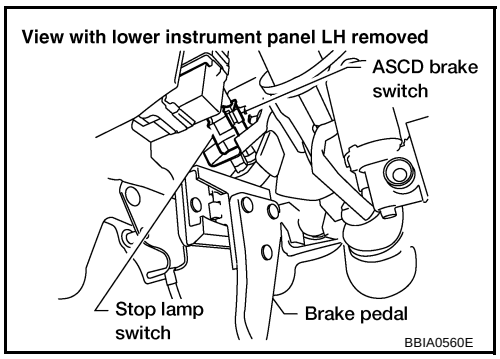


OK or NG

OK >> GO TO 12.
NG >> GO TO 8.

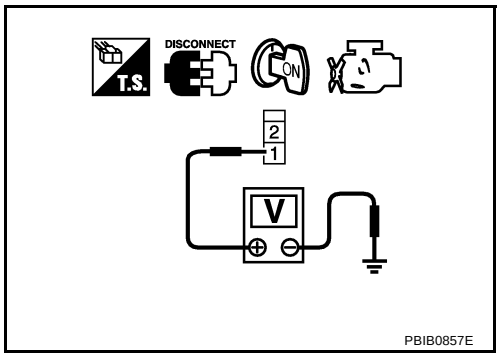
8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD brake clutch switch terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to EC-1190, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

12. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to EC-1190, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

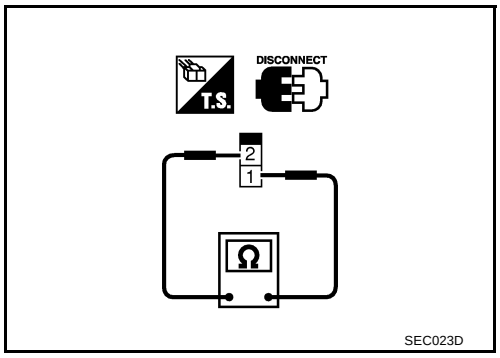
GBS0008J

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

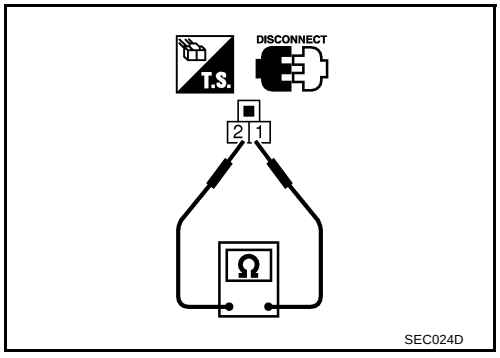


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

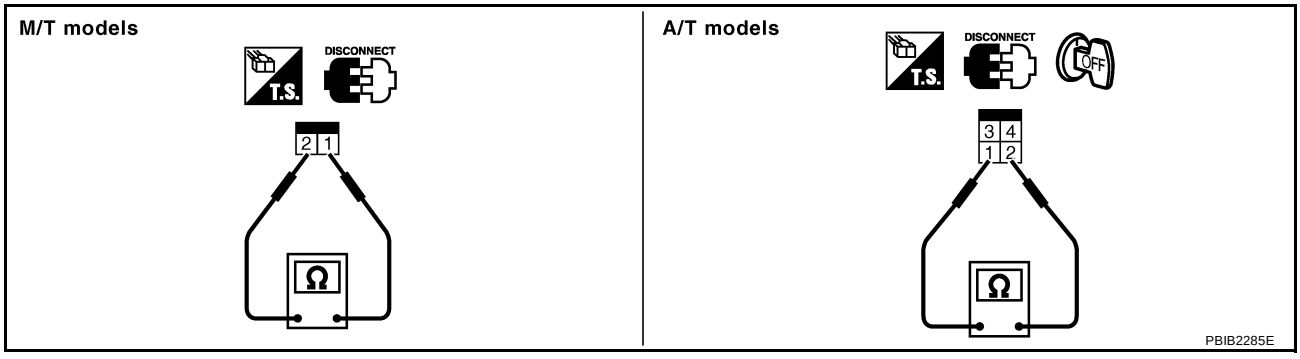
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

DTC P0563 BATTERY VOLTAGE

PFP:24410

On Board Diagnosis Logic

GBS0008K

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563 0563	Battery voltage high	An excessively high voltage from the battery is sent to ECM.	● Battery ● Battery terminal ● Alternator ● Incorrect jump starting

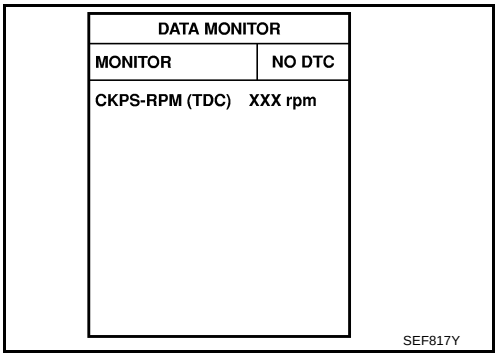
DTC Confirmation Procedure

GBS0008L

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 35 seconds.
4. If DTC is detected, go to EC-1191, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 35 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1191, "Diagnostic Procedure" .

Diagnostic Procedure

GBS0008M

1. INSPECTION START

Are jumper cables connected for the jump starting?

Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK BATTERY AND ALTERNATOR

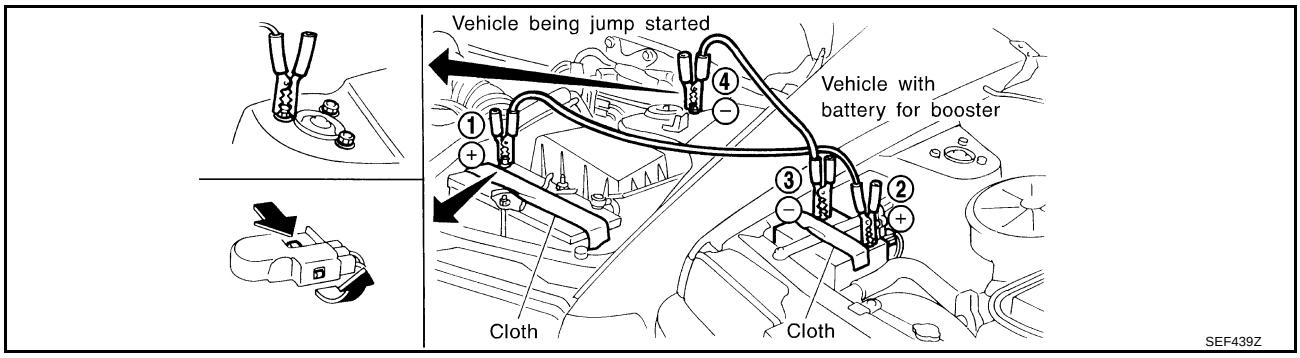
Check that the proper type of battery and type of alternator are installed.
Refer to, SC-5, "BATTERY" and SC-14, "CHARGING SYSTEM" .

OK or NG

OK >> GO TO 5.
NG >> Replace with the proper one.

3. CHECK JUMPER CABLES INSTALLATION

Check that the jumper cables are connected in the correct sequence.



OK or NG

OK >> GO TO 4.
NG >> Reconnect jumper cables properly.

4. CHECK BATTERY FOR BOOSTER

Check that the battery for the booster is a 12V battery.

OK or NG

OK >> GO TO 5.
NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT-II

1. Select “SELF DIAG RESULTS” mode with CONSULT-II.
2. Touch “ERASE”.
3. Perform EC-1191, "DTC Confirmation Procedure" , again.
4. Is DTC P0563 displayed again?

Without CONSULT-II

1. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
2. Perform EC-1191, "DTC Confirmation Procedure" , again.
3. Is DTC 0563 displayed again?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.

- Wiring harness and harness connectors for burn
- Fuses for short

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace malfunctioning part.

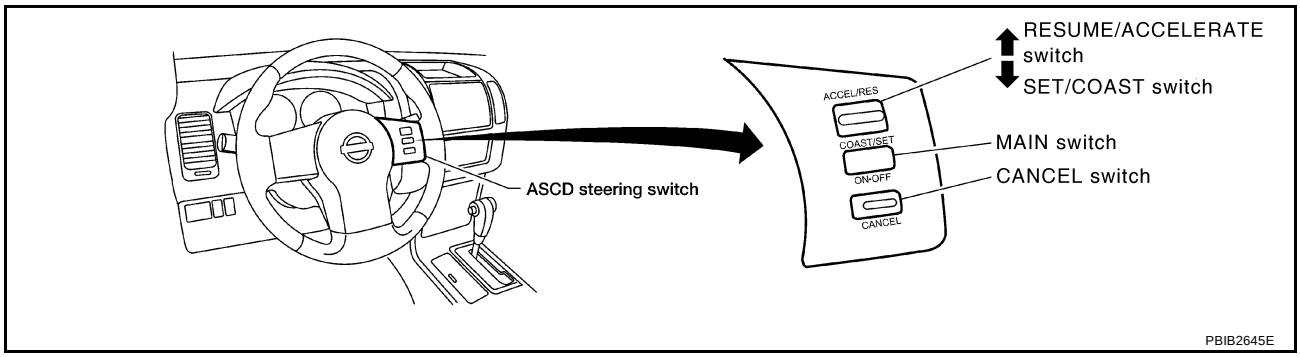
DTC P0580, P0581 ASCD STEERING SWITCH

PFP:25551

Component Description

GBS0008N

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

GBS0008O

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

ECM Terminals and Reference Value

GBS0008P

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	SB	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B	ASCD steering switch ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS0008Q

The MIL will not light up for these diagnoses.

NOTE:
If DTC P0580 or P0581 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1203, "DTC P0606 ECM".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0580 0580	ASCD steering switch circuit low input	● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM
P0581 0581	ASCD steering switch circuit high input	● An excessively high voltage signal from the ASCD steering switch is sent to ECM.	

DTC Confirmation Procedure

GBS0008R

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-1197, "Diagnostic Procedure" .

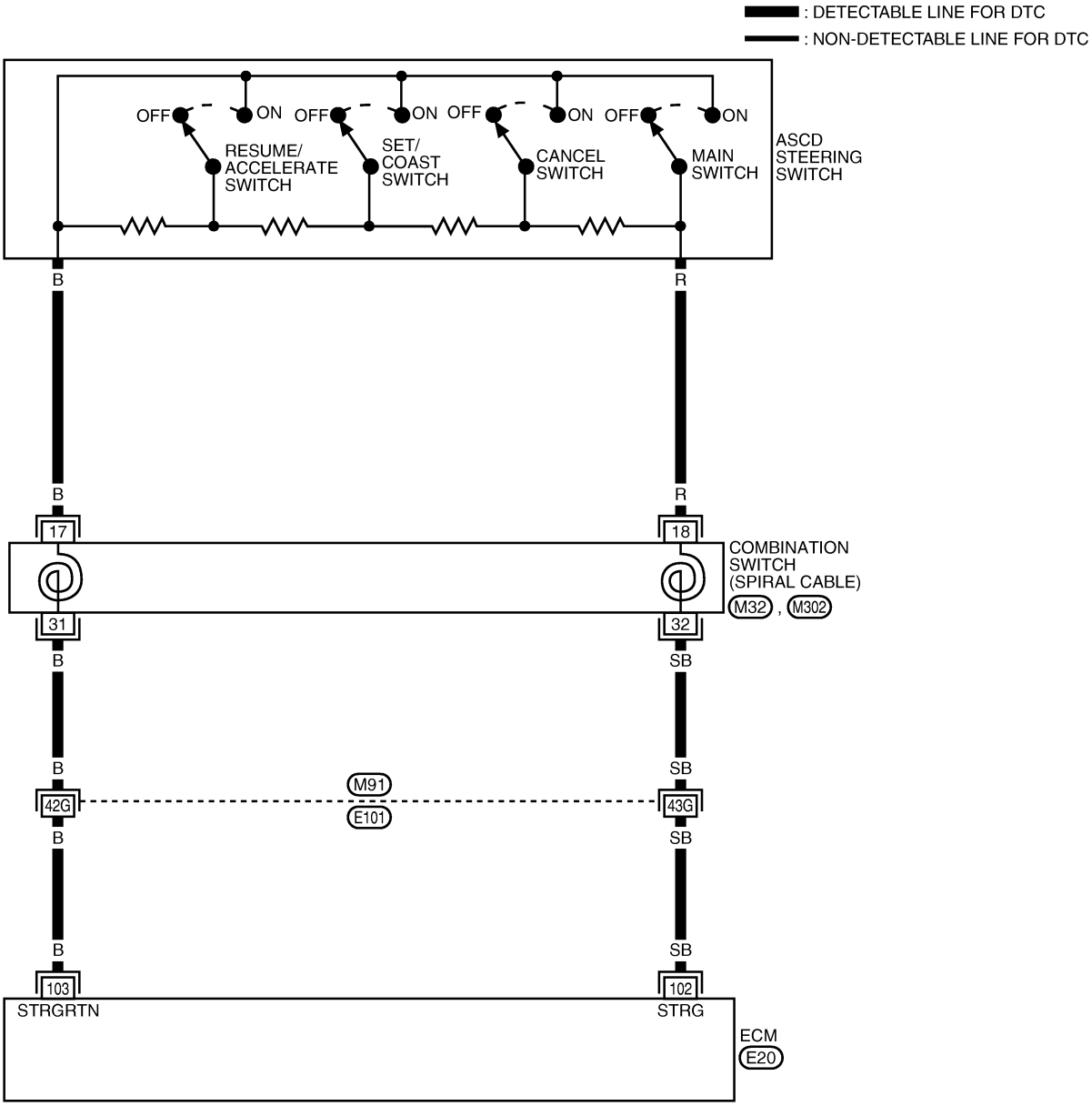
WITHOUT CONSULT-II

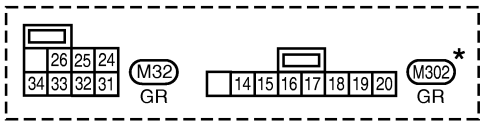
1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If DTC is detected, go to EC-1197, "Diagnostic Procedure" .

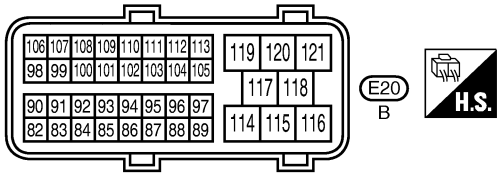
Wiring Diagram

GBS0008S

EC-ASC/SW-01







REFER TO THE FOLLOWING.
M91 -SUPER MULTIPLE JUNCTION (SMJ)

* : THIS CONNECTOR IS NOT SHOWN IN “HARNESS LAYOUT”, PG SECTION.

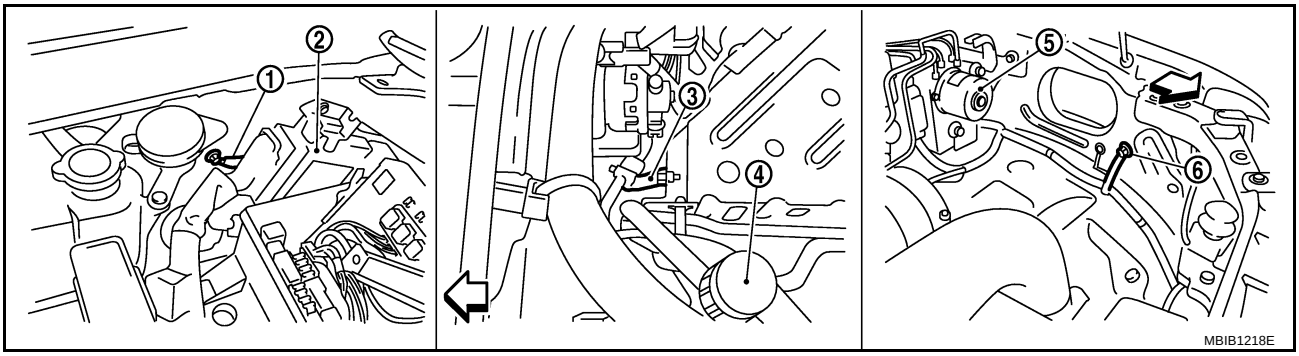
MBWA1422E

Diagnostic Procedure

GBS0008T

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

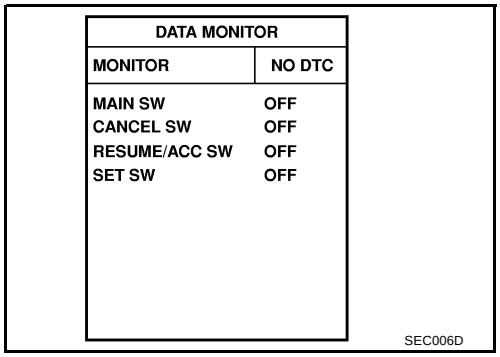
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

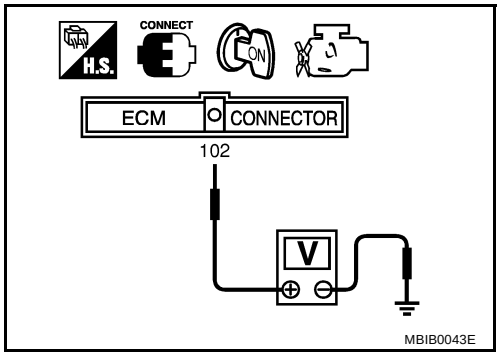
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.3
CANCEL switch	Pressed	Approx. 1.3
	Released	Approx. 4.3
RESUME/ACCELERATE switch	Pressed	Approx. 3.3
	Released	Approx. 4.3
SET/COAST switch	Pressed	Approx. 2.3
	Released	Approx. 4.3



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 17 and ECM terminal 103. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Combination switch (spiral cable)
- Harness connectors M91, E101
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 102 and combination switch terminal 18. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Combination switch (spiral cable)
- Harness connectors M91, E101
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1200, "Component Inspection"

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

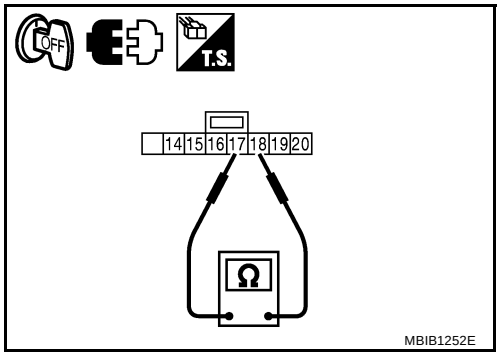
Component Inspection

GBS0008U

ASCD STEERING SWITCH

1. Disconnect combination switch.
2. Check continuity between combination switch terminals 17 and 18 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



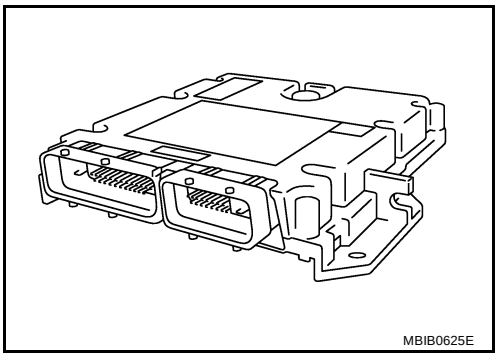
DTC P0605 ECM

PFP:23710

Description

GBS0008V

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

GBS0008W

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605 0605	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

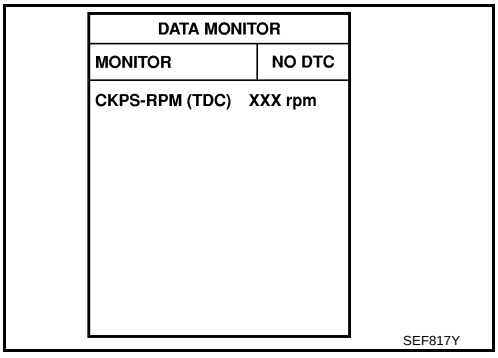
DTC Confirmation Procedure

GBS0008X

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1202, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1202, "Diagnostic Procedure" .

Diagnostic Procedure

GBS0008Y

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 EC-1201, "DTC Confirmation Procedure" , again.
5. Is DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
3. Perform EC-1201, "DTC Confirmation Procedure" , again.
4. Is DTC 0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

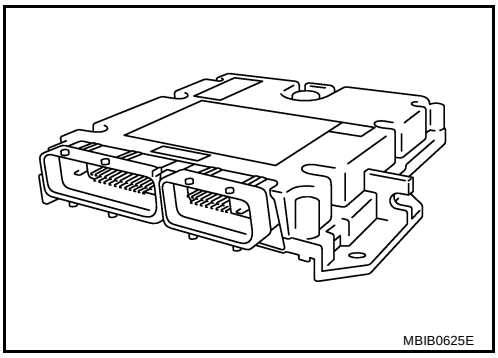
DTC P0606 ECM

PFP:23710

Description

GBS0008Z

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

GBS00090

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0606 0606	Engine control module (Processor)	ECM calculation function is malfunctioning.	● ECM

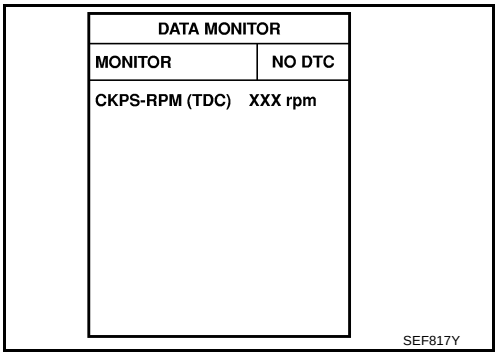
DTC Confirmation Procedure

GBS00091

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1204, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1204, "Diagnostic Procedure" .

Diagnostic Procedure

GBS00092

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 EC-1203, "DTC Confirmation Procedure" , again.
5. Is DTC P0606 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
3. Perform EC-1203, "DTC Confirmation Procedure" , again.
4. Is DTC 0606 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P0628, P0629 FUEL PUMP

PFP:16700

Description

GBS00093

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

GBS00094

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA

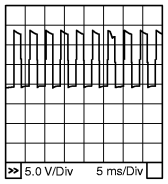
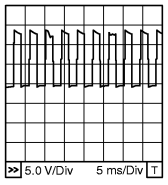
ECM Terminals and Reference Value

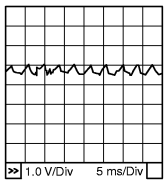
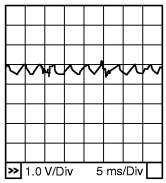
GBS00095

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS00096

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0628 0628	Fuel pump control circuit low input	ECM detects a control circuit for the fuel pump is open or short to ground.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump
P0629 0629	Fuel pump control circuit high output	ECM detects a control circuit for the fuel pump is short to power.	

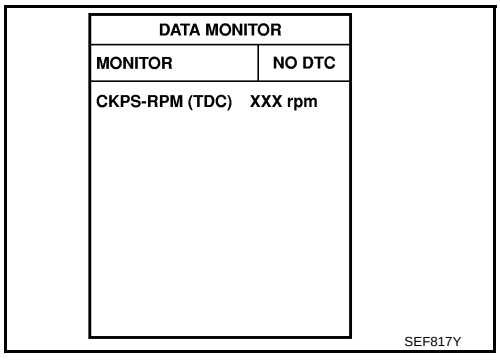
DTC Confirmation Procedure

GBS00097

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 5 seconds.
4. If DTC is detected, go to EC-1208, "Diagnostic Procedure" .



SEF817Y

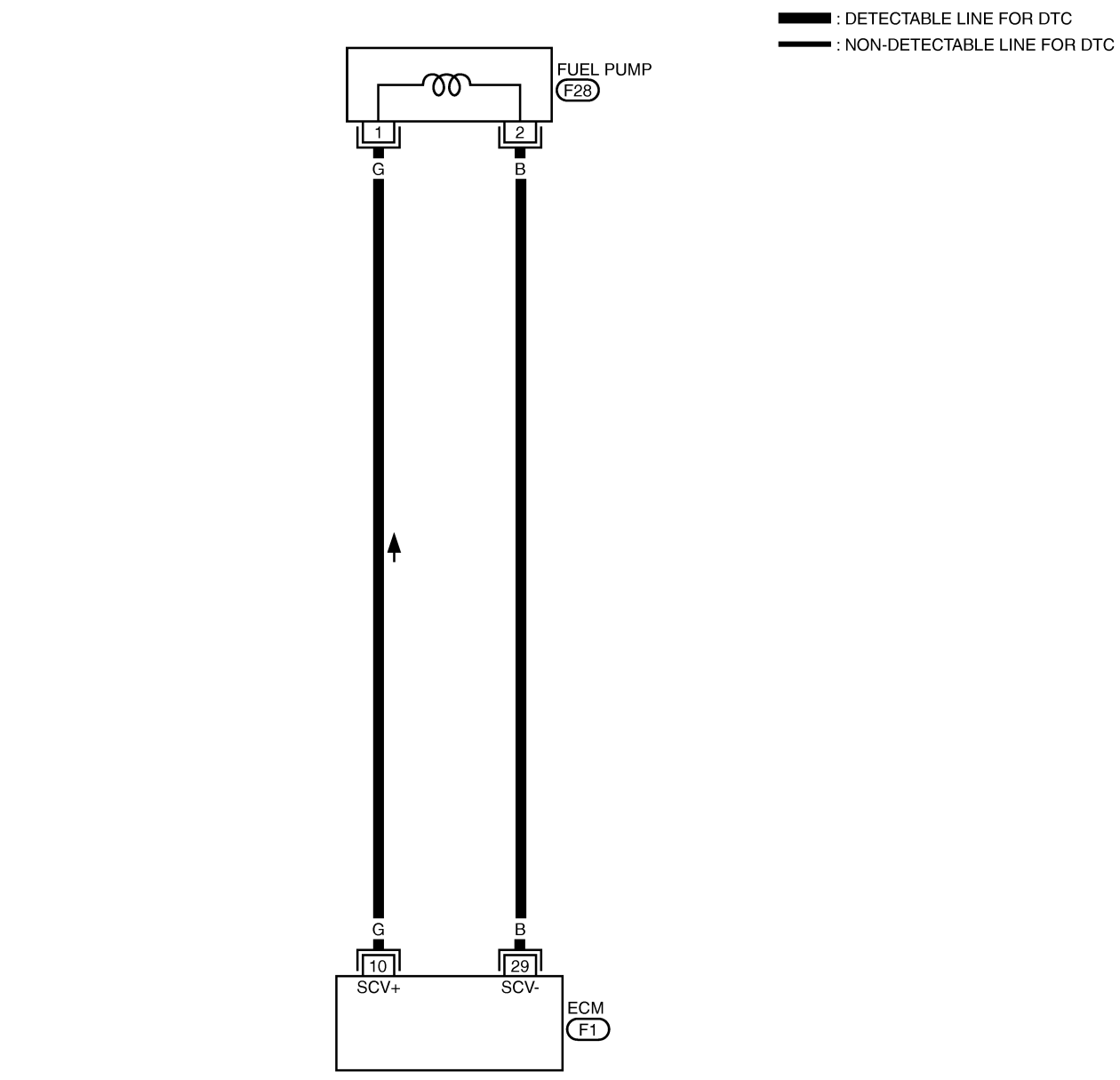
WITHOUT CONSULT-II

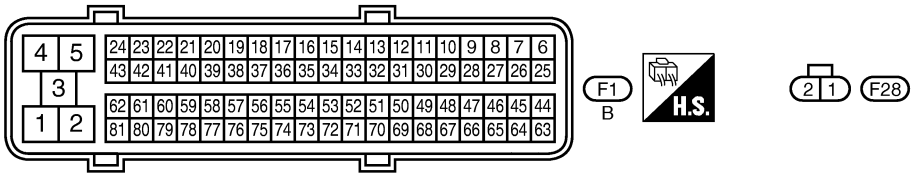
1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1208, "Diagnostic Procedure" .

Wiring Diagram

GBS00098

EC-F/PUMP-01





MBWA1050E

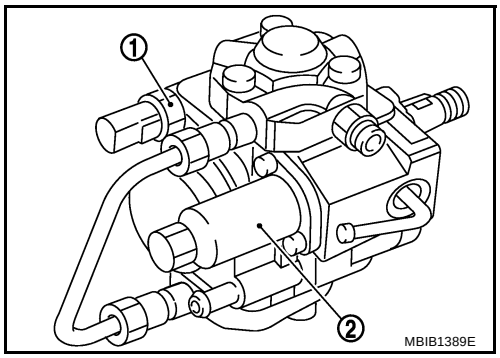
Diagnostic Procedure

GBS00099

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump 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 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP

Refer to EC-1209, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

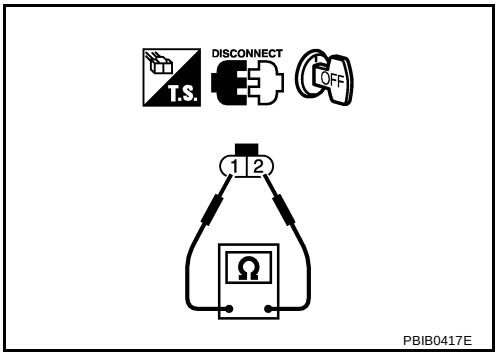
GBS0009A

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

GBS0009B

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P0642, P0643 SENSOR POWER SUPPLY

PFP:18002

ECM Terminals and Reference Value

GBS0009C

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

On Board Diagnosis Logic

GBS0009D

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0642 0642	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (The APP sensor 1 power supply circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0643 0643	Sensor power supply circuit high	ECM detects a voltage of power source for Sensor is excessively high.	

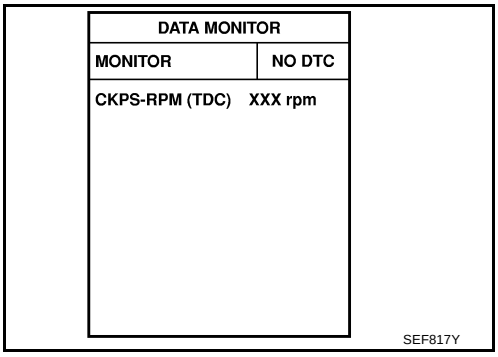
DTC Confirmation Procedure

GBS0009E

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1213, "Diagnostic Procedure" .



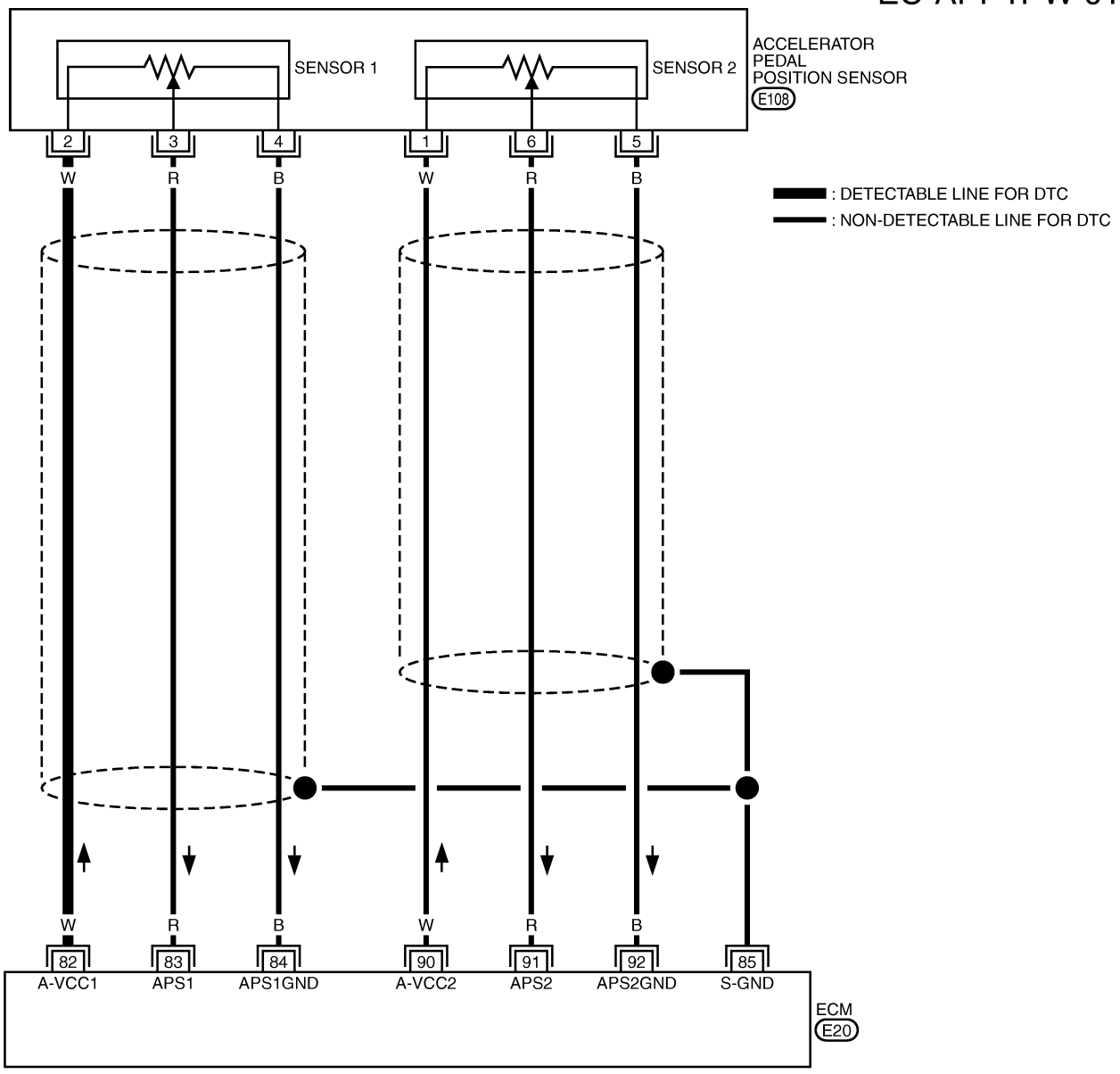
WITHOUT CONSULT-II

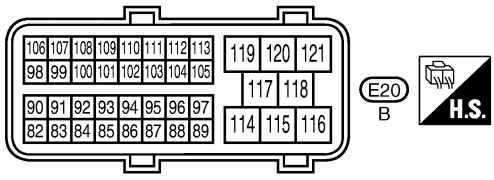
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1213, "Diagnostic Procedure" .

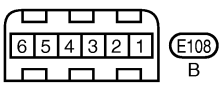
Wiring Diagram

GBS0009F

EC-APP1PW-01







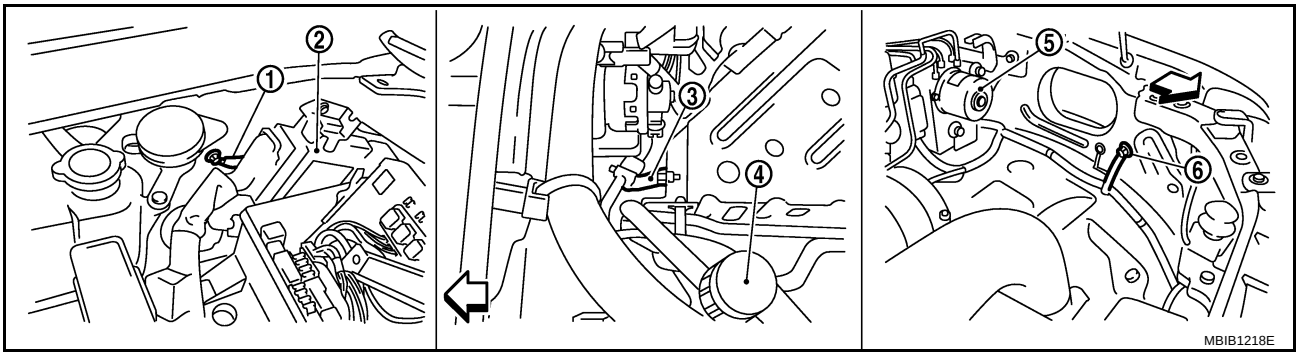
MBWA1051E

Diagnostic Procedure

GBS0009G

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

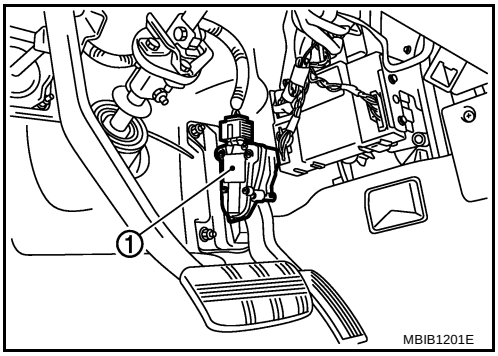
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

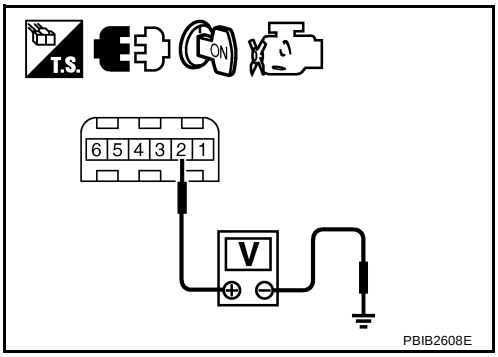
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR

Refer to EC-1134, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace accelerator pedal assembly.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0652, P0653 SENSOR POWER SUPPLY

PFP:18002

ECM Terminals and Reference Value

GBS0009H

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	W	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
45	W	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
63	R	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	V	Sensor power supply (Turbocharger boost sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

On Board Diagnosis Logic

GBS0009I

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0652 0652	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (APP sensor 2 power supply circuit is shorted.) (Crankshaft position sensor circuit is shorted.) (Camshaft position sensor circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 2) ● Crankshaft position sensor ● Camshaft position sensor ● Fuel rail pressure sensor ● Refrigerant pressure sensor ● Turbocharger boost sensor
P0653 0653	Sensor power supply circuit high	ECM detects a voltage of power source for sensor is excessively high.	

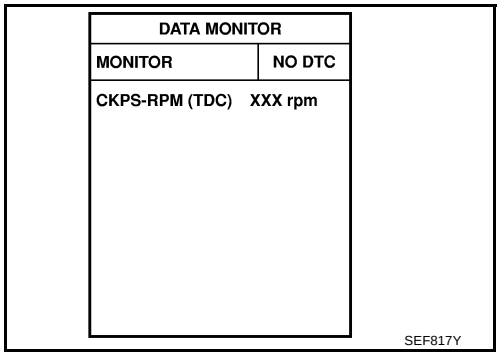
DTC Confirmation Procedure

GBS0009J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1218, "Diagnostic Procedure" .



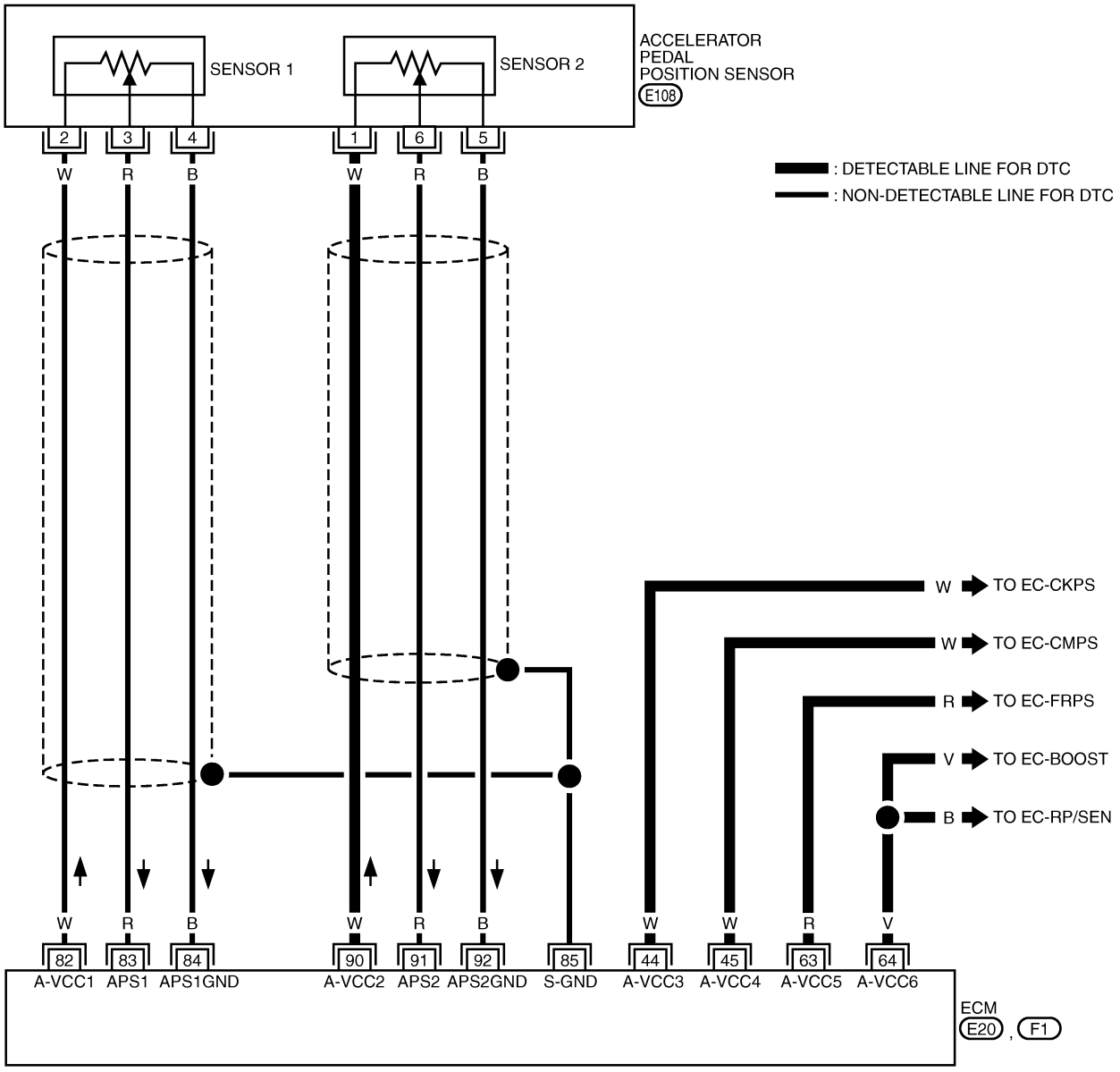
WITHOUT CONSULT-II

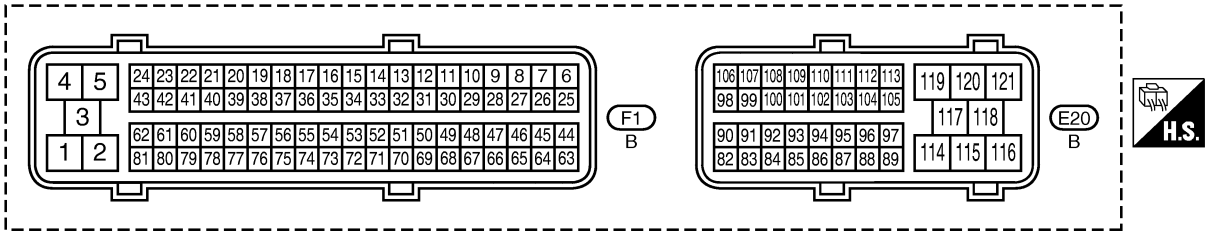
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1218, "Diagnostic Procedure" .

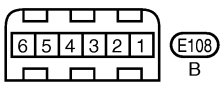
Wiring Diagram

GBS0009K

EC-APP2PW-01







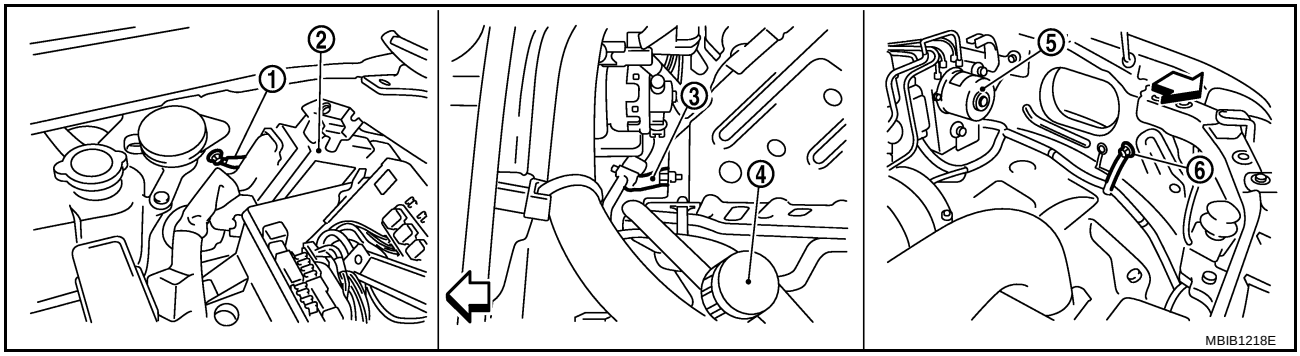
MBWA1052E

Diagnostic Procedure

GBS0009L

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

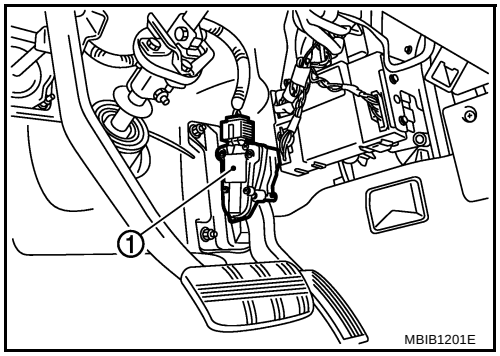
1. Body ground E21
2. ECM
3. Body ground E41
4. A/C high-pressure service valve
5. ABS actuator and electric unit (control unit)
6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

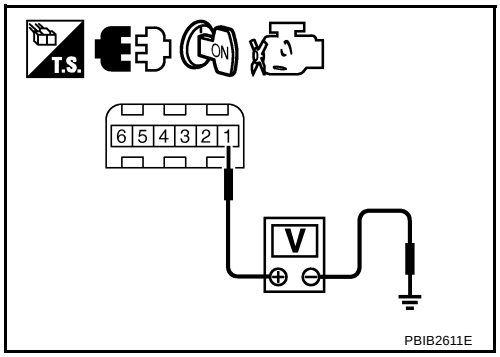
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 1	EC-1217
44	Crankshaft position sensor terminal 3	EC-1149
45	Camshaft position sensor terminal 3	EC-1161
63	Fuel rail pressure sensor terminal 1	EC-1108
64	Refrigerant pressure sensor terminal 3	EC-1308
64	Turbocharger boost sensor terminal 3	EC-1143

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (Refer to EC-1152, "Component Inspection" .)
- Camshaft position sensor (Refer to EC-1163, "Component Inspection" .)
- Fuel rail pressure sensor (Refer to EC-1110, "Component Inspection" .)
- Refrigerant pressure sensor (Refer to MTC-77, "COMPONENT INSPECTION" .)
- Turbocharger boost sensor (Refer to EC-1146, "Component Inspection" .)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-1134, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0686 ECM RELAY

PFP:25230

ECM Terminals and Reference valve

GBS0009M

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	R R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

GBS0009N

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0686 0686	ECM relay circuit	ECM detects ECM relay is stuck closed even if ignition switch OFF.	● Harness or connectors (The ECM relay circuit is shorted.) ● ECM relay

DTC Confirmation Procedure

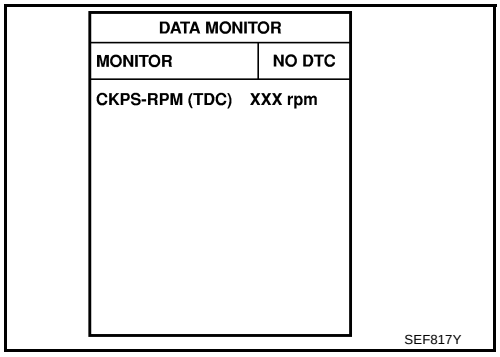
GBS0009O

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-1223, "Diagnostic Procedure" .



WITHOUT CONSULT-II

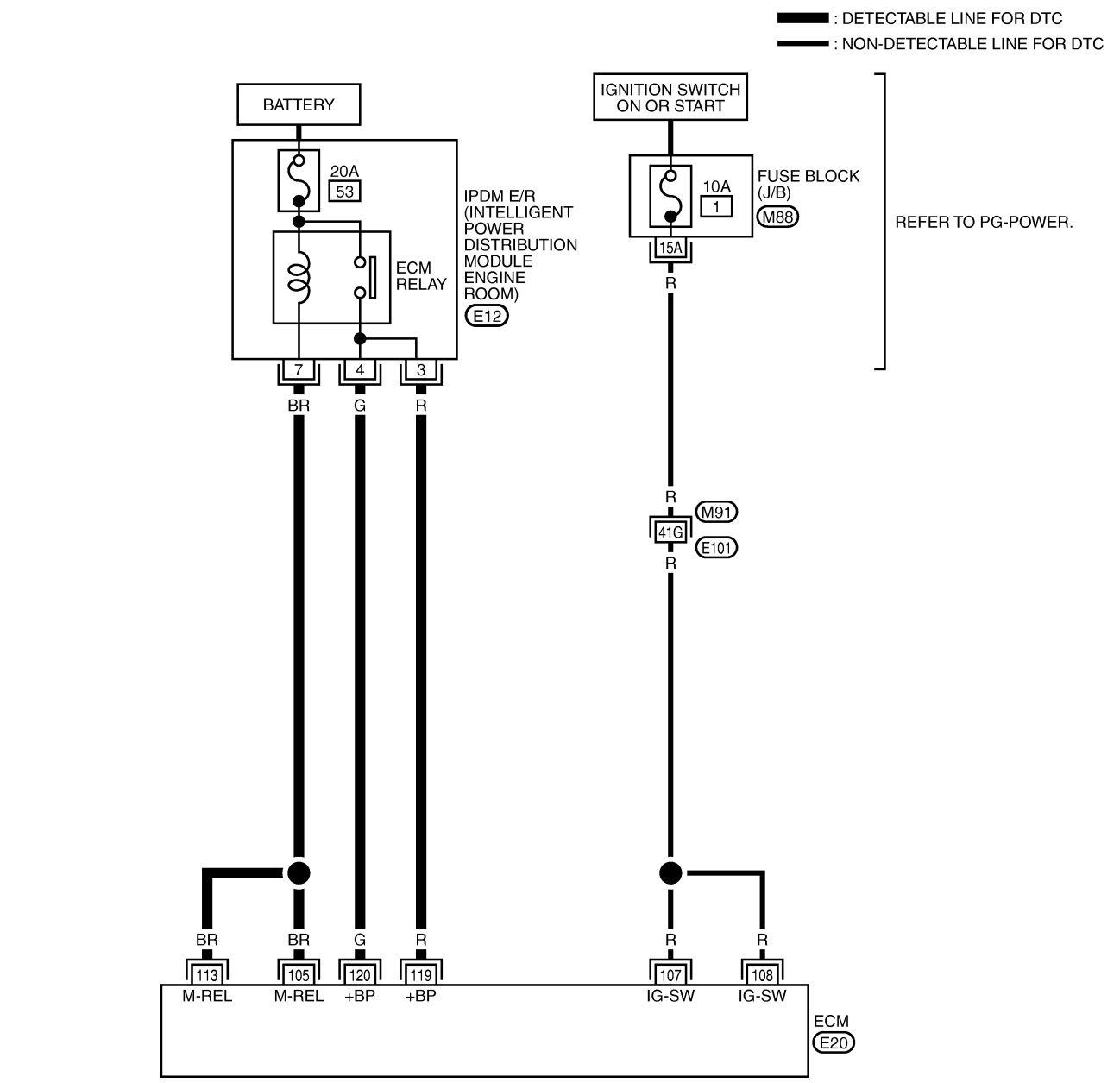
1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

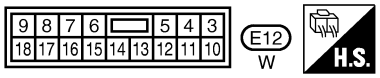
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to EC-1223, "Diagnostic Procedure" .

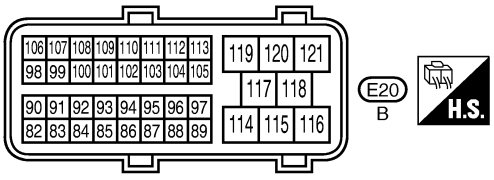
Wiring Diagram

GBS0009P

EC-ECMRLY-01







REFER TO THE FOLLOWING.
M88 -FUSE BLOCK-JUNCTION BOX (J/B)
M91 -SUPER MULTIPLE JUNCTION (SMJ)

MBWA1053E

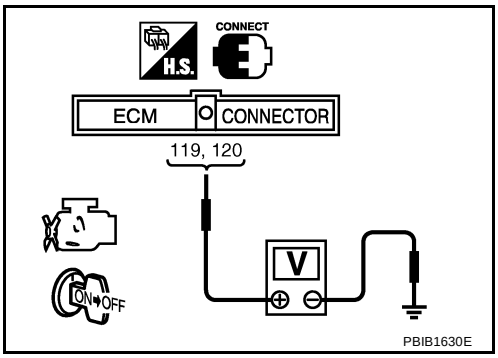
Diagnostic Procedure

GBS0009Q

1. CHECK ECM RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.



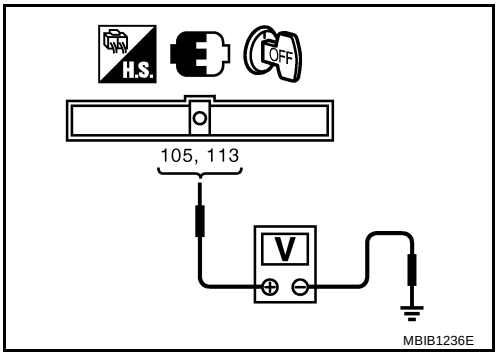
OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

2. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF, and wait at least 10 seconds.
2. Check voltage between ECM terminals 105, 113 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminals 105, 113 or IPDM E/R terminal 7 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground in harness or connectors.

4. CHECK ECM RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check harness continuity between ECM terminal 119 and IPDM E/R terminal 3, ECM terminal 120 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-14, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)"

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

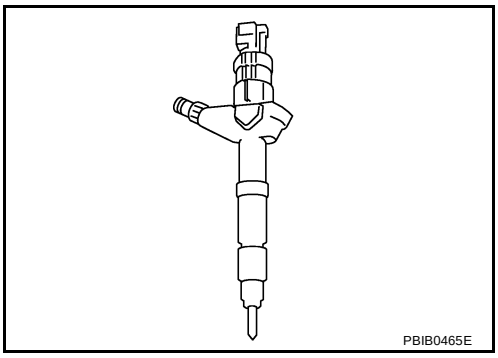
DTC P1268 - P1271 FUEL INJECTOR

PFP:16600

Component Description

GBS0009R

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

GBS0009S

Specification data are reference values.

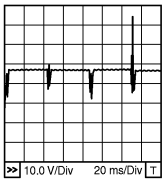
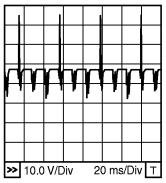
MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Idle speed	No load	0.50 - 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 - 0.80 msec

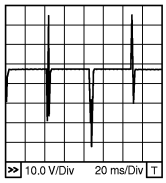
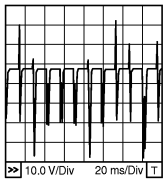
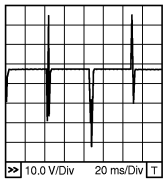
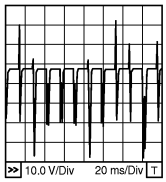
ECM Terminals and Reference Value

GBS0009T

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	V	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1295E
5	G	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1296E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	G P W W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E
40 41 42 43	W GR W B	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS0009U

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1268 1268	No. 1 cylinder fuel injector	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	● Injector adjustment value ● Fuel injector
P1269 1269	No. 2 cylinder fuel injector	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270 1270	No. 3 cylinder fuel injector	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271 1271	No. 4 cylinder fuel injector	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC Confirmation Procedure

GBS0009V

CAUTION:

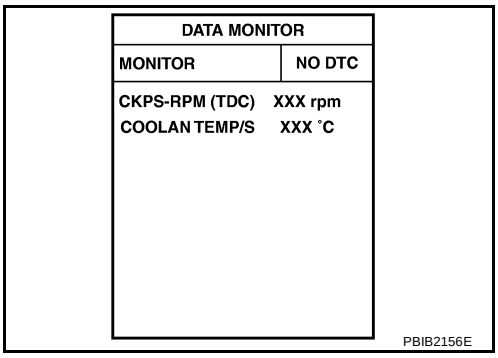
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Restart engine and let it idle for about 15 minutes.
3. If DTC is detected, go to EC-1229, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
4. Drive vehicle and maintain the following conditions for at least 60 seconds.



CKPS·RPM	700 - 2,000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

5. If DTC is detected, go to EC-1229, "Diagnostic Procedure" .

WITHOUT CONSULT-II

1. Start engine and let it idle for about 15 minutes.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1229, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Set voltmeter probes between ECM terminal 70 (engine coolant temperature sensor signal) and ground.
6. Restart engine and drive vehicle and maintain the following conditions for at least 60 seconds.

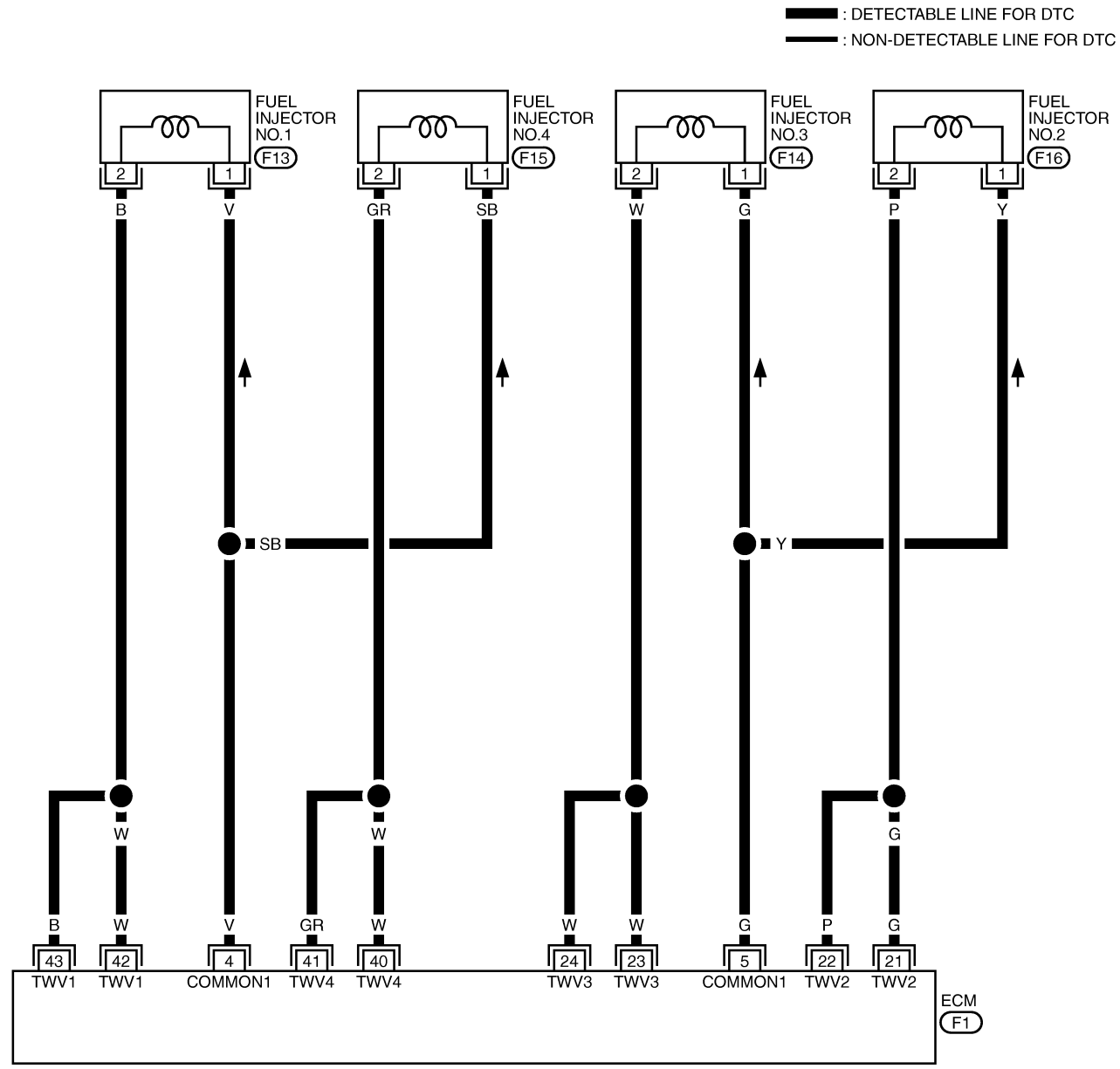
Engine speed	700 - 2,000 rpm (A constant rotation is maintained)
Voltage between ECM terminal 70 and ground	More than 0.6V
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

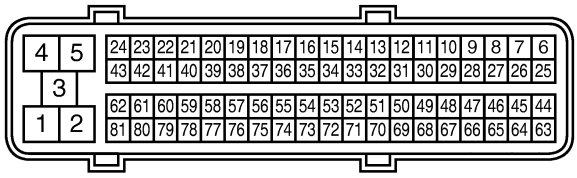
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to EC-1229, "Diagnostic Procedure" .

Wiring Diagram

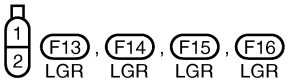
GBS0009W

EC-INJECT-01





F1
B



MBWA1042E

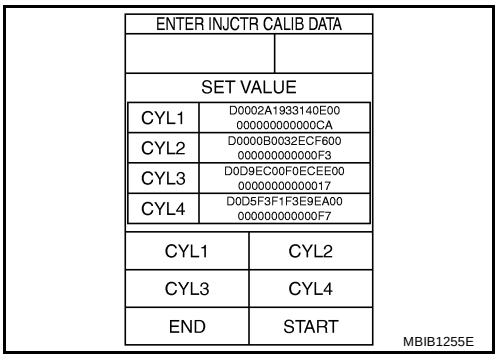
Diagnostic Procedure

GBS0009X

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



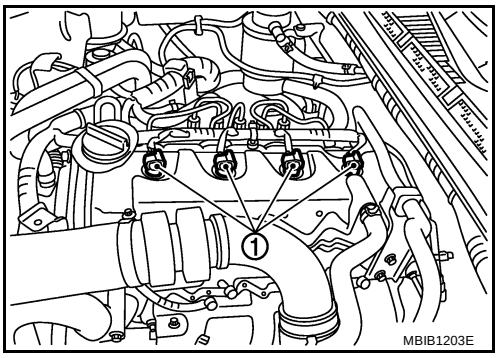
OK or NG

OK >> GO TO 2.

NG >> Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

2. CHECK FUEL INJECOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector (1) harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	4	1	No.1
P1269	5	1	No.2
P1270	5	1	No.3
P1271	4	1	No.4

Continuity should 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.

3. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	42, 43	2	No.1
P1269	21, 22	2	No.2
P1270	23, 24	2	No.3
P1271	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR-I

Refer to EC-1231, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel injector.

5. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform EC-1227, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

Without CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .
6. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
7. Perform EC-1227, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

GBS0009Y

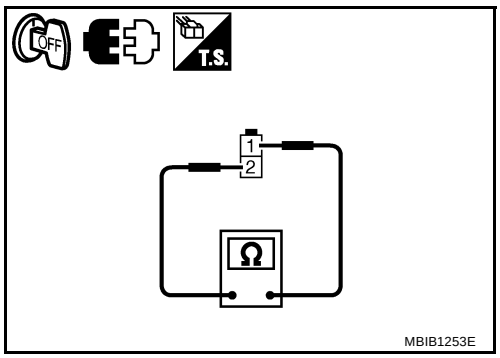
FUEL INJECTOR

1. Disconnect fuel injector harness connector.

2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

GBS0009Z

FUEL INJECTOR

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P1272 FUEL PUMP

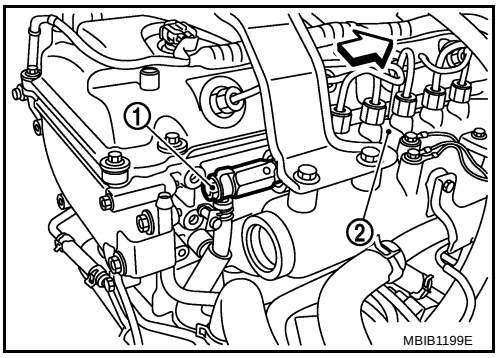
PFP:16700

Description

GBS000A0

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve (1) opens to carry excess fuel to the return hose.

- ⇦: Vehicle front
- Fuel rail (2)



CONSULT-II Reference Value in Data Monitor Mode

GBS000A1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA

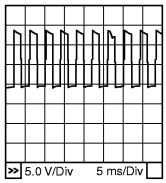
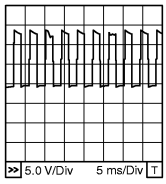
ECM Terminals and Reference Value

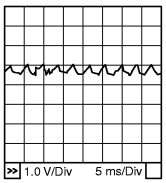
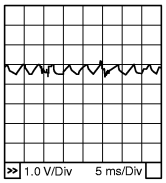
GBS000A2

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000A3

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P1272 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1272 1272	Fuel rail pressure relief valve open	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	● Harness or connectors (Fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor ● Air mixed with fuel ● Lack of fuel

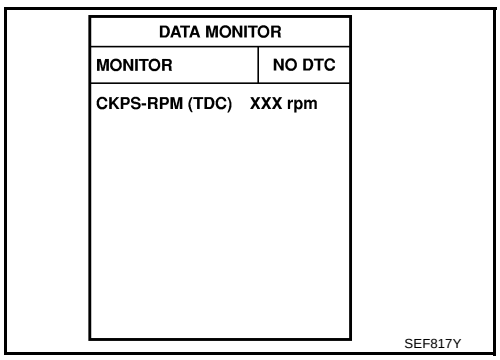
DTC Confirmation Procedure

GBS000A4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
4. If DTC is detected, go to EC-1237, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

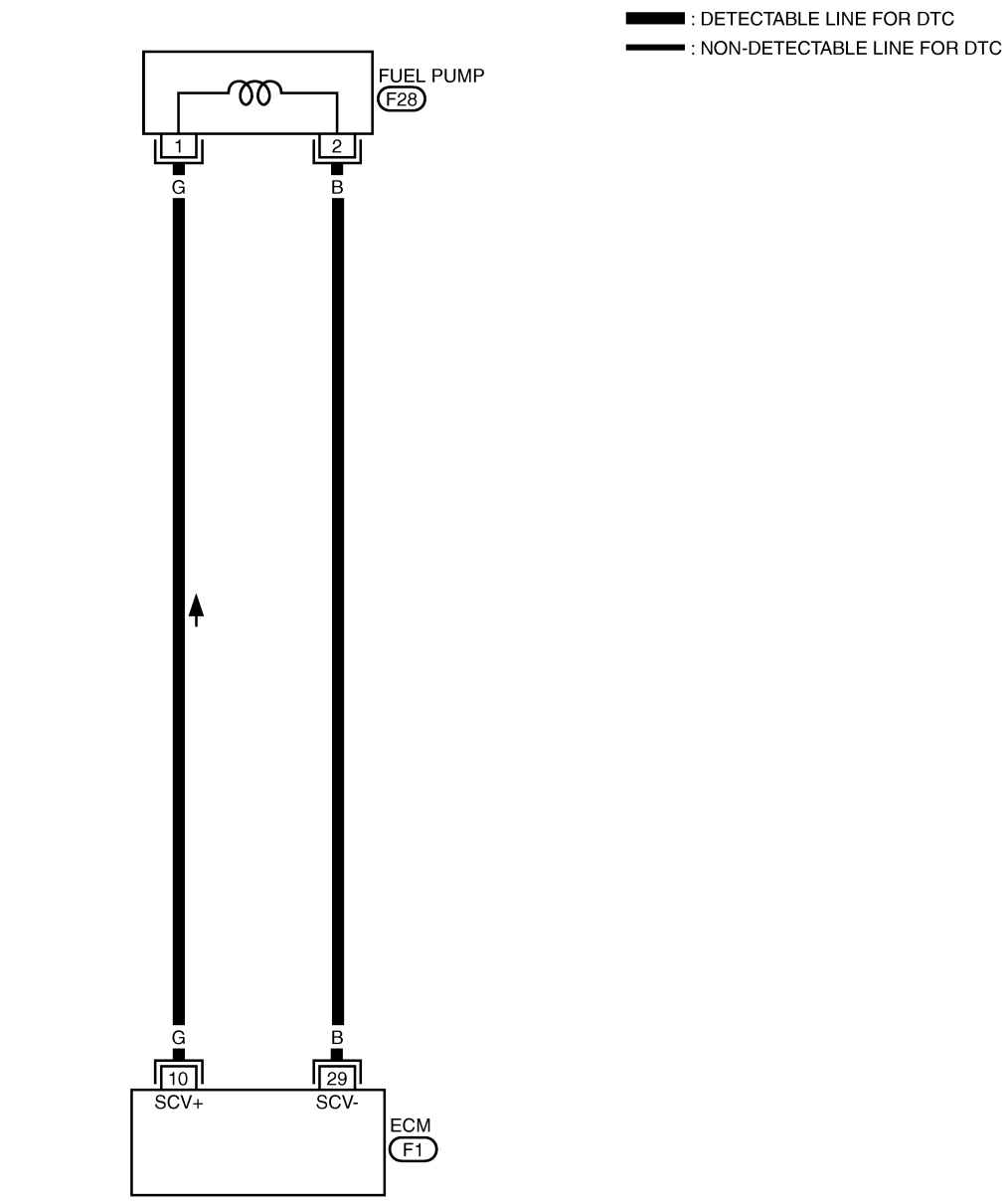
1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.

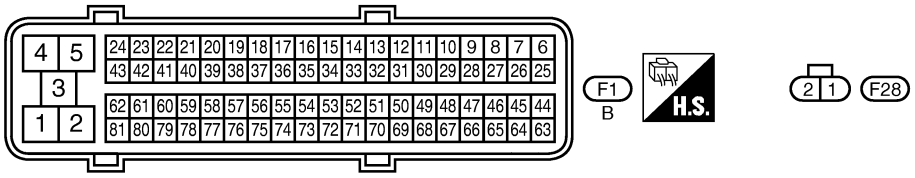
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1237, "Diagnostic Procedure" .

Wiring Diagram

GBS000A5

EC-F/PUMP-01





MBWA1050E

Diagnostic Procedure

GBS000A6

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1234, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
5. Perform EC-1234, "DTC Confirmation Procedure" , again.
6. Is DTC displayed again?

Yes or No

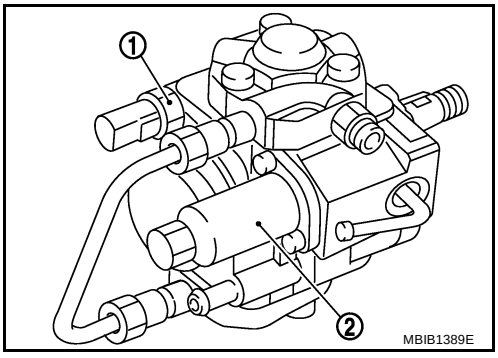
Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump 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 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP

Refer to EC-1238, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

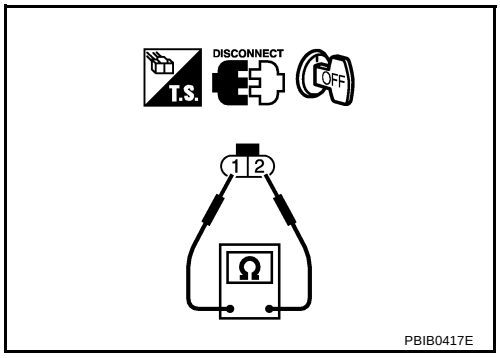
GBS000A7

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

GBS000A8

FUEL RAIL

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P1273 FUEL PUMP

PFP:16700

Description

GBS000A9

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

GBS000AA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA

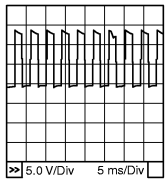
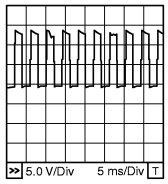
ECM Terminals and Reference Value

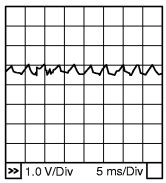
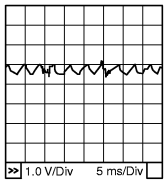
GBS000AB

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000AC

The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P1273 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1273 1273	Fuel pump insufficient flow	ECM detects the abnormal pulse of fuel pressure.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Injector adjustment value ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

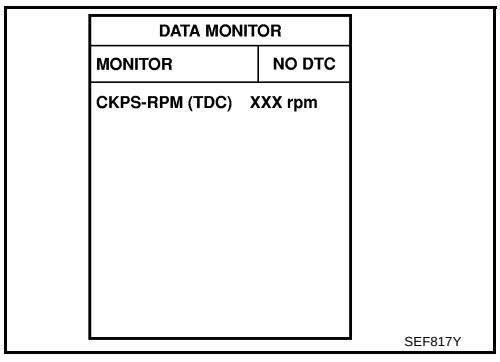
DTC Confirmation Procedure

GBS000AD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 10 seconds.
4. If DTC is detected, go to EC-1243, "Diagnostic Procedure" .



WITHOUT CONSULT-II

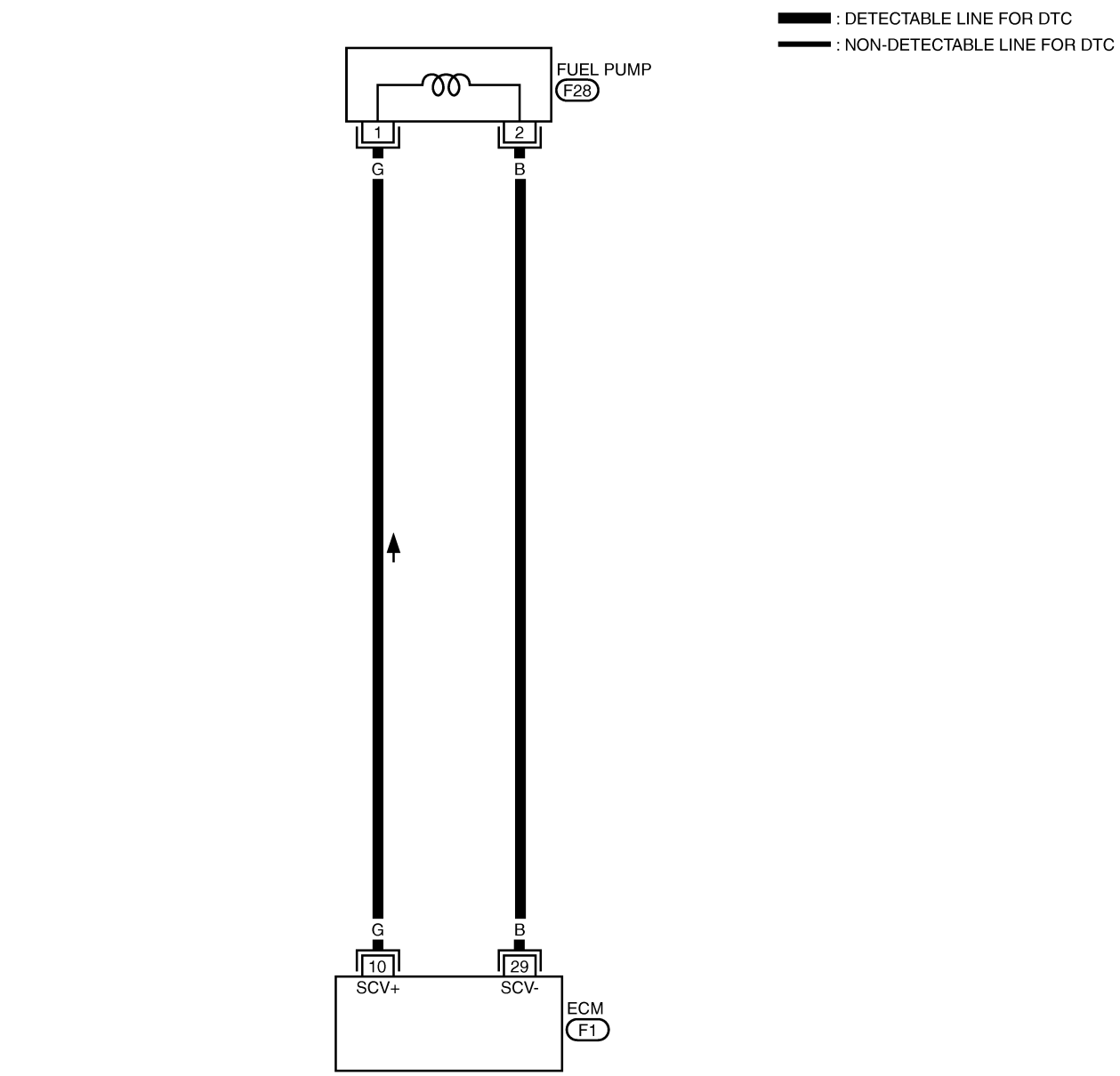
1. Start engine and warm it up to normal operating temperature.

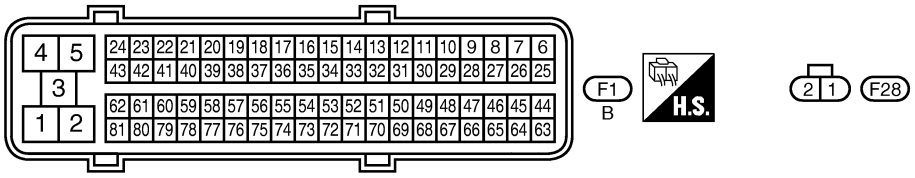
2. Keep engine speed more than 2,000 rpm for at least 10 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1243, "Diagnostic Procedure" .

Wiring Diagram

GBS000AE

EC-F/PUMP-01





MBWA1050E

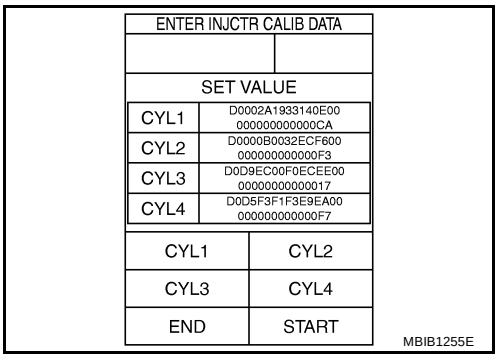
Diagnostic Procedure

GBS000AF

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1240, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Clear fuel pump learning value. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
5. Perform EC-1240, "DTC Confirmation Procedure" , again.
6. Is DTC displayed again?

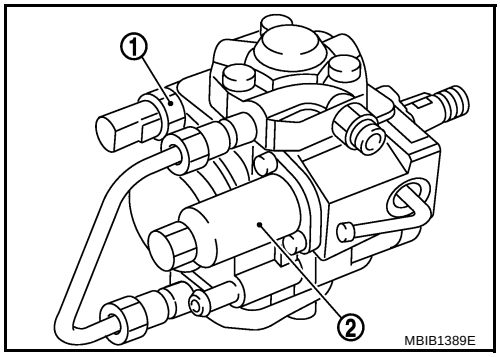
Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK FUEL PUMP

Refer to EC-1245, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

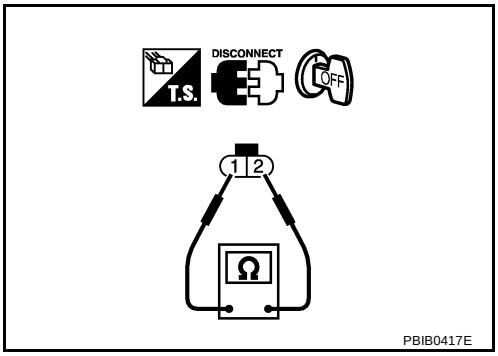
GBS000AG

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

GBS000AH

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P1274 FUEL PUMP

PFP:16700

Description

GBS000AI

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

GBS000AJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA

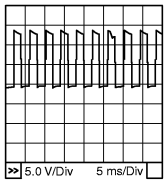
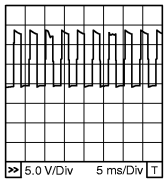
ECM Terminals and Reference Value

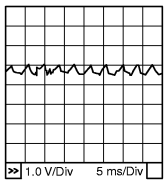
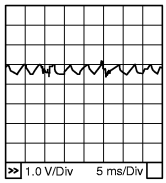
GBS000AK

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000AL

NOTE:
If DTC P1274 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1274 1274	Fuel pump protection	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

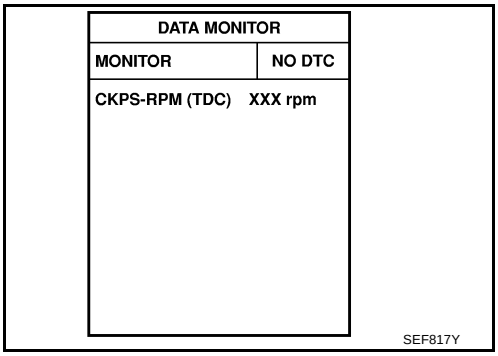
DTC Confirmation Procedure

GBS000AM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Tuning ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let idle for at least 5 seconds.
4. If DTC is detected, go to EC-1249, "Diagnostic Procedure" .



WITHOUT CONSULT-II

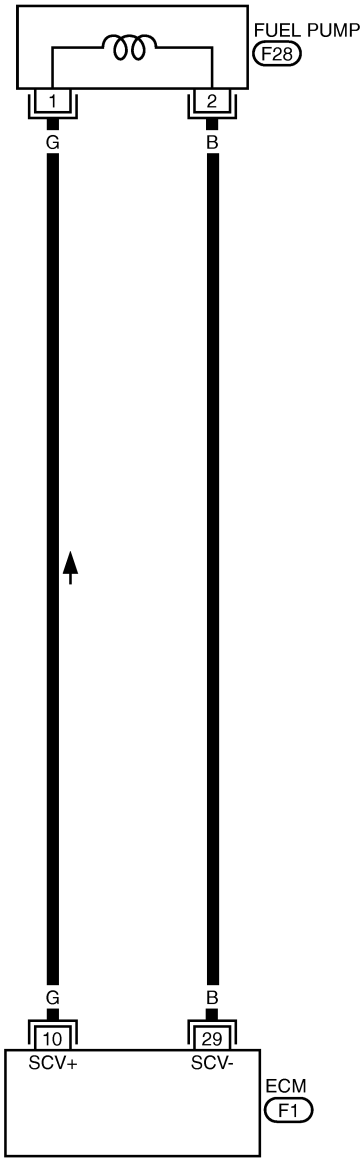
1. Start engine and let idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1249, "Diagnostic Procedure" .

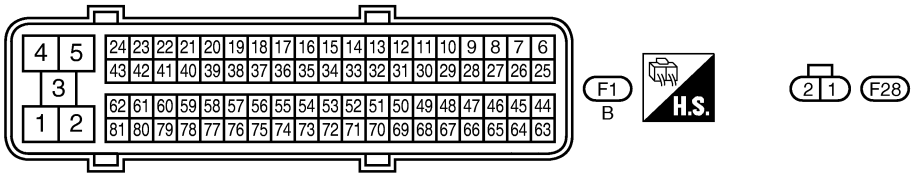
Wiring Diagram

GBS000AN

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





MBWA1050E

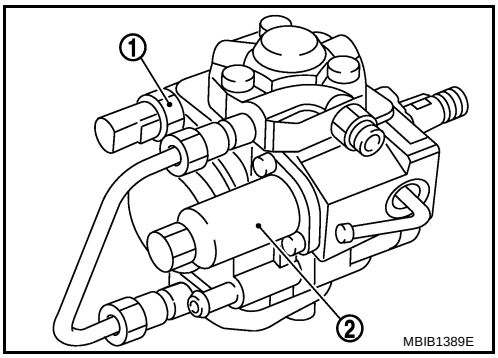
Diagnostic Procedure

GBS000AO

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump 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 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1250, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

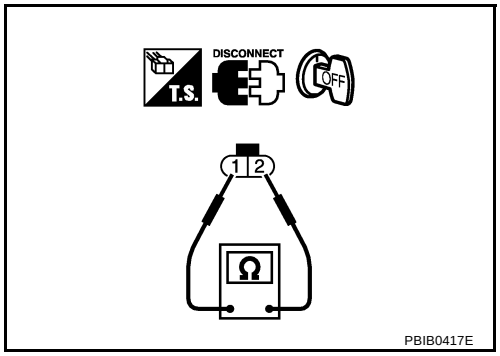
GBS000AP

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

GBS000AQ

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

DTC P1275 FUEL PUMP

PFP:16700

Description

GBS000AR

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

GBS000AS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1,600 - 2,000 mA
		2,000 rpm	1,500 - 1,900 mA

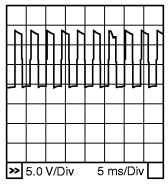
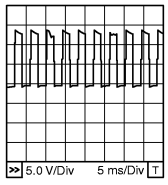
ECM Terminals and Reference Value

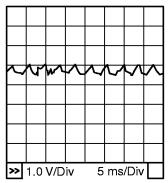
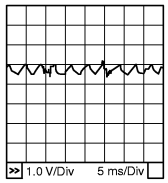
GBS000AT

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	G	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5.8V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 5.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	B	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000AU

NOTE:
If DTC P1275 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1275 1275	Fuel pump exchange	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

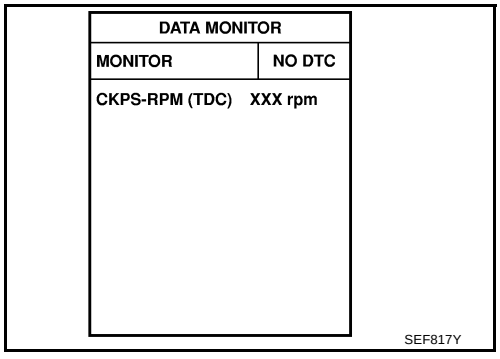
DTC Confirmation Procedure

GBS000AV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 60 seconds.
4. If DTC is detected, go to EC-1255, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

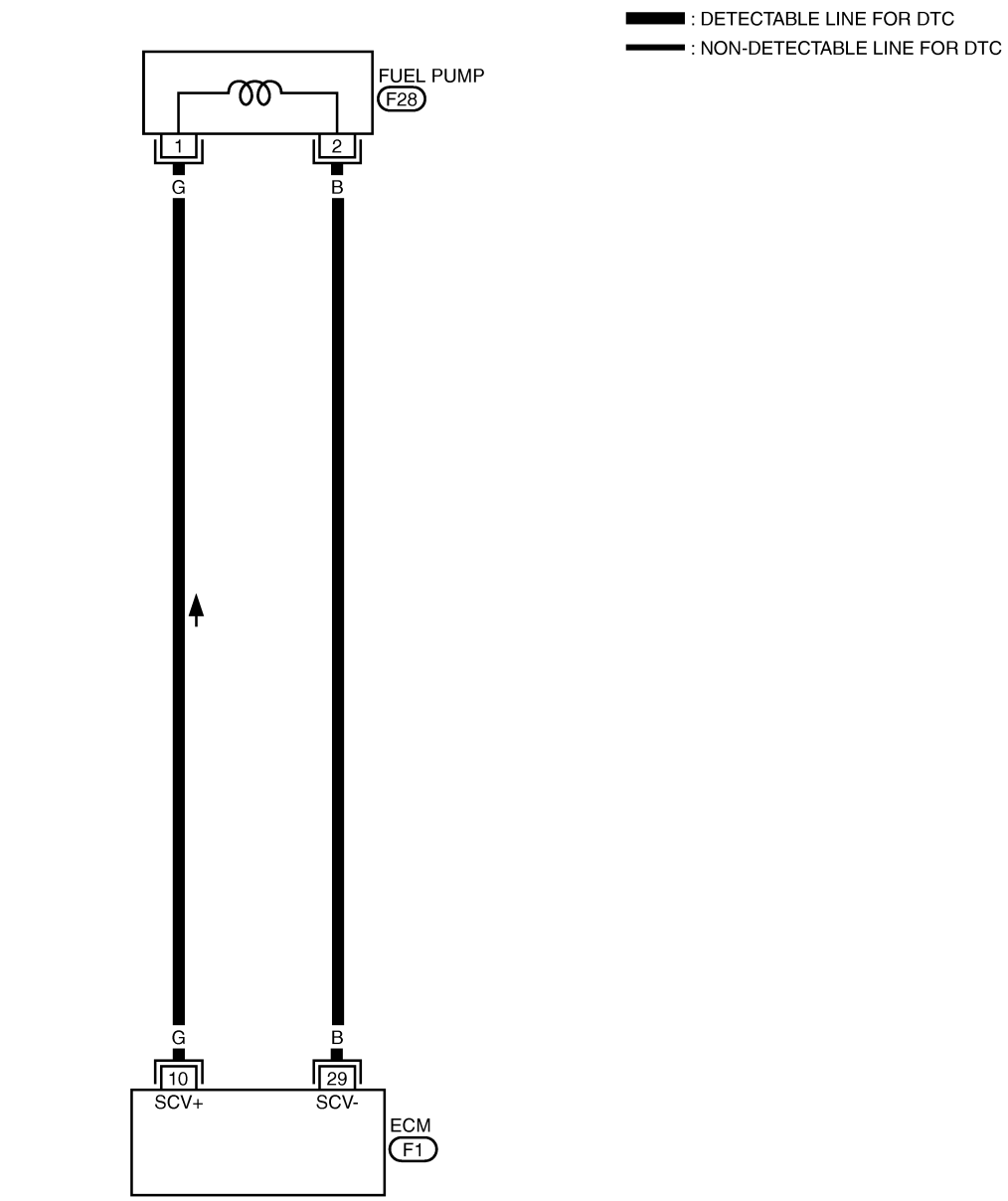
1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 60 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

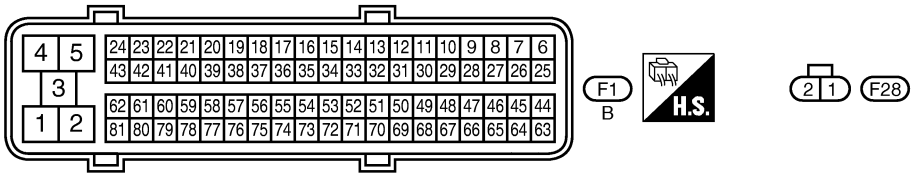
5. If DTC is detected, go to EC-1255, "Diagnostic Procedure" .

Wiring Diagram

GBS000AW

EC-F/PUMP-01





MBWA1050E

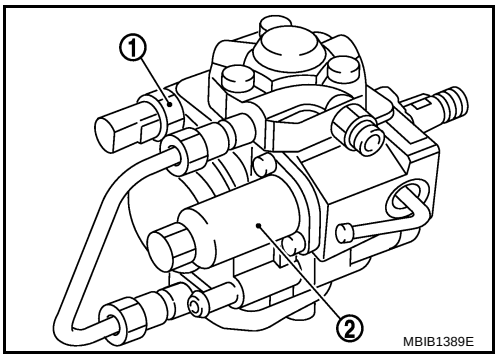
Diagnostic Procedure

GBS000AX

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connectors.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump 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 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1256, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

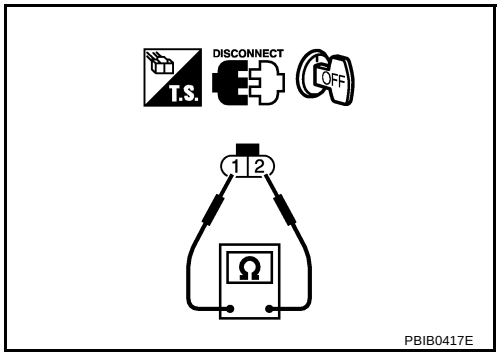
GBS000AY

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

GBS000AZ

FUEL PUMP

Refer to EM-193, "FUEL PUMP" .

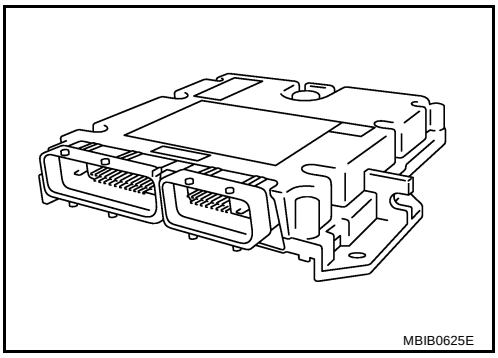
DTC P1616 ECM

PFP:23710

Description

GBS000B0

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

GBS000B1

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1616 1616	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

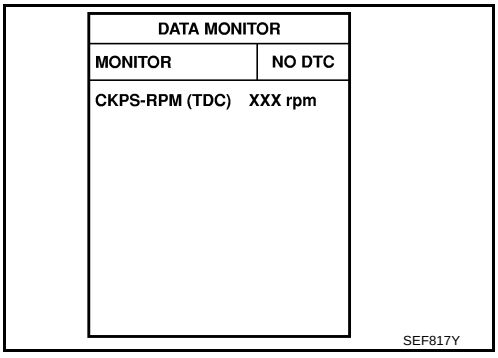
DTC Confirmation Procedure

GBS000B2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1258, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1258, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000B3

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 EC-1257, "DTC Confirmation Procedure" , again.
5. Is DTC P1616 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
3. Perform EC-1257, "DTC Confirmation Procedure" , again.
4. Is DTC 1616 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P1622 INJECTOR ADJUSTMENT VALUE

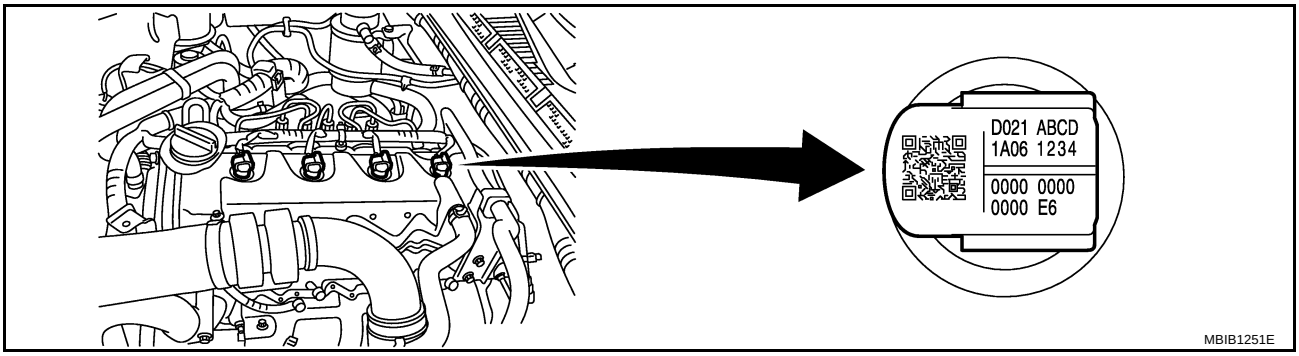
PFP:23710

Description

GBS000B4

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D021ABCD1A06123400000000000E6

On Board Diagnosis Logic

GBS000B5

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1622 1622	Injector adjustment value data uninput	Injector adjustment value is not stored in ECM.	● Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.)

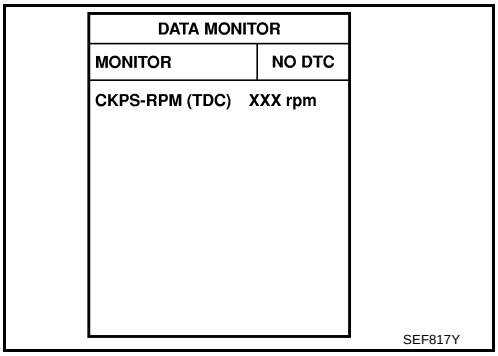
DTC Confirmation Procedure

GBS000B6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1260, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1260, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000B7

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P1623 INJECTOR ADJUSTMENT VALUE

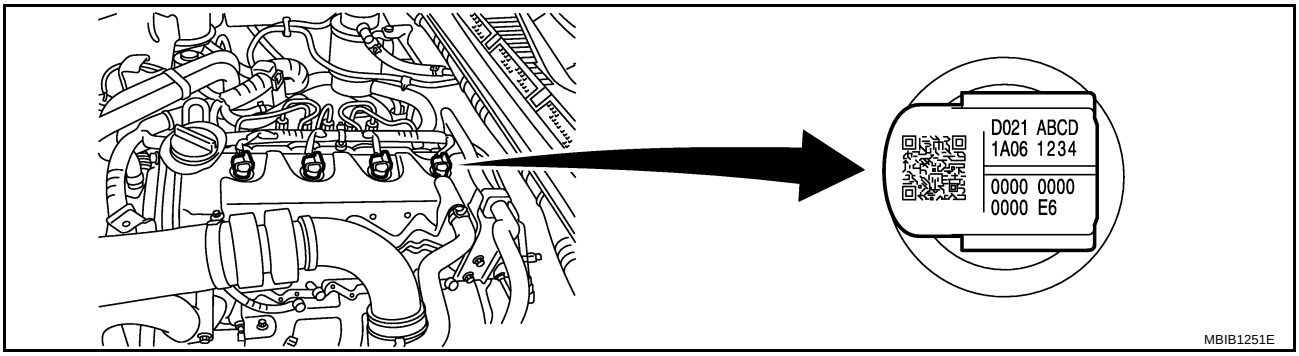
PFP:23710

Description

GBS000B8

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D021ABCD1A06123400000000000E6

On Board Diagnosis Logic

GBS000B9

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1623 1623	Injector adjustment value data error	ECM detects the abnormal value of injector adjustment value.	● CONSULT-II communication status (The status of CONSULT-II communication becomes improper during Injector Adjustment Value Registration.) ● ECM

NOTE:
This DTC is not detected when injector adjustment value (not correct but existent) is stored in ECM.

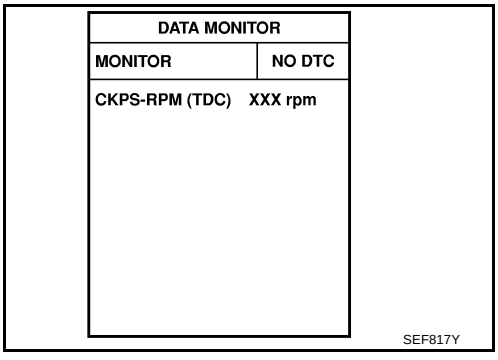
DTC Confirmation Procedure

GBS000BA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1262, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

4. If DTC is detected, go to EC-1262, "Diagnostic Procedure" .

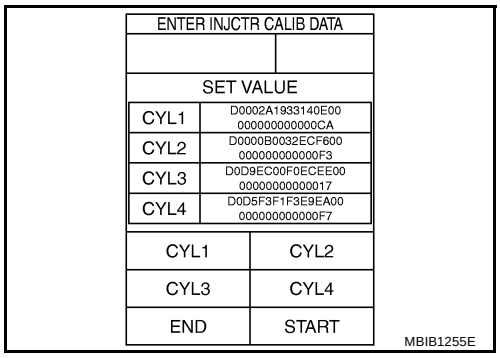
Diagnostic Procedure

GBS000BB

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

NOTE:
When two or more injector adjustment value are improper, it is useful to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode with CONSULT-II. And then perform Injector Adjustment Value Registration.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Select “SELF DIAG RESULTS” mode with CONSULT-II.
2. Touch “ERASE”.
3. Perform EC-1261, "DTC Confirmation Procedure" , again.
4. Is DTC P1623 displayed again?

Without CONSULT-II

1. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
2. Perform EC-1261, "DTC Confirmation Procedure" , again.
3. Is DTC 1623 displayed again?

Yes or No

Yes >> GO TO 4.
No >> **INSPECTION END**

4. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

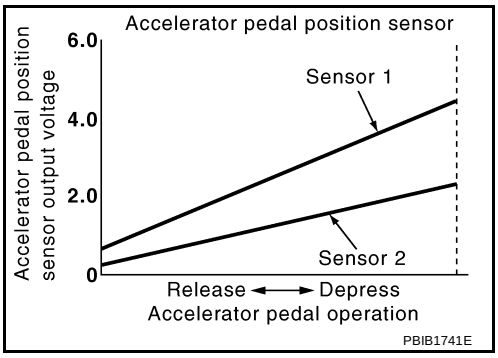
DTC P2135 APP SENSOR

PFP:18002

Description

GBS000BC

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

GBS000BD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.28 - 0.48V
		Accelerator pedal: Fully depressed	More than 2.0V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

GBS000BE

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	W	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.95 - 1.17V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 4.6V
84	B	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	W	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine: Stopped ● Accelerator pedal: Fully released	0.58 - 0.78V
			[Ignition switch ON] ● Engine: Stopped ● Accelerator pedal: Fully depressed	More than 2.3V
92	B	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

GBS000BF

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P2135 is displayed with DTC P0642 or P0643, first perform the trouble diagnosis for DTC P0642 or P0643. Refer to EC-1210, "DTC P0642, P0643 SENSOR POWER SUPPLY" .**
- **If DTC P2135 is displayed with DTC P0652 or P0653, first perform the trouble diagnosis for DTC P0652 or P0653. Refer to EC-1215, "DTC P0652, P0653 SENSOR POWER SUPPLY" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	● Harness or connectors (The APP sensor circuit is open or shorted.) ● Accelerator pedal position sensor

DTC Confirmation Procedure

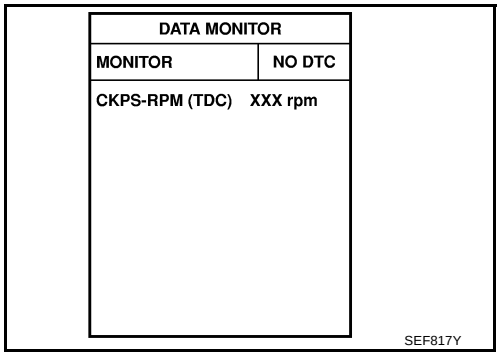
GBS000BG

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
5. If DTC is detected, go to EC-1266, "Diagnostic Procedure" .



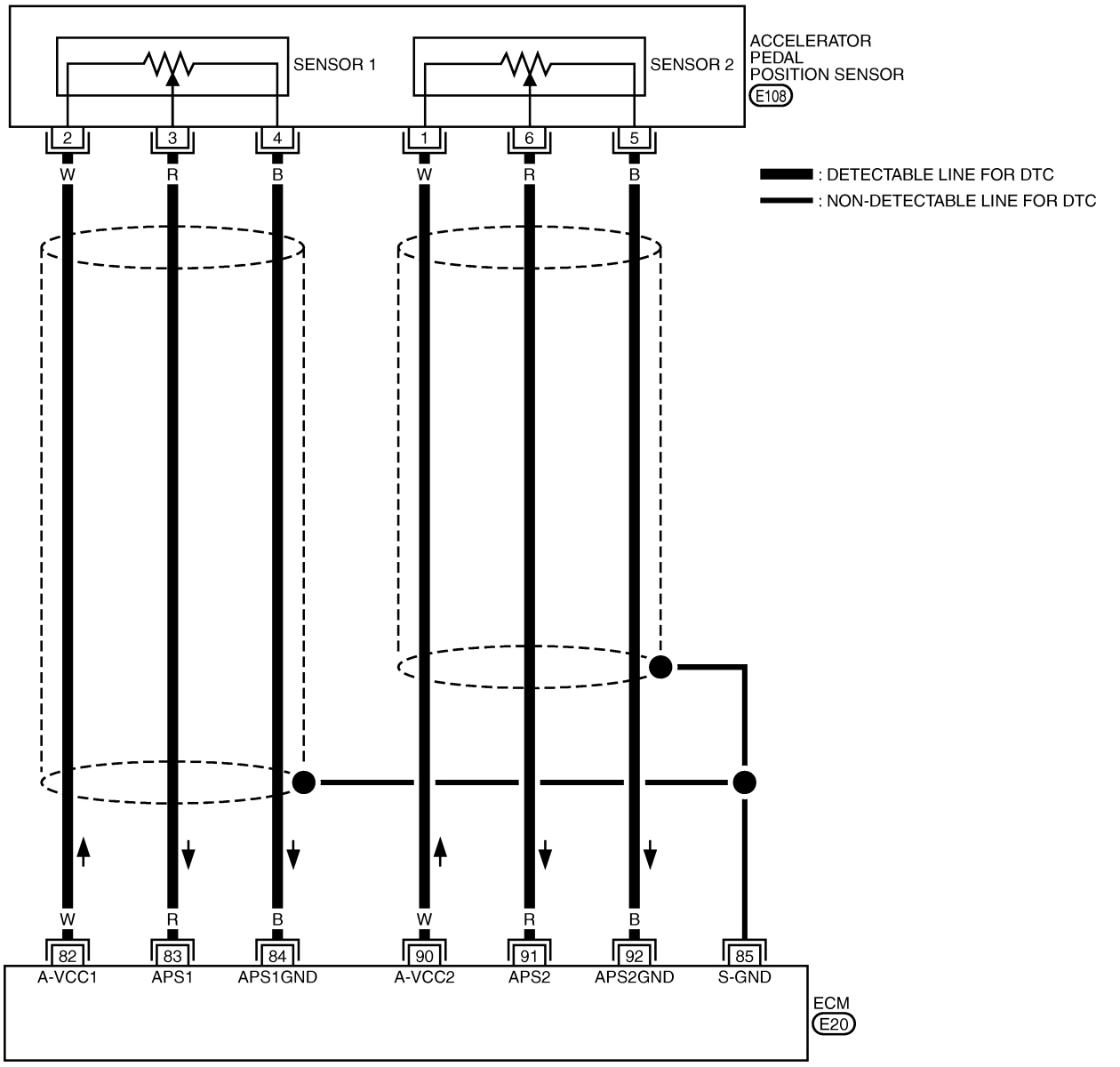
WITHOUT CONSULT-II

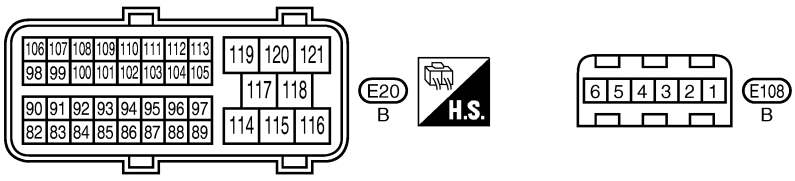
1. Turn ignition switch ON and wait at least 5 seconds.
2. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1266, "Diagnostic Procedure" .

Wiring Diagram

GBS000BH

EC-APPS3-01





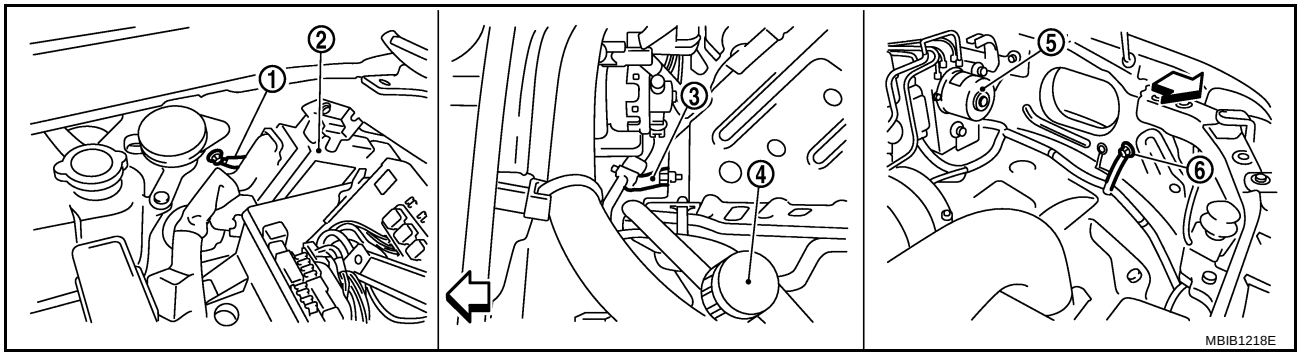
MBWA1054E

Diagnostic Procedure

GBS000BI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

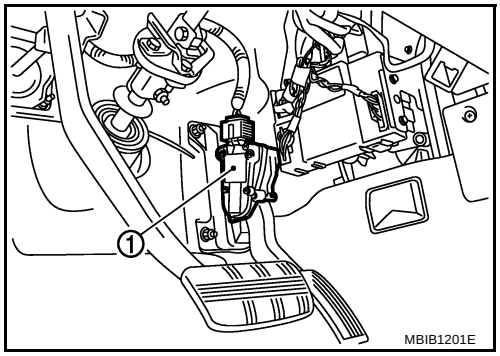
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

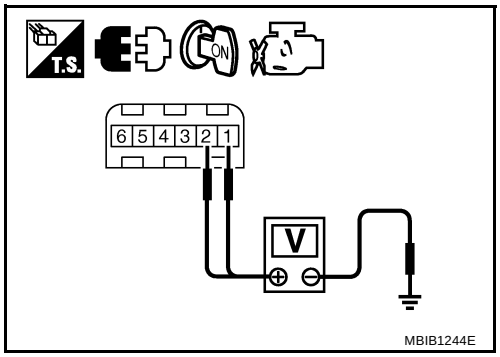
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 84, APP sensor terminal 5 and ECM terminal 92.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 3, ECM terminal 91 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1267, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

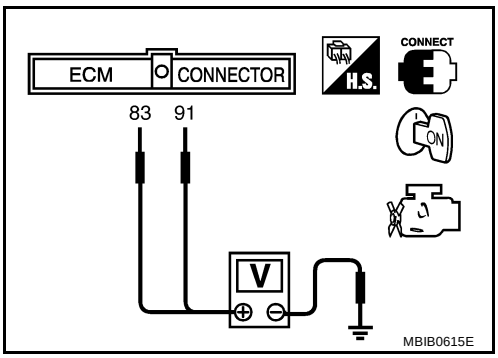
Component Inspection

GBS000BJ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.95 - 1.17V
	Fully depressed	More than 4.6V
91 (Accelerator pedal position sensor 2)	Fully released	0.58 - 0.78V
	Fully depressed	More than 2.3V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

GBS000BK

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

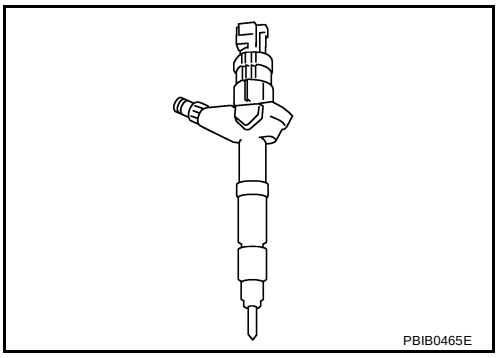
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

PFP:16600

Component Description

GBS000BL

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

GBS000BM

Specification data are reference values.

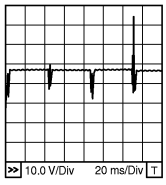
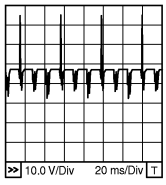
MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Idle speed	No load	0.50 - 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 - 0.80 msec

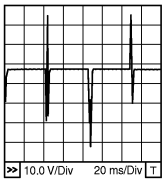
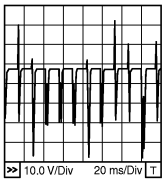
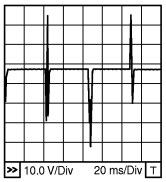
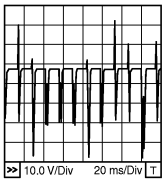
ECM Terminals and Reference Value

GBS000BN

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	V	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1295E
5	G	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1296E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	G P W W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E
40 41 42 43	W GR W B	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000BO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2146 2146	No. 1 and 4 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.)
P2149 2149	No. 2 and 3 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC Confirmation Procedure

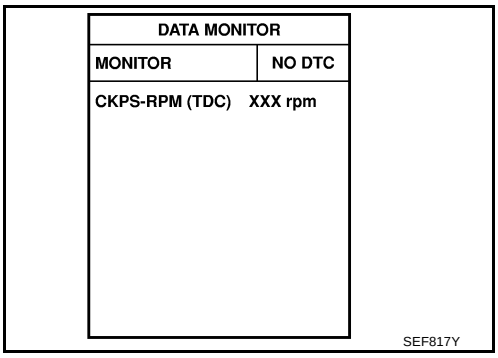
GBS000BP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

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 DTC is detected, go to EC-1273, "Diagnostic Procedure" .



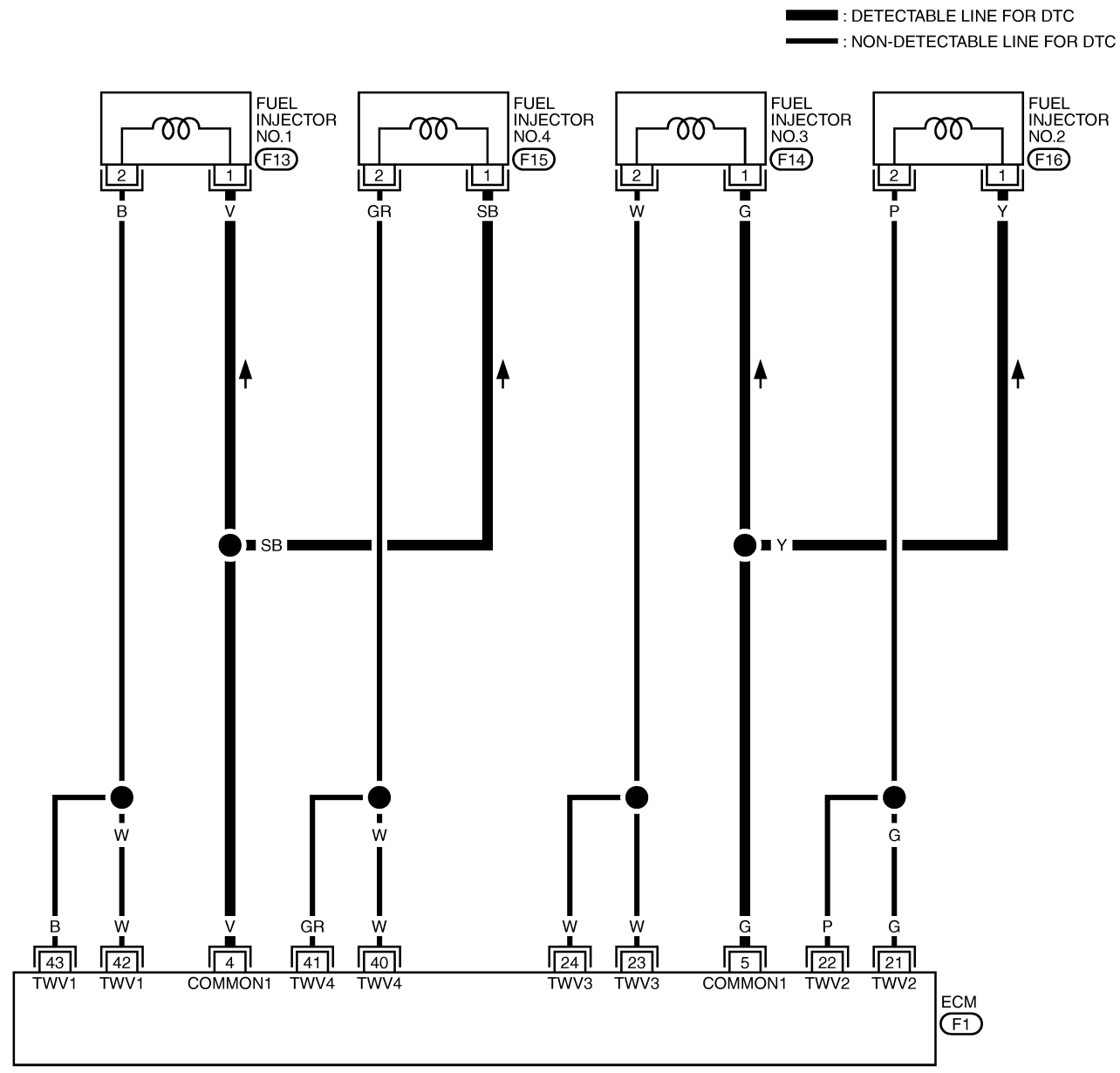
WITHOUT CONSULT-II

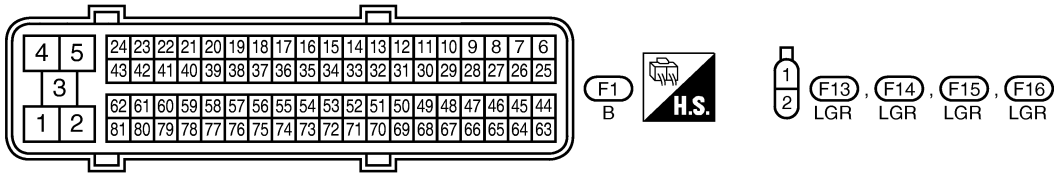
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1273, "Diagnostic Procedure" .

Wiring Diagram

GBS000BQ

EC-INJ/PW-01





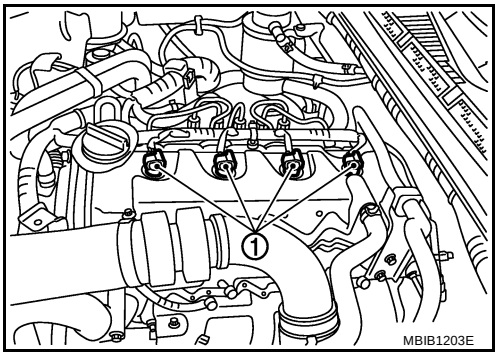
MBWA1055E

Diagnostic Procedure

GBS000BR

1. CHECK FUEL INJECOR POWER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector (1) harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Terminal		Cylinder
ECM	Fuel injector	
4	1	No.1
5	1	No.2
5	1	No.3
4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

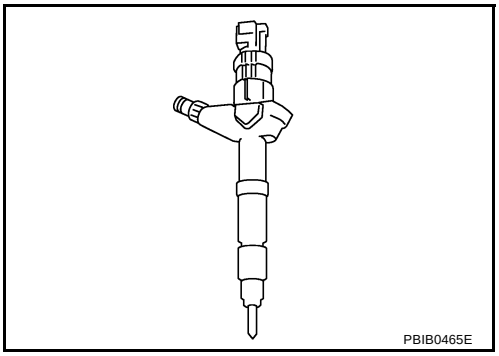
DTC P2147, P2148 FUEL INJECTOR CIRCUIT

PFP:16600

Component Description

GBS000BS

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

GBS000BT

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Idle speed	No load	0.50 - 0.70 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.50 - 0.80 msec

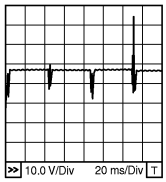
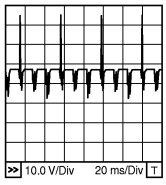
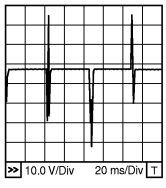
ECM Terminals and Reference Value

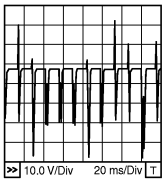
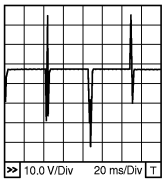
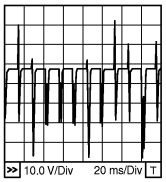
GBS000BU

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	V	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1295E
5	G	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1296E
21 22 23 24	G P W W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E
40 41 42 43	W GR W B	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 7.5V ★  MBIB1297E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.0V ★  MBIB1298E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

GBS000BV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2147 2147	Fuel injector circuit low input	ECM detects the fuel injector circuit is shorted to ground.	● Harness or connectors (The fuel injector circuit is shorted.)
P2148 2148	Fuel injector circuit high input	ECM detects the fuel injector circuit is shorted to power.	

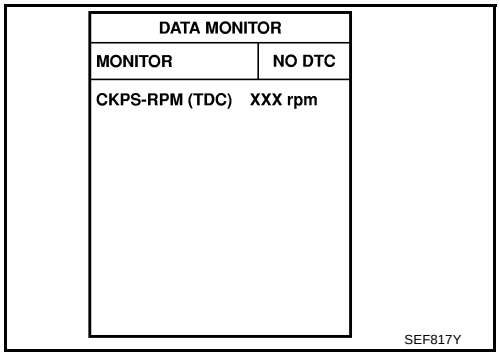
DTC Confirmation Procedure

GBS000BW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1278, "Diagnostic Procedure" .



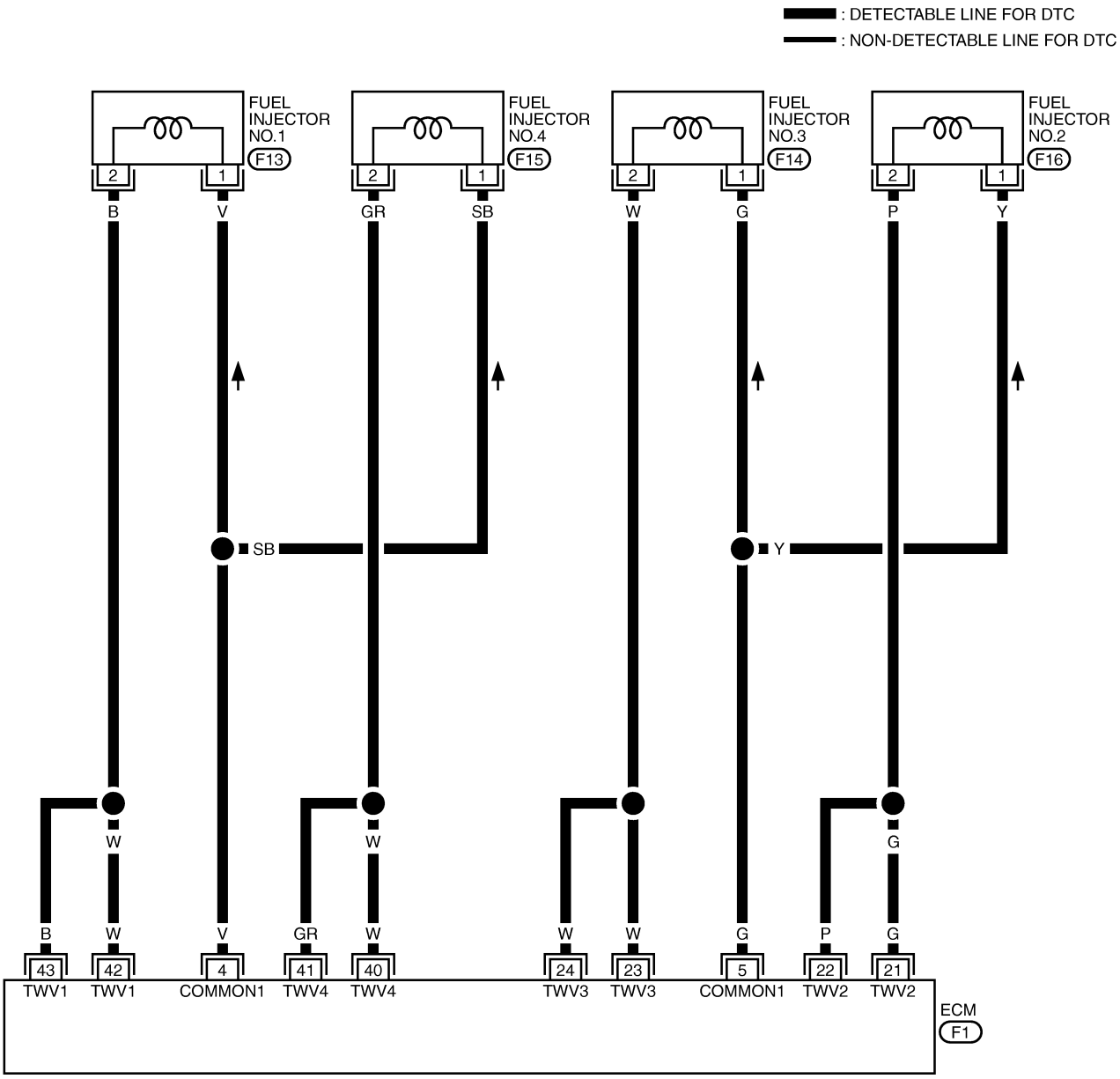
WITHOUT CONSULT-II

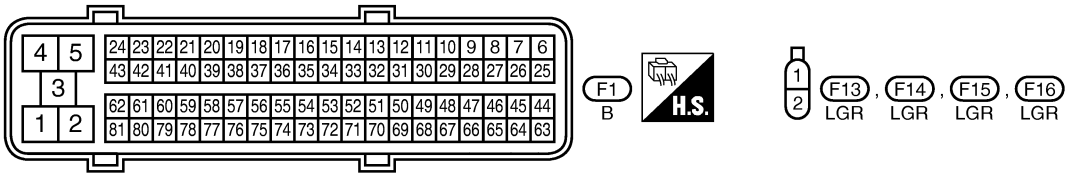
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1278, "Diagnostic Procedure" .

Wiring Diagram

GBS000BX

EC-INJECT-01





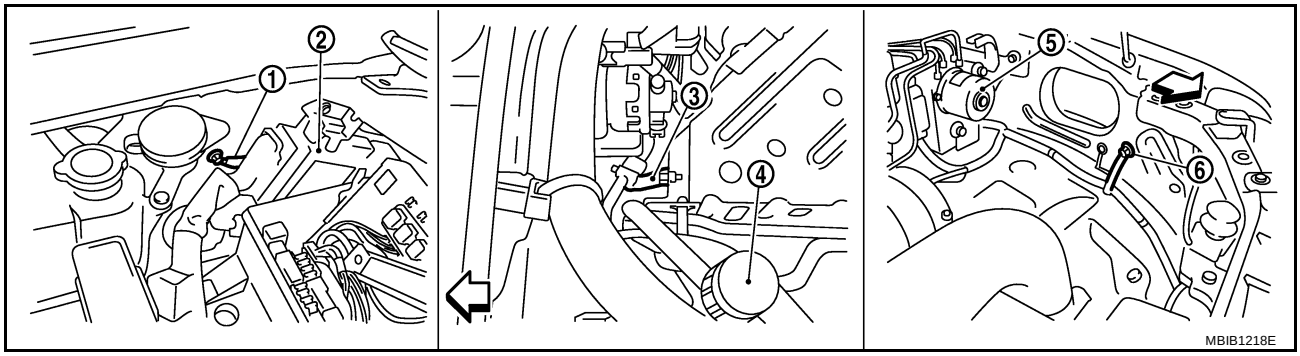
MBWA1042E

Diagnostic Procedure

GBS000BY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

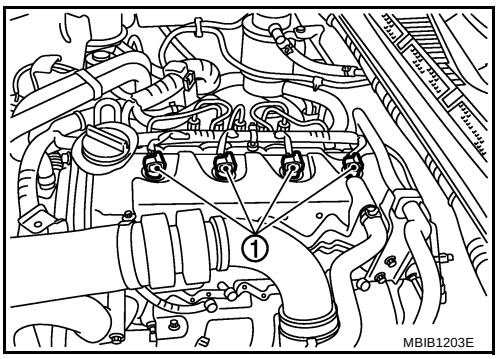
1. Body ground E21	2. ECM	3. Body ground E41
4. A/C high-pressure service valve	5. ABS actuator and electric unit (control unit)	6. Body ground E61

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector (1) harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Cylinder	Terminal		Continuity
	Fuel injector	ECM	
No.1	1	42, 43	Should not exist
		4	Should exist
	2	42,43	Should exist
		4	Should not exist
No.2	1	21, 22	Should not exist
		5	Should exist
	2	21, 22	Should exist
		5	Should not exist
No.3	1	23, 24	Should not exist
		5	Should exist
	2	23, 24	Should exist
		5	Should not exist
No.4	1	40, 41	Should not exist
		4	Should exist
	2	40, 41	Should exist
		4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FUEL INJECTOR

Refer to EC-1280, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration.
   Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

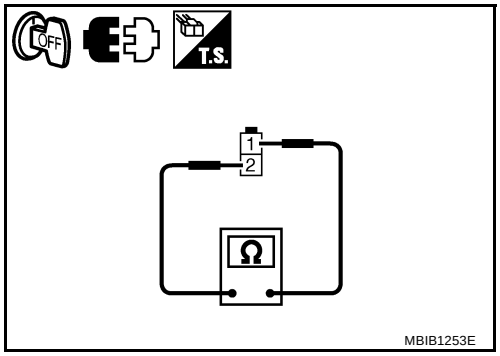
GBS000BZ

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

GBS000C0

FUEL INJECTOR

Refer to EM-188, "INJECTION TUBE AND FUEL INJECTOR" .

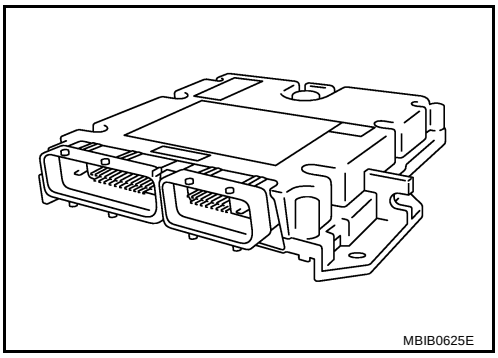
DTC P2228, P2229 BARO SENSOR

PFP:23731

Description

GBS000C1

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.



MBIB0625E

On Board Diagnosis Logic

GBS000C2

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2228 2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	● ECM
P2229 2228	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

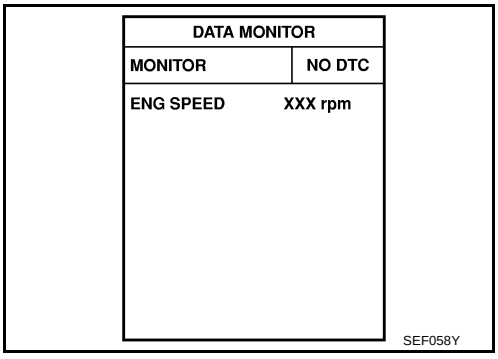
DTC Confirmation Procedure

GBS000C3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1282, "Diagnostic Procedure" .



SEF058Y

WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1282, "Diagnostic Procedure" .

Diagnostic Procedure

GBS000C4

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 EC-1281, "DTC Confirmation Procedure" , again.
5. Is DTC P2228 or P2229 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1016 .
3. Perform EC-1281, "DTC Confirmation Procedure" , again.
4. Is DTC 2228 or 2229 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-83, "ECM Re-communicating Function" .
3. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1013, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1014, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

GLOW CONTROL SYSTEM

PFP:25230

Description

GBS000C5

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Glow control	Glow lamp* Glow relay Glow plugs
Engine coolant temperature sensor	Engine coolant temperature		

*: The output signal is sent from the ECM through CAN communication line.

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When engine coolant temperature is lower than approximately 80°C (176°F):

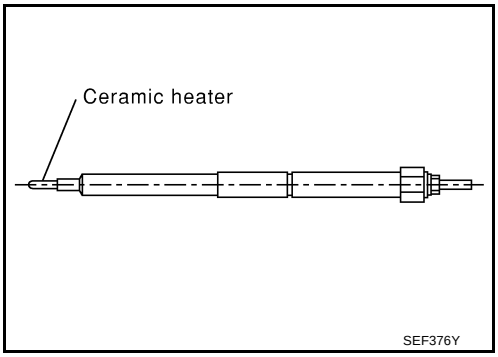
- Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
- Starting
  After 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 coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

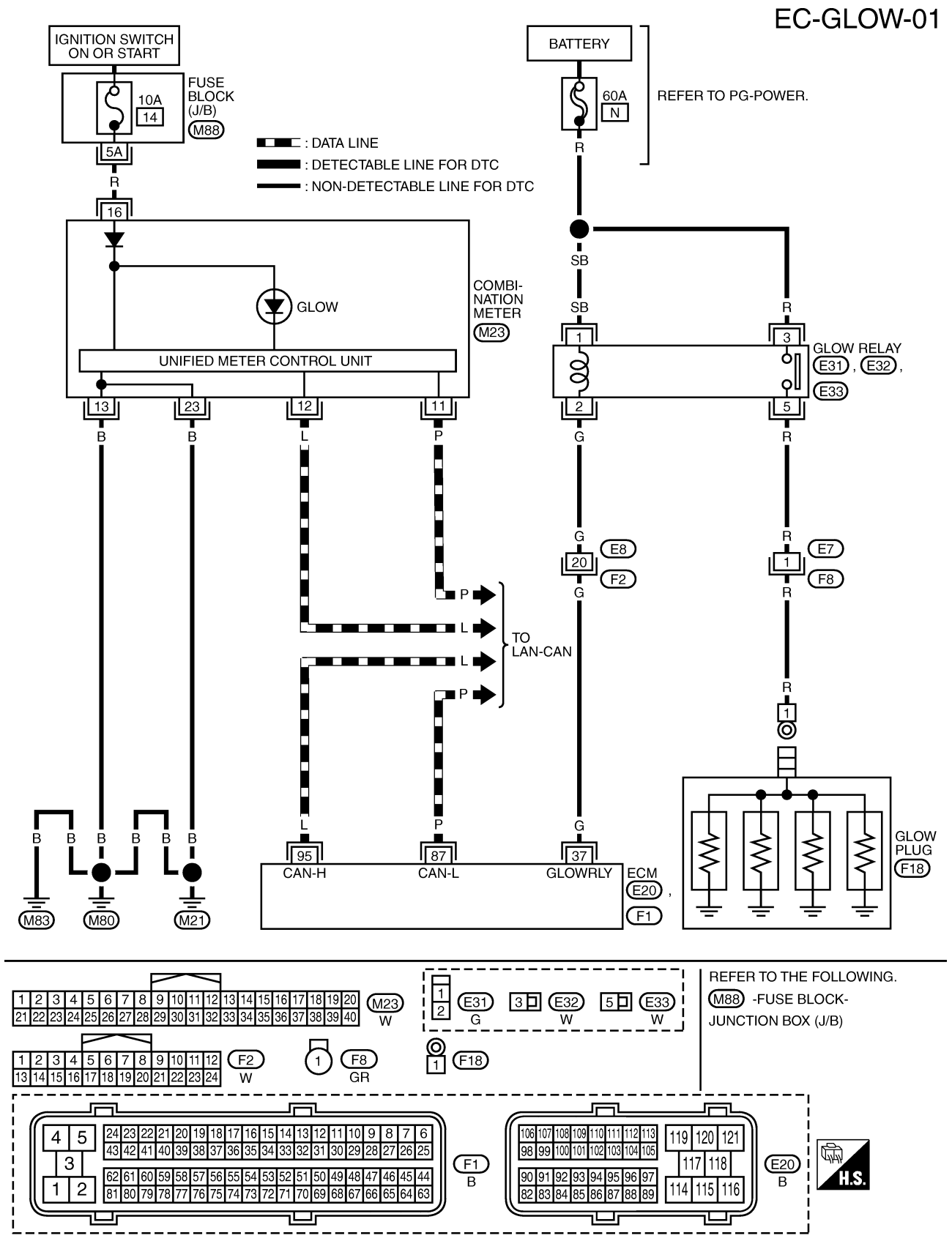
Glow Plug

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.



Wiring Diagram

GBS000C6



MBWA1329E

Diagnostic Procedure

GBS000C7

1. INSPECTION START

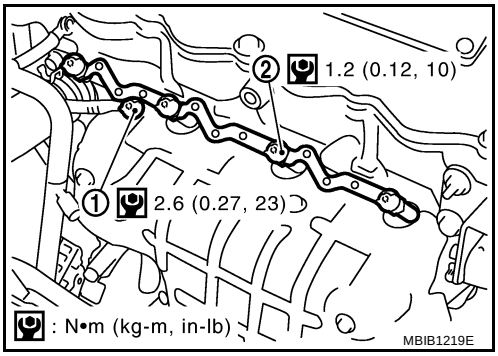
Check fuel level, fuel supplying system, starter motor, etc.

OK or NG

OK >> GO TO 2.
NG >> Correct.

2. CHECK INSTALLATION

Check that glow plug nut (1) and all glow plug connecting plate nuts (2) are installed properly.



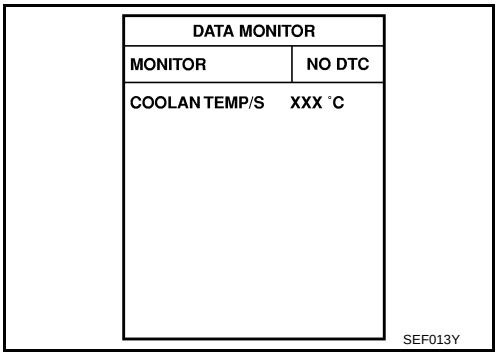
OK or NG

OK >> GO TO 3.
NG >> Install properly.

3. CHECK GLOW INDICATOR LAMP OPERATION

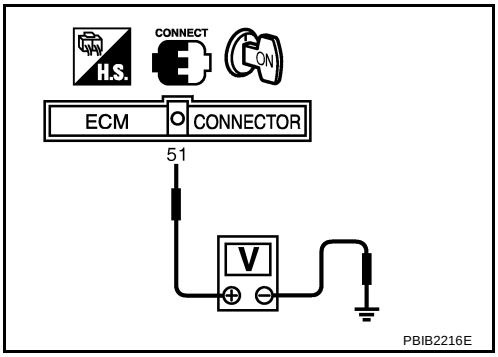
With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.



Without CONSULT-II

1. Set the tester probe between ECM terminal 51 (engine coolant temperature sensor signal) and ground.
2. Confirm that the voltage indicates above 1.53V. If it indicates below 1.53V, cool down engine.
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 glow indicator lamp turned OFF.



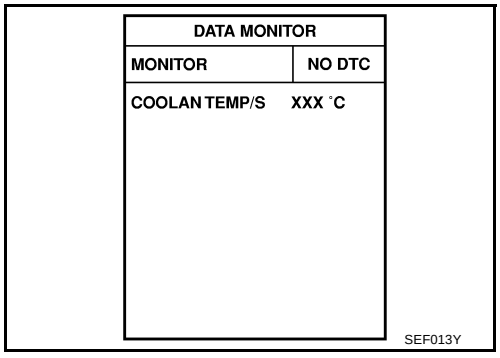
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

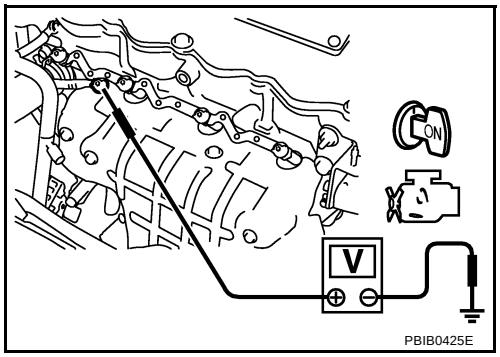
With CONSULT-II

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



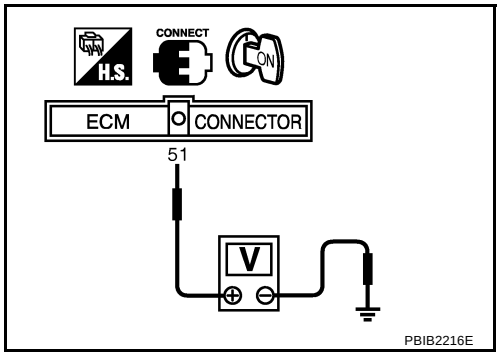
6. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



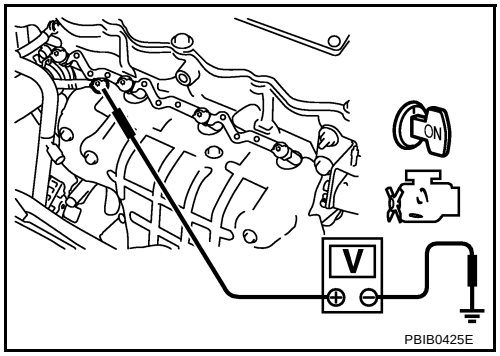
Without CONSULT-II

1. Set the tester probe between ECM terminal 51 (engine coolant temperature sensor signal) and ground.
2. Confirm that the voltage indicates approximately 3.62V. If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



6. Check the voltage between glow plug and engine body under the following conditions.

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

OK >> **INSPECTION END**
NG >> GO TO 7.

5. CHECK DTC

Check that DTC U1000 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .

No >> GO TO 6.

6. CHECK COMBINATON METER OPERATION

Does combination meter operate normally?

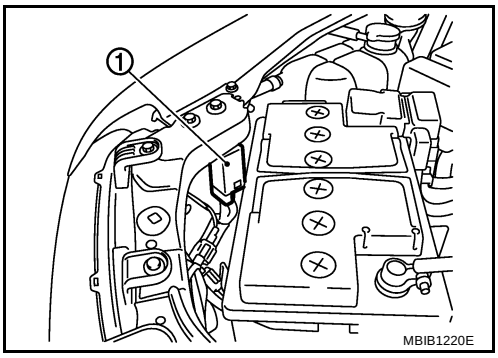
Yes or No

Yes >> GO TO 14.

No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

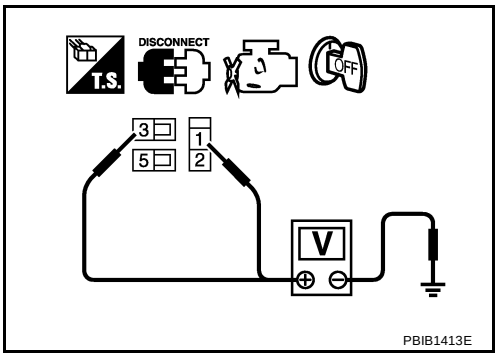
7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay (1).



3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.

NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open or short between glow relay and battery

>> Repair harness or connectors.

9. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 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 or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between glow relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check harness continuity between glow relay terminal 5 and glow plug harness connector.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, F8
- Harness for open or short between glow relay and glow plug

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK GLOW RELAY

Refer to EC-1289, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace glow relay.

14. CHECK GLOW PLUG

Refer to EC-1289, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace glow plug.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

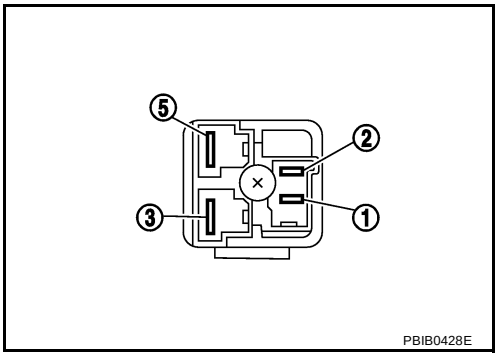
GBS000C8

GLOW RELAY

Check continuity between glow relay terminals (3) and (5) under the following conditions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

Operation takes less than 1 second.



PBIB0428E

GLOW PLUG

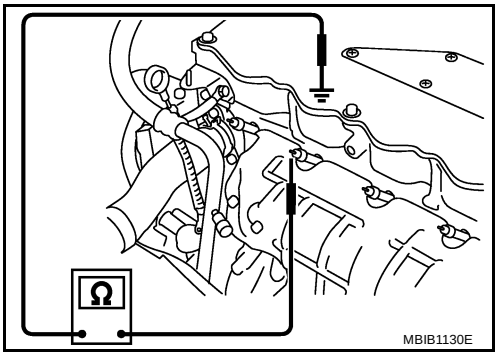
1. Remove glow plug connecting plate.
2. Check glow plug resistance.

Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

NOTE:

- **Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.**
- **If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.**
- **If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.**
- **Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.**

: 20.1 N-m (2.1 kg-m, 15 ft-lb)



MBIB1130E

Removal and Installation

GBS000C9

GLOW PLUG

Refer to EM-185, "GLOW PLUG" .

EGR VOLUME CONTROL SYSTEM

PFP:14710

Description

GBS000CA

SYSTEM DESCRIPTION

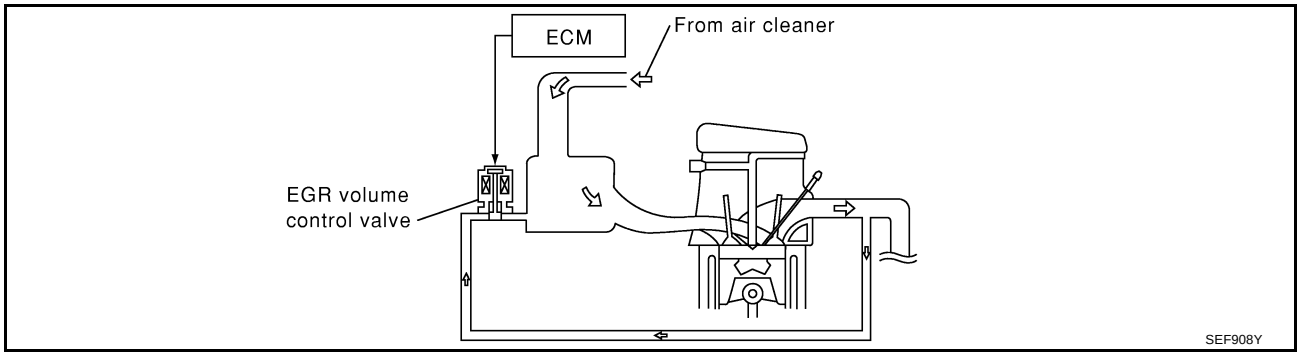
Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor*	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch*	Air conditioner operation		

*: This signal is sent to the ECM through CAN communication line.

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.

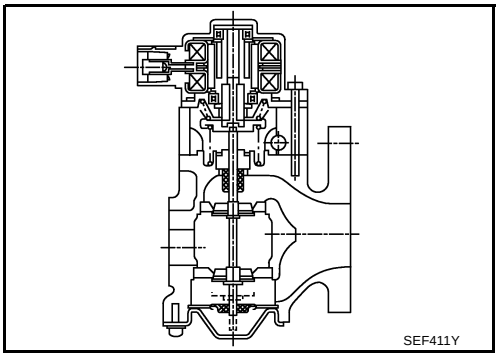
- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

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

GBS000CB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,200 rpm	0 step

ECM Terminals and Reference Value

GBS000CC

Specification data are reference values and are measured between each terminal and ground.

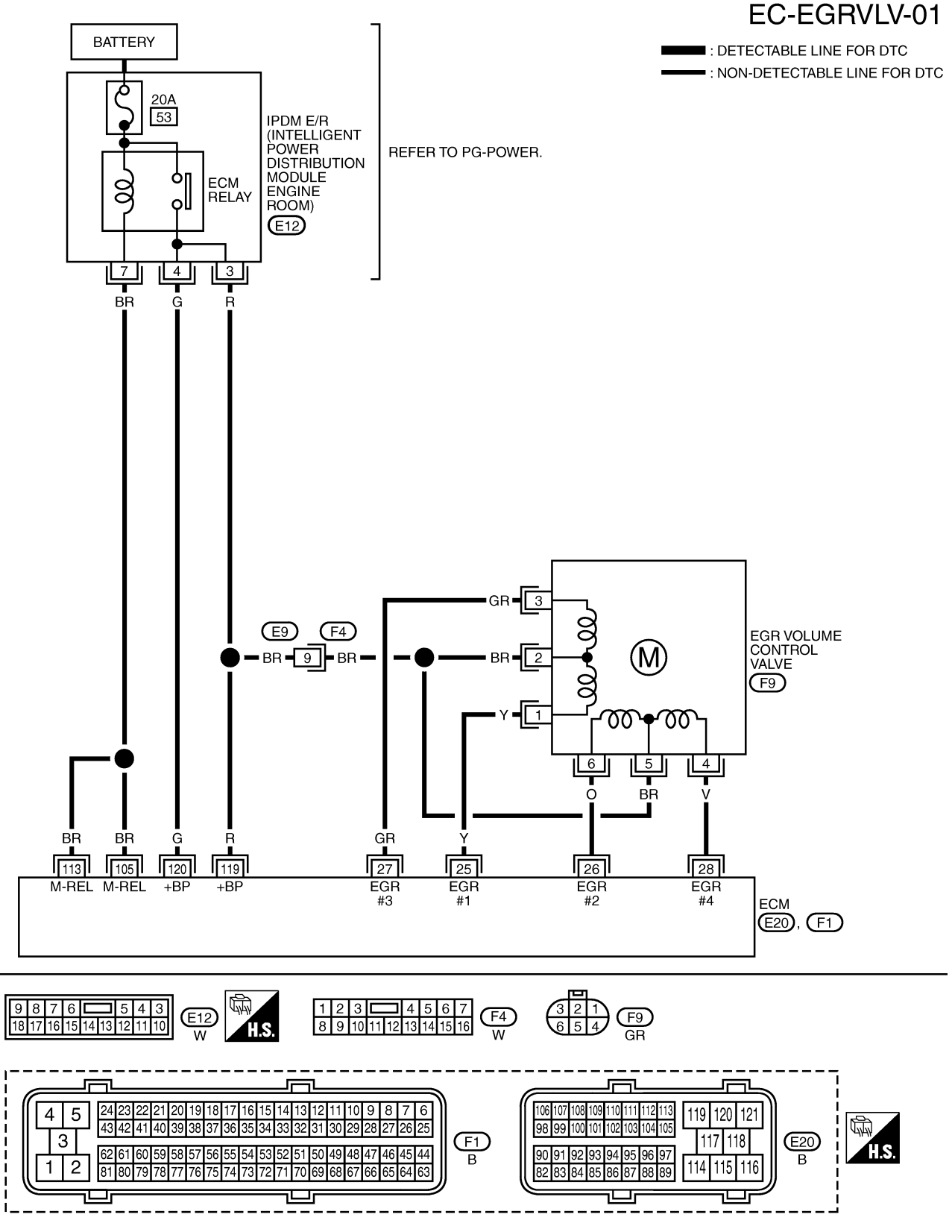
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 26 27 28	Y O GR V	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.)
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

GBS000CD

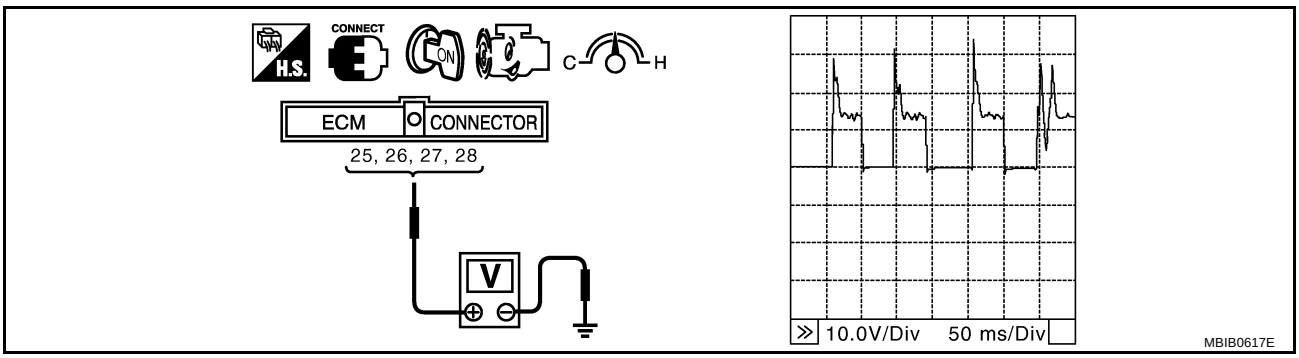


Diagnostic Procedure

GBS000CE

1. CHECK EGR VOLUME CONTROL SYSTEM OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Set the oscilloscope probe between ECM terminals 25, 26, 27, 28 and ground.
3. Start engine and let it idle.
4. Check the oscilloscope screen when revving engine up to 3,200 rpm and return to idle.



The pulse signal as shown in the figure should appear.

OK or NG

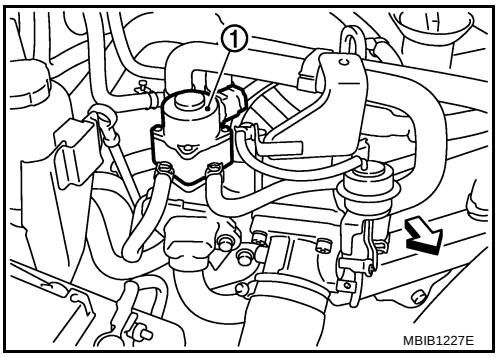
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve (1) harness connector.

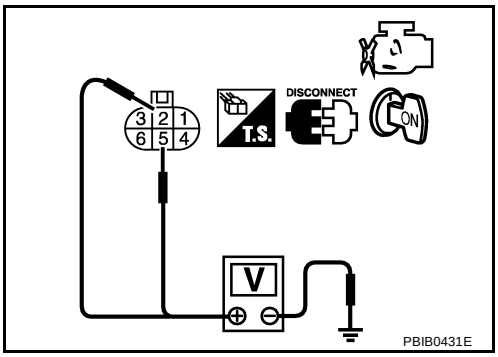
– ⇦: Vehicle front

3. Turn ignition switch ON.



4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open and short between ECM and EGR volume control valve
- Harness for open and short between IPDM E/R and EGR volume control valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

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 EGR VOLUME CONTROL VALVE

Refer to EC-1295, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EGR volume control valve.

6. CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR cooler (A/T models)

OK or NG

OK >> GO TO 7.
NG >> Repair or replace EGR passage.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

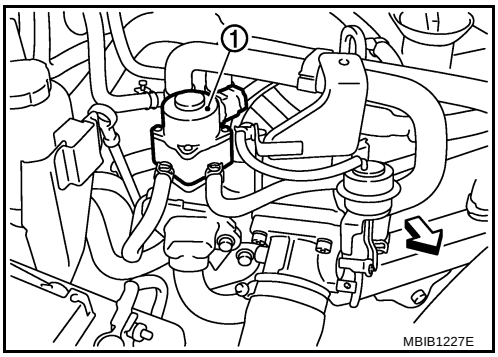
Component Inspection

GBS000CF

EGR VOLUME CONTROL VALVE

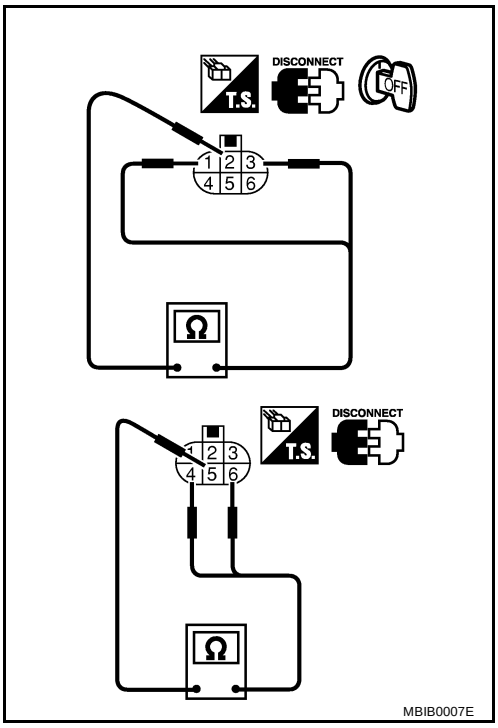
With CONSULT-II

1. Disconnect EGR volume control valve (1) harness connector.
   - ⇦ : Vehicle front



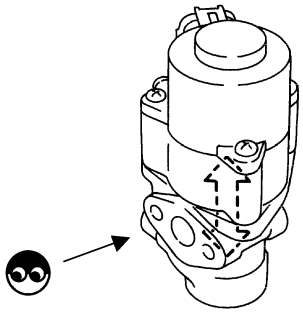
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17



   If NG, replace EGR volume control valve.
   If OK, go to next step.
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
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.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm

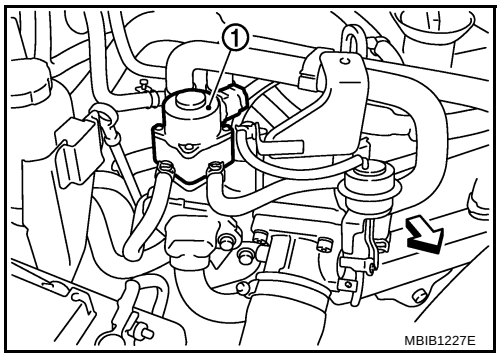


   If NG, replace the EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

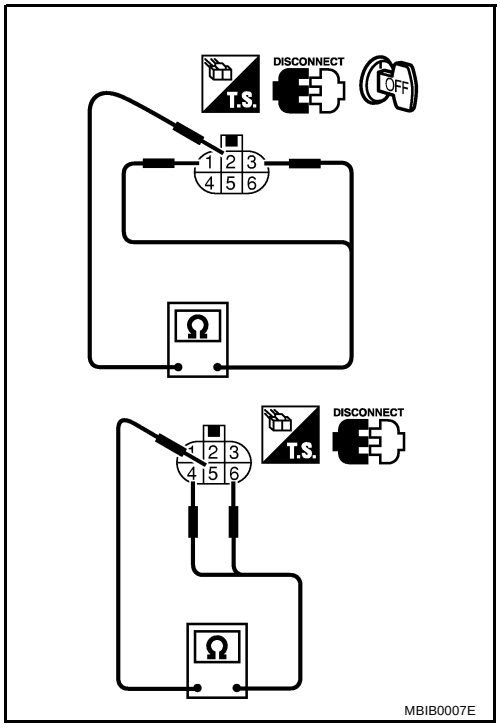
1. Disconnect EGR volume control valve (1) harness connector.
   - ⇦ : Vehicle front



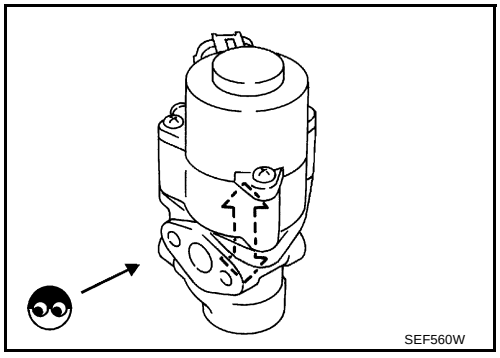
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

   If NG, replace EGR volume control valve.
   If OK, go to next step.
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF



6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.
   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.



Removal and Installation

EGR VOLUME CONTROL VALVE

GBS000CG

Refer to EM-164, "INTAKE MANIFOLD" .

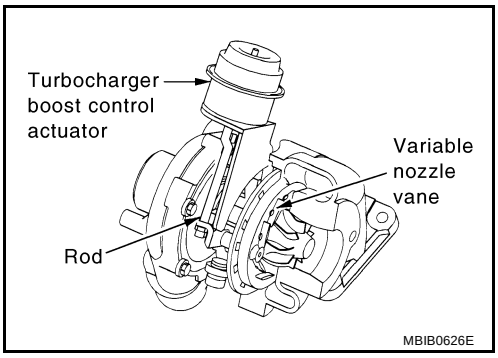
TC BOOST CONTROL SOLENOID VALVE

PFP:14956

Description

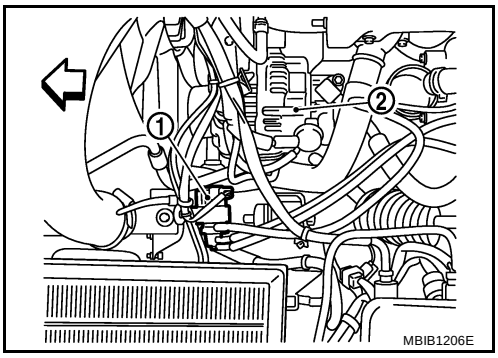
GBS000CH

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve (1) is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

- ⇦: Vehicle front
- Alternator (2)



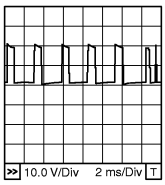
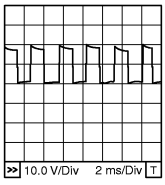
ECM Terminals and Reference Value

GBS000CI

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

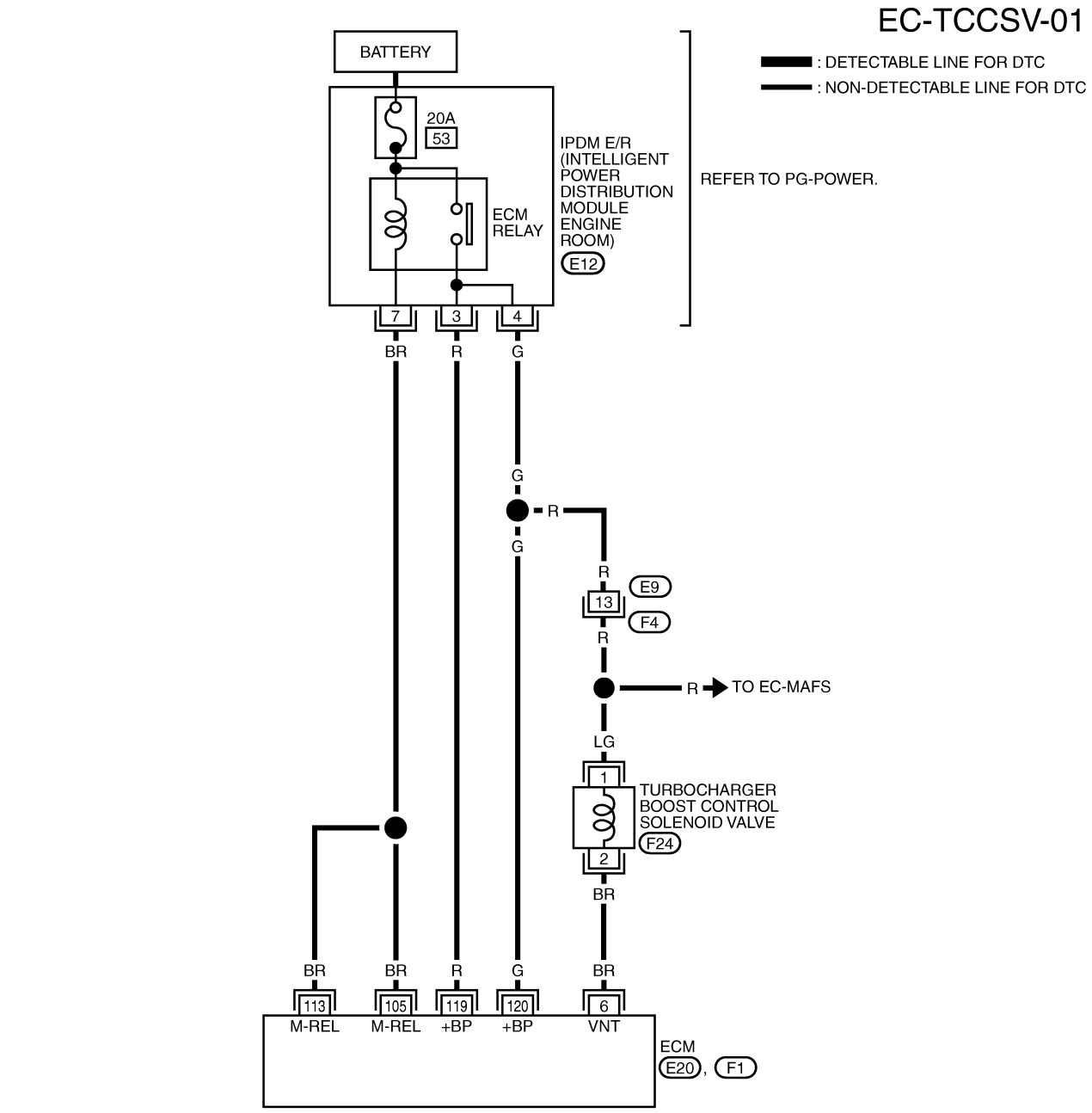
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

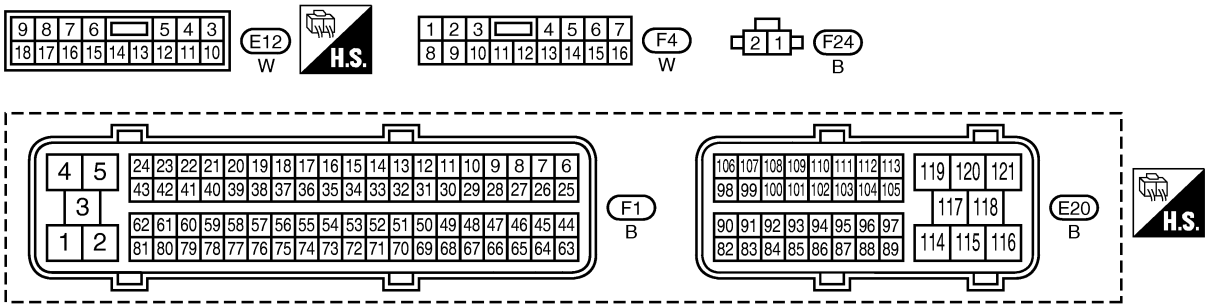
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	BR	Turbocharger boost control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 6.3V ★  MBIB0889E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 8.6V ★  MBIB0890E
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram

GBS000CJ





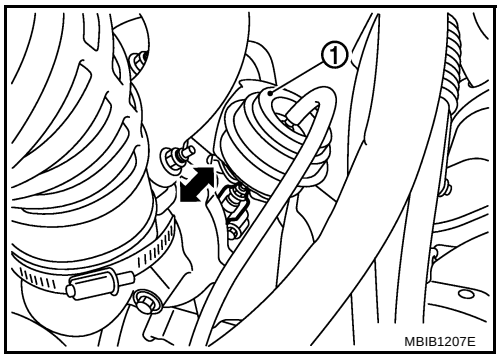
MBWA1058E

Diagnostic Procedure

GBS000CK

1. CHECK OVERALL FUNCTION

1. Start engine and let it idle.
2. Make sure that turbocharger control actuator (1) rod moves slightly when engine is started.

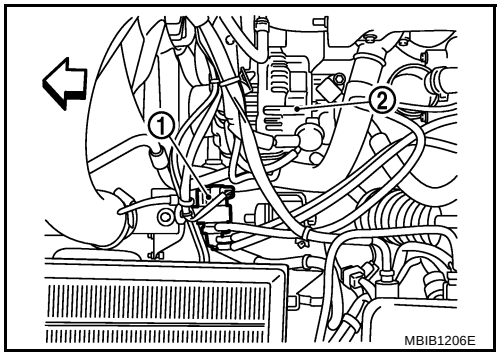


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

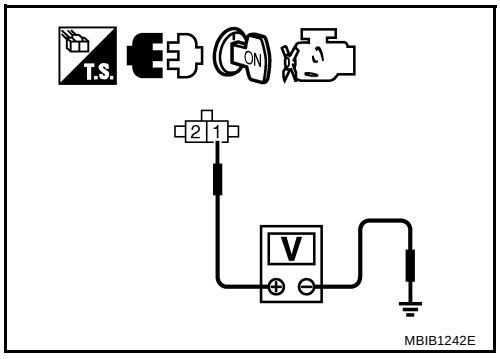
2. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve (1) harness connector.



- ⇦: Vehicle front
- Alternator (2)

3. Turn ignition switch ON.
4. Check voltage between turbocharger boost control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between ECM and turbocharger boost control solenoid valve
- Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1301, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

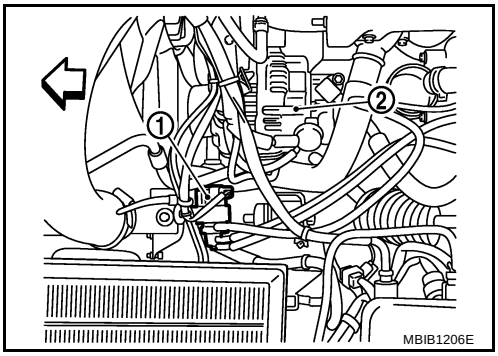
>> **INSPECTION END**

Component Inspection

GBS000CL

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

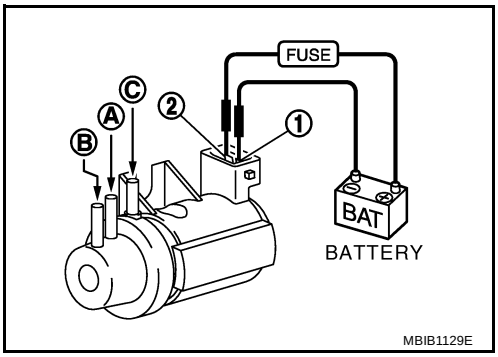
1. Disconnect turbocharger boost control solenoid valve (1) harness connector.
   - ⇦: Vehicle front
   - Alternator (2)



2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.
3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	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

Operation takes less than 1 second.



If NG, replace turbocharger boost control solenoid valve.

Removal and Installation

GBS000CM

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EM-162, "CHARGE AIR COOLER" .

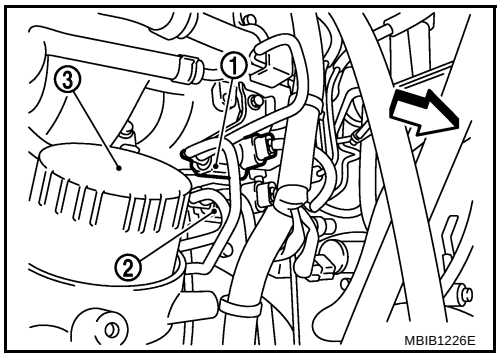
INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE

PFP:16188

Description

GBS000CN

Vibration when stopping the engine can be controlled by cutting intake air right before the fuel is cut. The intake air control valve control solenoid valve (1) controls the ON-OFF load of the intake air control valve actuator. As a result, the intake air control valve control solenoid valve will be turned ON when the ignition switch is turned OFF with the engine running and when the engine stalls. After the engine has stopped, the intake air control valve control solenoid valve will return to fully open.



- ⇦: Vehicle front
- Electronic controlled engine mount control solenoid valve (2)
- Oil filter (3)

ECM Terminals and Reference Value

GBS000CO

Specification data are reference valves, and are measured between each terminal and ground.

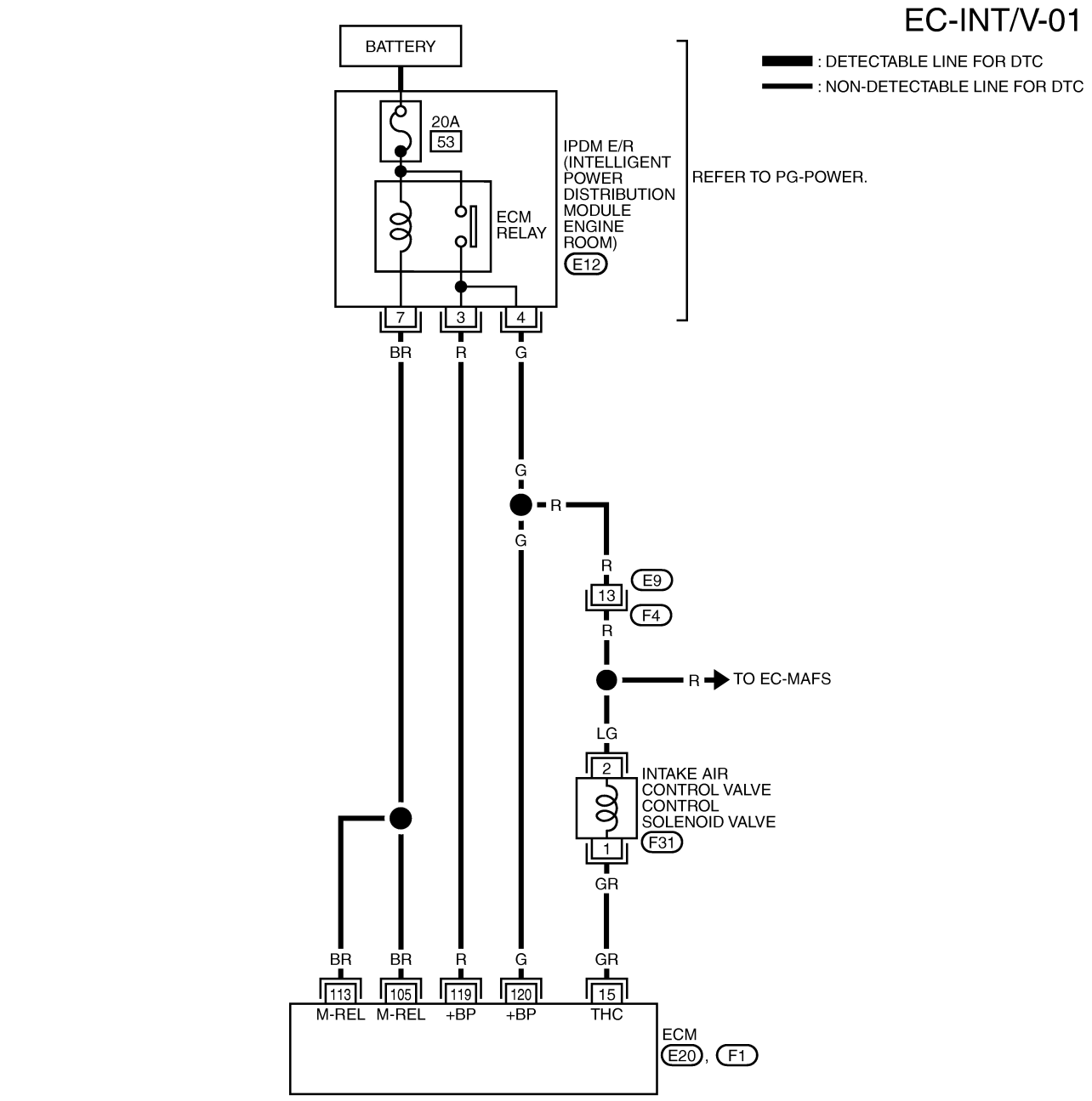
CAUTION:

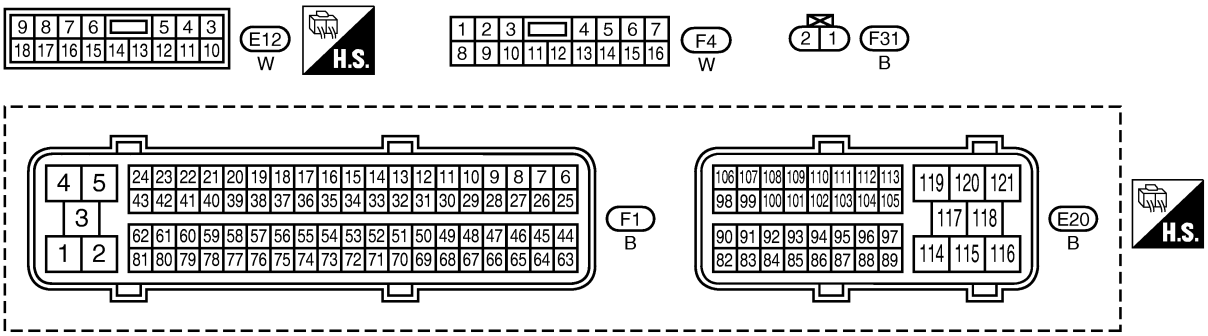
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
15	GR	Intake air control valve control solenoid valve	**[Engine is running]**	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 0.3V
105 113	BR BR	ECM relay (self shut-off)	**[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.0V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R G	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

GBS000CP





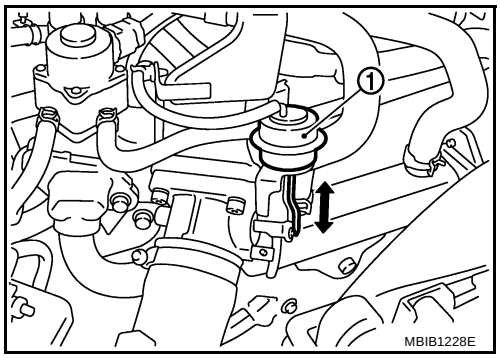
MBWA1066E

Diagnostic Procedure

GBS000CQ

1. CHECK OVERALL FUNCTION

1. Start engine and let it idle.
2. Make sure that intake air control valve actuator (1) rod moves when turning ignition switch OFF.

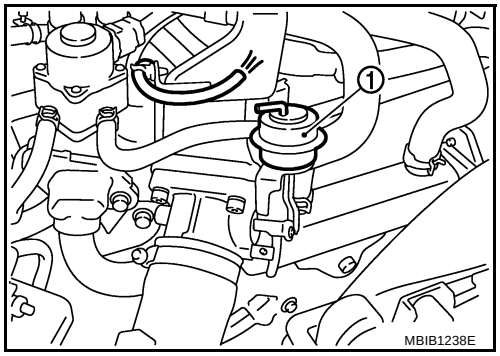


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to intake air control valve actuator (1).
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence under the following conditions.



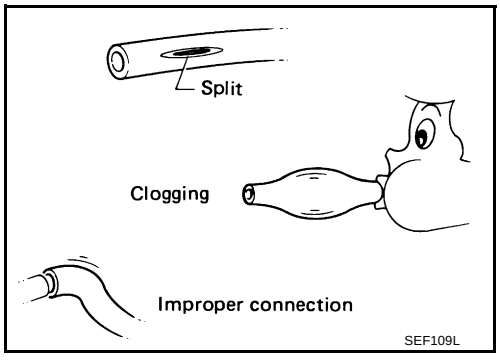
CONDITIONS	vacuum
For a few seconds after turning ignition switch OFF	should exist
Except above	should not exist

OK or NG

OK >> GO TO 9.
NG >> GO TO 3.

3. CHECK VACUUM HOSE

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection.
   Refer to EC-1005, "Vacuum Hose Drawing" .

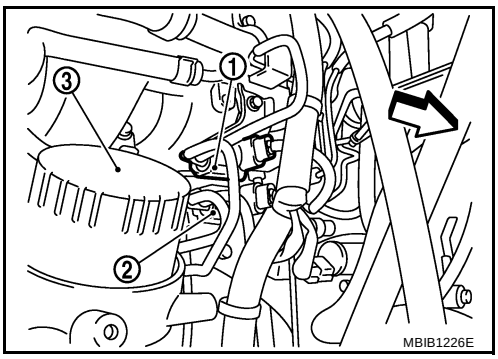


OK or NG

OK >> GO TO 4.
NG >> Repair or replace vacuum hoses and vacuum gallery.

4. CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake air control valve control solenoid valve (1) harness connector.
   - ⇦: Vehicle front
   - Electronic controlled engine mount control solenoid valve (2)
   - Oil filter (3)
3. Turn ignition switch ON.

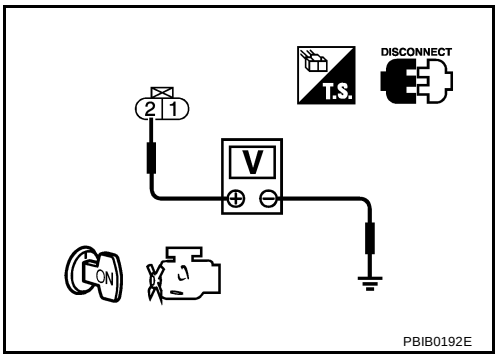


4. Check voltage between intake air control valve control solenoid valve terminal 2 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F4
- Harness for open or short between IPDM E/R and intake air control valve control solenoid valve
- Harness for open or short between ECM and intake air control valve control solenoid valve

>> Repair open circuit or short to power in harness or connectors.

6. CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 15 and intake air control valve control solenoid valve terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE

Refer to EC-1306, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace intake air control valve control solenoid valve.

8. CHECK VACUUM PUMP

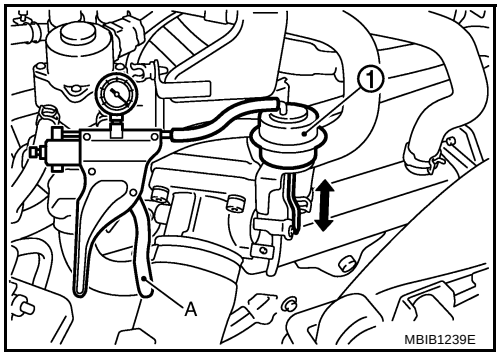
Refer to EM-186, "VACUUM PUMP" .

OK or NG

OK >> GO TO 9.
NG >> Replace vacuum pump assembly.

9. CHECK INTAKE AIR CONTROL VALVE ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump A to intake air control valve actuator (1).
3. Make sure that the intake air control valve actuator rod moves smoothly when applying vacuum of –53.3 kPa (–533 mbar, –400 mmHg, –15.75 inHg) and releasing it.



OK or NG

OK >> GO TO 10.
NG >> Replace intake air control valve actuator.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

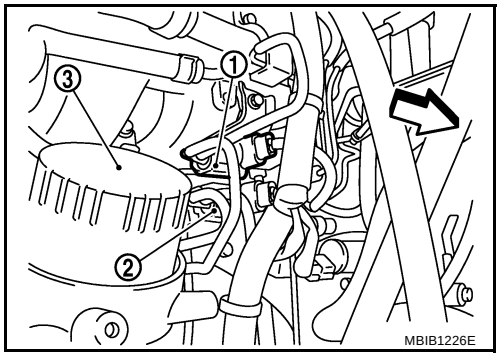
>> **INSPECTION END**

Component Inspection

GBS000CR

INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE

1. Disconnect intake air control valve control solenoid valve (1) harness connector.
   - ⇦: Vehicle front
   - Electronic controlled engine mount control solenoid valve (2)
   - Oil filter (3)
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.

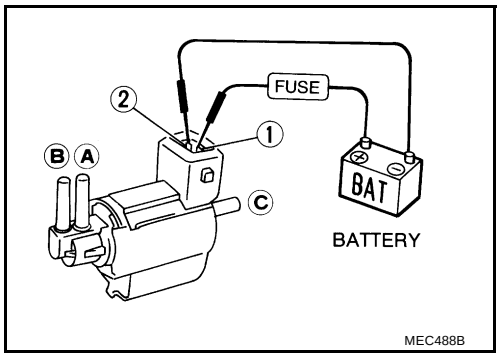


3. Check air passage continuity of intake air control valve control solenoid valve under the following conditions.

CONDITIONS	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

Operation takes less than 1 second.

If NG, replace intake air control valve control solenoid valve.



REFRIGERANT PRESSURE SENSOR

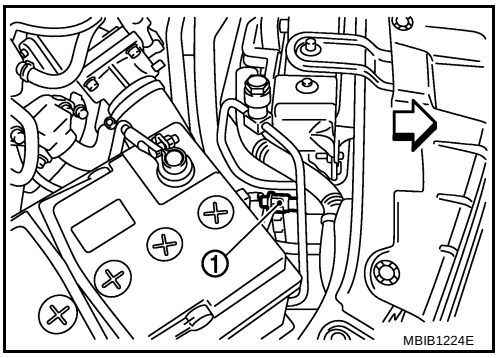
PFP:92136

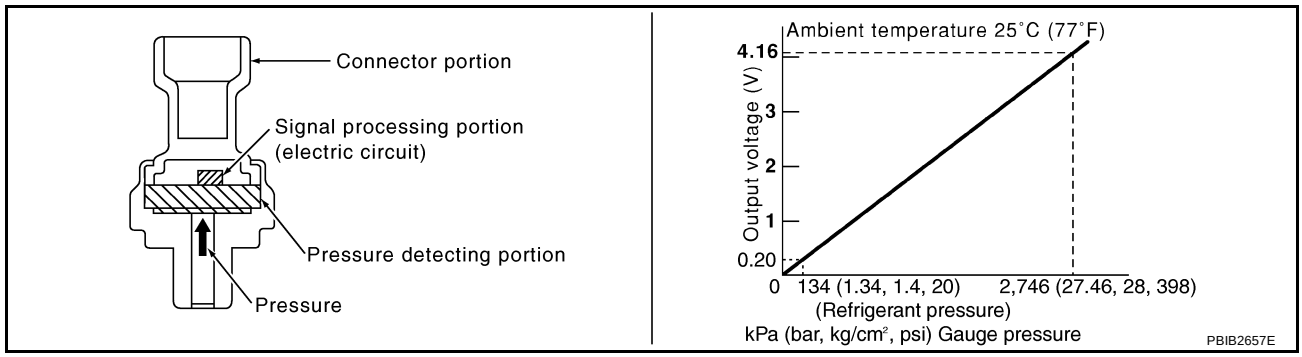
Component Description

GBS000CY

The refrigerant pressure sensor (1) is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

- ⇦: Vehicle front





ECM Terminals and Reference Value

GBS000CZ

Specification data are reference valves, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

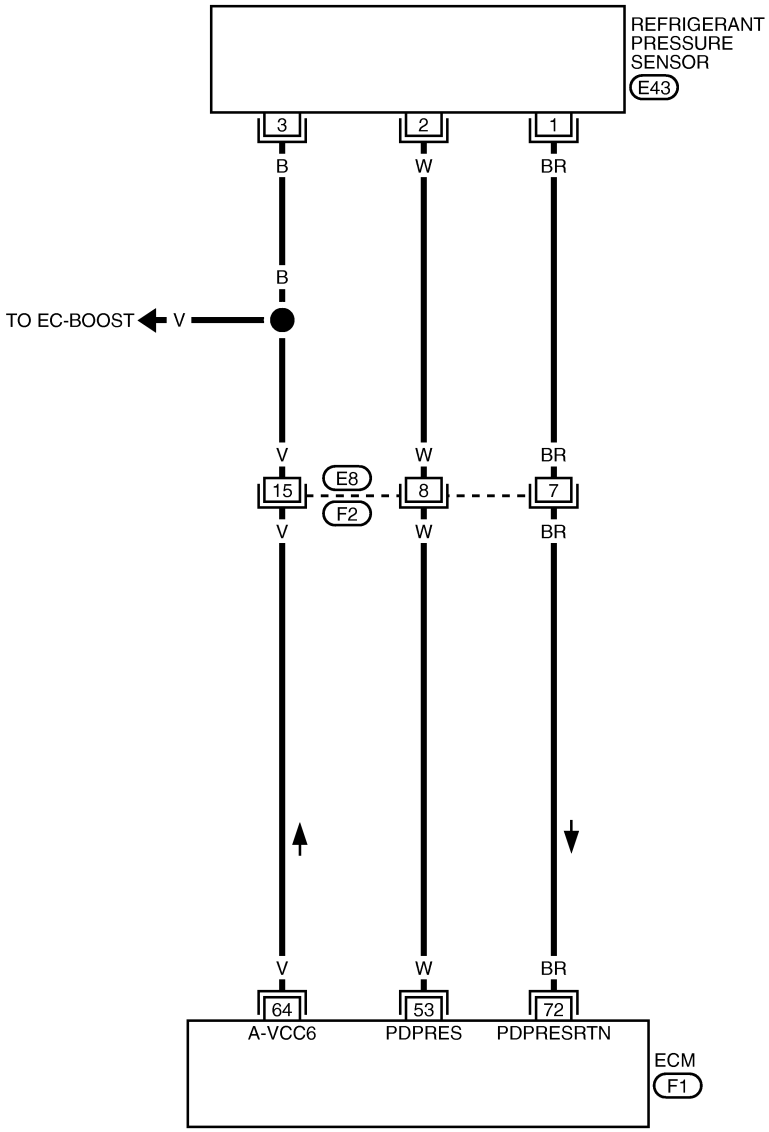
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	W	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
64	V	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
72	BR	Refrigerant pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

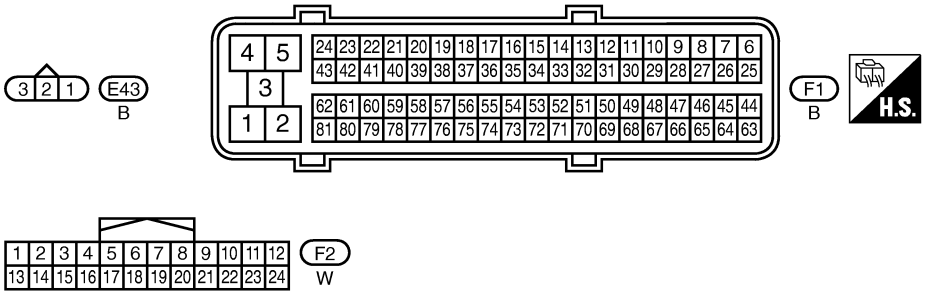
Wiring Diagram

GBS000D0

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





MBWA1064E

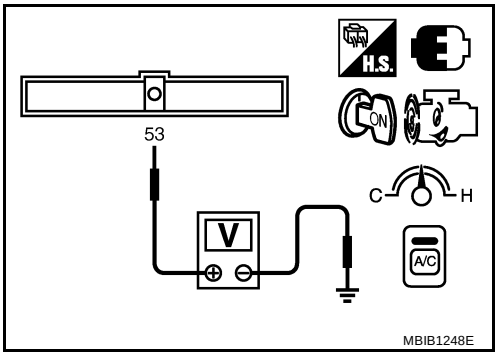
Diagnostic Procedure

GBS000D1

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 53 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

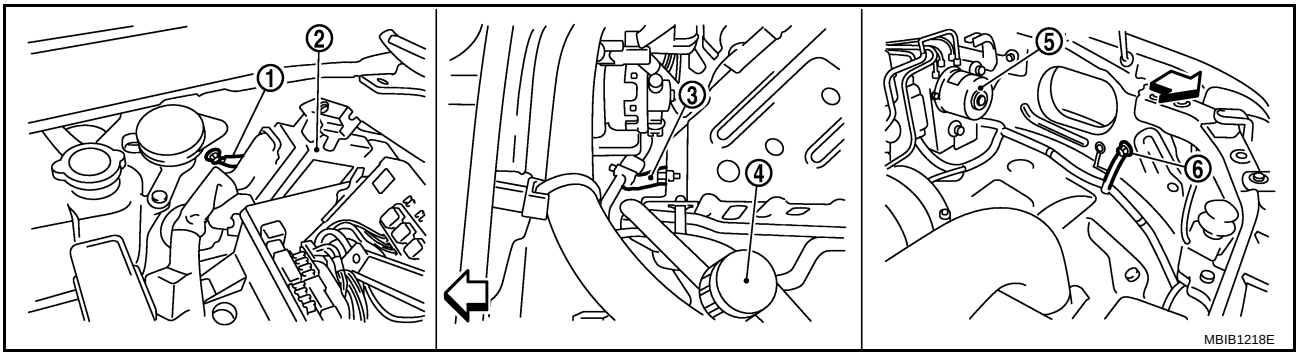


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to EC-1066, "Ground Inspection" .



⇦ : Vehicle front

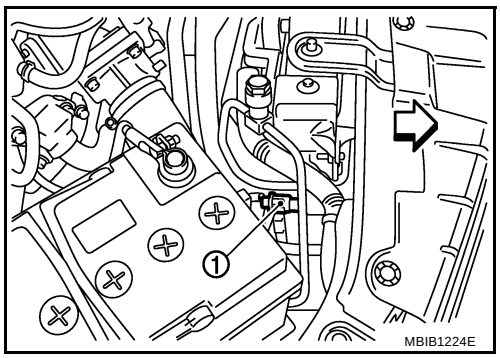
1.	Body ground E21	2.	ECM	3.	Body ground E41
4.	A/C high-pressure service valve	5.	ABS actuator and electric unit (control unit)	6.	Body ground E61

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

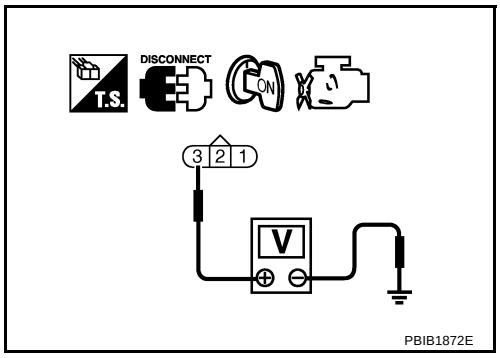
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor (1) harness connector.
– ⇦: Vehicle front
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 72. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 53 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

GBS000D2

REFRIGERANT PRESSURE SENSOR

Refer to MTC-121, "Removal and Installation for Refrigerant Pressure Sensor" .

BRAKE SWITCH

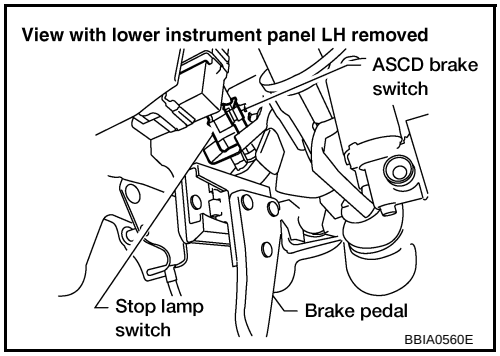
PFP:25230

Description

GBS000D3

STOP LAMP SWITCH

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.



ASCD BRAKE SWITCH (MODELS WITH ASCD)

When depress on the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

GBS000D4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	OFF
		● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	ON

ECM Terminals and Reference Value

GBS000D5

Specification data are reference values and are measured between each terminal and ground.

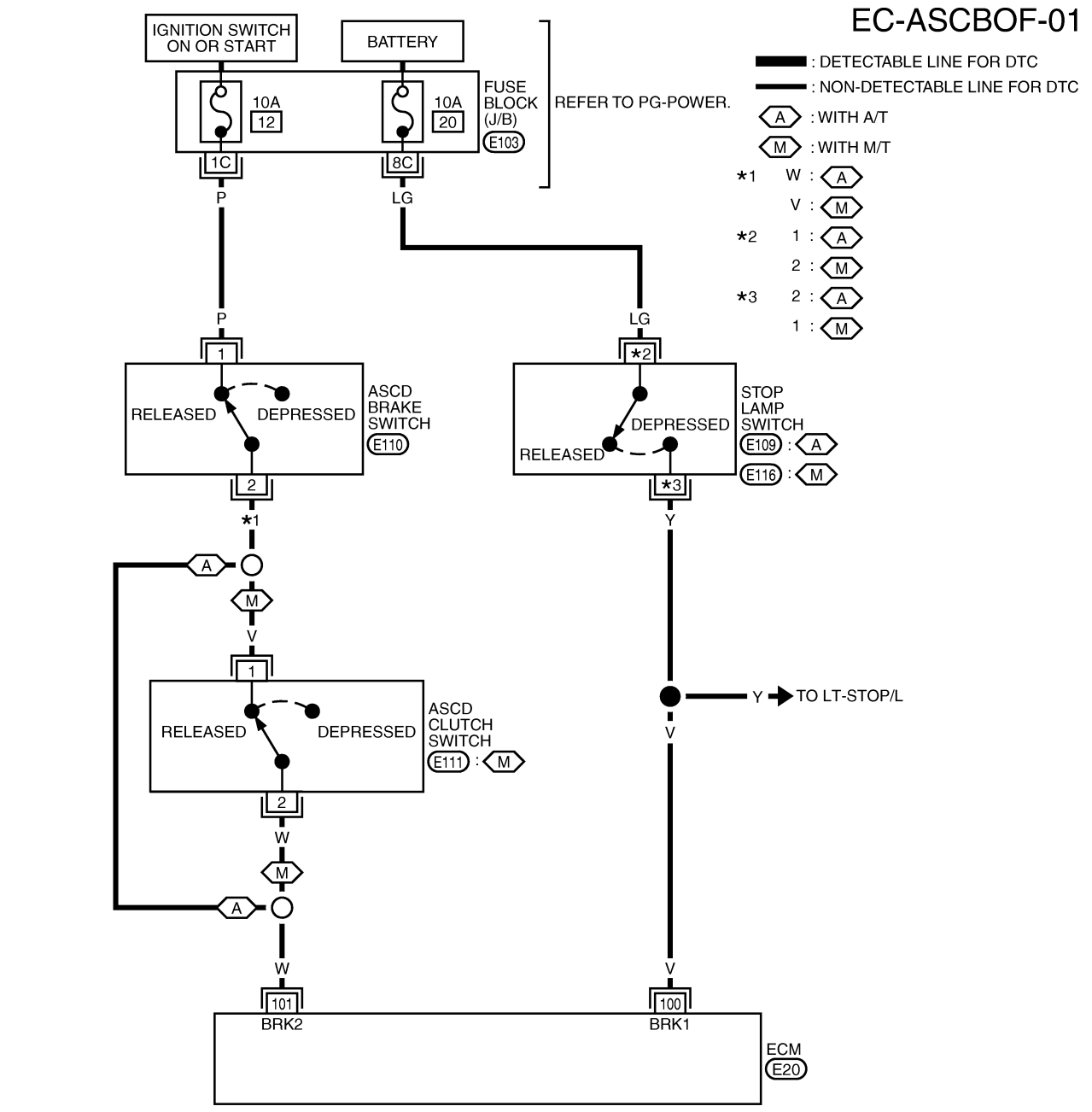
CAUTION:

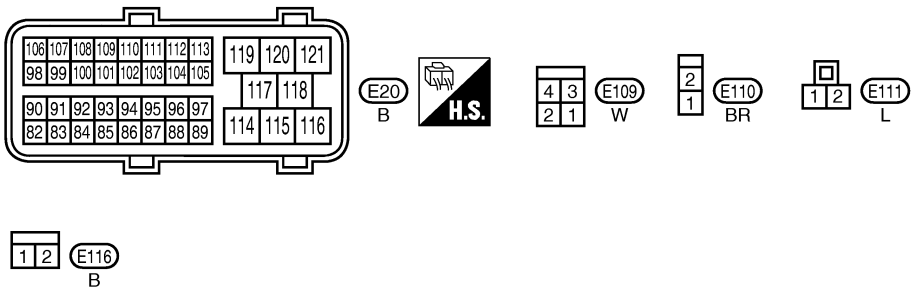
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
100	V	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	W	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal: Fully released (A/T) ● Clutch pedal and brake pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal: Slightly depressed (A/T) ● Clutch pedal and/or brake pedal: Slightly depressed (M/T)	Approximately 0V

Wiring Diagram

GBS000D6





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-
JUNCTION BOX (J/B)

MBWA1361E

Diagnostic Procedure

GBS000D7

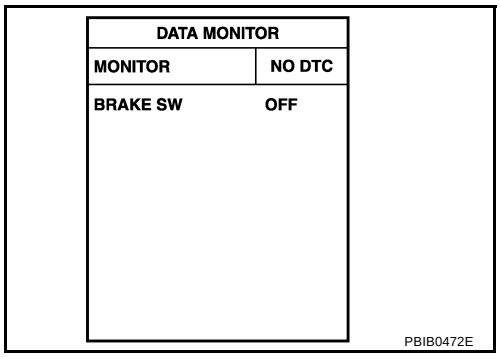
A/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

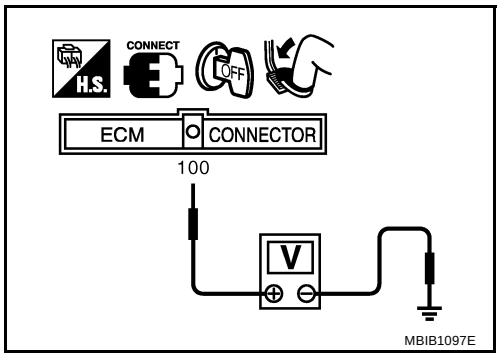
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

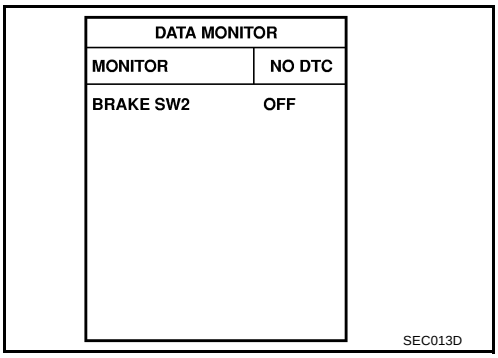
OK (Models with ASCD)>>GO TO 2.
OK (Models without ASCD)>>**INSPECTION END**
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

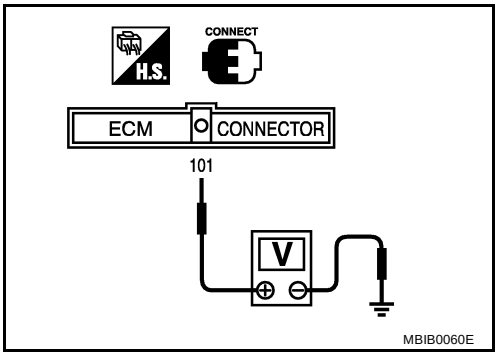
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0V

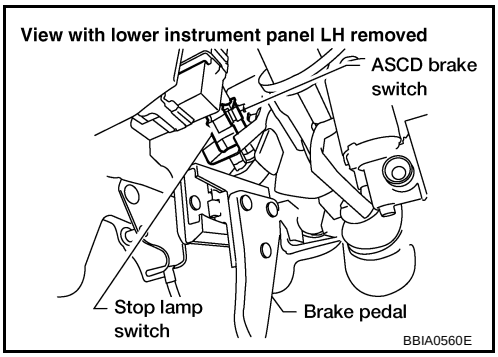


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

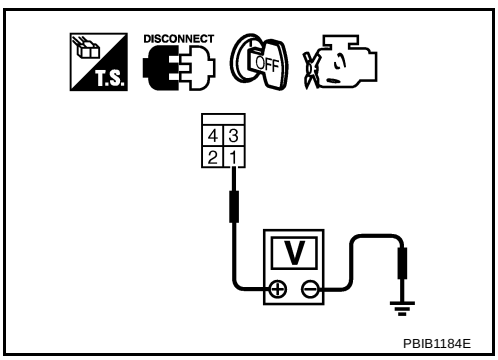
3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

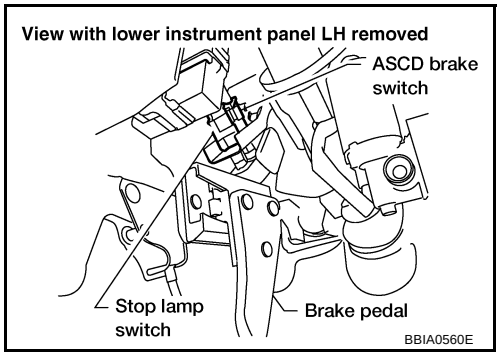
Refer to EC-1323, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

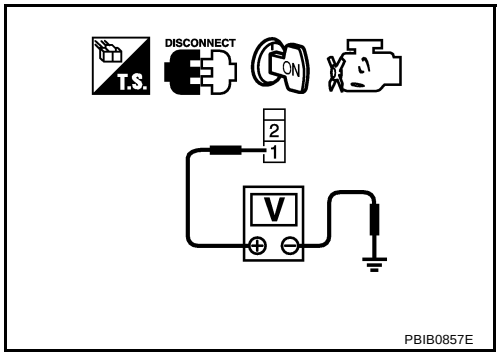
7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and ASCD brake lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

Refer to EC-1323, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

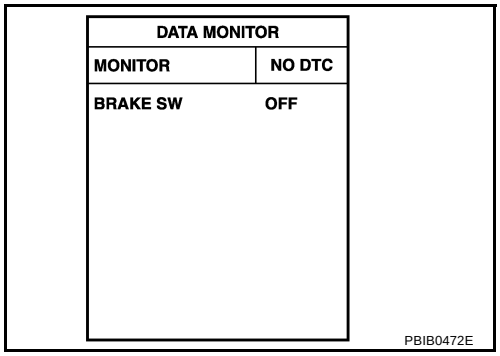
M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

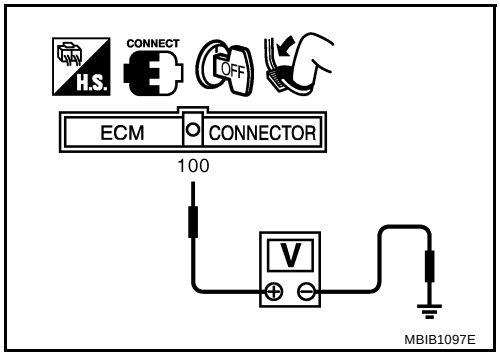
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

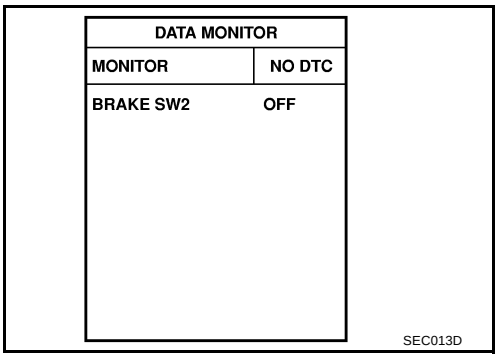
OK (Models with ASCD)>>GO TO 2.
OK (Models without ASCD)>>**INSPECTION END**
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

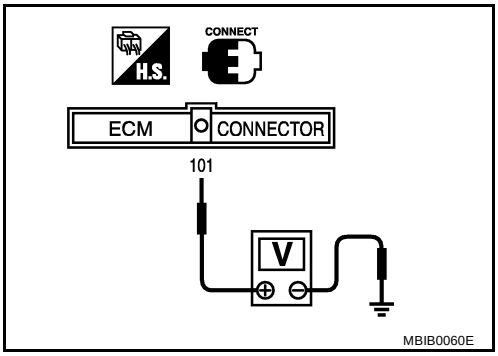
CONDITION	INDICATION
Clutch pedal and brake pedal: Fully released	OFF
Clutch pedal and/or brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and brake pedal: Fully released	Battery voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V

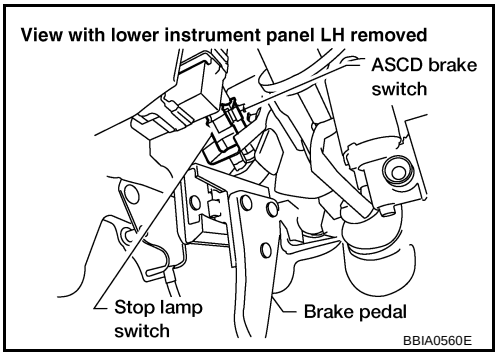


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

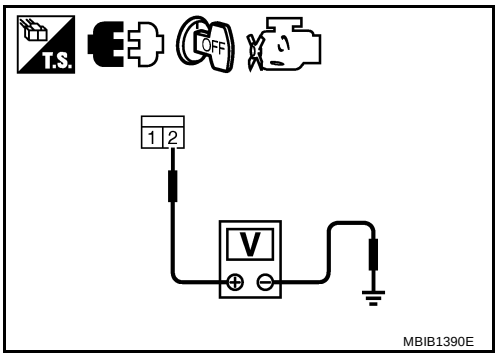
3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

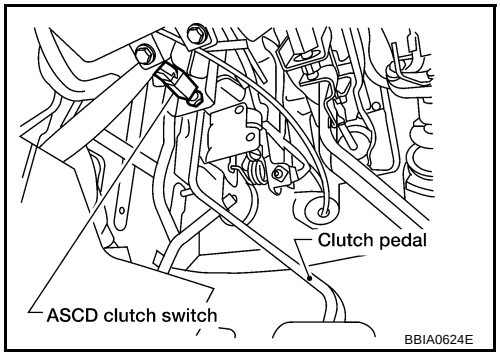
Refer to EC-1323, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

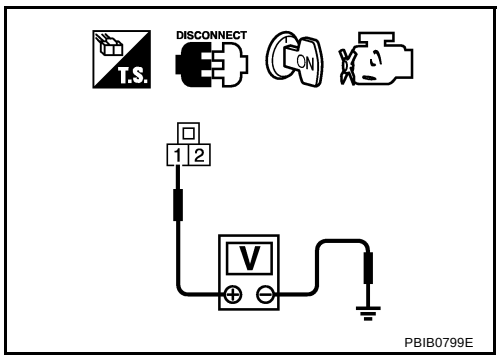
7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

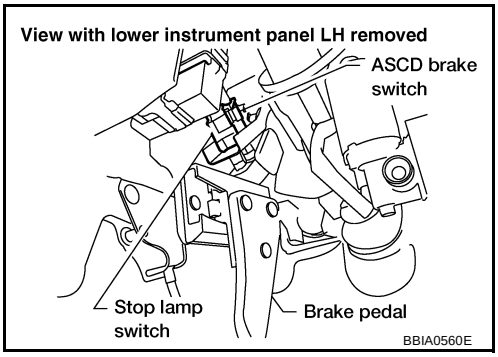


OK or NG

OK >> GO TO 12.
NG >> GO TO 8.

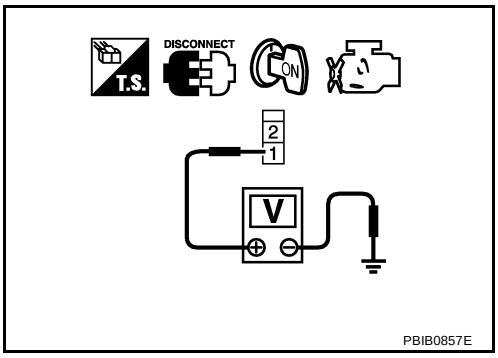
8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD brake clutch switch terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to EC-1323, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

12. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to EC-1323, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

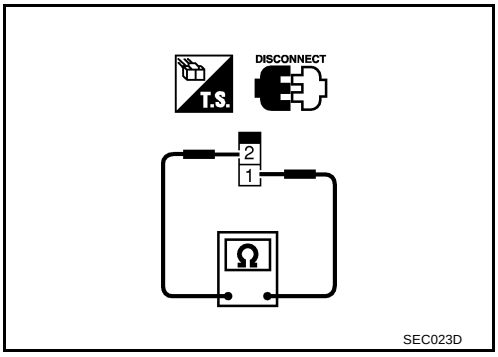
GBS000D8

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

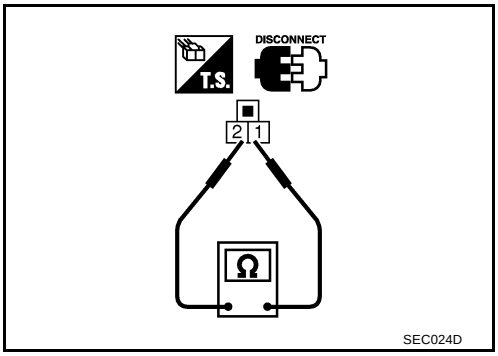


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

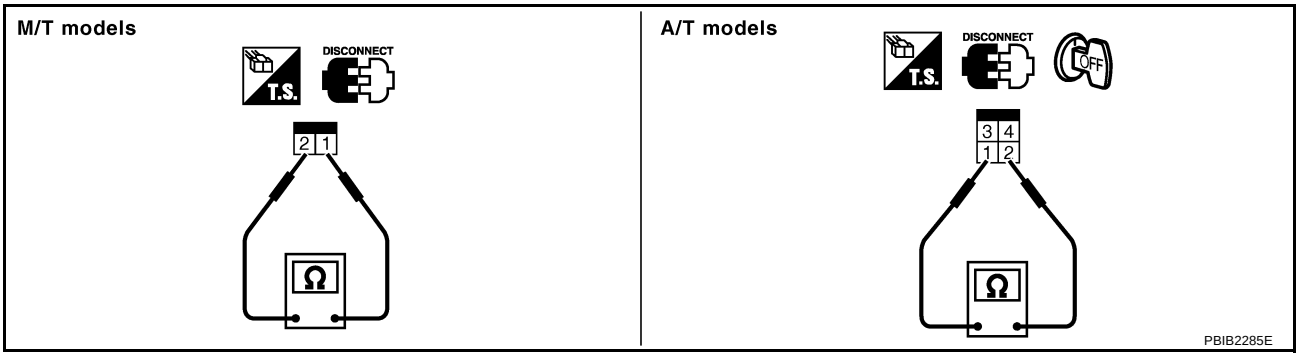
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH PEDAL" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

PNP SWITCH

PFP:32006

Description

GBS000D9

When the gear position is in P or N (A/T), Neutral (M/T), park/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

GBS000DA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

ECM Terminals and Reference Value

GBS000DB

Specification data are reference values and are measured between each terminal and ground.

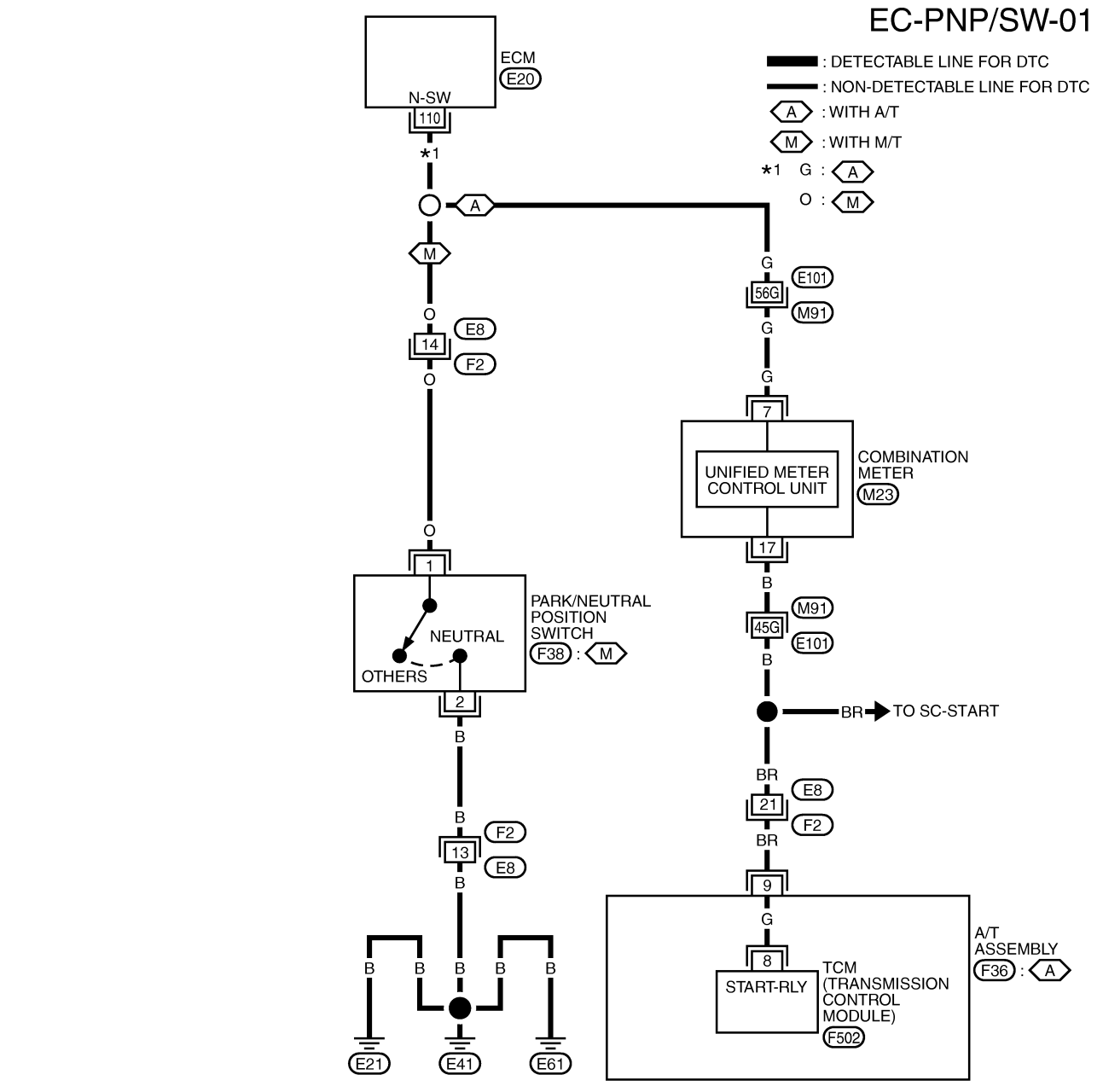
CAUTION:

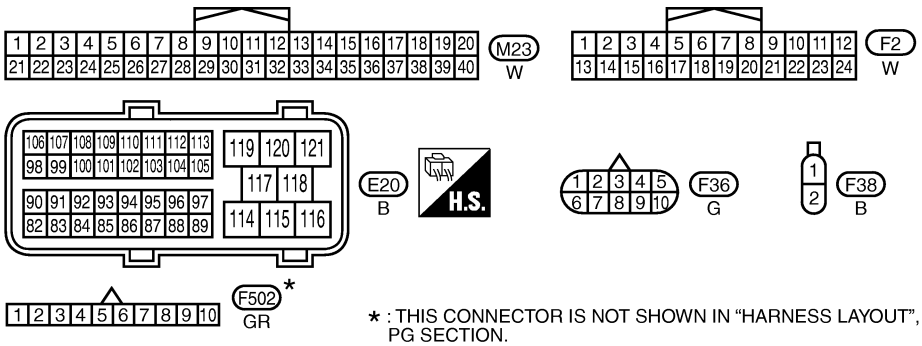
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G (A/T) O (M/T)	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch ON] ● Shift lever: Except above	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

GBS000DC





REFER TO THE FOLLOWING.
M91 -SUPER MULTIPLE JUNCTION (SMJ)

MBWA1060E

Diagnostic Procedure

GBS000DD

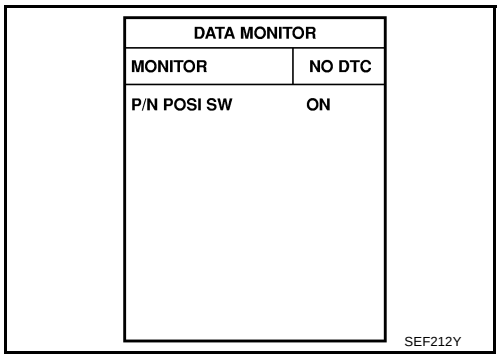
A/T MODELS

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

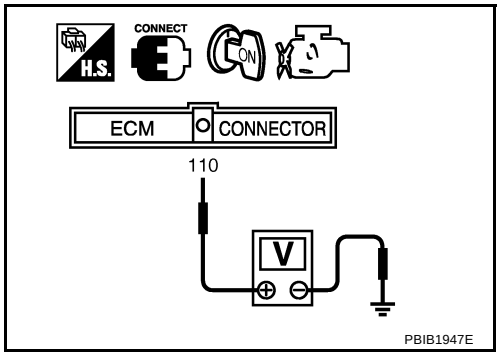
Shift lever position	P/N POSI SW
P or N	ON
Except above	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 110 and ground under the following conditions.

Shift lever position	Voltage
P or N	Approximately 0V
Except above	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-35, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between ECM terminal 110 and combination meter terminal 7. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E101, M91
- Harness for open or short between ECM and combination meter

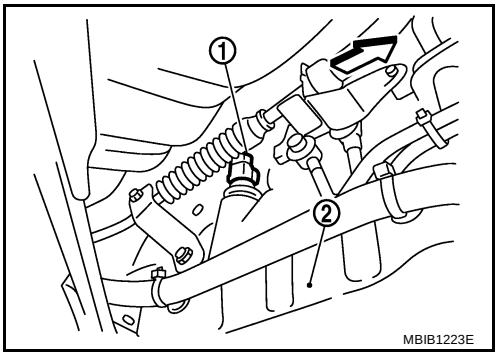
>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect A/T assembly harness connector (1).
   - Illustration shows the view from under the vehicle
   - ⇦ : Vehicle front
   - A/T oil pan (2)
2. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 17.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M91, E101
- Harness connectors E8, F2
- Harness for open or short between A/T assembly and combination meter.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8.
   Refer to AT-99, "DTC P0615 START SIGNAL CIRCUIT" .

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace.

9. REPLACE COMBINATION METER

Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

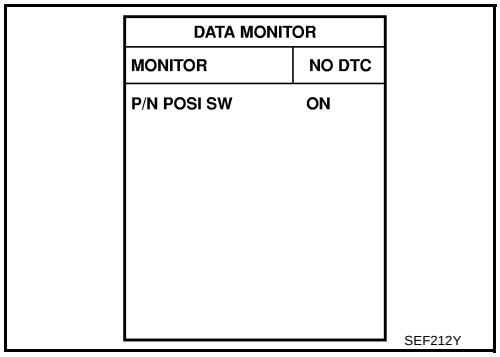
M/T MODELS

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

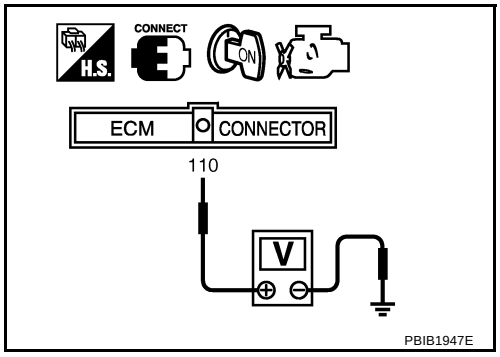
Shift lever position	P/N POSI SW
Neutral	ON
Except above	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 110 and ground under the following conditions.

Shift lever position	Voltage
Neutral	Approximately 0V
Except above	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

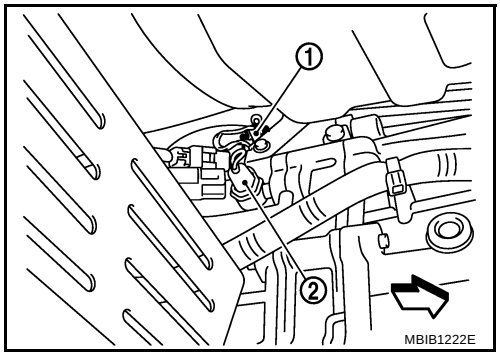
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch (1) harness connector.

– Illustration shows the view from under the vehicle
– ⇦ : Vehicle front
– Back-up lamp switch (2)

3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- 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.

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F2
- 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.

6. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to MT-12, "POSITION SWITCH" .

OK or NG

OK >> GO TO 7.
NG >> Replace park/neutral position switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

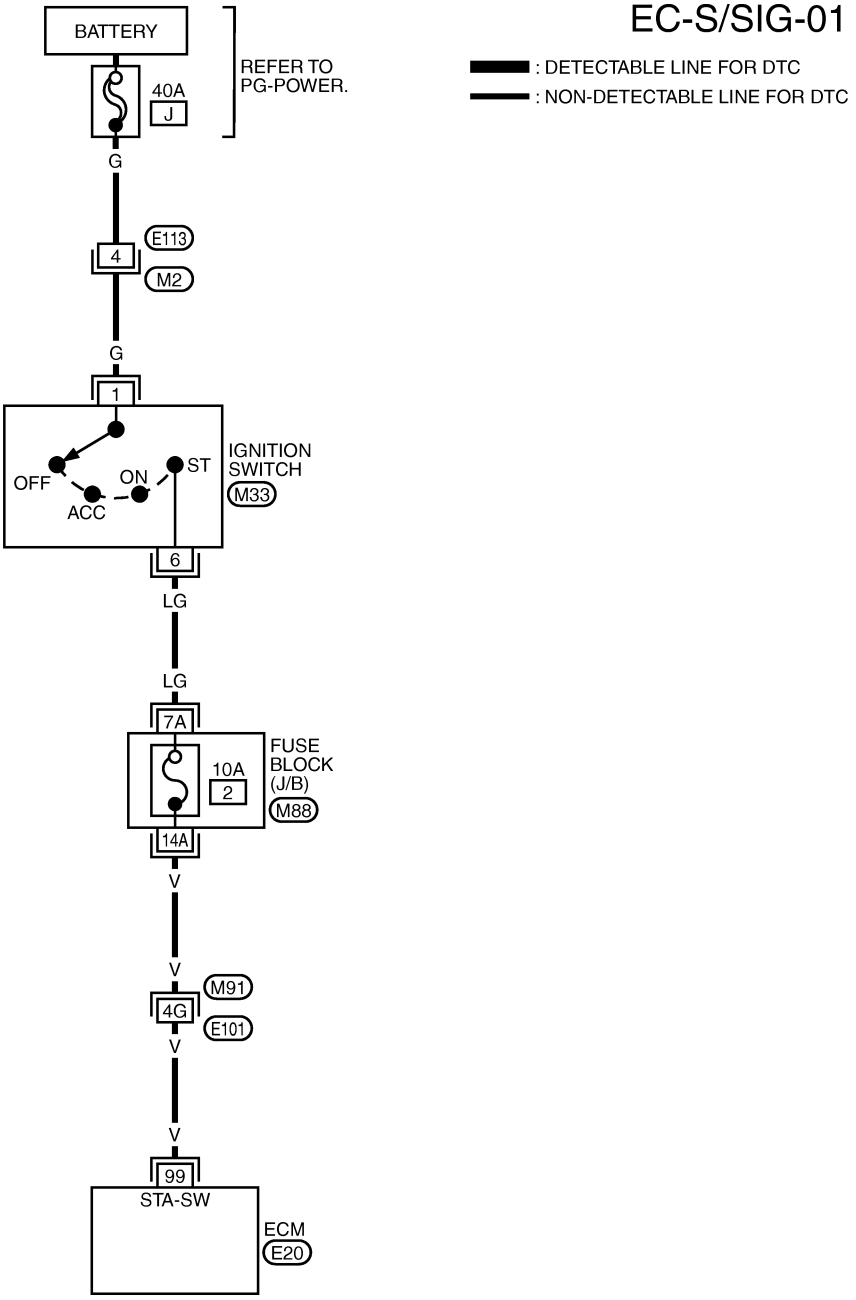
>> **INSPECTION END**

START SIGNAL

PFP:48750

Wiring Diagram

GBS000DE



MBWA1061E

Diagnostic Procedure

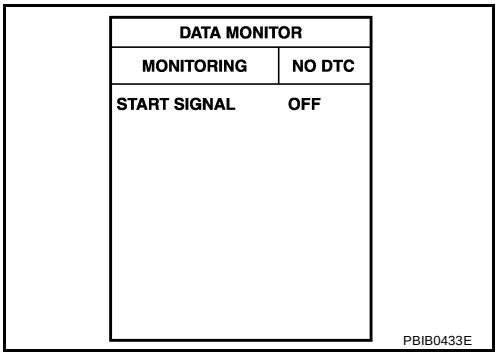
GBS000DF

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

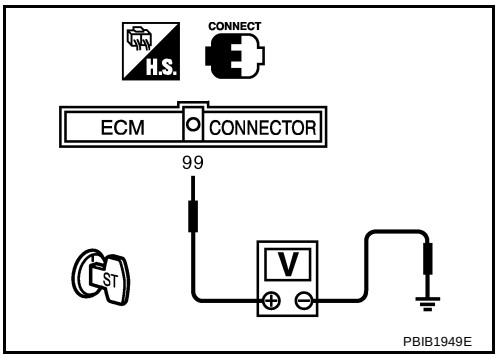
Condition	START SIGNAL
Ignition switch ON	OFF
Ignition switch START	ON



Without CONSULT-II

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Ignition switch ON	Approximately 0V
Ignition switch START	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch 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 >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M88
- Harness connectors M91, E101
- 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.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

ASCD INDICATOR

PFP:24814

Component Description

GBS000DG

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

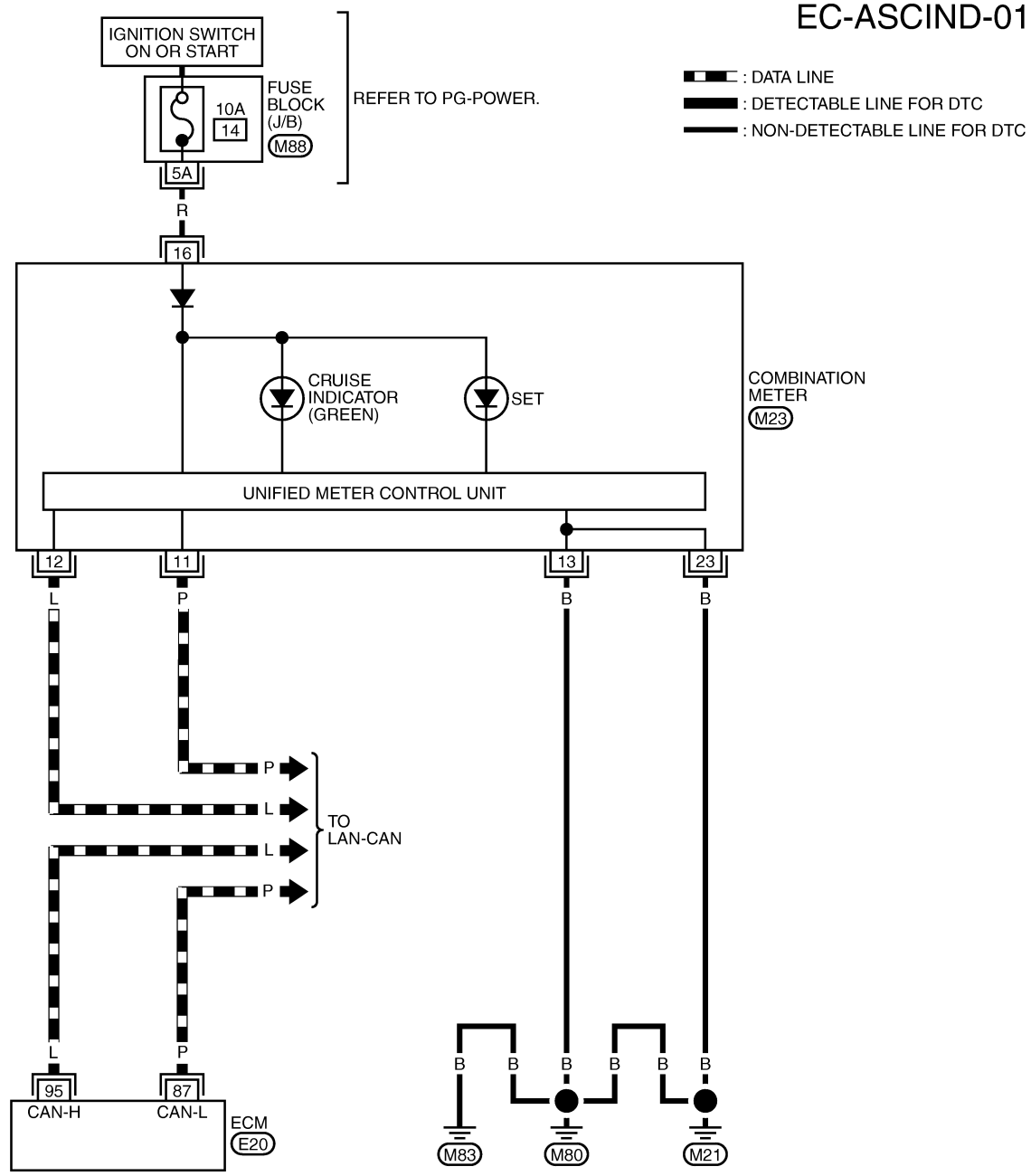
- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

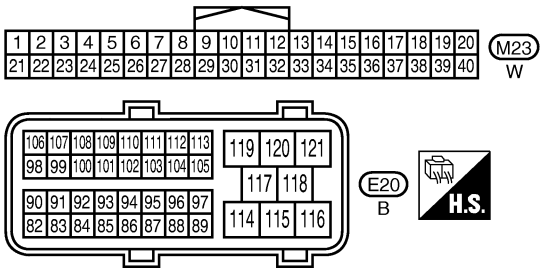
SET indicator remains lit during ASCD control.
Refer to EC-1337, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

Wiring Diagram

GBS000DH

EC-ASCIND-01





REFER TO THE FOLLOWING.
M88 -FUSE BLOCK-
JUNCTION BOX (J/B)

MBWA1330E

Diagnostic Procedure

GBS000DI

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: Pressed at the first time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 185 km/h (115 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 is not displayed.

OK or NG

OK >> Perform trouble diagnoses for DTC U1000. Refer to EC-1067, "DTC U1000 CAN COMMUNICATION LINE" .
NG >> GO TO 3.

3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

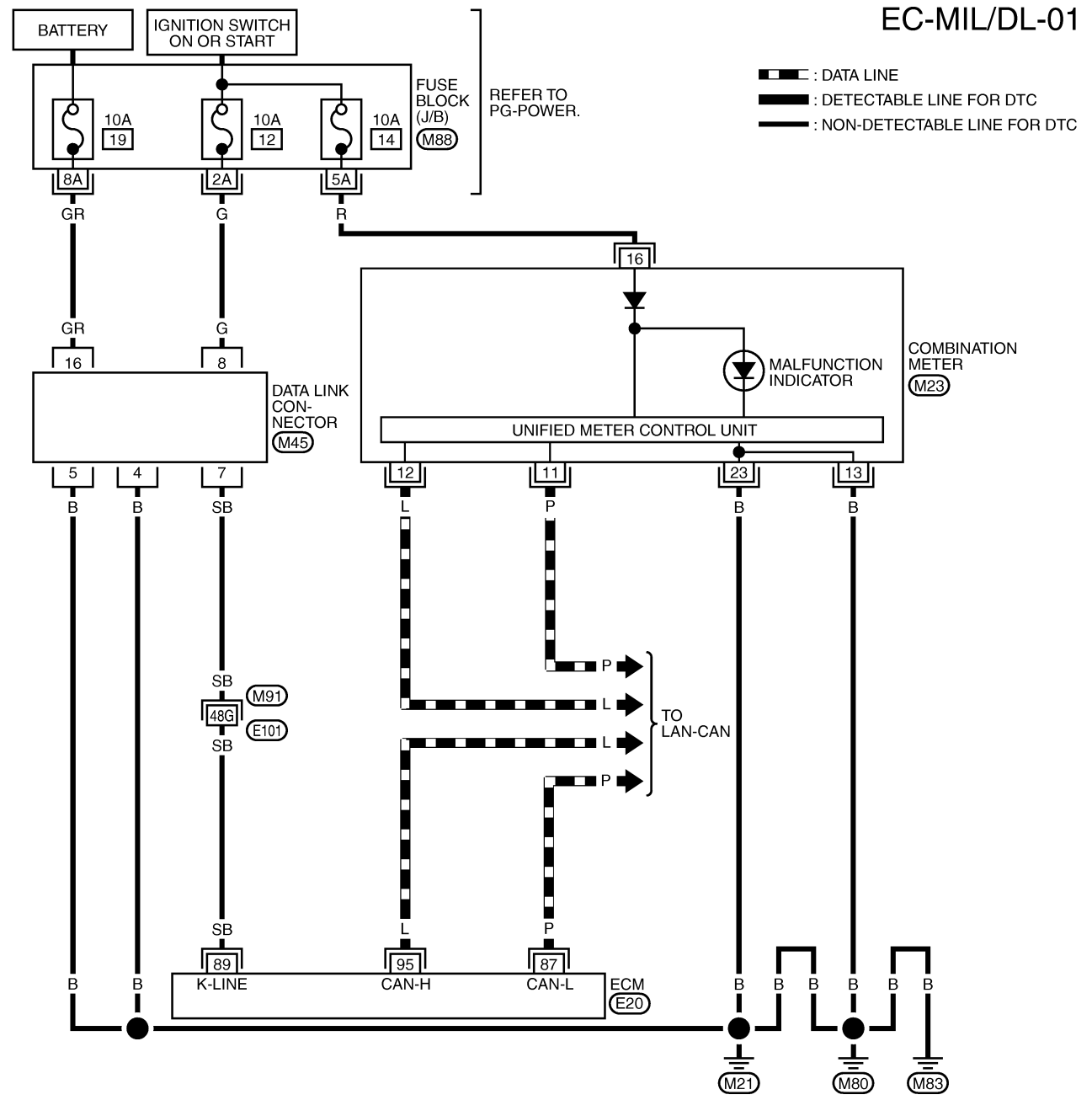
>> **INSPECTION END**

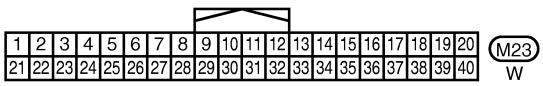
MIL AND DATA LINK CONNECTOR

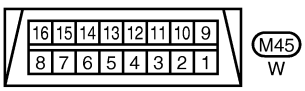
PFP:24814

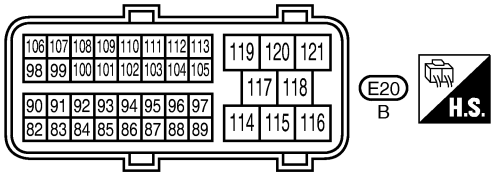
Wiring Diagram

GBS000DJ









REFER TO THE FOLLOWING.
M88 -FUSE BLOCK-JUNCTION BOX (J/B)
M91 -SUPER MULTIPLE JUNCTION (SMJ)

MBWA1364E

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

GBS000DK

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Fuel injector and Fuel pump
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch	Gear position		
Combination meter*	Vehicle speed		
TCM*	Powertrain revolution		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH).
ECM controls fuel injection value to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

SET OPERATION

Press ASCD MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH), press SET/COST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is depressed
- More than 2 switches at ASCD steering switch are depressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is depressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 185 km/h (115 MPH)

Component Description

GBS000DL

ASCD STEERING SWITCH

Refer to EC-1194 .

ASCD BRAKE SWITCH

Refer to EC-1177 and EC-1312 .

ASCD CLUTCH SWITCH

Refer to EC-1177 and EC-1312 .

STOP LAMP SWITCH

Refer to EC-1177 and EC-1312 .

ASCD INDICATOR

Refer to EC-1333 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

General Specifications

GBS000DM

Target idle speed	A/T	No load* (in P or N position)	750±25 rpm
	M/T	No load* (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	750 rpm or more
	M/T	In Neutral position	800 rpm or more
Maximum engine speed			4,900 rpm

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

GBS000DN

Supply voltage	Battery voltage (11 - 14V)
Ignition switch ON (Engine stopped.)	Approx. 0.4V
Idle (Engine is warmed up to normal operating temperature.)	1.3 - 1.7V *

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

GBS000DO

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200
80 (176)	0.283 - 0.359

Engine Coolant Temperature Sensor

GBS000DP

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Rail Pressure Sensor

GBS000DQ

Supply voltage	Approximately 5V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3V

Fuel Injector

GBS000DR

Resistance [at 10 - 60°C (50 - 140°F)]	0.2 - 0.8Ω

Glow Plug

GBS000DS

Resistance [at 25°C (77°F)]	Approximately 0.8Ω

EGR Volume Control Valve

GBS000DT

Resistance [at 25°C (77°F)]	13 - 17Ω

Crankshaft Position Sensor

GBS000DU

Refer to EC-1152, "Component Inspection" .

Camshaft Position Sensor

GBS000DV

Refer to EC-1163, "Component Inspection" .

Fuel Pump

GBS000DW

Resistance [at 10 - 60°C (50 - 140°F)]	1.5 - 3.0Ω